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MAI Journal is an open access journal that publishes multidisciplinary peer-reviewed articles around indigenous knowledge and development in the context of Aotearoa New Zealand. We aim to publish scholarly articles that substantively engage with intellectual indigenous scholarship. MAI Journal reflects developments in the vision and mission of Ngā Pae o te Māramatanga within the landscape of indigenous research in Aotearoa New Zealand.

The title and theme for our Special Issue

"Caring for Earth Mother: Indigenous-Led Pathways to Climate Adaptation"

Indigenous knowledge is critical in addressing the climate crisis. In this special issue on climate change, Indigenous scholars have identified pathways for world leaders and policymakers to incorporate Indigenous perspectives into climate decision-making, advocating for the preservation and sharing of traditional wisdom. They stress the importance of recognising Indigenous land rights, addressing the displacement of communities due to climate change, and ensuring equitable climate policies that empower Indigenous peoples.

Additionally, this special issue highlights the need for Indigenous-led climate action and support for enterprises that promote sustainable futures. It calls for increased collaboration between educational institutions and Indigenous communities to develop joint research initiatives and underscores the importance of funding for Indigenous-led climate solutions. The contributions of Indigenous elders and knowledge keepers are deemed invaluable in shaping effective climate strategies, reinforcing the urgency for collaborative partnerships that respect and elevate Indigenous voices in the fight against climate change.

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CLIMATE-INDUCED SEA-LEVEL RISE

Implications for archaeological taonga at Te Pokohiwi o Kupe | Wairau Bar, Aotearoa New Zealand

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Abstract

Te Pokohiwi o Kupe | Wairau Bar in the Marlborough region is where one of Aotearoa New Zealand's earliest archaeological heritage sites is located, dating back to the early 1300s. This article describes a baseline study to map the effects of present-day and future sea levels on archaeological heritage land at Te Pokohiwi o Kupe. Results suggest that approximately 20% of the heritage land is susceptible

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to a 100-year storm-wave inundation under present climate and sea-level conditions. With 1 m of sea-level rise likely to be reached between 2070 and 2130, approximately 75% of heritage land will be compromised by a 100-year storm inundation event. These results imply that heritage land at Te Pokohiwi o Kupe is already susceptible to inundation by significant storm waves, with potential erosion and loss of archaeological sites becoming more severe as the sea level continues to rise over time.

Keywords

climate change, coastal flooding, hazard risk, taonga, wāhi tapu, Wairau Bar

Introduction

Climate-induced sea-level rise (SLR) and extreme weather events over the next century are expected to increase flood frequency and intensity in coastal low-lying areas of Aotearoa New Zealand, increasing the exposure of assets and potential losses (Paulik, Wild, et al., 2023). Indeed, the accelerating pace of climate change has reshaped global environmental systems (Kulp & Strauss, 2019; Pettorelli et al., 2021), with SLR emerging as one of the most serious consequences (Kopp et al., 2014; Neumann et al., 2015; Vitousek et al., 2017). Driven by the melting of the polar ice caps, thermal expansion of seawater and altered oceanic patterns, sea levels have risen at an unprecedented rate over the past century, with many parts of the Pacific region experiencing rates higher than the global average (World Meteorological Organization, 2024). Coastal zones, which are already ecologically sensitive and densely populated, are amongst the most vulnerable to these changes (Trégarot et al., 2024).

Apart from the immediate threats of coastal erosion, infrastructure damage, resource pressures, human displacement and biodiversity loss, there is a less visible but equally significant impact: the loss of archaeological and cultural heritage (see, e.g., Jones et al., 2024). Archaeological sites capture up to millennia of human history and provide crucial records of past societies and their interactions with the environment (Rowland et al., 2024). Such sites hold significant cultural, spiritual and social significance for local communities. However, the accelerating threat from rising sea levels, coastal erosion and storm intensification places many of these sites at imminent risk of being submerged, damaged or entirely erased from the landscape. This in turn presents challenges pertaining to (a) the loss of irreplaceable evidence and knowledge about past civilisations and (b) the severing of the cultural connections modern societies maintain with their heritage.

This article assesses the effects of climate change–induced SLR on an archaeological heritage site in Aotearoa: Te Pokohiwi o Kupe | Wairau Bar—one of Aotearoa's earliest and most significant cultural heritage sites. We map the present and future scale of sea-level inundation at the site under a warming climate and assess the implications for archaeological site loss. Findings are discussed in the context of cultural preservation and the urgency for implementing interdisciplinary strategies that combine environmental science, archaeology and heritage management to mitigate the loss of these taonga before they are inundated by the rising tides.

Study objectives

The study reported here explored the implications of climate change–induced SLR inundation and likely areas of coastal erosion on Te Pokohiwi o Kupe (see Figure 1). Using available iwi-hapū geospatial information about archaeological taonga and wāhi tapu across the northwest portion of Te Pokohiwi o Kupe, along with high-resolution topographic data of the area, we analysed and mapped the exposure risk to these sites from permanent spring tide (PST) and coastal storm inundation at present sea level and future SLR.

Future SLR was linked with climate change scenarios consistent with the latest guidance from the Intergovernmental Panel on Climate Change (IPCC, 2021) to estimate the future timing of each SLR inundation scenario. The coastal erosion hazards analysis evaluated historical erosion rates using historical aerial and satellite imagery (1947–present). The analysis also estimated the future position of the shoreline associated with slow onset SLR.

The study represents the first high-resolution assessment of SLR and coastal change for the northwest portion of Te Pokohiwi o Kupe at a local scale. Previous national-scale studies of SLR for Aotearoa that encompassed Te Pokohiwi o Kupe (e.g., Paulik, Wild, et al., 2023) were developed for SLR risk-screening purposes and were thus output at a coarser resolution than what was required for the purposes of this study. While the focus of this

FIGURE 1 Te Pokohiwi o Kupe in northeast Te Waipounamu | South Island, showing the present heritage land boundary relative to topographic contours

present study was on developing first-order, high-resolution representations of SLR to inform the dialogue on potential adaptation/rescue options associated with wāhi tapu, the area is known to be at risk from tsunami inundation as evidenced by paleotsunami studies previously carried out in the area (e.g., Clark et al., 2015; King et al., 2017).

Rationale

The northwest portion of Te Pokohiwi o Kupe is one of Aotearoa's most significant historical sites and contains the remains of some of the earliest settlers to these lands (McFadgen & Adds, 2019; Meihana & Bradley, 2018). The site is exposed to multiple hazards, including earthquakes, which can cause subsidence; tsunamis; and extreme weather events such as storms and subsequent inundation. However, there are limited studies which evaluate the longer-term influence of climate change–induced SLR and its implications in the area. This project represents the first site-specific assessment of the potential impacts on and implications for Māori heritage and archaeology of climate change–induced SLR inundation and coastal erosion. It also provides a template for evaluating the impacts of SLR on similar taonga in coastal areas around Aotearoa.

Given the high possibility that a significant proportion of Māori heritage and archaeological resources relating to Māori occupation over the past millennium will erode away unrecorded, this work aims to support knowledge exchange and decision-making about what should be rescued, recorded, why and when. While it may not be possible to answer the question of how long we have with absolute certainty, outputs of this work are expected to help focus dialogue and inform decisions about adaptation and resilience options.

Coastal inundation mapping

Topography and digital elevation model

Te Pokohiwi o Kupe is located in the Wairau Lagoons Wetland Management Reserve and is characterised by an 8 km long gravel bar that is bound to the Vernon Hills in the southeast (Clark et al., 2015; King et al., 2017) (see Figure 1). The

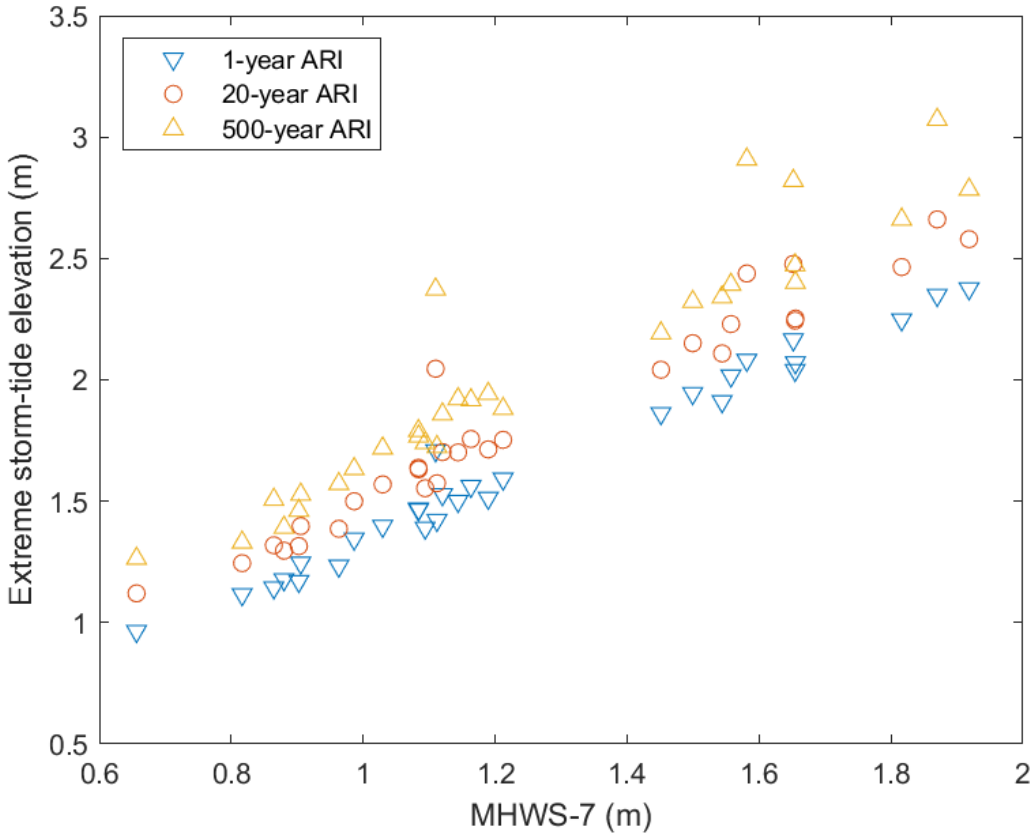

FIGURE 2 Linear relationships of stormtide and MHWS-7. Data points are from the tide and extreme value analysis of Stephens et al. (2020), which used individual tide gauge records from around Aotearoa.

FIGURE 3

1 km stretch on the northwest of the gravel bar where the heritage land is located is approximately 600 m in width, with the highest elevation approximately 4–5 m above mean sea level (MSL). Light detecting and ranging (LiDAR) topography data reveal that the heritage land is predominantly located in an area that is less than 3 m above MSL.

The availability of high-resolution LiDAR enables the development of an accurate digital elevation model (DEM) for use in simulating representative coastal inundation models in the area. A 1 m resolution DEM was created by averaging the 2014 Blenheim LiDAR point cloud (LINZ, 2018). Only points classified as "ground" were used for the DEM generation. The 1 m gridding was calculated by averaging all the point values located within 1.4142 m of each cell centre. The datum—the reference surface that defines a zero point for measuring elevations and depths—used was the New Zealand Vertical Datum 2016 (NZVD2016) (EPSG: 7839),* the same as the original dataset. Bathymetry data for the ocean and estuary were not included in the DEM. Bathymetry data are required for dynamic inundation modelling but not necessary for the static inundation modelling of this study.

Tide, datum and extreme storm tide

Analysis of coastal inundation requires an assessment of the mean high-water spring (MHWS) tidal level. For this study, MHWS was calculated as the 10th highest percentile of 18 years of astronomical high tide as predicted by the New Zealand tidal model (Goring, 2001), which is sometimes referred to as MHWS-10. The value for MHWS-10 was calculated as 0.74 m above MSL.

* EPSG stands for European Petroleum Survey Group, a scientific organisation that maintains a geodetic parameter database with standard codes. An EPSG code is a unique identifier used to represent coordinate systems and other geodetic properties like datums, spheroids and units.

Using the same methodology, the 7th highest percentile of high tides (MHWS-7) was calculated as 0.77 m above MSL. This value is useful in determining extreme storm-tide levels. Using tide gauge data for around Aotearoa, Stephens et al. (2020) found linear relationships between MHWS-7 and extreme storm-tide level for given return intervals (see Figure 2). Using these relationships, the 100-year average recurrence interval (ARI) can be calculated. The 100-year ARI represents the storm-tide conditions that are, on average, exceeded once in a 100-year period. This does not however, mean that the average period between such events is 100 years, and there is a low probability of observing such events multiple times in a given year. For Te Pokohiwi o Kupe, the 100-year ARI storm tide was calculated as 1.30 m MSL.

Wave contribution to inundation was simplified as a single value of 0.5 m of wave setup. This is an over-simplification of wave contribution to inundation, but it can provide a first-order assessment of inundation.

Converting MSL values to NZVD2016 is not trivial in the Blenheim region because of ongoing post-seismic land movement following the 2016 Kaikōura earthquake. However, Stephens and Paulik (2023) recently published an update of the relationship between MSL and NZVD2016 for New Zealand's main seaports. They report a datum shift of –0.12 to –0.13 m for the closest ports to Blenheim (i.e., Wellington and Picton).

Inundation modelling

Inundation extent and depth were calculated using a static inundation assessment, which is also referred to as a bathtub assessment. The storm-tide and wave setup level are intersected with the DEM to derive inundated surfaces. All the values of inundation level above ground are considered wet, regardless of their connectivity to the ocean or estuary. While this is a conservative estimate, it provides insight into the potential for inundation by shallow ground water that is uplifted by storm tide or spring tides.

Timing of sea-level rise scenarios

The modelled SLR scenarios were then correlated with the corresponding SLR projections for Aotearoa consistently with the Shared Socioeconomic Pathways (SSPs) as defined in the

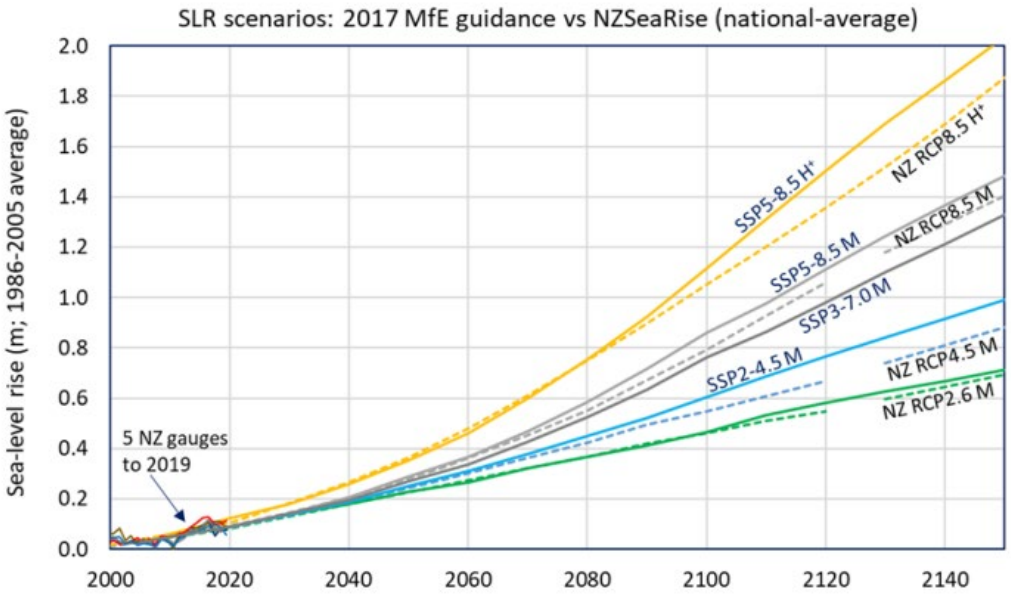

FIGURE 3 Comparison of SLR predictions for Aotearoa from the 2017 Ministry for the Environment guidance (dash lines) and the 2022 update (plain lines) (Ministry for the Environment, 2022).

RCP = Representative Concentration Pathway. RCPs are a range of scenarios used in climate change modelling that represent different levels of radiative forcing (the amount of energy imbalance caused by greenhouse gases) expected by the year 2100, ranging from 2.6 Watts/m^2 (strong mitigation) to 8.5 Watts/m^2 (high-emissions scenario) (see IPPC, 2014).
H+ = higher extreme scenario.

TABLE 1 Approximate years when various national sea-level rise increments could be reached

SLR	Year achieved for SSP1-2.6 (median)	Year achieved for SSP2-4.5 (median)	Year achieved for SSP3-7.0 (median)	Year achieved for SSP5-8.5 (median)	Year achieved for SSP5-8.5 H+ (83rd percentile)
0.3	2070	2060	2060	2055	2050
0.4	2090	2080	2070	2065	2060
0.5	2110	2090	2080	2075	2065
0.6	2130	2100	2090	2080	2070
0.7	2150	2115	2100	2090	2080
0.8	2180	2130	2110	2100	2085
0.9	2200	2140	2115	2105	2090
1.0	>2200	2155	2125	2115	2095
1.2	>2200	2185	2140	2130	2105
1.4	>2200	>2200	2160	2145	2115
1.6	>2200	>2200	2175	2160	2130
1.8	>2200	>2200	2200	2180	2140
2.0	>2200	>2200	>2200	2195	2150

Source: Ministry for the Environment (2022).

IPCC Sixth Assessment Report (2021). The SSPs are five climate change scenarios of projected socioeconomic global changes up to 2100. This allowed us to estimate the future timing at which each modelled SLR scenario is likely to be reached (see Figure 3 and Table 1).

Heritage land exposure mapping

The heritage area on the northwest portion of Te Pokohiwi o Kupe delineated by Te Rūnanga a Rangitāne o Wairau was digitised in QGIS* to produce a geospatial polygon representing the heritage land boundary. The polygon was then rasterised and gridded at the resolution of the baseline DEM (i.e., 1 m grid) using QGIS geoprocessing tools, with each grid representing a land area of 1 m^2.

This provided the exposure layer, which was then combined with each SLR scenario inundation model in the RiskScape multi-hazard impacts and loss modelling software (Paulik, Horspool, et al., 2023) to output metrics of total heritage land area (m^2) likely to be affected by inundation in each modelled scenario. That is, gridded cells from the heritage area polygon which intersected with a wet grid cell from each inundation model were output as being affected/exposed to inundation. A schema depicting the exposure modelling workflow is shown in Figure 4.

Results

Permanent spring tide inundation and heritage land exposure

The results shown in Figures 5 and 6 indicate that PST inundation with 0.5 m of SLR begins to affect approximately 16% of the heritage area by 2045–2060. With 1 m SLR, approximately 53% of the heritage area becomes affected between 2070 and 2130. By that time, the through to the east of the heritage site will be flooded by MHWS tides.

100-year storm inundation and heritage land exposure

Figures 7 and 8 show that a 100-year ARI storm inundation under present sea levels is likely to inundate approximately 20% of the heritage land area. With 1 m SLR, the 100-year storm

* QGIS is a geographic information system (GIS) software that is free and open-source (QGIS Development Team, 2024).

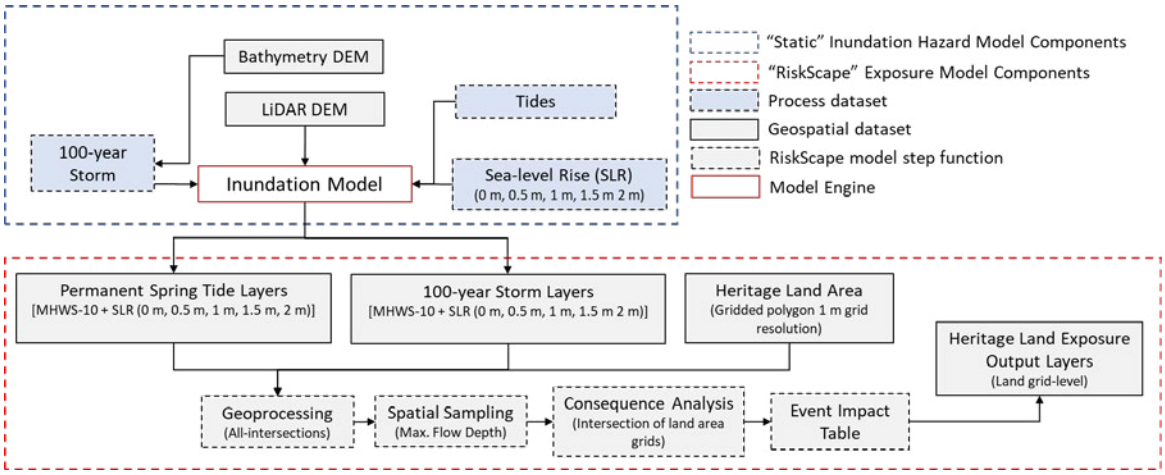

FIGURE 4 Schema of the RiskScape exposure risk workflow used to calculate the heritage land area exposure to each SLR scenario

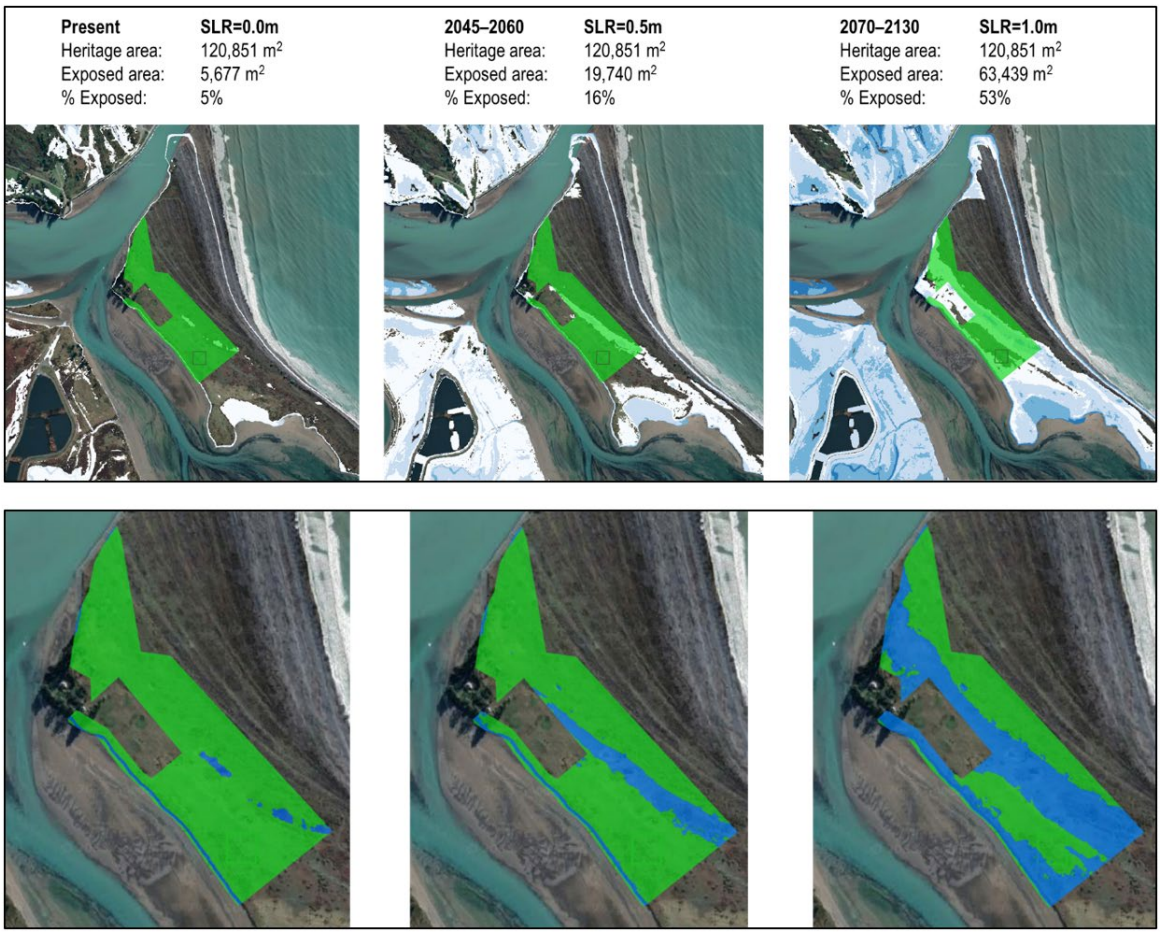

FIGURE 5 Results of heritage land area exposed to each PST inundation scenario under present and future SLR. Top panels: PST inundation of the northwest portion of Te Pokohiwi o Kupe under present sea level (left); 0.5 m of SLR (middle); and 1.0 m of SLR (right). Bottom panels: PST inundation exposure (blue shading) of Te Pokohiwi o Kupe heritage land under present sea level (left); 0.5 m of SLR (middle); and 1.0 m of SLR (right). Green shading depicts areas not inundated.

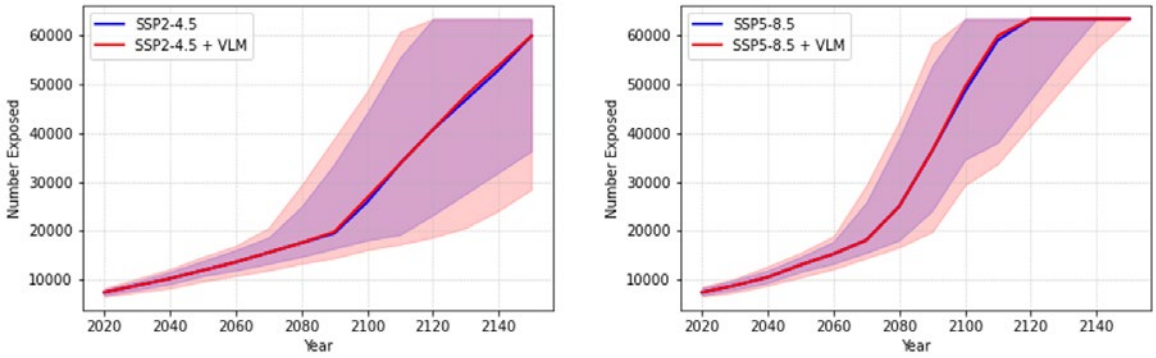

FIGURE 6 Estimated heritage land exposure (m^2) due to SLR under a warming climate for PST inundation under SSP 2-4.5 (left) and SSP 5-8.5 (right)

Note: VLM = vertical land movement (estimated for Aotearoa; see Naish et al., 2024).

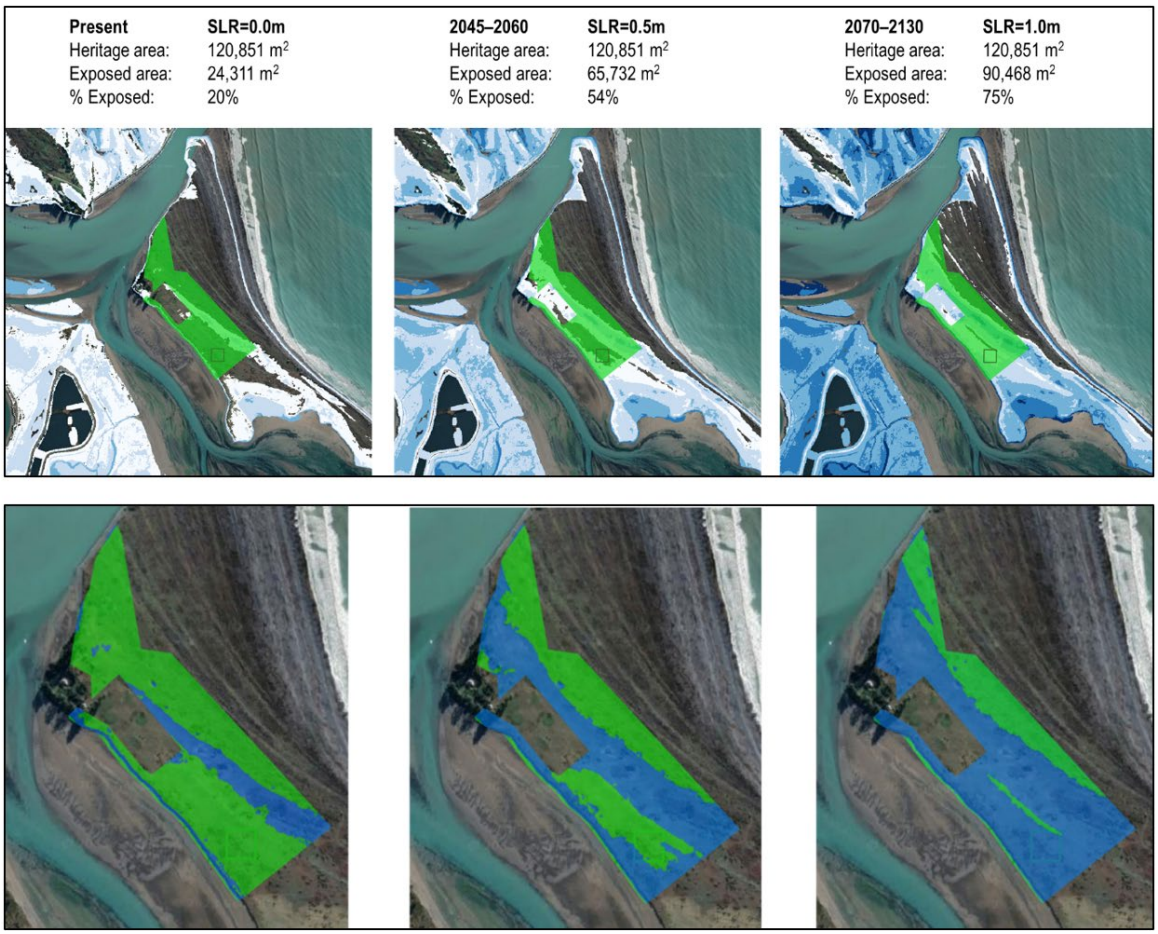

FIGURE 7 Results of heritage land area exposed to each 100-year storm inundation scenario under present and future SLR. Top panels: 100-year storm inundation of the northwest portion of Te Pokohiwi o Kupe under present sea level (left); 0.5 m of SLR (middle); and 1.0 m of SLR (right). Bottom panels: 100-year storm inundation exposure (blue shading) of Te Pokohiwi o Kupe heritage land under present sea level (left); 0.5 m of SLR (middle); and 1.0 m of SLR (right). Green shading depicts areas not inundated.

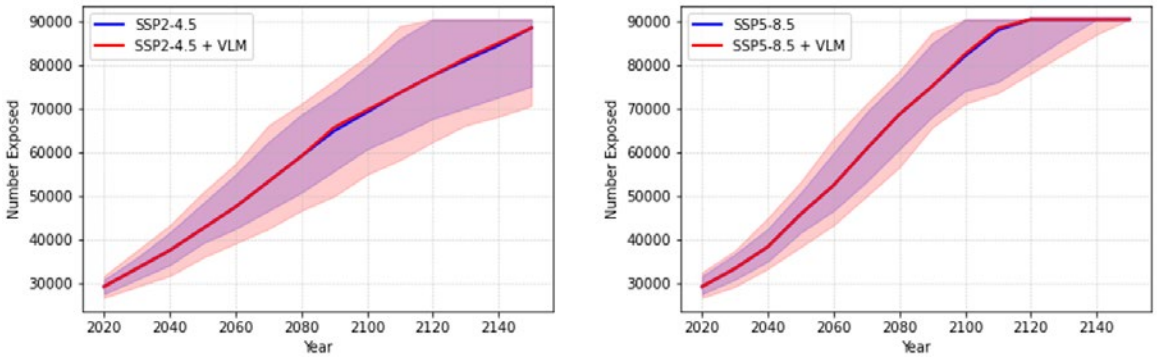

FIGURE 8 Estimated heritage land exposure (m^2) due to SLR under a warming climate for PST plus 100-year ARI extreme sea-level inundation under SSP 2-4.5 (left) and SSP 5-8.5 (right).

inundation affects approximately 75% of the total heritage area between 2070 and 2130.

Discussion

The findings of this study suggest that approximately 20% of the heritage land is susceptible to a 100-year storm wave inundation under present climate and sea-level conditions. Approximately 54% of heritage land becomes affected by a 100-year storm inundation event with a 0.5 m increase in sea level, which is likely to be reached between the years 2045 and 2060 (the next 22–37 years). With 1 m of SLR likely to be reached between the decades 2070–2130 (next 47–107 years), approximately 75% of heritage land then becomes compromised by a 100-year storm inundation event.

With regard to PST inundation, heritage land gradually becomes more inundated, with approximately 16% affected once the sea level reaches 0.5 m above present levels in the next 22–37 years. When the sea level reaches 1 m above present levels—between 2070 and 2130—approximately 53% of heritage land becomes affected.

These results imply that heritage land on the northwest portion of Te Pokohiwi o Kupe is already susceptible to inundation by significant storm waves and that these effects will become more prominent as sea level continues to rise over time. In addition, close to a fifth of the total heritage area is susceptible to PST inundation alone in the next 22–37 years, with more than half susceptible by as early as the next 50 years.

Future work to complement the baseline assessment presented here will include a coastal geomorphological change analysis under a warming climate to evaluate the potential effects of coupled inundation and erosion. This would encompass incorporating the potential effects of co-seismic land movement due to the possibility of large earthquakes, which are known to induce significant subsidence and associated erosion in the area (e.g., the 1848 and 1855 earthquakes) (McFadgen & Adds, 2019), and how these processes potentially exacerbate the heritage land exposure estimates made by this study.

Implications

The first-order estimates of heritage land exposure presented above and the potential loss of archaeological taonga at Te Pokohiwi o Kupe highlight the urgency of identifying adaptation and implementation options to preserve and/or rescue wāhi tapu and taonga within the heritage area. Key questions that emerge from the evidence presented in this study include, but are not limited to:

- What level of risk is acceptable, and what level of urgency is needed for preserving wāhi tapu at the site? Are decisions and actions required now or in several years to preserve and/or relocate wāhi tapu at threat of inundation? If relocation is an option, are there protocols to support and safeguard the rescue and relocation of wāhi tapu taonga, such as karakia for exhuming ancestral remains, etc.? Is there an acceptable location identified for relocating wāhi tapu remains, if relocation is an option?
- What options are available and what needs to happen to implement potential rescue activities? Who needs to be involved, and whose endorsement and/or permission is required? What implementation logistics are required?
- What resources are available to implement adaptation and/or rescue works? What are

the main financial costs and available budget sources at local, regional and national scales?

These questions are not intended to be prescriptive, but rather to help provide guidance to support ongoing dialogue on potential next steps in relation to adaptation and rescue/relocation of archaeological taonga at the site. More importantly, the findings of this study highlight the importance of undertaking similar local-scale, site-specific analyses of SLR implications on archaeological taonga in other parts of Aotearoa and in coastal environments across the Pacific region.

Limitations

The SLR inundation models developed for this study are representative of LiDAR topography captured in 2014 and do not account for dynamic changes in the geomorphology (size/shape and composition) of the gravel bar, including potential subsidence at future points/periods in time corresponding to the SLR scenarios presented. In addition, the compounding effects of SLR plus fluvial flooding from the Wairau River on inundation at Te Pokohiwi o Kupe were not considered in this analysis. Similarly, the compounding effects of other extreme events such as tsunami inundation and how exposure risk changes over time under a warming climate (e.g., Welsh et al., 2023) have not been considered in this study.

The estimated future timing of the SLR scenarios presented here are based on climate change scenarios that are consistent with the IPCC Sixth Assessment Report (2021), providing first-order representations of likely scenario inundation under a changing climate at a localised scale. These representations can be used to inform dialogue on adaptation options associated with wāhi tapu in the area, as well as directions for future investigations.

Climate change and SLR may affect Te Pokohiwi o Kupe in ways that have not been analysed here. For example, SLR will also raise the level of groundwater and its salinity, exposing assets that are not currently affected by groundwater or saltwater intrusion (Bosserelle et al., 2022). The challenges outlined above will need to be addressed in follow-up studies at Te Pokohiwi o Kupe in order to build on the baselines presented here.

Acknowledgements

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Glossary

hapū	sub-tribe
iwi	tribe
kaitiaki	guardians
karakia	traditional prayers
taonga	Māori assets of cultural and/or historical significance; treasured belongings
wāhi tapu	sacred sites

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KIA WHAKAKOROWAI I A PAPATŪĀNUKU

An Indigenous conceptualisation of extreme weather events

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Abstract

The article adopts a novel pūkenga-based approach to develop a narrative of extreme weather events informed by Indigenous knowledge. Three key findings, identified from co-learning amongst Indigenous researchers and pūkenga, are seen as required to formally (re)generate knowledges-in-place. First, an understanding of causal factors reveals the collapse of local knowledge narratives and the need to renew these. Second, te ao Māori (TAM) framings progressively assembled from narratives by pūkenga centred on environment, community and wellbeing generate authentic, alternative, coherent and verifiable accounts of how local material and spiritual conditions relating to extreme weather events are seen from a TAM worldview. These accounts speak to how intergenerational, lived and remembered extreme weather events are codified in mātauranga-a-iwi. Third, reconceptualising extreme weather events from a TAM perspective produces relational knowledge with practical outcomes.

Keywords

climate change adaptation, Indigenous knowledge, Kaupapa Māori research, local knowledge, mātauranga Māori, relational values

Introduction

> Papa was laid bare after the separation [from Ranginui] and so Tāne-mahuta cloaked his mother with a korowai of flourishment that supported the growth of native flora and fauna. What we are seeing is the return of Papa to this bare state through the actions of tangata. When Papa is stripped bare, Tāwhirimātea takes umbrage. The resulting floods are caused by the hara. Flooding

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> cleanses Papatūānuku of human-induced harm. Recloaking the whenua is required in this instance, to resolve the hara, to rebalance the system: Noho tahanga a Papatūānuku, kia whakakorowai i a ia [Papatūānuku is in a desolate, naked state; she needs recloaking]. (Keita Ngata)

Before the extreme weather events (EWEs) that have recently swept Aotearoa New Zealand, governmental concern was already converging on the urgency of disaster risk resilience and transition behaviours. The Intergovernmental Panel on Climate Change (2021) recently reiterated that "it is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred" (p. 1). Like other Indigenous peoples, Māori maintain a critical concern for Papatūānuku and recognise both the fragility of our ecologies and the continual disruption caused by humans (Harmsworth & Awatere, 2013). In this context of climate change (CC), questions concerning risk, impacts and adaptation strategies as they pertain to Māori communities must be meaningfully explored and actioned (Awatere et al., 2021).

This research, while focused on locally centred mātauranga-a-iwi from Ngāti Porou knowledge holders, additionally offers some conceptualisations of extreme weather and insights that can inform wider Aotearoa (and international) thinking on indigenising CC adaptation responses. We discuss specific knowledges-in-place from the research area—Te Tairāwhiti, the Gisborne region of the North Island—that give glimpses into how CC adaptation might be indigenised. This is crucial because in Aotearoa adaptation responses need to be reorientated to appropriately integrate te ao Māori (TAM) perspectives and draw on local context-specific information and mātauranga.

Conceptualising EWEs from a TAM perspective means asking what we can learn if we consider lessons that are codified in traditional ways and apply them thoughtfully in contemporary contexts to rebalance human interactions with Papatūānuku. This article aims to reframe the language and narrative on EWEs and draws on kōrero with Indigenous pūkenga to inform local and regional decision-makers on how TAM conceptualisations of extreme weather might be leveraged for appropriate decision-making contexts, enabling reframed TAM CC adaptation responses to be implemented.

Increasingly, CC narratives in Aotearoa recognise that EWEs are part of Aotearoa history. Te Tairāwhiti is one of the most erosion-prone regions of Aotearoa and indeed the world (Harmsworth et al., 2002). Frequent and extensive flooding occurs throughout the Waiapu Catchment but has always had a particularly devastating effect on the areas where many Māori either work or live. Research showing that EWEs will increase in Te Tairāwhiti makes indigenising CC adaptations even more urgent (Melia et al., 2019). Māori are the predominant population in Te Tairāwhiti, with long-term and ongoing links of occupation, and should be involved in co-creating adaptation strategies that will affect their livelihoods and futures (Smith, 2020).

Iwi governance entities are increasingly asserting their rangatiratanga to manage CC risks and meet the wellbeing needs of whānau, hapū and iwi (see, e.g., Maketu Iwi Collective, 2023). Iwi and hapū mātauranga of past EWEs are a valuable source of otherwise inaccessible information that can be used to shape adaptation to CC and inform emergency responses (McLachlan & Waitoki, 2022). However, there remains a dearth of specific guidance for whānau, hapū and iwi to support their CC adaptation and mitigation action. Most advice is framed for central and local government agencies. This article is therefore a demonstration of insights and practical suggestions already on hand from codified Māori/Indigenous knowledge.

Crucial role of Indigenous knowledges for climate change adaptation

Often marginalised in colonised contexts, Indigenous situated knowledges are of huge importance to developing local solutions (Whyte, 2017). D. Lewis et al. (2020) state that "Indigenous peoples also possess worldviews and traditional knowledge systems that are critical to climate mitigation and adaptation, yet, paradoxically, these are devalued and marginalized and have yet to be recognized as essential" (p. 897). Equally, Western research methodologies often marginalise Indigenous ways of caring for the environment as they can be blind to a range of ways of knowing the world (Greenaway et al., 2022). Research design that centralises Indigenous values, realities and priorities requires partnerships with Indigenous communities, and the incorporation of Indigenous knowledges and perspectives "beyond superficial understandings" (D. Lewis et al., 2020, p. 897).

TAM, with its holistic approach, spiritual and tangible dimensions, centuries-long knowledge accumulation, place-based expertise, and whakapapa relationality of kaitiakitanga—caring for the environment—can and should be part

TABLE 1 A sample of Te Ao Māori–informed frameworks, strategies and policies, and co-governance arrangements

Examples	Kaupapa
Non-statutory frameworks, policies and strategies informed by TAM framing	
Arotakenga Huringa Āhuarangi: A Framework for the National Climate Change Risk Assessment for Aotearoa New Zealand (Ministry for the Environment [MfE], 2019)	Considers CC, vulnerability and TAM perspectives, and risk assessments.
*Urutau, ka Taurikura: Kia Tū Pakari a Aotearoa i Ngā Huringa Āhuarangi | Adapt and Thrive: Building a Climate-resilient New Zealand: Aotearoa's First National Adaptation Pla*n (MfE, 2022)	Aims to enable Māori-led climate action, planning and solutions that build climate resilience.
Exploring an Indigenous Worldview Framework for the National Climate Change Adaptation Plan (Ihirangi, 2022*)*	Outlines cohesive cultural values and principles from which to approach climate action.
Co-management and co-governance in practice: Statutory arrangements	
Waiapu River Memorandum of Understanding (MoU): The Waiapu Restoration Agreement with the Ministry of Primary Industries (MPI) focuses on river restoration, and the MoU calls for collaboration between Ngāti Porou, MPI and Gisborne District Council for a unified approach to address challenges.	Calls for long-term commitment and collaboration with a 100-year vision: "Healthy land, healthy rivers, healthy people." Acknowledges the intergenerational approach required to achieve that vision (see MPI, 2020).
Whanganui River Personhood 2017: Te Awa Tupua (Whanganui River Claims Settlement) Act 2017 confers legal personality on the river.	Settlement focused on health and wellbeing: "The Crown will not own the riverbed. The river will own itself. That's a world-leading innovation for a river system" (see "Te Awa Tupua", 2016).
Te Urewera Personhood 2014: Considered a living person, Te Urewera is spoken for and governed by a board. Care for Te Urewera, including the tracks and facilities, is carried out by Ngāi Tūhoe's operational entity.	Working to develop a new kind of visitor experience—one that is rich with culture, appreciation of Papatūānuku, and care for nature and people. (Department of Conservation, n.d.; Tūhoe, n.d.)
Auckland Tūpuna Maunga Management 2014: Maunga Authority co-governs 14 Tūpuna Maunga following a 2014 Treaty of Waitangi settlement. The Authority comprises equal representatives from Ngā Mana Whenua o Tāmaki Makaurau and Auckland Council, together with Crown (non-voting) representation.	Single integrated management plan to set the direction for maunga restoration, protection and management (see Tūpuna Maunga o Tāmaki Makaurau Authority, 2022).
Waikato River Co-management 2010: Independent statutory body (Waikato River Authority) under the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010. A co-governance and co-management framework between the Crown and river iwi. The Authority has 10 board members—five appointed from each river iwi and five Crown-appointed members.	Achieve the restoration and protection of the health and wellbeing of the Waikato River for future generations; promote an integrated, holistic and coordinated approach to the implementation of the vision and strategy and the management of the Waikato River (see Controller and Auditor-General, 2016).
Kaipara Harbour Management 2005: Integrated Kaipara Harbour Management Group (IKHMG) formed to implement obligations between Ngāti Whatua ki Kaipara hapū and MoU partners under a Treaty of Waitangi Deed of Settlement. Now the Kaipara Remediation Programme.	Promote integrated management, interagency coordination, and kaitiakitanga of Kaipara Harbour and catchment (see IKHMG, n.d.) utilising traditional Māori and Western knowledges to manage Kaipara as an interdependent system.
Māori academic framings and Māori work in the CC space	
Stemming the Colonial Environmental Tide: Shared Māori Governance Jurisdiction and Ecosystem-based Management over the Marine and Coastal Seascape in Aotearoa New Zealand. Possible Ways Forward (Joseph et al., 2020)	Final report for Sustainable Seas National Science Challenge project Whaia te Mana Māori Whakahaere Tōtika ki Tangaroa | In Pursuit of Māori Governance Jurisdiction Models over Marine Resources.
"He waka eke noa | We are all in the same boat: A framework for co-governance from Aotearoa New Zealand" (Maxwell, Awatere, et al., 2020) "Navigating towards marine co-management with Indigenous communities on-board the Waka-Taurua" (Maxwell, Ratana, et al., 2020) values, and practices, alongside international initiatives such as ecosystem-based management (EBM)	The Waka-Taurua framework improves how marine co-management systems are developed by facilitating a more structured and equitable discussion of both Indigenous-Māori and broader societal worldviews, values and practices.
"Indigenous Approaches to Disaster Risk Reduction, Community Sustainability, and Climate Change Resilience" (Kenney et al., 2023) "A 'Te Ao Māori' Disaster Risk Reduction Framework" (Rout et al., 2024)	Indigenous perspectives on disaster risk reduction, CC adaptation, environmental resilience, sustainable development.
He Huringa Āhuarangi, he Huringa Ao: A Changing Climate, a Changing World (Awatere et al., 2021)	Tikanga Māori responses to CC, with the long-term goal of "greater realisation of Māori aspirations and capabilities for flourishing Māori and tribal economies, environments and people" (Awatere et al., 2021, p. 11).

of CC adaptation responses (Harmsworth & Awatere, 2013; Hikuroa, 2017). We argue that a range of knowledges is necessary: from core Māori concepts that are integral to understanding how Māori make sense of the world such as whakapapa, mana, mauri and kaitiakitanga to pūrākau, mātauranga and tikanga, including written and non-written ways of understanding and being-in-the-world (Marsden, 2003).

Current Western scientific understandings of EWEs are arguably insufficient in isolation. Co-production of knowledge across Indigenous and Western science perspectives, however, requires careful collaboration between Indigenous and non-Indigenous researchers to co-produce knowledge through enduring trustful partnerships (Greenaway et al., 2022). The interweaving of TAM and Eurocentric ontologies and epistemologies means creating and occupying "relational space[s] between Indigenous and non-Indigenous scholars" (Jones et al., 2022, p. e834).

Colonisation and the impact of CC on Indigenous peoples are inextricably linked (Jones, 2019), and, as we address in the results section, unpacking causal factors matters to being able to decolonise institutional arrangements and create adaptation strategies. As Rose (2014) notes, this means paying "due attention to environmental ethics and a re-imagining of the decision-making process in respect of environments and resources" (p. 223). Table 1 demonstrates that, in Aotearoa, considerable steps are being made towards this, as te Tiriti o Waitangi is being used to frame approaches to CC adaptation. The contemporary Aotearoa context offers pathways for new governance and institutional arrangements that support Indigenous knowledge framings and Indigenous-led contributions to CC adaptations. This is because "Treaty considerations are entrenched at every level of government and . . . the legal, scientific, financial, and technical apparatus of the nation" (N. Lewis et al., 2024, p. 155). Te Tiriti is not always appropriately given effect in these spaces, however, as Baker's (2023) experience highlights: "As a Māori, Tiriti-based policy advisor . . . there seems to be a growing understanding of the need for policy and legislation to be Tiriti-compliant, but understandings about what this actually looks like in practice are still worlds apart."

Table 1 shows examples of co-management and co-governance of resources with Māori that are increasingly being incorporated in government frameworks, processes and on-the-ground commitments. It is in this context that we provide advice here that is supportive of TAM framing and can be used to ward against business-as-usual framings.

Methodology: Kaupapa Māori approach

The research team used a Kaupapa Māori approach, which commits to open communication and a willingness to incorporate Indigenous values, practices and expertise (see Table 2). It ensures that Māori retain "conceptual, methodological and interpretive control" over the work (Walker et al., 2006, p. 333).

TABLE 2 Description of interviewees and interviews

Number of interviews	6	Date	2022
Tāne: wāhine	4:2	Iwi	Ngāti Porou
Pūkenga interviewed	Keita Ngata, Daniel/Raniera Proctor (Gisborne) Ngarimu Parata, Mokena/Morgan Reedy, Anaru/Tip Reedy (Wellington) Aroha Mead (online)		
Kōrero length	1–2 hours, at participant's home or agreed location		
Language	Reo rua (dual languages) to discuss concepts accurately and appropriately (e.g., karakia, whakataukī, waiata)		
Generational representation	2 rangatahi, 4 pakeke		
Kaupapa Māori approach	Sensitivities to personal situations, timing, appropriate approaches to individuals, meeting kanohi-ki-kanohi		
Questions to guide the kōrero	How might we explain current phenomena such as the Uawa and Tokomaru flood events of 2018, 2020 and 2021—that is, more frequent and impactful weather events? What can be deduced about the current situation from the environmental changes that have been experienced by our tīpuna in the past 150 years—that is, post-settlement? How does the geographic and geological make-up of Te Tairāwhiti explain what we are experiencing in this specific region of Aotearoa?		

The pūkenga were selected for (a) their knowledge of te reo; (b) being known repositories for mātauranga, tikanga and customary knowledges, with credibility within Ngāti Porou; (c) involvement in efforts to revitalise te reo Māori and taonga tuku iho; and (d), mauri ora: the participants were accessible, alive (many pūkenga are elderly and knowledge can be lost), and willing. Our pūkenga saw themselves as vessels of intergenerational knowledge transfer.

The majority of the authors have whakapapa connections to Ngāti Porou, and pre-existing relationships and hononga with those interviewed, allowing for trust and sharing. This increased the likelihood of participants agreeing to kōrero (Ware et al., 2018). The pūkenga had diverse experiences, from ground-roots working with whānau, hapū and iwi to working with the public sector and internationally, and were both pakeke and rangatahi—crucial to understanding the conceptualisation of te taiao through intergenerational mindsets. The kōrero explored how we might frame the climatically connected EWEs that had occurred in Te Tairāwhiti and identify the key issues associated through a TAM lens. All pūkenga agreed to the recording and sharing of their mātauranga beyond the project; they held trust in the researchers to pass it on in meaningful ways. In addition, their mātauranga is not anonymised as this would reduce the whakapapa link of the information, and therefore its potential validity.

The authors of this article have differing backgrounds. The first-listed author is Tangata Tiriti/Pākehā, and the others all whakapapa to Ngāti Porou. For the former, leaning into the work of others negotiating "becoming Pākehā" has been essential (Bluck, 2022; Makey, 2022). For the Māori authors, this work has been about navigating the dual worlds and expectations of TAM and Eurocentric approaches. Team members also negotiate multiple roles as public sector employees within different disciplines, as researchers, activists, and hapū and iwi members. The collective voice of the article thus contains a diversity of positions and positionalities.

Framework for results: Renewing relationships

The Renewing Relationships Framework is inspired by Whyte's (2017) "renewing relatives" concept, in which he articulates that fostering Indigenous knowledge and reforging connections is a form of empowerment. This involves "renewing relationships with humans and nonhumans and restoring reciprocity among the relatives (that is the parties to the relationships) . . . I call this process *renewing relatives*" (Whyte, 2017, p. 158).

The Renewing Relationships Framework gives a broad overview of relations of key knowledge areas. Figure 1 both outlines the traditional route from a TAM worldview—through conceptualisations and codified knowledges leading to action and strategies—and acknowledges the damage done by colonisation and other causal factors. The broken connections between TAM worldviews and contemporary practices stem from ongoing colonisation: "Colonialism has always included terraforming that tears apart . . . the 'flesh' of human-nonhuman-ecological relationships" (Whyte, 2017, p. 159). As the framework shows, the casual factors (yellow) break the connections between TAM worldviews and any contemporary responses to CC. However, paying attention to the conceptualisations (pink) and knowledges (orange) coming from TAM allows connections to be reforged and strategies for the current context to be reimagined. As the healing blue stripe in Figure 1 implies, nurturing both Western *and* Indigenous knowledges will allow better adaptation strategies and solutions to be determined. As Whyte (2017) observes, Indigenous peoples "often see the renewal of their knowledge systems as a significant strategy for achieving successful adaptation planning" (p. 157). This high-level positioning informs the presentation of this article.

TABLE 3 Key themes

Causal factors	TAM framings and the environment	Indigenous conceptualisations of extreme weather
Mātauranga loss Neoliberalism Tikanga loss Alienation	Balance Atua Māori Mātauranga expressed through codified knowledges	Solutions and strategies for resilience are held in mātauranga-a-iwi Re-indigenised ways of knowing, tools and interventions in community resilience-building to mitigate future risks

FIGURE 1 The Renewing Relationships Framework, showing broken connections and nurturing of te ao Māori conceptualisations

Results

A thematic analysis revealed key themes that reflect a TAM understanding of the kaupapa, as well as its challenges and solutions (see Table 3). A unique dimension incorporated into the Kaupapa Māori research approach in this article involved creating a sequence of original, co-developed visuals to accompany the textual argument. Treated as a storyline, the diagrams depict key aspects of an indigenised approach to CC adaptation and serve as thought prompts in the text. The inspiration for each diagram drew on the interviews with pūkenga. The sequence outlines the steps that underscore the complexity of analysis needed to better comprehend and work with a TAM framing of EWEs.

Our analysis employs key principles of TAM (kaitiakitanga, whakapapa, mauri and mana), along with key TAM practices and norms, and emphasises the importance of dual knowledge systems. When TAM conceptualisations and Western science can be woven together, as sources of truth, then the research can speak to the communities experiencing EWEs as well as decision-makers.

The knowledge gathered and conceptualisations offered are iwi-specific, grounded in place, space and time. While some of these results may possess Aotearoa-wide applicability in policy-making, our key intent with this research is to contribute to more nuanced conversations grounded and situated in place-based adaptation strategies.

Theme 1: Causal factors

The breakdown of intergenerational transfer of mātauranga Māori and Māori conceptualisations more broadly is directly related to colonisation and its associated processes. That loss of knowledge, connections and practices must be acknowledged because reforging these relationships is key to empowering steps forward (see Figure 2).

Mātauranga loss. In pre-contact Aotearoa, tribal knowledge holders were guides in all facets of directing behaviour, such as how to interpret signs in the environment and the ethics of sustainable management. As this knowledge was systemically supressed, the strong directive that privileged the wellbeing of the environment over the needs of people was also suppressed.

> Loss of tōhunga meant a loss of strong direction to follow or rally behind . . . Tōhunga makutu kept

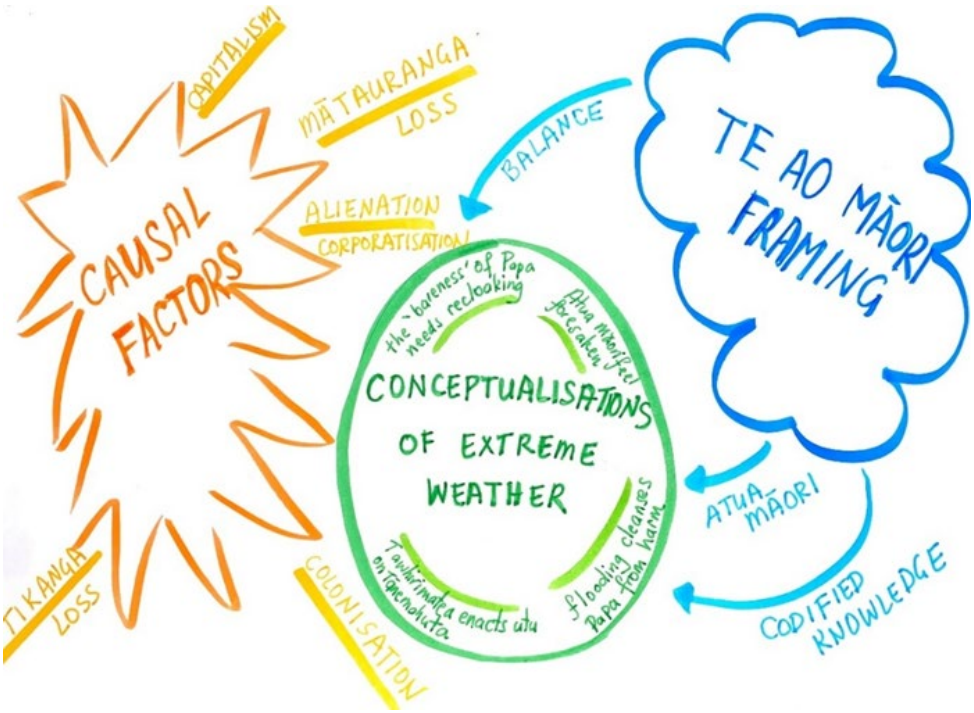

FIGURE 2 Conceptualisations of extreme weather can be found within te ao Māori, but there are factors that hinder these understandings

> people accountable to their actions . . . If we think about this today, what are the things that keep us wary about stepping over an invisible line? This has to be enacted in policy and monitoring approaches. (Daniel/Raniera Proctor)

Furthermore, in contemporary society, expertise is now sought from technocratic sources, further marginalising mātauranga Māori in our psyche. What does this mean for hazard management? If we were better in tune with our mātauranga, in terms of interpreting signals in the sky and on the land, this could inform more symbiotic actions to reduce the detrimental impacts of EWEs.

Neoliberalism. The objectives of market-orientated policies run contrary to resource management approaches that enhance the mana of atua Māori and in turn that of our natural ecosystems. Many damaging environmental impacts of disasters can be directly attributed to loss of land ownership, economic development, profit-driven aspirations and neoliberal market ideologies: "At a regional level we focus on economic development at the expense of the environment" (Aroha Mead).

For Ngāti Porou, the most impactful changes have been the loss of mauri within the Waiapu Catchment, and the way Maunga Hikurangi continues to be carved up by weather, climatic occurrences and land use practices:

> Through clearing of the whenua for agriculture/forestry, [the Waiapu] is now full of silt. Waka used to be able to travel up the awa. (Keita Ngata)

> Land use 150 years ago was primarily totara, kauri and manuka—this had stability and stronghold. Te Kakahu a Papatūānuku was stripped [through deforestation] …[this] instigated flooding and erosion. (Anaru/Tip Reedy)

Tikanga loss. Loss of tikanga knowledge contributes to loss of environmental connection. For example, karakia—the practice of connecting with everything in our environment (with which we share whakapapa)—has diminished over the time and alienated us from Papatūānuku and other ecosystems.

> Many have forgotten how to talk to our environment and forsaken our atua Māori in the process . . . Instead of talking to the trees, we are cutting them down . . . What we are experiencing in our environment as a result are the consequences of this. (Mokena/Morgan Reedy)

Alienation. A final barrier for many Māori is not being able to access their ancestral whenua. Present practices of land alienation, corporatisation to organise production, ownership challenges (such as shareholder land) and government-led conservation interests (such as the Department of Conservation) continue to impede access. Many contemporary interventions for reassertion of land ownership are further impacted by historic and/or purposeful legislative mechanisms: "Often access to the whenua is halted by ownership challenges . . . Disentangling shareholder land is a purposefully lengthy and arduous process" (Keita Ngata).

Theme 2: Te ao Māori framings and the environment

A TAM framing of the world involves environmental concepts that are not well understood by the Western world, such as reciprocity, balance, atua Māori and codified knowledge. This is related to how climatic events and their effects are understood in TAM, which codifies historic occurrences into karakia, pūrākau and waiata for intergenerational knowledge transfer.

Balance. Māori conceptualise the frequency and severity of EWEs as evidence that there is an imbalance between people and the environment. This is not a new phenomenon for Māori, and learnings from past experiences are often found in codified knowledge systems. For instance, the importance of balance within the environment is embodied in the coiled pattern of an unfurling fern frond, or koru. Daniel/Raniera Proctor commented that pūrākau together form a story framework, or storage point of information, which tīpuna used to make sense of their environment and the place of tangata in it: balance and imbalance.

Atua Māori. Localised atua that are guardians of one aspect of an environmental domain are now less recalled in TAM. However, in Te Tairāwhiti there are two prominent atua linked to the waves (Whakiwhakiratau) and tides (Tuawharau), respectively. "Loss of memory and mātauranga of these minor atua has major implications for the environment—that is, loss of how to acknowledge their role in the environment" (Ngarimu Parata).

Mātauranga expressed through codified knowledges. Other forms of knowledge can be found in ingoa Māori, pepeha, karakia, whakataukī, haka and waiata. These are examples of particular codified means of intergenerational knowledge transfer (see Figure 3). To illustrate, an 1864 EWE transformed the Waiapu River, wiped out crops and homes, and led to relocation to higher ground. The ingoa Māori "Waiapu" can be linked to these experiences as the name means "water" (wai) and "to take something with force" (apu). Or, as Ngarimu Parata articulates it, "Ingoa o Waiapu . . . speaks to erosion and the land under stress."

The whakataukī "Waiapu he aku whenua, he aku tangata" ("Waiapu is my land, my people") also acts as a warning and refers to the Waiapu River as the taker of land and the taker of people, as well as as an instruction to kaitiaki:

FIGURE 3 Mātauranga/codified knowledge holds many lessons for contemporary times

> Waiapu kōkāhūhua, the Waiapu of many mothers, speaks to a nurturing relationship and the idea that you get out what you put in. (Ngarimu Parata)

> Karakia are a way of communicating, of entreating atua. We are descended from all these living things; we need to talk to them [karakia] because they are us. Today we have alienated ourselves [as tangata] from the natural world . . . When you are talking to the trees through karakia, you are being one with them. (Mokena/Morgan Reedy)

The Karakia o Paikea is an example of a localised karakia that refers to surging waves, overturning, spilling and gutting the land, as were caused by Cyclone Bola in 1988. Karakia and pepeha are also formulas for traditional solutions:

> [Karakia are] problem-identifying and solution-finding. (Ngarimu Parata)

> Pepeha contain whakapapa and relational connection. They recognise the importance of tīpuna—yet we make decisions that are counter to their interests. (Aroha Mead)

The metaphors that are codified within all of these knowledge forms offer guidance and space for reflection on best practices in the contemporary world:

> The Raukūmara can be seen as the tāhuhu of Te Tairāwhiti. Similar to the front pillars of a wharenui whose role is to weather the storm, [it's] a framework for protection. The role of the people on the paepae kaiawha is to also weather the storm through coordination and communication—how is this realised under a metaphor framework? (Ngarimu Parata)

Theme 3: Indigenous conceptualisations of extreme weather

One example of framing EWEs from a TAM perspective is to examine the metaphorical nature of atua Māori, and the lessons contained in their conceptualisations:

> The Waipuke [flood] is important and symbolic of Papa being cleansed from hara and hea made by he tangata . . . Papa responds by trying to whakatikia herself . . . Rū and other events can be categorised in this same way. (Keita Ngata)

Equally, detrimental weather patterns could be conceptualised as infighting between Ranginui and Papatūānuku's children: "Another understanding for what we are seeing would attribute EWEs to other atua—for example, Tāwhirimātea and Tangaroa enacting utu on Tāne-mahuta as the creator of humans—who have instigated this severe imbalance" (Ngarimu Parata).

Atua Māori represent the inherent mana or awesomeness of our natural environment, which is something bigger than human. Primordial forces battling each other is another way of conceptualising EWEs. Atua Māori exist and are useful when thinking about extreme weather. Conceptualising weather processes in these ways can help people adapt and find means to cope (see Figure 4).

Discussion: (Re)conceptualise to reframe

Currently, Western scientific conceptualisations of EWE responses dominate. We argue that TAM conceptualisations will frame responses in TAM terms, which makes space for codified knowledges to be accessed, understood and utilised, and that such conceptualisations are most appropriate for Māori communities that are worst affected by EWEs. Conceptualising EWEs from Indigenous perspectives means acknowledging, understanding and privileging the worldviews from which this knowledge is enacted. Such worldviews often involve a holistic system of relational thinking in which the right and the obligation to care is embedded. TAM is about balance, and the kōrero with our pūkenga reflect this in their emphasis on working in reciprocal ways as tangata *with* te taiao.

The TAM conceptualisations and codified strategies discussed above represent a depth of knowledge and expertise that is situated and grounded in place. There are limits to the approach taken, however. Situated knowledge from Te Tairāwhiti cannot directly travel. For example, the tailored and specific knowledge of causal factors is manifested at a local and people level. Codified knowledge relating to Māori tikanga and te reo, for example, can travel as *conceptualisations*, but the actual information about any one place name is situated and specific. Situated knowledge of people and place, of tangata whenua, is highly specific and cannot be applied elsewhere. This article gives voice to Te Tairāwhiti knowledge—grounded, specific and situated. This research helps make sense of it *in that place*.

There are two distinct points to make here. First, as Figure 5 shows, we need to prioritise a way of working that gives space to both TAM worldviews *and* TAM practices. This is a higher-level theoretical framing, one that can travel and

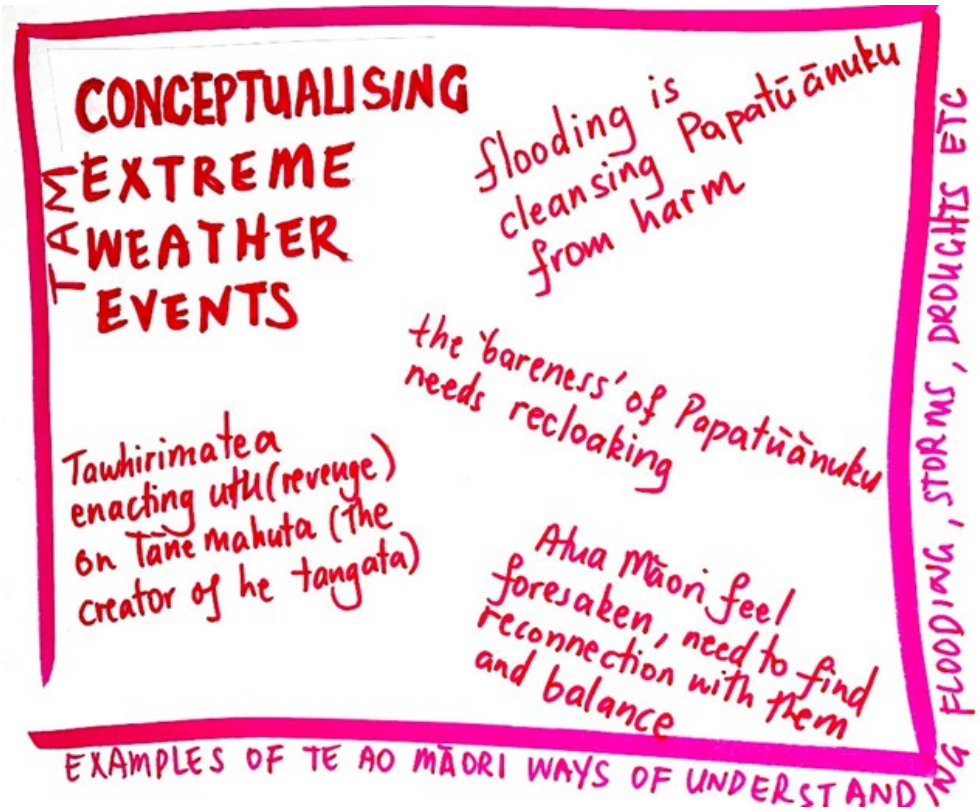

FIGURE 4 Te ao Māori conceptualisations give greater understanding of extreme weather events

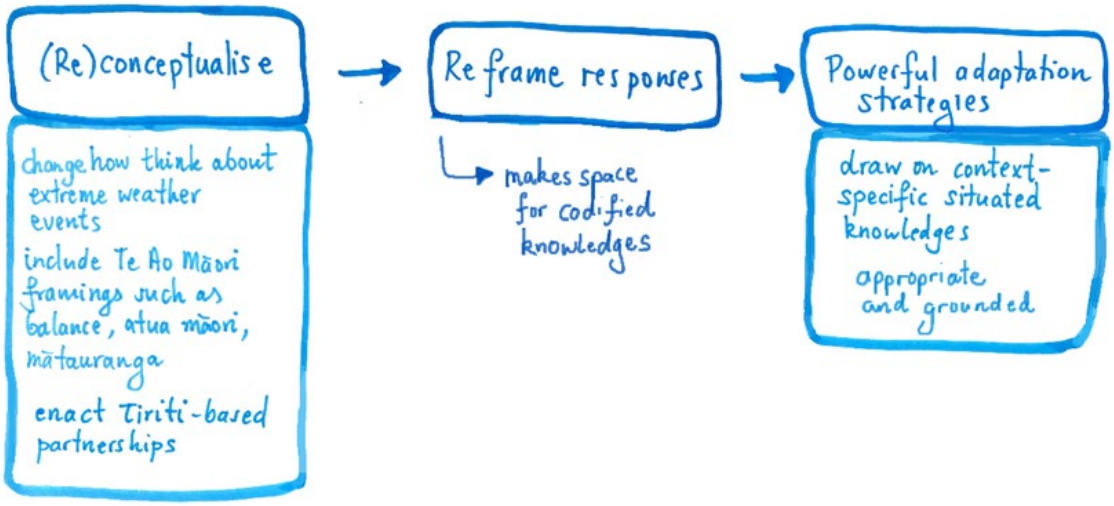

FIGURE 5 Pathway moving from (re)conceptualising EWEs to reframing responses to powerful adaptation strategies

be used in multiple contexts. Secondly, we stress that mātauranga itself is grounded and *does not* travel. The codified knowledges and any strategies developed from them are drawn from a depth of knowledge and expertise that is situated and grounded in place; it is highly specific and cannot be applied elsewhere without appropriate contextualisation.

Following the Renewing Relationships Framework (Figure 1)—which aims to reforge broken connections between TAM worldviews and conceptualisations of EWEs—can lead to the development of indigenised adaptation strategies. The framework is broadly applicable elsewhere in Aotearoa, and even beyond. However, the information that informs each aspect will need to be specific to the place it is being applied to. Developing adaptation strategies for other areas can follow the same pathway, but this will need local engagement and co-production of the strategies to ensure they fit the people and place. Thus, Figure 5 illustrates how (re)conceptualising EWEs allows CC responses to be reframed and enables powerful and fit-for-purpose adaptation strategies to be developed. As Hyslop et al. (2023) recently observed, "Where communities are tightly connected to their natural resources and Te Ao Māori-led ways of thinking and being . . . [then there is] an intimate understanding of interpreting environmental cues and changes" (p. 232), which can be used to inform CC responses.

Conclusion: Indigenous conceptualisations offer future possibilities

The 2023 Cyclone Gabrielle response was a business-as-usual one and was not good enough for all the communities adversely affected. The causes are known, and many of the solutions and strategies are equally well-recognised; the focus must now be on appropriate steps forward. Recovery and resilience efforts need to be reframed from a TAM perspective, so that they do not simply perpetuate the causal factors and harm discussed above.

This article adds to the literature on EWEs and Indigenous approaches to CC in Aotearoa because we provide grounded and place-based examples of what it actually means to think in terms of TAM conceptualisations, and how these offer future possibilities and potentialities to do and be differently in response to EWEs. The connections between TAM worldviews and contemporary responses to CC adaptation should be nurtured. Many are doing amazing work in this area; this article plays its small part by outlining key components of what indigenised CC adaptation strategies might contain.

We began the article with Keita Ngata's whakataukī "Noho tahanga a Papatūānuku, kia whakakorowai i a ia", and we return to it now as it represents a fundamental regrounding of EWEs from a TAM perspective. There are lessons to be learned from the metaphorical nature of atua Māori, and Ngata's proverb describes the problem, shows an understanding of the care needed, recognises relationships and offers a solution—all in a succinct and relatable metaphor. Reconceptualising EWEs in terms of a relational exchange with the environment and its embodied atua Māori, provides a useful and "caring with" approach to adaptation and mitigation of EWEs. Mātauranga embedded in TAM ontologies should not be dismissed but rather included in the knowledge sets of the central and local government, where metaphor, analogy and historic information can be helpful in simplifying, motivating and creating change that makes sense in environmental, spiritual, governance and, above all, practical terms. *Indigenous conceptualisations of EWEs are relational knowledges with practical outcomes.*

Indigenous knowledge has a crucial role to play in CC adaptation. Indigenous situated knowledges are of huge importance to developing local solutions. This article has shown that nurturing connections with TAM worldviews offers insights into how to create place-based, appropriate, meaningful, co-produced and effective adaptation strategies that tie in with both Indigenous worldviews *and* Western science to offer new ways forward.

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of this article; or in the decision to submit it for publication.

Glossary

atua Māori	Māori gods; metaphorical representations of ecosystems
awa	river
haka	dances
hapū	local subtribe
hara	harm or wrongdoing
hea	mistakes
he tangata	the people
Hikurangi Maunga	the sacred mountain of Ngāti Porou
hononga	connections
ingoa Māori	Māori names
iwi	extended kinship group, tribe
kaitiaki	guardians
kaitiakitanga	ethic of intergenerational sustainability
kanohi-ki-kanohi	face to face
karakia	incantations
kaupapa	issue, theme
Kaupapa Māori	approach according to Māori principles
kia whakakorowai i a Papatūānuku	restoring the cloak of Papatūānuku
kōrero	talk, speech, interviews
korowai	cloak
koru	spiral shape
mana	respect and (decision-making) authority
Māori	Indigenous people of Aotearoa New Zealand
mātauranga(-a-iwi)	(iwi-specific) experiential knowledge
maunga	mountain
mauri	lifeforce
mauri ora	life and wellbeing
Ngāti Porou	iwi relating to Te Tairāwhiti
paepae kaiawha	orator's bench
Pākehā	New Zealanders of European descent
pakeke	elders
Papa/Papatūānuku	Earth Mother
pepeha	formulaic expressions
pūkenga	knowledge holders
pūrākau	stories that explain history
rangatahi	youth
rangatiratanga	autonomy
Rangi/Ranginui	Sky Father
Raukūmara	mountain range in northern Tairāwhiti that includes Hikurangi Maunga
(te) reo	(the) language
reo rua	dual languages
rū	earthquake
tāhuhu	spine
tāne	man/men
Tāne-mahuta	atua of forest and birds
Tangaroa	atua of sea, lakes, rivers, and creatures that live within them
tangata (whenua)	people (of the land)
Tangata Tiriti	people of the treaty (non-Māori)
taonga tuku iho	treasures handed down
Tāwhirimātea	atua of winds and storms
te ao Māori	Māori world or worldviews
te taiao	natural environment
Te Tairāwhiti	Gisborne region
te Tiriti o Waitangi	the Treaty of Waitangi: founding document establishing rights, responsibilities and relationships between the Crown and tangata whenua signed 6 February 1840
tikanga	practices
tīpuna/tūpuna	ancestors
tōhunga/tōhunga makutu	experts/expert enforcers
utu	revenge
wahine/wāhine	woman/women
waiata	songs
waka	canoe
whakapapa	genealogical connections
whakataukī	proverb(s)
whakatikia	to correct
whānau	family
wharenui	meeting house
whenua	land

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ME TŪ Ā-URU

Together for a flourishing Aotearoa

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Abstract

This article presents Me Tū ā-Uru, an action plan developed under the New Zealand Biological Heritage National Science Challenge, with a focus on reshaping our relationships, governance and policy to best care for our environment in Aotearoa New Zealand. Inspired by existing action plans and reports, the authors formed a working group comprising Māori researchers and environmental practitioners. The authors discuss the rationale behind creating an action plan to address the multifaceted crises facing Aotearoa, including climate change and biodiversity decline. In this article we argue the importance of co-creating our research through wānanga and then communicating this research in inspiring and action-oriented ways. This article provides the context, background and methods used for the creation of our plan and relational framework, as well as some practical examples of it in action.

Keywords

co-governance, environment, mātauranga, relational governance, Te Tiriti o Waitangi, tikanga

Introduction

Many people living in Aotearoa New Zealand, of all backgrounds and cultures, feel a close connection and affinity to the environment. Yet our environmental governance and policy is failing to address the decline in the health of our environment and instead often actively contributes to it (M. A. Brown et al., 2015; Resource Management Review Panel, 2020). Māori communities have often been locked out of decision-making, and this has seen joint harm to the health of their communities and biodiversity (Parsons et al., 2021). As researchers under the BioHeritage National Science Challenge, we have spent the past five

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years exploring how we can change our governance arrangements and policy to better protect our biological heritage. In April 2023, consolidating this research, our working group launched *Me Tū ā-Uru—An Action Plan for* a *Flourishing and Abundant Environment* (Bargh et al., 2023). Me Tū-ā-Uru proposes an approach to environmental governance that prioritises balanced relationships between peoples, and between people and the environment. One of the key findings from our earlier research is that equitable and caring relationships between te Tiriti o Waitangi partners is essential for effective governance of the environment (Bargh & Tapsell, 2021; Tapsell, 2022). Furthermore, when we work together and share our distinctive knowledge and experiences, we have more solutions and opportunities. Another key finding is that communicating research and evidence in a way that connects communities through shared values and provides actionable solutions is an important aspect of effectively translating research to encourage policy changes and social action (Berentson-Shaw, 2018; Dietz, 2013; Holmes et al., 2012). Environmental crises such as climate change and biodiversity loss are causing high levels of distress and overload in communities (Cunsolo et al., 2020; Usher et al., 2019). We wanted to create a document that communicates our evidence and encourages positive and actionable steps for government departments, decision-makers and all communities living in Aotearoa.

We were inspired by other action plans and reports released in Aotearoa, such as Matike Mai (Matike Mai Aotearoa, 2016), He Puapua *(*Charters et al., *2019)* and Te Pūtahitanga *(*Kukutai et al., *2021)*, that envision fairer and more equitable ways to govern, embracing te Tiriti o Waitangi. Te Tiriti o Waitangi is one of the founding constitutional documents of Aotearoa, establishing the relationship between the Kāwanatanga and hapū Māori. Me Tū ā-Uru (Bargh et al., 2023) explores the unique opportunities that arise when we honour te Tiriti o Waitangi, as a blueprint for how Māori and non-Māori can share decision-making in order to take best care of each other and the environment.

In this article we outline the background context, methods and framework that ground Me Tū ā-Uru and argue that this form of communicating and co-creating research is significant because it encourages and enhances relationship building and connection, thereby aligning our methods to the findings and evidence that can support a flourishing Aotearoa.

BioHeritage National Science Challenge

Me Tū ā Uru (Bargh et al., 2023) emerged from the broader context of the New Zealand Biological Heritage National Science Challenge (BioHeritage Challenge). In 2014, 11 National Science Challenges were created to answer some of Aotearoa's biggest science questions. The BioHeritage Challenge aimed to facilitate research and impact in the areas of biosecurity and native biodiversity (New Zealand's Biological Heritage, 2024a). Four overarching research pillars guide the BioHeritage Challenge, including Whakahou—Restore (New Zealand's Biological Heritage, 2024c). Whakahou aims to create a resilient, thriving environment for Aotearoa, and within this research pillar sits the research programme Adaptive Governance and Policy, sometimes referred to as Strategic Outcome 7 (SO7). SO7 is focused on the ways governance arrangements and policy models can be changed to better protect our environment. It is co-led by Professor of Politics and Māori Studies Maria Bargh and Kaihautū—Te Whare Whakatupu Mātauranga Carwyn Jones, and seeks to create innovative frameworks, policies and capacities to enhance environmental governance (New Zealand's Biological Heritage, 2024b).

Narratives for change

Over the course of our research on environmental governance, we found a significant level of evidence supporting te Tiriti o Waitangi–based governance of the environment. Tiriti-based environmental governance can be defined as forms that include both Māori and the government (the Crown's representative in present-day Aotearoa) at either local or national levels in decision-making, sharing authority over natural resources (Webster & Cheyne, 2017). A study of 18 Waitangi Tribunal reports from 1992 to 2019 revealed that 78% recommended co-governance or co-management arrangements to correct breaches of te Tiriti o Waitangi and ensure that in these different cases mana whenua were able to uphold their kaitiaki obligations and rights over their precious places and species (SO7/Adaptive Governance and Policy Group, 2020). Similarly, research exploring examples of co-governance or co-management between mana whenua and local governments has highlighted the environmental and social benefits of these arrangements (Dodson, 2014; Jones, 2023; Office of the Auditor-General, 2016; Parsons et al., 2021; Webster & Cheyne, 2017). Despite the research, Māori still face considerable barriers to having co-governance implemented and te Tiriti o Waitangi effectively honoured (Margaret, 2016).

International and local messaging research on communicating research and evidence on topics such as climate justice, poverty, racism and Indigenous rights advocate for using values and narratives that are collectively focused and connect us to each other because these are most effective (Crompton, 2011; Elliot & Berentson-Shaw, 2019). We wanted to know whether similar approaches would work in the context of shared-authority and te Tiriti–based environmental governance and lead to increased understanding and awareness of the benefits for Aotearoa. This led our research group to undertake a series of training sessions and commission research with The Workshop during 2020–2021 to explore how to communicate our evidence more effectively.

The Workshop is a research organisation in Aotearoa that focuses on public narratives; they work with clients to develop storytelling tools for effective communications on complex issues (The Workshop, 2025). The Workshop has published numerous guides that aim to communicate evidence and research in ways that build public understandings (The Workshop, 2021, 2023).

Covid-19 and political movements at the time

The impact of Covid-19 during the creation of our action plan was profound, not only in respect to the immediate health impacts of the pandemic, but also in highlighting the importance of our interdependence with each other as we responded collectively to the pandemic. The response to the first wave of the pandemic in Aotearoa has been described by some health experts as successful with relatively low levels of disease, effective communication and buy-in by the public of Covid-19 mandates (Baker & Wilson, 2022; Jefferies et al., 2020). During the pandemic, the government was speaking to the opportunity of putting the well-being of people and environments at the heart of Aotearoa's long-term recovery (Cook et al., 2020; Office of the Minister for Economic Development, 2019). Budget 2020 set out some ambitious environmental programmes, which involved co-design and delivery by Māori, regional councils and local communities (Government of New Zealand, 2020). However, it is significant that in the following waves of the pandemic, we saw a breakdown of this trust and divisive narratives arise around vaccination and Covid-19 mandates, resulting in the 2022 protest outside parliament (Hunt, 2023).

Creating our action plan

In 2021 we formed a working group consisting of Maria Bargh, Carwyn Jones, Erin Matariki Carr, Carly O'Connor, Oliver McMillian, Tasman Gillies and Ellen Tapsell, with a support team of Bernard Steeds, Tessa Thomson and Jordan Green. The method for writing and creating our action plan was to hold a series of wānanga with our working group. The term wānanga is associated with whare wānanga and Māori tertiary institutions (Mead, 2016, p. 59). However, it explains much broader ideas and practice (Mahuika & Mahuika, 2020). Smith et al. (2019) explain that wānanga is both a noun and a verb, and as a verb it involves engaging "in active and collective thinking and problem solving; not just 'talk'" (p. 5). Smith et al. (2019) describe their use of "thought space wānanga" as a method to share knowledge and translate it into practical outcomes (p. 6). The authors outline this process as being part of Kaupapa Māori and Indigenous research agendas and mythologies as well as co-design or co-creation research processes (Smith et al., 2019).

In *Decolonizing Methodologies*, Linda Tuhiwai Smith (2021) argues that the Indigenous research agenda is based on the core aspects, including self-determination, healing, decolonisation, mobilisation and development (p. 133). Co-designed research is grounded in the idea that those who are end users or relevant stakeholders form a partnership with researchers and work together on all aspects of research and development (Duncan, 2020; Mark & Hagen, 2020). The larger BioHeritage Challenge has worked with a co-designed approach across its research programmes (Duncan, 2020). In this context, te Tiriti o Waitangi was significant, and co-design specifically recognised the need for research to work with Māori communities and Māori knowledge alongside Western knowledge frameworks (Duncan, 2020). Smith et al. (2019) acknowledge that in most cases when Indigenous communities are engaged in co-design approaches, the aim is "to facilitate opportunities for Indigenous knowledge to inform production" but that Kaupapa Māori approaches to co-design assumes that te ao Māori is the norm (p. 4).

Our research methods exercised wānanga as a mode of collective thinking and problem solving, and as a group, we all co-created and co-designed the action plan. The wānanga and co-creation process was important for bringing together a range of relationships and diversity of thought. Each of our working group members brought with them different experiences, perspectives, relationships

and expertise that influenced our thinking and outcomes. This included those working in or having expertise in environmental engineering, management, law, politics, academia, policy, iwi governance, and media and communications. Outside of these roles, however, the members of the working group were also all members of their own hapū, whānau and communities. Our working group of researchers and practitioners all have whakapapa Māori, and the use of tikanga Māori, te reo Māori and mātauranga Māori in our wānanga was normal. The research process grew our relationships and connections with each other because we worked collectively. Consequently, our methods and methodologies on a smaller scale are reflective of co-design research theories and Kaupapa Māori and Indigenous research theories. The methods and methodologies grounding our research process required us to put relationships and working together at the centre of what we were doing and creating. In the next section, we briefly explore parts of the discussions we had in our wānanga.

The Wānanga

In our first wānanga, we discussed our vision for environmental governance and explored what resources and support would be most beneficial for each of our communities engaged in this work. Te Tiriti o Waitangi was central to this discussion as a key aspect of land and environmental governance in Aotearoa. If this foundational constitutional agreement is not honoured, the environment will continue to suffer (Options Development Group, 2022; Parliamentary Commissioner for the Environment, 1988). Te Tiriti o Waitangi affirmed tino rangatiratanga, meaning Māori would have continued care and self-determination over their lands, homes, waters and ways of life (Mutu, 2019). Since the signing of te Tiriti, successive colonial governments have failed to adhere to this contract by marginalising Māori communities and compromising their relationships to their own lands, environments, knowledge and rights asserted under te Tiriti o Waitangi (Mutu, 2022; Ross, 2020). The breaches of te Tiriti o Waitangi simultaneously resulted in environmental degradation, usually due to agricultural development by settlers, incentivised through Crown policies (Hayward, 2022; Parliamentary Commissioner for the Environment, 1988). We discussed at length the joint harm done to both Māori communities and the environment in our ongoing wānanga. While there have been positive steps towards better te Tiriti o Waitangi relations, it is important to reflect the repetitive cycles of harmful behaviour towards Māori and the environment that our communities observe and are impacted by over the long term (Tapsell, 2022). In contrast, Māori communities have by and large acted in good faith towards the government and aimed to honour te Tiriti relationships by gifting lands or resources for reserves, hospitals, schools and use rights for the benefit of all in the community (Durie et al., 1991; Tapsell, 2022). We realised the need to share the stories of these ongoing harms as well as the hope for a future free of them. This led to our vision:

> A flourishing and abundant taiao that sustains and nurtures all people of Aotearoa. Tangata whenua and tangata Tiriti valuing, being informed by, and in good relationships with Papatūānuku, and each other.

During our second wānanga, we reflected further on the barriers to and opportunities for realising our vision. Many of the barriers we discussed related to the ideologies and practices of current and past governance systems in Aotearoa—specifically, Aotearoa's settler colonial–influenced governance systems that are underpinned by a legacy of values such as private property ownership, domination and control (Jackson, 2018, p. 96). Settler colonial traditions and British common law established a hierarchical relationship between humans and nature in Aotearoa (Forster, 2019). This framework privileged white men as powerful actors in control of nature, and devalued the environment and its labour, such as soil cleansing pollutants, trees producing clean air and water providing essential life, in comparison with human labour (Forster, 2019). This devaluation extended to Māori communities, their work and their knowledge, reflecting ethnocentric and phallocentric viewpoints embedded in British common law (Mikaere, 2017; Johnston & Pihama, 1994).

The environmental policies and legislation implemented over many decades in Aotearoa have often reflected this colonial framework in which legislation and policy aim to control, preserve and safeguard resources without Māori participation (Ngata, 2022; Tapsell, 2022). For instance, the Wildlife Act 1953 assumed Crown ownership and control of all wildlife deemed valuable for protection and has blocked Māori communities' processes for caring for their taonga species (Waitangi Tribunal, 2011). Despite the enactment of the Wildlife Act in 1953, a grim reality persists: nearly 4,000 native species in Aotearoa are currently either threatened or at risk

of extinction under the government's governance models (Ministry for the Environment & Stats NZ, 2019). Therefore, these ideologies prove unhelpful in caring for our environment and also contradict Māori practices and ways of knowing, grounded in reciprocal and holistic practices and reaffirmed by te Tiriti o Waitangi (Hayward, 2022; Roberts et al., 1995).

The solutions and opportunities we found in our research and wānanga were notably connected to honouring te Tiriti o Waitangi, tikanga Māori and mātauranga Māori. The evidence suggests that by working together to value and embrace Māori knowledge and leadership, there will be more solutions and opportunities to benefit all of us and the environment (Bargh, 2019; Bargh & Tapsell, 2021; Jones, 2023). Tikanga Māori and mātauranga Māori are based on nurturing relationships rather than ownership or dominance over each other or the environment (Mutu, 2022; Ngata, 2022). For example, in a Māori worldview land was not something owned by one person, but something that a community belonged to and had rights and responsibilities to care for, protect and use. Concepts such as whakapapa, mana, mauri, rāhui, utu and whanaungatanga all contribute to the Māori scientific and legal systems that aim to nurture relationships and balance the impact and outcomes, for each other and the earth (Jones, 2010; Mead, 2016; Tapsell, 2022). Decision-making and knowledge creation considered through a te ao Māori lens is therefore less likely to function in the same way as colonial or British common law, and instead, steer us towards a more sustainable and equitable future (Bargh, 2019; Jones, 2010). Increasingly, the use of tikanga, mātauranga and global Indigenous knowledges and management practices, are being recognised as critical to successful efforts to mitigate climate change and biodiversity loss (IPBES, 2019; Wehi et al., 2019)

For the solutions to be successful, however, we must remember and reconcile the past harms and the constraints put on Māori communities, including their knowledge and ways of being—so this knowledge is not appropriated or co-opted in harmful ways going forward (Tapsell, 2022). Aotearoa's colonial past is often romanticised, misremembered or completely hidden from view by government and the majority (Elkington et al., 2020; Kidman et al., 2022). This leads to confusion and misunderstandings about why honouring te Tiriti relationships is so important today. Acknowledging and responding to the inequities and systematic constraints by partnering with and adequately resourcing Māori communities to undertake environmental management is critical. It is pivotal for the well-being of both humanity and the planet for our governance systems to enhance the care and support for all marginalised communities and their historical contexts (Elkington et al., 2020; Koroi, 2021; Tapsell, 2022). Our social connections and relationships must be nurtured so that we can care for each other and our environment—this is an intertwined opportunity.

In the third wānanga, we shared the values and actions we each thought were pivotal for embracing the solutions and overcoming barriers. We then discussed at length what—out of all the things we had shared—would be the four key themes used in our framework. Throughout our discussions, we consistently circled back to several key areas, which formed our relational framework:

- ***Whanaungatanga—relationships:*** the importance of cultivating right relationships, placing interdependence at the core of decision-making and emphasising long-term relationships over short-term transactions.
- ***Utu—balance and reciprocity:*** upholding the mana of oceans, rivers, lands and species. Recognising past imbalances, including allocating time and resources for restoration and healing among human and non-human communities.
- ***Mātauranga—knowledge and ways of seeing:*** recognising the significance of mātauranga Māori as an Indigenous way of knowing and seeing the world, which is unique and specific to the environments in Aotearoa.
- ***Mana and rangatiratanga—authority with care:*** Māori leadership and self-determination is already providing solutions, but it requires more support and resourcing.

In the fourth and final wānanga, we reviewed all the content together, asking: (a) Where is there overlap? (b) Who are we talking to? (c) What are we missing? (d) Which references are important? (e) What other case studies do we need? (f) How do we want people to feel reading this? (e) What are the practical actions needed from different groups?

We formulated our structure, key arguments and recommendations, and identified supporting references and resources. As a group, we were clear that we needed to be truthful about the harmful

histories and barriers to a healthy environment and te Tiriti o Waitangi relationships but also share values, positive stories and narratives that inspire and build connections among readers. We decided that each theme section would have a range of case studies and practical actions for four distinct groups participating in the environmental and social relationships in Aotearoa: (a) whole of government, (b) local government and government departments, (c) tangata whenua and (d) tangata Tiriti.

Providing actionable steps was a response to the numerous requests we each received over the time of our wānanga from external parties asking what they should do. We began to see an encouraging number of people and groups keen to support te Tiriti and better environmental outcomes, but unsure what collective steps (legislative, governance, policy) or individual steps they should take.

See the full report for all of the actionable steps, available online (www.metuauru.co.nz). The next section shares several case studies and examples of positive actions that align with Me Tū ā-Uru's relational framework and action plan.

Case studies

Working with Mātauranga Māori and local nature-based solutions

Since 2021, Te Arawa Lakes Trust, alongside hapū and iwi, have been trialling the use of uwhi mats—hand-woven harakeke mats—as an alternative to imported hessian mats to suppress weed growth in lakes and waterways (Partsch, 2023). The trust has uwhi trial sites in Lakes Tarawera, Rotomā, Rotoiti and Tikitapu, and Kaikaitāhuna Stream (Te Arawa Lakes Trust, 2022). The sites are monitored regularly, and it has been incredibly effective due to the uwhi lasting longer and having a more sustained effect on killing and suppressing weed growth than hessian mats (Bathgate, 2022). This innovative project is leading to an increase in native species present in the lakes and waterways (H. Brown, 2022). The uwhi project has also provided social and cultural benefits to the communities involved. The project provided jobs for local weavers during the Covid-19 pandemic and has cultivated community engagement by bringing together local hapū and marae to participate and share in protection of their waterways (Bathgate, 2022). This case study is a clear example of the benefits of working with mātauranga Māori and nature to find solutions to big environmental issues.

Supporting marae as places of refuge in emergencies

As environmental emergencies and natural disasters become more common, marae are often becoming the centre of crisis support and places of refuge for those who are displaced (Wara, 2023). This was particularly evident following the arrival of Cyclone Gabrielle in Aotearoa. Marae fed, sheltered and supported thousands of local people, and this was organised and run mostly by volunteers and those who had whakapapa connections to the marae (Wara, 2023; Yates, 2023). Māori communities' care work, or mahi aroha, regularly goes unnoticed and unsupported in Aotearoa, although it contributes greatly to the well-being of all of us—as expressed by marae during Cyclone Gabrielle (Cram, 2021; Tapsell, 2022).

In a positive step to support marae and enhance readiness for future natural disasters, emergency pods are to be established at 24 marae across the South Island ("New Emergency Pods", 2023). The pods are a joint effort between Te Rūnanga o Ngāi Tahu and Te Puni Kōkiri, and each will be adapted to local needs. This collaboration represents the government, iwi and local community working together for the betterment of all. In addition, it acknowledges the solutions and skills Māori communities bring.

Resourcing iwi to participate in decision-making at local government level

In 2022, two full-time environmental positions were established in collaboration with Taranaki Regional Council and eight iwi in Taranaki (Ashworth, 2022). The roles form part of an independent iwi environmental unit or Pou Taiao to provide support for iwi to be involved in and respond to resource management planning and policy. The Pou Taiao roles are funded by the Taranaki Regional Council until the end of 2024, staff are chosen by the eight iwi of Taranaki and administered through iwi entity Te Kotahitanga o Te Atiawa (2023). The roles include bringing mātauranga into plans, recognising iwi cultural and intellectual property rights, and identifying taonga species and cultural and historic sites (Te Kotahitanga o Te Atiawa Taranaki, 2023).

This case study provides an example of the ways that local governments can take practical steps to uphold their obligations and responsibilities under te Tiriti o Waitangi and ensure that iwi have increased participation and authority in decision-making around freshwater and other environmental issues (Lucas et al., 2023).

Do not shy away from wrongs of the past

In 1838, land in Te Papa Peninsula, Tauranga, was gifted to the Church Missionary Society by mana whenua (Tauranga City Council, 2022). This gift came with the condition that the land be held in trust for the benefit of Māori (Tauranga City Council, 2022). Subsequently, due to a series of land confiscations, much of this land was taken and the original agreement for the gift was broken. A portion of this confiscated land was transferred to Tauranga City Council (2022). To address this historical injustice, an agreement was made to return a parcel of land in the city centre to mana whenua in 2022. The land will be co-owned by Otamataha Trust, representing mana whenua Ngāi Tamarawaho, Ngāti Tapu, alongside Tauranga City Council in the form of the charitable trust Te Manawataki o Te Papa (Evans, 2022).

The plans for the returned land include the establishment of a new library, museum, civic whare, venue for council and community meetings, and exhibition space that will benefit the entire community by celebrating the culture and history of the area (Evans, 2022; Otamataha Trust, 2022). This act of returning land and creating joint ownership represents a step towards reconciling a past injustice and restoring the mana of both the land and hapū. It signals a commitment to healing relationships between te Tiriti partners and honouring the past with the hope of building a better future.

Future of Me Tū ā-Uru and conclusions

In conclusion, there is an urgent need for transformative environmental governance in Aotearoa; this includes the way Māori and non-Māori relate to each other and share knowledge and ideas. The Me Tū ā-Uru (Bargh et al., 2023) action plan was created through co-design and Kaupapa Māori–informed methods and methodology. The action plan presents a novel approach to prioritising balanced relationships between people and the environment both in the way it was created and with regard to the purpose of the plan. Recognising the historical social harms and structural barriers that have impacted communities, the plan seeks to encourage positive and actionable steps for government departments, decision-makers and communities to strengthen their connections and relationships. Me Tū ā-Uru stands for a flourishing Aotearoa, aligning with other visionary plans such as those of Matike Mai, He Puapua and Te Pūtahitanga, which envision just and more equitable governance rooted in te Tiriti o Waitangi.

In sharing our research methods and process, we aim not only to inform but also to inspire positive action. We acknowledge the distress caused by environmental crises and strive to provide a hopeful and truthful narrative, drawing on successful examples. Moving forward, our goal is to continue sharing hopeful visioning and practical steps through various platforms, fostering a collective commitment to a flourishing and abundant Aotearoa.

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Glossary

Aotearoa	te reo Māori name for New Zealand
hapū	subtribe
harakeke	flax
iwi	tribe
kaitiaki	guardian, minder; custodian over natural resources
Kaupapa Māori	research methodology
Kāwanatanga	British Crown/government
mahi aroha	volunteer work, care work
Māori	Indigenous peoples of Aotearoa New Zealand
mana	authority and power
mana whenua	Māori tribes and subtribes from a specific geographical area
marae	meeting house
mauri	life principle/force
mātauranga	knowledge/wisdom
Otamataha Trust	administers property in Tauranga on behalf of Ngāti Tapu and Ngāi Tamarawaho
Papatūānuku	earth mother
Pou Taiao	environmental iwi uni in Taranaki
rangatiratanga	self-determination
rāhui	temporary closure or prohibition placed on an area
taiao	environment
tangata Tiriti	those who live in Aotearoa New Zealand and are not tangata whenua

tangata whenua	Māori communities
taonga	precious; protected natural resource
te ao Māori	Māori worldview
Te Arawa Lakes Trust	board responsible for the oversight and management of Te Arawa's 14 lakes
Te Kotahitanga o Te Atiawa	post-settlement governance entity for Te Atiawa
Te Manawataki o Te Papa	trust co-governed by Otamaha Trust and Tauranga City Council to manage land in the civic precinct
te reo Māori	the Māori language
Te Puni Kōkiri	the Ministry of Māori Development
Te Rūnanga o Ngāi Tahu	post-settlement governance entity for Ngāi Tahu
te Tiriti o Waitangi	the Treaty of Waitangi, founding document first signed in 1840 by Māori and the Crown
tikanga	custom/law/correct practice
tino rangatiratanga	self-governing; having absolute independence and autonomy
utu	balance/reciprocity
uwhi	mat made from flax
wānanga	meeting/discussion
whakahou	restore
whakapapa	Māori lineage
whānau	family; nuclear/extended family
whanaungatanga	relationships
whare	house
whare wānanga	traditional houses of learning

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HAUMANU HAUORA

A commentary on strengthening health institution responsiveness to Māori health in the face of climate change

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Abstract

Climate change is the biggest threat to humanity through compounding ecological disasters. A focus on global averages tends to hide dramatic differences and mask health disparities that exist for Indigenous people. For 21 years, district health boards (DHBs) were responsible for providing or funding the provision of health services across Aotearoa. The introduction of the Pae Ora (Healthy Futures) Act 2022 disestablished DHBs and offered an opportunity to reshape health in ways that give serious consideration to climate change impacts. The need to give greater consideration to Indigenous people in climate change conversations is essential. The Waitangi Tribunal highlights areas where the Crown needs to work to improve Māori health outcomes. A clear deficit in existing policy process means a lack of preparedness for the intersecting health crises vulnerable Māori will experience in the face of climate change. Structural change is needed to strengthen health institution responsiveness to Māori health needs.

Keywords

climate change, health, Māori, policy

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Introduction

On a global scale, climate change is the biggest threat to humanity through compounding ecological disasters such as droughts, fires, rising sea levels, ocean acidification, flooding and the spread of vector-borne diseases (Intergovernmental Panel on Climate Change, 2019, 2021). When it comes to examining climate change impacts, a focus on global averages tends to hide dramatic disparities between rich and poor, and there remain large segments of the human population whose lives are curtailed by poverty, hunger and disease (Myers & Patz, 2009, p. 225). Climate change disproportionately impacts the socially and politically marginalised whose very identity is closely connected to the environment (Begay & Gursoz, 2018; Tassell-Matamua et al., 2021). Well documented is the notion that Māori experience a lower average life expectancy than other New Zealanders (Dow, 1999; Ministry of Health, 2020).

A research project, named "Haumanu Hauora", received funding from the Vision Mātauranga programme of the Deep South National Science Challenge (2020–2022) to look at pathways for strengthening health institution responsiveness to climate change. The team took up the task of gathering quality information that would help guide health institutions (district health boards [DHBs]) to prepare to adapt policies to the scale and pace of climate change. With Bridgette Masters-Awatere as the lead, the team worked to determine how health institutions develop Māori responsive policy as a preparatory step in anticipation of climate change impacts on Māori health. Several activities were undertaken and presented in the Haumanu Hauora project report (Masters-Awatere et al., 2022), and these are presented in brief in this commentary: a critical analysis of literature and a systematic review of publications assessed for their inclusion and consideration of Indigenous perspectives; speaking with tangata whenua and DHB staff from the Bay of Plenty, Lakes and Waikato DHB regions about their experiences of climate change and involvement with health services; recruitment of rangatahi who were actively engaged in climate change activities to participate in interviews; and an environmental scan of available website information on the 20 DHBs to ascertain the extent of policy that speaks to both the Treaty of Waitangi and climate change.

This commentary presents a summary of our findings from activities and highlights the relevance of these to current legislation in Aotearoa.

Evidence pathway

As the primary health providers and funders of health services around the country for more than 20 years, DHBs were engaged as the site through which to understand the Māori health and climate change policy needs. While the timing was coincidental in that DHBs were disestablished in July 2022, at the time of the conclusion of our project there remained lessons from the "old" health system that provided insight for progression in the "new" health system.

DHBs have overseen and been responsible for providing and funding most of the health services throughout Aotearoa since they were established in 2001. In 2018 a review of the health system began. Subsequent review findings noted a fragmented health system that struggled to deliver equity and consistency for all New Zealanders. This latest health reform, with the creation of the partnership arrangement, heralded the promise of a new public health system that can better address the persistent health inequities that Māori experience.

Systematic review

Through PRISMA protocols (Moher et al., 2009), 22 international studies were identified as suitable for inclusion in the review. Included studies came from Fiji (n = 1), Samoa (n = 1), Aboriginal and Torres Strait Islands (Australia) (n = 10) and First Nations and Inuit communities (Canada and the United States) (n = 10). Studies were analysed according to the four components (cultural centeredness, community engagement, integrated knowledge transfer and systems thinking) of the He Pikinga Waiora framework (Oetzel et al., 2017). This framework was developed for people working with Indigenous communities and intentionally centres Indigenous knowledges. Our analysis found that collaboration with Indigenous groups remained shallow, and that only two of the included studies explicitly mentioned health systems or health institutions as state actors.

Our systematic review of published literature highlighted the minimal ways in which Indigenous voices are included in climate change adaptation planning internationally (Masters-Awatere et al., 2023). This is despite prior recognition that Indigenous groups are highly vulnerable to the health impacts of climate change (Clayton et al., 2015; Doherty & Clayton, 2011; Jones, 2019). Considering this review in light of the work being done in Aotearoa New Zealand, specifically that of the Office of the Māori Climate Change Commissioner (http://www.

maoriclimatecommission.co.nz/) and the Ministry of Health's (2020) Māori Health Action Plan 2020–2025, we find it heartening to see that government agencies within Aotearoa are prioritising Indigenous responses to climate change adaptation activities.

Tangata whenua and DHB staff interviews

Often framed as a recent phenomenon, climate change is something that Māori have been responding to for a long time: "Māori have been involved in climate change action for decades" (Mike Smith, personal communication, 23 June 2022). Within our interviews we identified challenges within health service policy processes that warranted further investigation. In response to interviews with tangata whenua, we refined the existing policy framework and identified key intervention points transmutable to different contexts and structures. Our research conversations with tangata whenua and DHB staff identified two core themes: current policy process and its weaknesses, and co-designing policies with Māori.

Theme one includes institutional strategies of excluding Māori input. This is an obvious weakness in current policy development practices within DHBs. The corollary is ensuring opportunities for comprehensive and resourced Māori contributions to future climate change policy development. Our research participants expressed that a collectively perceived institutional weakness is that health policy can be developed without Māori input. The optional nature of Māori inclusion, and the pervasive inconsistency of inclusive practices, is a significant issue. We also share narratives of tensions arising from ad hoc invitations and of small teams of Māori staff being overburdened with requests to review multiple drafts of policies.

Theme two reflects on current policy development practices when searching for solutions-based opportunities for Māori in the climate change space. We were interested in opportunities that allow for the inclusion of Māori aspirations and experiences in climate change policy processes. Participants were eager for avenues to be solidified so that there would be consistent opportunities for Māori input into climate change policy.

Rangatahi interviews

Rangatahi Māori between the ages of 18 and 25 were interviewed. They were all wāhine with a passion for and interest in or had a role related to climate change. Some interviews were held kanohi ki te kanohi, while others were held via videoconference because of COVID-19 lockdown restrictions.

Among rangatahi narratives, the concept of whakapapa was woven throughout how rangatahi connected to the environment and hence climate change, sat at the foundation of the responsibility they felt for the taiao, and lastly, grounded their aspirations for climate change responses. Rangatahi expressed that paradigm shifts grounded in whakapapa are crucial to ensure climate-safe realities are attained for both tangata whenua and the taiao (Ranginui Charlton, 2023). Further findings highlighted that rangatahi consider themselves to be equipped to contribute to decision-making spaces in order to address climate change, but these spaces must transform so as not to structurally disempower rangatahi (Ritchie, 2021).

Environmental scan

To ensure our in-depth focus on health institutions at the regional level was consistent at a national level, our team did an environmental scan of all 20 DHBs' policies related to climate change and Māori health (an activity undertaken in 2021–2022). An examination of the websites found a resounding lack of policy that dealt with climate change or a recognition of Māori health vulnerabilities to climate change. It was especially problematic that not a single DHB website publicly pronounced policies that addressed climate change and the Treaty of Waitangi in unison. In Aotearoa, health institutions such as DHBs and other providers have an obligation to ensure they are responsive to Māori health needs. The Wai 2575 report (Waitangi Tribunal, 2023) highlights areas the Crown needs to work on to improve Māori health outcomes. This gives rise to the need for Māori community health service provision and for Māori models of health and wellbeing to be included more readily in health institution policy, process, and ultimately, service delivery. Ensuring consistent Māori input in the policy process offers greater potential for such a vision to be realised. Our intention is to strengthen health institution preparedness to mitigate risk to Māori health in the context of climate change, and it is clear that there is substantial mahi to do in this space.

Towards an actionable solution

Through our research process, we examined the health institution policy processes so that we could identify places of potential in which to intervene in a proactive manner in order to strengthen Māori voices and guide climate change policy.

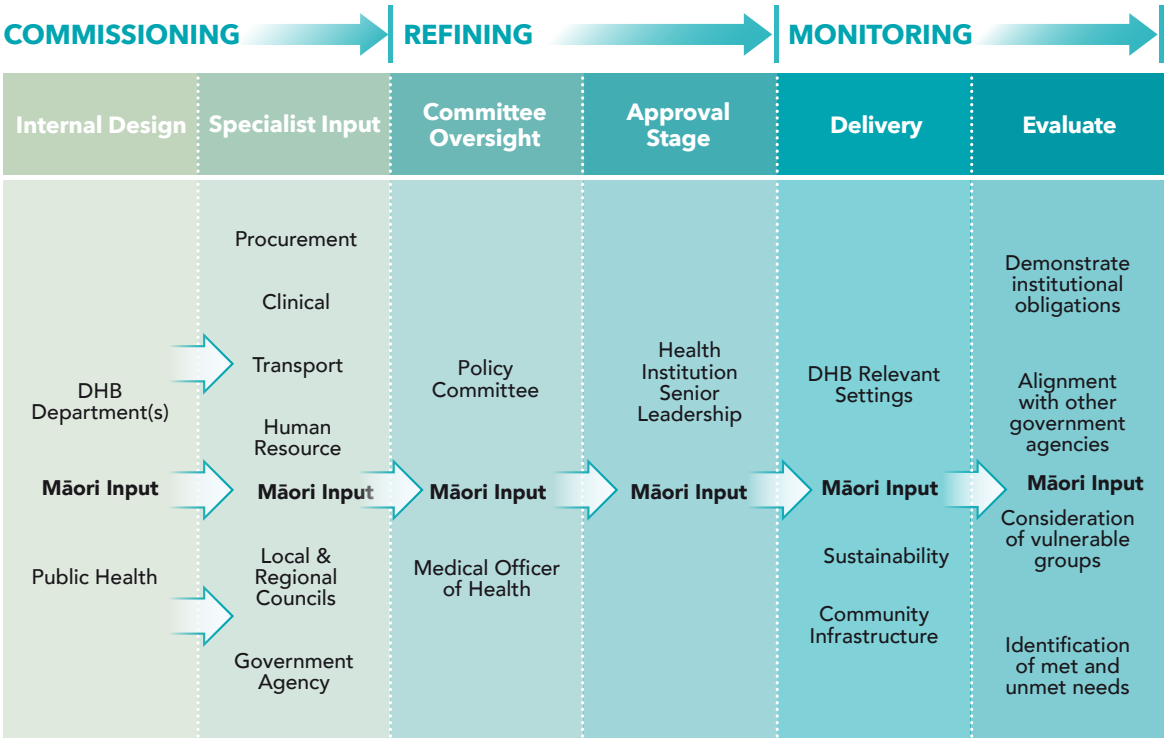

FIGURE 1 Haumanu Hauora proposed climate change policy process to ensure Māori input

The process (based on what we heard in interviews with tangata whenua and DHB or health institution staff) minimised tangata whenua input into DHB policy. The framework demonstrates several key problems, namely, a lack of consistent Māori input and an absence of policy evaluation. In light of our interview findings, we developed a policy framework that we present as transmutable to different contexts and structures. Our proposed changes to the policy development, implementation and then evaluation process within DHBs (see Figure 1) would address the problem of excluding Māori voice in the process and thereby ensure that Māori input is a consistent part of the process and that decision-making power would be held by Māori at key points before progressing to an evaluation phase.

Along with the new policy development process proposed, we identified five intervention points that are important for effective policy that incorporates climate change and Māori health perspectives (see Figure 2). Described below, they are ensuring foundation alignment, enhancing access to care, engaging with vulnerable communities, building capacity and capability, and demonstrating institution obligations:

- *Ensuring foundation alignment* is imperative to consider decision-making factors, climate adaptation, Māori health delivery and outcomes, and the social determinants of health. Consideration of these four areas in a commissioning phase of policy development clearly sets out the expectations for all new health institution policy.
- Public health institutions are part of the larger health system that have responsibility for maintaining health delivery, funding and service provision in Aotearoa. A recent finding of the Waitangi Tribunal (2021) that health services had not met the health needs of Māori means that work needs to be done to improve equity in health outcomes for Māori. *Enhancing access to care* involves improving the health system to reduce unmet health needs, ideally while also preparing for the impacts of climate change.
- The need to implement climate change as core business across health services to build capacity and capability to strengthen leadership and delivery is an intervention point that is pertinent to the entirety of the policy process. Climate change was reportedly not well understood by health institution staff and participants emphasised the need for strategies to help to increase knowledge and understanding. *Building capacity and capability* will strengthen

FIGURE 2 Five key intervention points to enhance Indigenous perspectives in policy

all phases of policy development, in turn generating more effective policy outcomes.

- Indigenous people are disproportionately experiencing the negative impacts of climate change, despite generally contributing little to climate emissions. The deepening climate crisis generates specific impacts that will exacerbate the already disproportionately negative health impacts on Māori. Economic insecurity and deprivation substantially hinder capacities to respond to climate change impacts or seek health assistance. Health institutions such as DHBs and other providers have an obligation to ensure they are responsive to Māori health needs. *Demonstration of institution commitment* is key to making progress.

Relevance to legislation

The Waitangi Tribunal (2023) Wai 2575 report highlights areas the Crown needs to work on to improve Māori health outcomes. This gives rise to the need for Māori community health service provision and for Māori models of health and wellbeing to be included more readily in health institution policy, process, and ultimately, service delivery. A clear national policy to mitigate the impact of climate change on Māori health is needed. Health institutions need to improve adaptation preparedness, while simultaneously engaging with mitigation and prevention.

The Ministry for the Environment (2019) produced the National Climate Change Risk Assessment, which clearly states the importance of prioritising wellbeing and health for people and the environment. While much of the focus of climate change research has drawn on population-level analyses, there remains a lack of investigation towards Indigenous (in this case, Māori) health risks (Bennett et al., 2014; Raerino et al., 2013). Jones et al. (2020) noted

the need to improve the quality of evidence relating to issues of importance to Indigenous peoples. Additionally, a recent report (Awatere, King et al., 2021) and webinar (Awatere, Masters-Awatere et al., 2021) by Māori research experts identified a clear need to prioritise Māori when considering the Ministry for the Environment's National Climate Change Risk Assessment (Awatere, King et al., 2021).

Those most at risk of exposure to floods, droughts, extreme heat and the spread of vector-borne diseases are Indigenous and low-income groups (Masters-Awatere, 2021). Such peoples are especially vulnerable to adverse health impacts from climate change (New Zealand College of Public Health Medicine, 2013). There are clear and strong connections to the Ministry of Health's (2014) He Korowai Oranga framework element of wai ora—healthy environments, which is recognised as essential to the Pae Ora Act (healthy futures for Māori).

Unfortunately, the opportunity to incorporate a clear reference within legislation (Pae Ora [Healthy Futures] Act, 2023) to embed consideration of the impacts of climate change on health, and especially Māori health, was overlooked despite a submission by the research team on how and where to do so (e.g., in Section 14: Functions of Health New Zealand & Section 19: Functions of Māori Health Authority to protecting the health needs of Māori [and other vulnerable population groups]).

Where climate change impacts Māori community physical environments (e.g., marae, urupā and water quality), there are also relevant economic, cultural, social and psychological impacts. The role of the healthcare system in the context of climate health is important. The Pae Ora (Healthy Futures) Act needed to include specific reference to meeting the health needs arising from the impacts of climate change to ensure a systems approach. Preparation for climate change is crucial. Ensuring necessary preparations are made would ensure that all health services can continue to function following climate change events—such as floods; heavy, continuous rain; and heatwaves—and prevent disruption to the provision of usual health services. There needs to be clear direction and signals from the Ministry of Health.

There already exists legislation that connects health and climate change. Pae Ora needs to (and can easily) connect with the Climate Change Response (Zero Carbon) Amendment Act 2019, which requires the government to develop and implement policies for climate change adaptation and mitigation. Of interest is pt 1C, "Adaptation", specifically, s. 5ZS(4), "National adaptation plan": "In preparing a national adaptation plan, the Minister must take into account the following: (a) economic, social, health, environmental, ecological, and cultural effects of climate change, including effects on iwi and Māori."

Closing comments

Both tangata whenua and rangatahi participants shared their experiences of climate change and its impacts upon their whānau and hāpori. Knowledge of climate change ranged widely among these participants. Some had a deep understanding of the nature of climate change and how to apply it to the health and wellbeing of whānau, hapū and iwi, while others asked, "What is climate change?" Understandings of climate change were compared with the impacts of extreme weather events on the environment, waterways, marae and urupā situated on the coastline and by waterways. The Pae Ora (Healthy Futures) Act 2022, the changing health structure, the need for a broader review of health infrastructure, the necessity to build relationships with iwi, hapū and whānau Māori, and barriers that hamper the implementation of recommended policy frameworks combine to communicate that our identified intervention points cannot be ignored.

There is a clear deficit in the existing policy processes. This means there is a lack of preparedness for the intersecting health crises that vulnerable people, including Māori, will experience in the face of climate change. Despite clear resilience and adaptation strategies, structural change is needed to address identified disadvantages. Strengthening health institution responsiveness to Māori health needs is essential. The refined policy framework and intervention points are a key place to start; central to the success of this is the connection between health institutions and iwi and Māori providers to develop policy that is centred on Kaupapa Māori and focused on whānau wellbeing to guide and develop climate adaptation strategies that fit Māori communities.

Glossary

hāpori	community
hapū	subtribe
iwi	tribe
kanohi ki te kanohi	face to face
Kaupapa Māori	Māori based topic/event/enterprise run by Māori for Māori

mahi	work
marae	tribal meeting grounds
rangatahi	young adult Māori
taiao	Earth, natural world, environment
tangata whenua	Indigenous people of the land, first people of the land
urupā	burial ground, cemetery
wāhine	women
wai ora	healthy environment
whakapapa	genealogy, ancestry, familial relationships
whānau	family; nuclear/extended family

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TE MANU HUNA O TE PŌ

The kākāpō's cultural legacy

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Abstract

The kākāpō, a nocturnal parrot native to Aotearoa New Zealand, embodies resilience and rarity. Once found across the country, this taonga species is now critically endangered, threatened by habitat loss and predators, and requiring major conservation efforts. This article is an attempt to retrieve mātauranga Māori about the kākāpō by exploring its role in cosmology, material culture and oral traditions. Our search of the literature, mōteatea and waiata archives, and museums resulted in very few references of central interest to this study. Most references concerned the kākāpō's decline and conservation. References of note were Elsdon Best's detailed account of the bird's ecological, cultural and material significance as a taonga species; a rare waiata tangi collected by George Grey in which the composer mourns the loss of a child; and the kahu kākāpō in Perth Museum, the only known example of its kind. In response to the limited references to kākāpō, a waiata tangi composed by the first author is used to discuss our results and as a model for revitalising knowledge and memory.

Climate change poses substantial challenges to the survival of the kākāpō, including disruptions to essential food sources and habitat. These challenges mirror the historical upheavals faced by Māori and the natural world. To address these threats, adaptive strategies must prioritise not only the conservation of kākāpō and other threatened species but also the revitalisation of mātauranga Māori, reaffirming its significance in safeguarding this taonga species.

Keywords

biodiversity conservation, cultural heritage, kākāpō, mātauranga Māori, mōteatea, taonga species

Introduction

The kākāpō (*Strigops habroptilus*), a nocturnal, flightless parrot endemic to Aotearoa New Zealand, occupies a central place in ecological and cultural narratives. Critically endangered, with fewer than 250 individuals remaining, the kākāpō's decline exemplifies biodiversity loss in Aotearoa, a nation with one of the highest rates of threatened species globally (Bradshaw et al., 2010). Beyond biology, the kākāpō is a

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taonga deeply interwoven with Māori cosmology, material culture and traditions.

This article examines Māori mōteatea and waiata, archival literature, and museum artefacts to uncover the kākāpō's historical and cultural significance. By engaging with these sources, the research highlights the importance of Māori perspectives in enriching conservation narratives and practices.

Kākāpō decline

The kākāpō, also known as tātarapō, tarepō and kākātarapō (Moorfield, n.d.), was once widely distributed across Aotearoa, as evidenced by subfossil records and early observations (Brunner, 1848; Reischek, 1884; Scarlett, 1979; Williams, 1956). These nocturnal, flightless parrots thrived in dense forests and scrub from the North Island to the South and Stewart Islands (Best, 1942). However, the arrival of humans, mainly British colonial settlers, alongside introduced predators such as rats, stoats, ferrets and cats, devastated kākāpō populations. Habitat destruction, predation and hunting drove the species to the brink of extinction by the late 20th century.

The alarm was raised in the 1970s when naturalists and conservationists, including Don Merton, recognised the kākāpō's precarious status (Clout & Merton, 1998; Eason et al., 2006). Kākāpō, primarily from Fiordland, were relocated to predator-free offshore sanctuaries such as Whenua Hou (Codfish Island) and Pukenui (Anchor Island). These efforts established the foundation for intensive management strategies, integrating habitat restoration, genetic intervention and community engagement (Department of Conservation, n.d.).

Recovery strategies

Scientific research, particularly in genomics and reproductive biology, has significantly advanced kākāpō recovery efforts. A comprehensive study sequenced the genomes of 169 kākāpō, representing nearly the entire population as of early 2018. This genomic dataset enabled researchers to evaluate genetic diversity, identify traits linked to chick growth and disease susceptibility, and predict breeding behaviours to guide conservation strategies (Guhlin et al., 2022; Savage et al., 2020). Innovative monitoring techniques, such as analysing environmental DNA (eDNA) from soil samples, now enable detection of kākāpō and other vertebrates without disturbing them. These methods also enable individual identification, providing valuable tools for conservation efforts (Urban et al., 2023).

Studies on the genetic basis of feather colour polymorphism in kākāpō suggest these colours may have evolved to help the birds evade now-extinct avian predators. Understanding these evolutionary dynamics sheds light on genetic diversity and informs future conservation strategies (Urban et al., 2024).

Major research initiatives addressing habitat destruction and introduced predators include relocating kākāpō to predator-free islands, restoring native vegetation crucial for their diet and nesting, and establishing fenced, predator-free mainland sanctuaries such as Sanctuary Mountain Maungatautari (Elliott et al., 2001; Innes et al., 2019). Habitat studies have highlighted the species' preference for dense forests and fruiting trees, guiding targeted restoration efforts (Innes et al., 2019). However, climate change threatens the availability of these kinds of habitat and critical food sources such as rimu tree masts, and adaptive management strategies are required (Eason et al., 2006). Despite these advancements, maintaining predator-free environments remains an expensive and significant challenge.

Community engagement and public awareness

Conservation efforts have heavily emphasised public awareness, community engagement and policy support. As a national icon, the kākāpō has inspired campaigns and funding initiatives highlighting its cultural and symbolic value while increasing public awareness (Seabrook-Davison & Brunton, 2014). A central component of these efforts is the Kākāpō Recovery Programme's Facebook page (Kākāpō Recovery, n.d.), which has become a key platform for informing the public and fostering global engagement. The page provides regular updates, including breeding season highlights, individual kākāpō health reports and insights into the recovery team's work. The platform has cultivated a dedicated community of supporters by combining informative posts with interactive features such as Q&A sessions and live streams. This digital presence raises awareness and motivates action, such as donations, volunteer participation and advocacy for conservation policies.

Documentaries have further amplified public awareness and support for kākāpō conservation. Early films such as *The Edge of Extinction* (Harraway, 1976) documented initial relocation efforts to predator-free islands, while *To Save the Kākāpō* (New Zealand Geographic, 1998)

highlighted the first population increase in over a century. Recently, *Kākāpō Crisis* (1News, 2019) and *Brave New Wilderness* (Stash—Free Documentaries, 2024) have captured the ongoing challenges and successes of conservation efforts, playing a pivotal role in mobilising public engagement.

Historical and cultural significance

From a Māori perspective, understanding the kākāpō's historical and cultural significance is a vital component of conservation efforts. Acknowledging Ngāi Tahu as tangata whenua of those islands that serve as sanctuaries is a crucial step in recognising their cultural and ancestral connection to the kākāpō. The Ngāi Tahu Deed of Settlement (New Zealand Government, 1997) formalises this relationship by ensuring Ngāi Tahu's involvement in key policy decisions regarding the bird's protection, management and conservation, including a dedicated seat on the Department of Conservation's Kākāpō Recovery Programme. While this collaboration is significant, it marks only the beginning of a broader opportunity to integrate Māori cultural narratives into kākāpō conservation and public awareness initiatives.

The kākāpō has been recognised as endangered for nearly 200 years, a period during which intergenerational Māori knowledge about the species has significantly diminished. This decline highlights the urgency of retrieving archival records, examining museum collections and engaging with oral traditions to restore the kākāpō's place in contemporary consciousness before this knowledge fades further.

Central to this effort is examining waiata and mōteatea such as those collected by scholars in the 1800s and early 1900s. These records may contain references to ecological elements—flora, fauna and landscapes—offering insights into the kākāpō's role in the lives of Māori. Studying kākāpō-related artefacts in museum collections could further reveal the bird's cultural significance and historical human–environment interactions. Items such as kākahu adorned with kākāpō feathers might reveal the bird's role in Māori material culture, while hunting and captivity tools could provide clues about traditional practices, including adaptations to the kākāpō's nocturnal and ground-dwelling behaviours. These artefacts may also shed light on seasonal patterns, habitats and the species' historical range. Moreover, their geographic distribution could indicate trade networks (Coutts, 1969), inter-iwi relationships and the bird's broader significance.

Collaborative research with Māori weavers and knowledge holders could connect these artefacts to oral histories and traditional practices, enriching cultural understanding and supporting conservation initiatives that honour the kākāpō as a taonga species. This study seeks to explore the archives and invigorate the kākāpō's historical and cultural significance, ensuring its legacy endures.

Method

This study involved accessing public archives, including literature, artefacts and textiles, to uncover insights into the kākāpō's significance. The process began with networking and collaboration with archivists, librarians, conservationists and researchers to identify and locate relevant materials. The University of Waikato Library served as the primary source, particularly its extensive New Zealand and Māori collections.

Key scholars included George Grey (1885), Elsdon Best (1942) and Edward Shortland (1980). Apirana Ngata's (1874–1950 with Pei Te Hurinui Janes and Hirini Mead) collection of mōteatea and waiata, *Ngā Mōteatea,* stands out for its rich metaphors and references to native species. We also examined the works of James Cowan (1870–1943) and Te Rangi Hīroa (Sir Peter Buck) (1877–1951) as potential sources of references.

The University of Waikato Library also houses the Pei Te Hurinui Jones manuscript collection, which is particularly significant because Jones was the principal translator of mōteatea and waiata collected by Apirana Ngata and published in the *Ngā Mōteatea* series (Ngata & Jones, 2004; Ngata et al., 2004). The Pei Te Hurinui Jones collection also includes artefacts acquired and gifted to Jones during his lifetime, providing access to tangible taonga that may offer valuable insights into kākāpō.

Harlow and Thornton's (1986) index is an essential resource for exploring and searching *Ngā Mōteatea*, given that it is not available electronically. Additional searchable online collections, particularly for older texts, include Index New Zealand, Papers Past and the New Zealand Electronic Text Collection.

The research process began with a systematic desk search of the library's catalogue, using keywords such as "kākāpō", "manu pō", "te manu huna o te pō", "manu ngaro", "te manu a Tāne", "native birds", "Māori birds", "forest lore" and "ecology". We refined the results through filters for subject, author and publication date. We recorded call numbers to locate physical materials and then reviewed them for references to the kākāpō.

Interlibrary loans enabled us to access additional content for unavailable resources. This systematic approach ensured a thorough search for references to the kākāpō within the library's holdings. We applied a similar approach to online materials, where we found that electronic word and phrase searches proved remarkably effective.

Te Whare Taonga o Waikato Museum & Gallery was the only institution visited in person; all other searches were conducted through online catalogues and collections. These included Te Papa Tongarewa, Auckland Museum, Canterbury Museum and Tūhura Otago Museum. Online international searches extended to the British Museum and Perth Museum. References to the kākāpō were identified in the catalogues of these institutions, and records were retrieved and analysed for their relevance to the study's focus.

Findings

The overall outcome of the search for references to the kākāpō's historical and cultural significance was marked mainly by an overwhelming silence, except for three notable discoveries described below.

Māori narratives

We found Elsdon Best's (1942) *Forest Lore of the Maori* to be the most comprehensive description of the historical and cultural significance of the kākāpō in te ao Māori. Drawing on knowledge from his Tūhoe informants, Best (1942) describes the bird's ecology, traditional hunting practices, and the use of snares and trained dogs (Black, 1922). Best notes, as do White and Hamilton (1925), the kākāpō's inability to fly, its diet of forest fruits such as rimu, hīnau, tawa berries and fern root, and its green plumage, which provided effective camouflage.

Best also highlights the kākāpō's presence in recorded oral narratives. In his retelling of the story of Raumahora and Takarangi of Taranaki (circa 1740), Best (1927) describes how Ngāti-Tuoi gifted kākāpō plumes to Raumahora during a visit to her village, Whakarewa. These plumes were part of a broader exchange of prestigious items, including cloaks and weapons, as the tribe sought to honour Raumahora's exceptional leadership, hospitality and kindness. Hata and Fletcher (1917) document a similar narrative. However, our search revealed that references to the kākāpō in collected narratives are generally limited and appear primarily in contexts where the kākāpō is incidental to the main events or themes of the story. Our review of titles by James Cowan (1930) and Buck (1949) resulted in no further references.

Mōteatea me ngā waiata

The *Ngā Mōteatea* series and *Ko nga Moteatea, me nga Hakirara o nga Maori* (Grey, 1853) were thoroughly examined for references to kākāpō. Combined, this extensive archive, comprising over 500 mōteatea, waiata and karakia, is a critical repository of Māori oral history. While rich in references to native birds, only one entry specifically mentions the kākāpō. As found in Grey (1853, p. 329), a waiata tangi, composed by an unknown author, mourns the loss of a lastborn child. The kākāpō is invoked as a metaphor not just for loss but also for preciousness.

Key imagery in the waiata tangi draws parallels between the kākāpō's ecological characteristics—its rarity, soft green feathers and elusive nature—and the irreplaceable qualities of the child and relationship being mourned. Specific phrases include "huruhuru kākāpō", referencing the bird's prized feathers; "taku manu huna i te pō", evoking its nocturnal and secretive nature; and "Te Whatu o Poutini", a link to cosmogenesis and a metaphor for pounamu, reflecting the bird's colour, rarity and value as a taonga. These connections deepen the symbolic weight of the kākāpō, linking its place in the forest to the enduring value and cherished memory of the deceased.

This lone waiata tangi underscores not only the kākāpō's symbolic significance but also its concerning absence from the broader Māori oral chant record, reflecting another layer of mourning—one of cultural erosion and the diminishing of collective memory. Nevertheless, other memory triggers persist within pūrākau and whakapapa, preserving connections to the bird's legacy.

Museum collections

In Aotearoa, museum collections hold various kākāpō-related items, including biological specimens such as taxidermy mounts, skeletons and DNA samples. Historical documentation, including collector notes, illustrations, and photographs, provides valuable insights into the bird's natural history and early conservation efforts, highlighting the kākāpō's struggle for survival. Aside from a reference to kākāpō feathers interwoven into a kahu kiwi at Te Papa Tongarewa (Kahu kiwi, 1850–1900), no significant catalogue references to other kākāpō-related artefacts were found during our museum searches.

Although it is not housed in a museum, Simmons (1967) offers a detailed professional analysis of a 17th-century cloak made from kākāpō pelts excavated from a burial cave at Lake Hauroko. This cloak remains in situ, safeguarded by an iron

grille installed in 1967 with the approval of the Murihiku Tribal Executive.

Internationally, the most significant item identified is a kāhu kākāpō housed in the Perth Museum and Art Gallery, Scotland. David Ramsay collected the cloak in the early 1800s and donated it to the Perth Literary and Antiquarian Society in 1842 (Tamarapa et al., 2022). This cloak is of exceptional importance as the only known kāhu kākāpō in existence in a museum. Its presence in Scotland highlights historical exchanges during the colonial era and raises critical questions about the preservation and ethical stewardship of Indigenous cultural artefacts in international collections.

The findings from the search reveal the kākāpō's profoundly limited presence across Māori oral traditions, early scholarly records and museum archives. While the overall lack of references to the bird's historical and cultural significance is striking, the few that do exist affirm its status as a much-treasured taonga. From Elsdon Best's detailed ecological observations and references to a poignant waiata tangi collected by George Grey, the kākāpō emerges as a symbol of rarity, preciousness and survival. Despite the sparse representation of kākāpō-related artefacts in museum collections, important biological taonga and historical records have been preserved. Among these, the kāhu kākāpō housed in the Perth Museum stands out as a singular, irreplaceable artefact, reflecting both the bird's ecological significance and its deep cultural resonance.

Discussion

In response to the limited references to kākāpō, this discussion is centred on a waiata tangi composed by the first author. This composition aims to address the gaps in the mōteatea and waiata

KEI HEA RĀ KOE, E KĀKĀPŌ?

He Waiata Tangi
Nā Moana Murray

1	Kei hea rā koe, e kākāpō?	*Where have you gone, kākāpō?*
2	Te manu kura huna i te pō	*The hidden bird of the night*
3	Mai i a Tāne-tikitiki-o-Rangi	*Descendant of Tāne-tikitiki-o-rangi*
4	Mai i a Tū-mata-mata-ika	*Of Tūmata-mata-ika*
5	Mai i a Tā-whiri-mātea e ī	*Of Tā-whiri-mā-tea*
6	He hoa i riro mai i te pakanga	*An ally earned in the battle*
7	o Te Rangi-kaupapa, Ko Pekapeka,	*Te Rangi-kaupapa*
8	Ko Pōpōia ngā haumi i Rarohenga, e!	*Alongside Pekapeka and Pōpōia, in the depths of Rarohenga*
9	Ka uhi te pōuri ki ō huruhuru	*Grief wrapped in your feathers*
10	He mārō kakara mai i a Poutini	*A fragrant mārō brought forth from Poutini*
11	Mauria e Pāpā mō ake tonu e ī!	*You remain in Pāpā's grasp forever*
12	Me te puāwai huarangi rimu	*Like the flowering of the rimu berry*
13	whāioio anō hei oranga	*You will once again flourish*
14	Mai rānō e tangi ana kākāpō e!	*From our long-ago past, the kākāpō call will be heard once again!*
15	Koukou te rūrū, ketekete kākā, hou hou te kākāpō!	*The rūrū calls, the kākā laughs, the kākāpō sings!*

records while providing a model for revitalising knowledge and memory—an urgent need for kākāpō and other extinct or threatened species.

We begin our discussion by fully presenting the waiata tangi with an accompanying translation. This genre mobilises metaphor, imagery and cosmological references that demand explanation. We do this in sections that highlight and discuss the issues that each stanza seeks to address. They are (a) scarcity of direct references to the kākāpō in archival materials, (b) the kākāpō's symbolic and relational significance within Māori cosmology, (c) the bird's cultural value as evidenced in material culture and (d) patterns of inclusion and omission in archival records. The section ends with a discussion of the study's limitations and areas for future research.

Kei hea rā koe, e kākāpō? | Archival absences

Kei hea rā koe, e kākāpō?
Te manu kura huna i te pō
Mai i a Tāne-tikitiki-o-Rangi
Mai i a Tū-mata-mata-ika

The first stanza of the waiata tangi opens with a poignant question: "Where has the hidden bird of the night gone?" The near-total absence of references to the kākāpō in mōteatea and waiata records prompts speculation. Were mentions of the bird deliberately omitted, or did they exist in oral traditions that were never transcribed? The kākāpō's nocturnal habits and rarity may have made it a less accessible subject for lyrical commemoration than more visible birds such as the ruru or kākā. Alternatively, could the bird's symbolic meanings have been subsumed under more general terms for manu, such as "kākā", or embedded in metaphors that elude contemporary interpretation?

By the time colonial ethnographers and historians began recording Māori oral traditions in the 19th century, the kākāpō population was already in critical decline. The knowledge shared with Elsdon Best by his informants in the late 1800s was often inherited rather than based on firsthand experience because few had ever encountered a kākāpō. This decline likely contributed to the bird's limited representation in the chants and oral traditions recorded during this period, reflecting its diminished presence in everyday life and cultural memory.

Yet, waiata referencing long-extinct birds continue to be composed, even in modern times. For example, "He tangi mō Te Momo", composed by Ahumai, references the moa and conveys profound desolation with the phrase "ko te huna i te moa; i makere iho ai te tara o te marama" (Ngata & Jones, 2004, Vol. 1, Song 41), as do Songs 181 (Vol. 2) and 206 (Vol. 3). A more recent example is the widely known "Tōku reo, tōku ohooho", composed by Okeroa Huriwaka and Te Tawhiro Maxwell, and first performed by the Ōpōtiki Mai Tawhiti kapa haka group in 2022. This composition urges the preservation of te reo Māori to prevent its extinction, drawing a powerful parallel with the disappearance of the moa.

The disparity in references to the moa compared with the kākāpō or other extinct birds, such as the huia (Ngata et al., 2004), Songs 182 (Vol. 2) and 218 (Vol. 3), may be attributed to symbolism. The moa, extinct by 1445 CE because of overhunting, is iconic as a metaphor for extinction, serving as a cautionary tale of human impact and thus gaining prominence in compositions. Additionally, the focus of early settler scholars like George Grey often prioritised content that aligned with their interests, such as pre-Christian practices, potentially overlooking other aspects, including references to the kākāpō. It is also possible that Māori were strategic in sharing knowledge, choosing to withhold or provide incomplete information in specific contexts. Regardless of the explanation, these historical record gaps remain frustrating and unsettling.

Te ao Māori | Māori cosmology

He hoa i riro mai i te pakanga
o Te Rangi-kaupapa, Ko Pekapeka,
Ko Pōpōia ngā haumi i Rarohenga, e!

Whakapapa presents the scaffolding upon which millennia of history are remembered and retold. The second stanza references the cosmological battle of Te Rangi-kaupapa, the final battle between Tāne-te-wānanga and Whiro. As a battle of epic proportions, the kākāpō, along with pekapeka and pōpōia, became the companions of the fallen as they journeyed to the afterlife, symbolising the profound relationship between the living, the departed and the natural world. This pūrākau is retold in Best (2005, p. 398).

In the cosmogenesis of the world, after separating the primal parents, Tāne adorned his mother, Papatūānuku, with trees, plants and vegetation, creating forests and covering the land in life. Birds in te ao Māori are also linked to Tāne and Tūmataika, a deity associated with kākā

and potentially other parrot species, in turn, situating kākāpō as a relational being (Best, 1982; Brougham & Reed, 2001, p. 15). Because manu descend from deities such as Tāne and Tūmataika, while humans trace their lineage through Tāne and Hineahuone, manu are regarded as tuakana or senior to humans. References to kākāpō, whether in pūrākau, mōteatea and waiata or artefacts such as woven taonga, are all a reminder of our relationship and connectedness to our broader ecological context. The critically endangered status of kākāpō presents a stark reminder of the need to uphold our ethical responsibilities towards the bird as part of a more significant commitment to environmental stewardship. That most of the literature, mōteatea and waiata, and museum catalogue references to kākāpō concern enlivening this taonga species bodes well for its future.

He maro kakara | Material culture

> Ka uhi te pōuri ki ō huruhuru
> He maro kakara mai i a Poutini
> Mauria e Papa mō ake tonu e ī!

This stanza highlights the significance of the kākāpō in Māori material culture, particularly its feathers and pelts. The final line reflects the bird's ground-dwelling nature and underscores the earth's essential role as a source of physical, spiritual and cultural sustenance.

The references we reviewed tell us that the bird's feathers were sought after to adorn and ornament clothing and instruments such as pūtātara (Andersen, 1934). Its pelts were used to make wāhine maro (Stack, 1996), its feathers were a special koha by themselves (Best, 1927), and they increased the prestige of kākahu and items they were woven into. Like other birds, they were sought after as an important food source, requiring knowledge of their ecology, life cycles, behaviours and habitats (Best, 1942). Once abundant and central to material culture and practices, the bird's decline has since rightfully led to its protection as an endangered species. This shift from sustenance and adornment to conservation reflects a change in traditional practices and an embrace of kaitiakitanga practices. Now cherished as a taonga, its survival symbolises the collective effort to protect biodiversity and sustain the natural world. Despite these changes, the bird's cultural and symbolic significance endures.

Whāioio anō | Decolonising conservation efforts

> Me te puawai huarangi rimu
> whāioio anō hei oranga
> Mai rānō e tangi ana kākāpō e!

The last verse in "Kei Hea Rā Koe, e Kākāpō" is a call to action.

Recent advancements in kākāpō conservation have significantly bolstered efforts to protect this critically endangered species. Comprehensive genome sequencing has provided crucial insights into the kākāpō's low genetic diversity, enabling targeted strategies to enhance breeding success (Dussex et al., 2021). Additionally, the reintroduction of kākāpō to mainland sanctuaries, such as Sanctuary Mountain Maungatautari, represents a pivotal step towards establishing self-sustaining populations in diverse habitats (Department of Conservation, n.d.). Technological innovations, such as using drones for radio-tracking, have revolutionised monitoring practices, enabling efficient tracking of multiple birds across challenging terrains (Wildlife Drones, n.d.). These innovations enhance kākāpō survival by improving genetic health, expanding habitats and enabling less effort-intensive monitoring and management. Even so, perhaps there is an important contribution to be made by te ao Māori.

A te ao Māori approach reframes conservation through tikanga, pūrākau and kaitiakitanga, emphasising interconnectedness, spiritual significance and cultural restoration. A conservation framework must also acknowledge the waning presence of kākāpō in Māori life due to colonisation, habitat destruction, introduced predators and law changes that severed Māori access to the species. Restoring the kākāpō's place in Māori cosmology requires revitalising mōteatea and waiata, pūrākau, and symbolic representations, ensuring these are preserved and expanded within Māori and broader public discourse. Decolonising conservation means addressing these historical disruptions, centring Māori participation, and integrating ecological, cultural and spiritual dimensions to restore the kākāpō's significance and to foster intergenerational knowledge and cultural empowerment. This includes building out existing educational initiatives in learning institutions and promoting Māori-framed campaigns that message not just to the general public but especially to Māori. Māori need to see that public messaging values the contribution of Māori cultural and historical narratives.

Hou hou te kākāpō! | Restoration through creative praxis

> Koukou te rūrū, ketekete kākā, hou hou te kākāpō!

The final line of the mōteatea sounds the mating call of the kākāpō alongside other birds such as rūrū and kākā. When performed, this onomatopoeia progressively slows in pace so that listeners can experience the sounds these birds make.

This waiata is a heartfelt tribute to the kākāpō, embodying both reverence for the bird as a cherished ally and a vision of hope for its thriving future. It acknowledges the kākāpō's deep connection to the natural world and its symbolic role within Māori cosmology and cultural heritage. Through its verses, the waiata honours the bird's enduring spirit, unique characteristics and place as a taonga, enriching the relationship between humans and the environment. At the same time, it serves as a call to action, urging collective efforts to ensure the kākāpō's survival and restoration. By weaving together respect, remembrance and aspiration, this waiata stands as a reminder of the responsibility to uphold kaitiakitanga and safeguard the natural world for future generations.

Conclusion

The limited references to kākāpō in this study likely reflect the context in which mōteatea and waiata were collected and documented, as well as the perspectives of those involved in the process. Additionally, many mōteatea and waiata remain preserved in iwi and hapū archives or artefacts in regional museums and private collections, which fall outside the scope of this research. These repositories present valuable opportunities for further exploration. Engaging Māori knowledge holders and technologists—such as experts in karakia, weaving, tā moko and taonga pūoro—could uncover new dimensions of kākāpō narratives and revitalise the bird's presence in Māori traditions.

Another explanation for the limited references in mōteatea and waiata is the gradual erosion of memory and awareness over time, leading to the bird's exclusion from new Māori compositions and narratives. This trend must be reversed. The Te Matatini kapa haka festival, with its wide-reaching platform, offers a transformative opportunity to elevate the kākāpō's presence in contemporary Māori consciousness, aligning ecological conservation with cultural expression in deeply Māori ways.

Involving more Māori kaitiaki communities in conservation efforts is essential for restoring the kākāpō to the collective consciousness and adapting to contemporary environmental challenges. Aligning these efforts with the bird's original distribution honours the ancestral connections between Māori and this taonga species. Providing dedicated opportunities for Māori to fulfil their kaitiaki responsibilities revitalises traditional practices, integrates tikanga into environmental stewardship and reinforces the kākāpō's cultural significance. This approach fosters intergenerational knowledge sharing and positions the kākāpō as a powerful symbol of resilience in both ecological and cultural contexts.

Finally, climate change presents significant challenges to the survival of the kākāpō, including disruptions to vital food sources such as rimu mast cycles. These threats echo historical disruptions experienced by Māori and the natural world during colonisation and ecological degradation. Adaptive strategies must, therefore, prioritise not only the conservation of the kākāpō but also the invigoration of cultural activities that reaffirm its significance as a taonga species. Efforts to restore its habitat and ensure its survival must be paired with revitalising cultural practices such as composing mōteatea, creating kākahu, and incorporating the bird's story into educational and artistic expressions. These integrated approaches honour the kākāpō's place within the cultural and ecological landscapes of Aotearoa, ensuring its booming call resonates once again as a symbol of resilience, unity, and the enduring relationship between Māori and their environment.

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Glossary

hapū	subtribe
huna	nocturnal
huruhuru	feather
iwi	tribe
kahu	cloak
kaitiaki	guardian; custodian over natural resources
kaitiakitanga	guardianship
kākā	parrot
kākahu	cloak

kapa haka	a group that performs traditional Māori dance, song and chants
karakia	prayer, chant, incantation
koha	gift, token
manu	bird
maro	a woven garment worn around the hips
mātauranga Māori	Māori knowledge
mōteatea	chant
ngaro	extinct
pekapeka	bat
pō	night
pōpōia	owl
pounamu	greenstone, nephrite
pūrākau	foundational stories
pūtātara	conch shell trumpet
ruru	morepork, owl
tā moko	the process of tattooing the face or body done under traditional protocols
Tāne-te-wānanga	deity of knowledge
tangata whenua	first people of the land
taonga	treasured object; (species) highly treasured native plants or animals
taonga pūoro	musical instrument
tawa	*Beilschmiedia tawa*
te ao Māori	the Māori world
te Pō	the realm of night
te reo Māori	the *Māori* language
tikanga	customs
tuakana	elder sibling
wāhine	women
waiata	sing, song, chant
waiata tangi	lament, song of sorrow
whakapapa	genealogical ties
Whiro	deity of darkness

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CLIMATE CHANGE AND WHENUA MĀORI

A management perspective

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Abstract

This article is about the utilisation of whenua Māori in the context of climate change and its implications for owners, governors and managers of such lands. The article draws on existing literature and employs a whānau-centric methodology to discuss Māori land-owning entities and their awareness of, preparedness for and action on the matter of climate change in Aotearoa New Zealand. Forty-five survey respondents and interviews with three governors of Māori authorities provided data for the following research question: *What is the state of Māori authority readiness for climate change and its effect on whenua Māori utilisation?* Climate change represents an existential challenge, a phenomenon that has not escaped whenua Māori landowners, trustees and managers. Findings show that climate change awareness among Māori is high and brings additional complexity to Māori land use and decision-making with broader considerations to ensure the ecological stability and sustainability of whenua Māori. Māori are actively considering and implementing strategies to adapt to and mitigate the effects of climate change. Access to credible research, information and expertise; effective engagement with whānau and landowners; and finding solutions within Indigenous knowledge are identified as necessary factors to support whenua Māori decision-making.

Keywords

climate change, Indigenous people, Māori authority, Māori management, whenua Māori

Introduction

Whenua Māori is fundamentally important to Māori people, holding cultural, social and economic significance as a vital source of identity and spirituality that has nurtured and sustained whānau, hapū and iwi over generations. Therefore, when the sustainability of the whenua is put at risk because of human activity or natural processes, consequences for whānau, hapū, iwi and hāpori can be devastating. This article contends that climate change is one such risk impacting whenua Māori, requiring a considered and active response.

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Changes in temperature, precipitation patterns, rising sea levels and extreme weather events pose threats to the ecological stability and sustainability of whenua Māori (Ministry for the Environment & Stats NZ, 2021). These environmental challenges affect biodiversity, agriculture, water resources and cultural heritage sites. The social and cultural implications of climate change for Māori communities are already being felt, with extreme weather events becoming more common (Parata et al., 2023). Cyclone Gabrielle, which struck New Zealand in February 2023, viscerally brought to the fore what can happen when imprudent land use meets extreme weather (Parata et al., 2023). Drawing on existing literature and data collected from a small group of Māori landowners and whenua Māori decision-makers, this article discusses Māori authority awareness of, preparedness for and action on the matter of climate change in Aotearoa New Zealand.

The article proceeds with a review of key concepts, primarily whenua Māori, Māori management and climate change. Next, the use of mixed methods research is outlined, as well as participants, data collection, analysis and ethics. This is followed by presentation of findings and discussion of key themes, before concluding with remarks on the state of Māori authority readiness for climate change.

Literature review

Whenua Māori

As an Indigenous people, the traditional relationship that Māori have with the environment and te taiao, including whenua, wai and ngahere, forms an integral part of their identity (Rout et al., 2021; Tassell-Matamua et al., 2020). Despite colonisation eroding this human–environment relationship, Māori and other Indigenous peoples continue to defend their ancestral lands from state and corporate actors intent on depriving current and future generations of their heritage and means of sustaining traditional economies (Mika et al., 2022). For Māori, the importance of land is expressed in whakataukī as one manifestation of mātauranga Māori (Brougham et al., 2012; Hikuroa, 2017). The whakataukī "Whatu ngarongaro te tangata, Toitu te whenua" translates to "As people disappear from sight, the land remains" (I. Warbrick et al., 2023, p. 1) and alludes to the permanency of land and to the transiency of humanity. Another whakataukī, "Ko au te whenua, ko te whenua ko au: I am the land, and the land is me" (Mark et al., 2022, p. 1), depicts the deep physical and spiritual connection and interreliance Māori have with whenua. This perspective, Kingi (2008) argues, stems from a belief system that humans *belong to* rather than *own* the land. Such knowledge also speaks to a fundamental premise of Māori thinking that human wellbeing is contingent upon environmental wellbeing (Mika, 2021) or, more specifically, upon healthy human-to-nature relationships (Rout et al., 2021), a premise Durie (1985) articulated in his holistic view on health.

The word "whenua" also translates as "placenta", and the term for people, tangata whenua, metaphorically means "born of the earth's womb" (Kingi, 2008, p. 134). A tikanga Māori observed is to bury their babies' placenta on ancestral whenua, reinforcing the connection to Papatūānuku, the Earth Mother, and the lifelong nourishment she provides to the land, flora and fauna, and humans. Whenua has a strong relationship with wairuatanga, which is vital for intergenerational wellbeing (Durie, 1985; Hēnare, 2021). An example is the Te Awa Tupua Act passed in 2017, which recognises the Whanganui River as a legal person (Cribb, Macpherson, & Borchgrevink, 2024; Cribb, Mika, et al., 2024; Mika & Scheyvens, 2023). Cultural rights in the Act recognise the Whanganui River as the source of spiritual and physical sustenance supporting and sustaining the health and wellbeing of the iwi and hapū of the river, who in turn have responsibility for its health and wellbeing (Collins & Esterling, 2019).

Given the intrinsic value of whenua, there are consequences for Māori identity, wellbeing and prosperity when alienated from whenua. Thom and Grimes (2022) analysed the impact of land loss, through colonisation, on Māori cultural wellbeing and health outcomes. The relationship that Māori have with whenua and the importance of kaitiakitanga (M. Kawharu, 2000; Spiller et al., 2011) are aspects of tikanga Māori that are vital in understanding the social, cultural and health impacts of Māori land loss (Thom & Grimes, 2022). Harmsworth and Awatere (2013) describe Māori relationships with the natural world as intricate, holistic and interconnected, with a rich knowledge base—mātauranga Māori—dating back to life in Polynesia and trans-Pacific migrations. Harcourt et al. (2022) echo this sentiment, asserting that, in the Māori worldview, people are seen as part of, and genealogically connected to, the natural world.

Pre colonisation (1769–1839), Māori land was communally owned (Kingi, 2008; Sinclair, 1992). Figure 1 shows how Māori land holdings in the North Island of Aotearoa substantially reduced

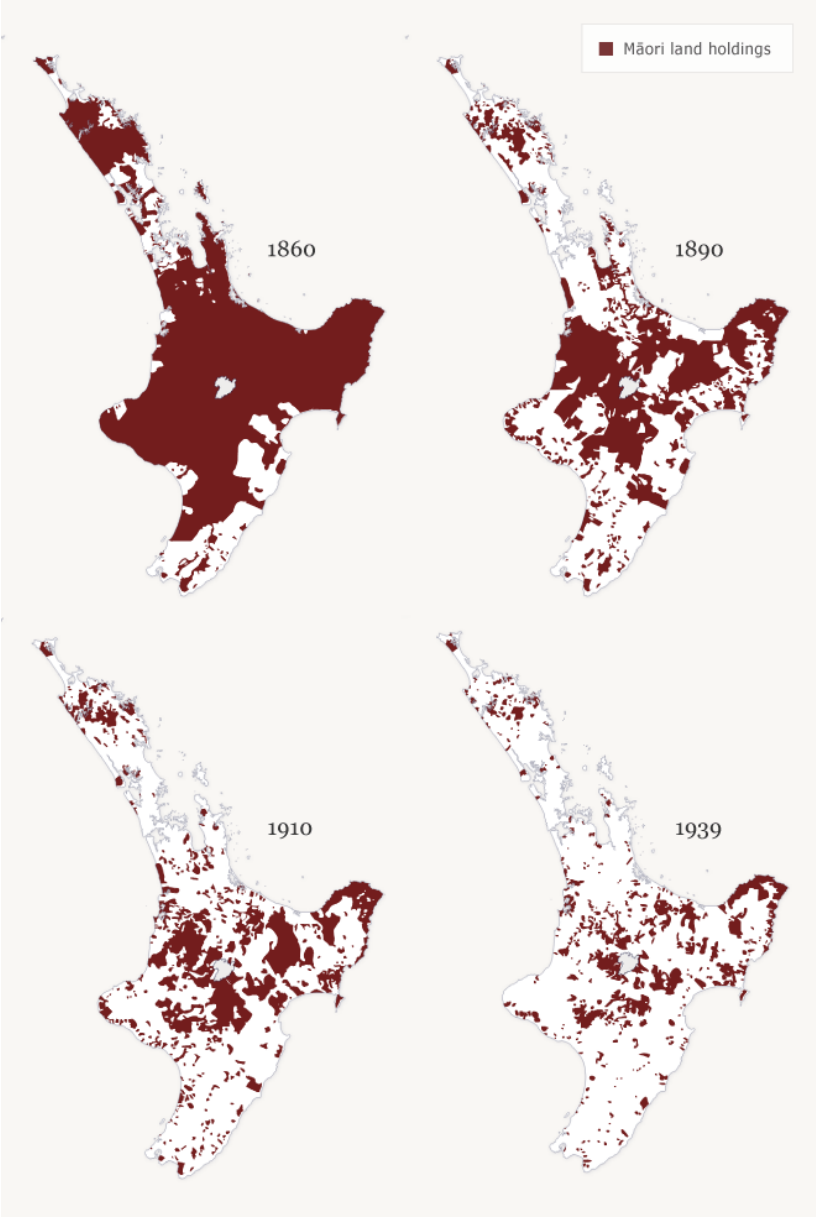

FIGURE 1 Māori land in the North Island, 1860–1939

Source: McAloon (2008), adapted from Orange (2015, pp. 318–319). CC BY-NC 3.0 NZ (https://creativecommons.org/licenses/by-nc/3.0/nz/).

between 1860 and 1939, following the signing of te Tiriti o Waitangi | Treaty of Waitangi in 1840 (I. H. Kawharu, 1989; Orange, 1987). The relatively sudden and substantial loss of land during this period is attributed to Crown and governor legislation and actions, primarily the confiscation and individualisation of Māori land and its eventual transfer into European ownership, governance and control (Mika et al., 2022). In the 1950s and 1960s, the New Zealand Government recognised the detriment of the previous legislative framework to Māori and introduced legislation to protect Māori land from further alienation (Brady, 2004).

Today, the Te Ture Whenua Māori Act 1993 governs Māori land and sets out the jurisdiction of the Māori Land Court. Section 2(2) states the Act is to be interpreted in a way that "facilitates and promotes the retention, use, development, and control of Maori land as taonga tuku iho by Maori owners, their whanau, their hapu, and their descendants, and that protects wahi tapu". This provision clearly shows Parliament's expectation

that Māori landowners are to be supported to both retain and develop Māori land. Successive attempts by the New Zealand Government at Māori land reform (Te Puni Kōkiri, 2021) suggest that resolving the plurality of legislative objects (autonomy, utilisation and retention) has been deeply problematic for policymakers and landowners alike. For example, despite "extensive consultation" and "16 drafts over a period of some 30 months" on the Te Ture Whenua Māori Bill 2016 (Korako et al., 2017, p. 2), the Bill and associated reforms were widely criticised (P. Warbrick, 2016). One submitter offered a scathing assessment, asserting that the Bill was hastily assembled, offered organisations of its kind little value, lacked empirical evidence, and was incomplete and flawed (Wakatū Incorporation, 2016). The Māori Affairs Committee recommended the Bill pass with amendments, with a minority expressing an opposing view (Korako et al., 2017). Given its contentious nature, the Bill was not progressed by the new government in 2017. Proposals to reform aspects of Te Ture Whenua Māori Act 1993 are now subject to public consultation (Te Puni Kōkiri, 2025).

It is acknowledged that "Māori landowners are part of a complex land system that owners of general land are not" (Brady, 2004, p. 8). For instance, with 2.3 million land interests (Brady, 2004) across a population of 978,246 Māori (Stats NZ, 2024), multiple ownership is a complex and growing management challenge for whānau who aspire to retain and develop their whenua. Multiple ownership issues are compounded when decision-makers of Māori land seek to give effect to their "kaitieki [kaitiaki] and fiduciary obligations" because owners may have differing values and priorities (Pohatu et al., 2019, p. 4), while considering the decision effects on future generations (Acosta, 2019; Pohatu et al., 2020). In the specific case of developing native forestry on Māori land, Pohatu et al. (2020) found that "restrictive governance, limited access to resources and expertise, timeliness and poor communication can be insurmountable barriers within the Māori land decision-making process" (p. 31).

Māori management

The retention and development of whenua Māori in the context of climate change is as much a management problem as it is a governance one. While Māori governance is well canvassed in the scholarly literature (Joseph & Benton, 2021), particularly in relation to environmental matters (Joseph, 2014; Joseph et al., 2020; Magallanes, 2021; Simmonds et al., 2016), knowledge of Māori management as it relates to Māori land is less well covered (Iremonger & Scrimgeour, 2001; Joseph et al., 2016; Mulligan & Tuuta, 2003; Phillips et al., 2016). Traditional (precolonial) approaches to Māori management, according to Mika and O'Sullivan (2014), concern the way in which Māori managed their social, cultural, spiritual and economic activities within tribal institutions, where the central object was group survival. Contemporary approaches concern the way in which managers who identify as Māori draw on their whakapapa and aronga to achieve purposes beneficial to Māori and others in both what is done and how in Māori and non-Māori organisations (Mika & O'Sullivan, 2014). The Mika and O'Sullivan (2014) model of Māori management does not preclude non-Māori management knowledge but integrates this within a Māori worldview and approach to achieve Māori-defined purposes.

Nicholson et al. (2017) similarly contend that Māori management is ambicultural, integrating Indigenous and Western paradigms to achieve mauri ora through kaitiakitanga as a decision-making framework oriented to enterprise planning horizons of 500 years or more. In place of the cultural incongruity of integrative approaches like the balanced scorecard and quadruple bottom line, Nicholson et al. (2017) propose He Whenua Rangatira—A Balanced Landscape as a culturally grounded framework for organisational success. In this framework, paradoxical tensions between economic and ecological wellbeing (Xiaoliang et al., 2023) are resolved through the relationality of the Māori worldview (Marsden, 2003), metaphorically described as a whāriki (Nicholson et al., 2017), and enacted as a synthesis of spiritual, human and ancestral connections (Rameka et al., 2024). A good kaitiaki, whether governor or manager, in this view recognises that ancestral land has spiritual, cultural and material value (Nicholson et al., 2017) and its retention and use must account for and manage within the relational value that exists among dimensions of atua, tangata and tīpuna (Rameka et al., 2024; Reid & Rout, 2024).

Māori and climate change

Indigenous peoples' connection to their environments has enabled them to understand and adapt to climate and environmental change (Scheyvens et al., 2017). King et al. (2008) acknowledge the value of Indigenous peoples' knowledge of weather and climate, including Inuit, Icelandic, Yukon and Aboriginal peoples. King et al. (2008) assert that

Māori environmental knowledge has been "an important factor in [their] successfully responding to past weather and climatic change in New Zealand" (p. 385). While Māori are experienced in dealing with climate variability, the authors argue that new strategies will be needed, including collaboration with other iwi.

The impact of climate change on the environmental, economic, social and cultural elements of Māori society cannot be overestimated, given climate events are expected to become more intense (Ministry for the Environment & Stats NZ, 2021). Longer growing seasons and warmer temperatures may bring opportunities for Māori land (Harmsworth et al., 2010), but more extreme weather like floods, droughts, heatwaves, intense storms and climate change–induced sea-level rise will disproportionately affect Māori communities (King et al., 2010). Packman et al. (2001) note that remote areas of New Zealand such as Northland and the East Cape, where larger populations of Māori rely heavily on natural resources and ecosystems to sustain modern and traditional livelihoods and cultural practices, have been identified as especially vulnerable to projected impacts of climatic change.

In 2021, Te Arawa iwi published Te Ara ki Kōpū, their climate change strategy (Te Urunga o Kea, 2021). This strategy anticipates the impacts of climate change within the Te Arawa rohe being rising sea levels and increased storm events; warming rivers, streams, lakes, and coastal waters; warming air temperatures; and higher average temperatures. In response, the strategy outlines the following 10-year priorities for Te Arawa:

- adaptation planning & resilience building
- biodiversity
- circular enterprise & economies
- energy security & sovereignty
- food and water security & sovereignty
- land use change & practices (Te Urunga o Kea, 2021, p. 11)

Further, Māori economic, social and cultural systems are strongly tied to the natural environment, with 50% of the Māori asset base in climate-sensitive primary industries (King et al., 2010). Stats NZ data for Māori exports in 2015 shows that primary industry products, seafood, dairy and meat made up 89% of the total value of Māori exports (Clarke-Nathan, 2016). Seafood was the top export commodity, being 59% of the total (Clarke-Nathan, 2016). BERL has reported that the Māori economy is overrepresented in New Zealand's emissions profile, largely due to the Māori economy's activities in agriculture (McMillan et al., 2021). BERL also states, however, that despite the risks and challenges that climate change poses for the Māori economy, as it does for the national and global economies, climate change also brings opportunities (McMillan et al., 2021). Some of these opportunities are native forestry (Pohatu et al., 2020), carbon farming, wood energy and sustainable wood production (Harmsworth et al., 2010).

Methodology

Mixed methods

The study reported here was based on data and information the first coauthor collected for their master of business administration research on the impact of climate change in primary sector uses of, and decision-making on, whenua Māori. Waikato Management School granted ethical approval to conduct the research (approval no. WMS 23/168). Permission from interview participants to use their data for this article was obtained. Survey participants were informed prior to answering questions that their data would remain confidential and be used solely for academic purposes.

This study deals with several complex issues, including climate change, whenua Māori, Māori governance, and Māori landowner and decision-maker perspectives associated with these concepts. Therefore, mixed methods research was applied due to its known effectiveness in addressing both exploratory and confirmatory questions, revealing a fuller picture of a problem in practice (Ivankova & Wingo, 2018). Mixed methods research was overlaid with a whānau-centred approach through the targeted selection of survey and interview participants from within the first coauthor's whānau network. A whānau-centred research approach ensures personal and cultural safety for researcher and participants due to their familiarity with one another, while prioritising the perspectives of Māori families and communities. By the same token, limitations exist such as affinity bias given that people from the same social grouping may not provide sufficiently diverse responses and the small study size. The limitations are not, however, considered detrimental to our aim because the study is primarily exploratory, seeking to uncover prevailing views of whānau and indicate valuable lines of further inquiry.

Data collection

Quantitative data was collected through an anonymous online survey administered by the

first coauthor using Qualtrics (https://www.qualtrics.com). The only criterion to take part in the survey was that a participant identified as a Māori landowner or a descendant of a Māori landowner. The latter category is deliberate and recognises the intrinsic connection to whenua through whakapapa and not just legal title. The quantitative data is derived from 60% of the invited participants, totalling 45 respondents. Qualitative data collection involved kanohi-ki-te-kanohi interviews with three participants who hold decision-making or other significant advisory roles in whenua Māori entities. Participants were provided with information and consent forms. Interviews were audio recorded and transcribed, with transcripts provided to participants to review. Participants were assured of anonymity. Given the familiarity of those working in the Māori primary sector, care is taken to ensure that "generic identifiers" are sufficient to protect the anonymity of the interview participants and their organisations.

Data analysis

The online survey yielded quantitative data, which were analysed using IBM SPSS (Version 30). Descriptive analysis was employed for scrutiny, with discrete values removed as needed before the application of specific analyses. Reliability and internal consistency were assessed using Cronbach's alpha analysis, followed by Pearson correlation analysis. Thematic analysis was applied to the qualitative data to reveal significant patterns and meanings, culminating in identified themes. In line with the methodology of mixed methods, the quantitative and thematic analyses were integrated (Creswell & Plano Clark, 2011).

Findings

Māori landowner perspectives

Nearly half (48%) of the 45 survey responses related to whenua in the Bay of Plenty. The majority (84%) of responses related to Māori freehold land (55%) and Māori customary land (29%). Forestry (exotic and Indigenous) and farming (sheep, beef and dairy) were the main primary sector activities being undertaken or considered. Sixty-one per cent of respondents had a formal decision-making role as a trustee or governor (37%), manager or executive (7%) or advisor (17%). The way respondents engage in decision-making was somewhat passive, with the highest categories being "discussing with whānau" (23%) and "attending meetings" (21%). More active participation in decision-making could likely be achieved by "analysing performance" and "voting in meetings", which scored lower, at 12% and 14%, respectively. Results demonstrate that respondents were aware of and concerned about climate change, believing that climate change is having a negative effect on productivity, sustainability and decision-making of whenua Māori. That said, the mean result indicates that climate change–induced consideration of land-use change is limited, with only 30% of respondents saying that "significant changes" are being contemplated. Responses to the open-ended survey questions provide some insight as to why this might be the case:

> Too many of our people want to bury their head in the sand about the impact of CC [climate change] and emissions reductions on the whenua … [This is] largely because they do not fully understand what this might mean and the most "backward" view is they do not want to spend funds while there is still time to carry out their investigations/modelling before the landowner has to pay real money when that time eventually does arrive. (Respondent 1)

Whenua Māori decision-makers' perspectives

Climate change awareness is high among Māori

The interview results aligned with the survey results, affirming participants were aware that climate change presents a risk for the long-term sustainability and utilisation of whenua Māori, and that action is needed. For some, awareness gave way to concern that had developed due to the detrimental impacts on whenua, awa, marae and hāpori from previous or "legacy" land-use decisions. Therefore, decision-makers were exercising a cautionary approach when assessing land-use options. This approach involves undertaking extensive due diligence, commissioning external research and expertise, and increasing engagement with landowners and whānau before making significant land-use decisions. One decision-maker explained how their trust undertook whānau and landowner engagement, due diligence, and environmental monitoring over 10 years before proceeding with a new land development:

> We waited for 10 years. We didn't put in any money … We watched to see what impact that would have environmentally and whether our whānau could come along on the journey or whether they would oppose any further development. (Interviewee 1)

For others, while awareness was high, the level of concern was lower:

> Very aware of the impacts. The concern, I guess, would be minimal—I wouldn't say it's Tūhoe-centric, but we're quite resilient at observing our taiao and then adapting to those changes. So, it's more of an opportunity rather than a barrier. (Interviewee 2)

Having awareness, though, did not mean that decision-makers knew exactly what they might do to mitigate climate change risk on their whenua:

> I think for, in particular my father, who is a decision-maker, it makes it more challenging because he hasn't been exposed to climate change, and I suppose understanding what it is, the impacts and strategising where to next. (Interviewee 2)

Climate change risk is a key consideration

The responses demonstrated that climate change risk has exacerbated the challenges and complexities of managing land-use activities. In particular, increased environmental compliance set by government, industry and export markets, which is increasingly expected by climate-conscious consumers and customers, incurs extra cost and requires additional capability (external and internal), time and investment. In addition, whānau and landowner expectations regarding long-term sustainability and impact of any land-use activity on the whenua remains a priority:

> I don't think any of us object to utilising the whenua, it's just how. And what impact will it have? We see things differently probably as Māori in that we will imprint in every generation that will come after us. What legacy do you want to leave behind? (Interviewee 1)

One participant described the "biggest challenge that Māori face in this area" as being the clash of values between Western and Māori approaches. This was raised in the context of engaging and receiving external technical expertise but not always being able to act on the advice:

> We receive reports all the time where it says, "You could do this, that and this, and it will make you more money if you run some chemicals through the system." It rolls off their tongue. And we're like, "Say what? Chemicals through our whenua? No." "Oh yeah, but it will get rid of blah, blah, blah." "No, it doesn't matter. We can't explain that to the whānau. It doesn't belong there. Therefore, we can't do it." . . .
>
> What's hard for all those people to understand is the responsibility of a board member of an ahu whenua trust [the most common type of Māori land trust]. They don't understand why what they're saying, we can't do. That might make a lot of sense to them, but in our world it doesn't. (Interviewee 1)

The findings show that effort is being made to address environmental concerns in, for example, effluent disposal, water recycling and reducing carbon emissions. However, decisions around climate change mitigation and adaptation were not straightforward for three main reasons. First, information is lacking, not readily available or not easily accessible to support whenua Māori decision-makers, especially those on smaller land blocks who are unlikely to be financially able to commission research or external expertise. Second, decision-makers felt "stuck" with their current land use given the significant infrastructure and capability investment made over many years. Third, decision-makers were aware that climate change is a risk to whenua Māori but were not clear on the specific impacts or the action required to address the risks to their whenua.

There are solutions in Indigenous knowledge

The findings emphasise the importance of incorporating Māori perspectives, values and aspirations into climate change decision-making and land-use planning. Te ao Māori approaches of balancing economic, environmental, social and cultural aspects of land use were viewed by participants as complementing the holistic approach necessary to tackle issues associated with whenua Māori utilisation and decision-making amid climate change: "If we take care of the whenua, the whenua will take care of us" (Interviewee 1).

When discussing climate change, participants could see opportunities for whenua Māori and Indigenous knowledge. These included potential for growing different crops and vegetables on their whenua due to a warmer climate. They were already noticing a change in species coming into their forests and expressed excitement about the potential to cultivate different food crops:

> Where the taiao is concerned, what couldn't grow in those altitudes or climates could potentially be grown going forward. As a strategy for the farm, we've always looked 50 to 100 years ahead. So, looking 50 to 100 years ahead and what we could potentially grow within that 50 to 100 years is quite exciting, given that the climate is warming, and we could potentially grow vegetables that we wouldn't have been able to grow before. The

> change in species coming into the forest is changing as well. Not only does it bring more opportunities, but also challenges. (Interviewee 2)

Indigenous-to-Indigenous connections were occurring in acknowledgement of the unique insights and holistic perspectives that Indigenous knowledge can contribute to environmental management and climate adaptation:

> I think it just keeps showing us that we have to go international to see some of this stuff as well. But a lot of international Indigenous people are looking back at Māori. …
>
> We had a group contact us from Canada. … They wanted to talk to us about whether this is actually good for Papatūānuku? They didn't want to hear from scientists; they wanted to hear it from other iwi taketake [Indigenous people]. (Interviewee 1)

Whānau and landowner engagement is essential

The need for effective communication, trust-building and education to engage whānau and landowners was identified as essential to mitigating climate change risk on whenua Māori. This study highlights the need for consideration of the impact on the environment and whānau, and the importance of involving whānau and landowners in decision-making processes. One interviewee spoke of their two-year journey to find and engage with their landowners and whānau across the country. This coincided with their 10-year journey of undertaking due diligence by engaging scientists, environmental planners, cultural monitors, business consultants and sector experts. They wanted to be assured as decision-makers—and gain the confidence of their landowners—that the land-use opportunity would deliver intended economic benefits without negatively impacting cultural, social and environmental dimensions: "If it doesn't answer that and it doesn't do that, then the answer is no. And it will be the same for our whānau" (Interviewee 1).

Some of the barriers to effective communication with landowners and whānau exist at a practical level. These barriers include limited email access for whānau and landowners, misinformation spread through social media, and the sheer number of landowners with whom to engage, which can number in the thousands and be dispersed across the country and around the world.

In some instances, effective communication and education were also needed with decision-makers who may be unfamiliar with climate change risk, mitigation and adaptation. One participant spoke of the challenge for long-serving trustees to consider alternative land uses due to their lack of understanding of climate change. Conversely, while climate change may be unfamiliar to some decision-makers, landowners and whānau, there still exist those close to the whenua with a deep understanding of the taiao who identify and recognise changes through particular tohu:

> Climate change has never really been something that we as Māori look at, it's just normalised. It's the taiao changing and you have indicators—tohu—to tell you at what time to plant and depending on what's flowering, birds have come back at a certain time, or the tuna are going out to sea. So … watching and observing those, I suppose, is impacted by climate change. But then also understanding that within te ao Māori, and then translating that to your trustees. … You're trying to help them understand what climate change is like and is what they do anyway … helping them understand that it has the same meaning, but not quite. In a Western sense that's what it's called, but in te ao Māori, you do it anyway. (Interviewee 2)

Access to credible research, information and expertise needed

While Māori have confidence in their knowledge as Indigenous people and kaitiaki of their whenua, there was also an acknowledgement that credible research, information and expertise from scientists, climate change specialists, sector experts and the like are necessary for a deeper understanding of the impact of climate change on whenua Māori and managing its effect.

It was clear that the larger trusts could invest in external expertise and research, and did so on an ongoing basis to responsibly monitor and manage their whenua. Even for them, however, access to relevant, balanced and credible climate resilience research, information and expertise was lacking. Having this information would facilitate a more informed dialogue and enable prudent decision-making.

Participants acknowledged the role of industry in the urgency for addressing climate change. Initiatives such as B-Corp certification—which signifies a company's commitment to high standards of social and environmental performance—and Environmental, Social and Governance goals were cited. While there was mention of the government's role in supporting Māori communities to manage the impacts of climate change on their whenua,

there was some scepticism about the government's overall effectiveness and motives.

> [The] current political climate with change of government provides lots of uncertainty on our business including being able to deliver future aspirations of our owners, whānau, hapū and iwi. (Respondent 2)

> Not from the government, who tend to interfere rather than being helpful. We trust our own tikanga and mātauranga to guide us. (Respondent 3)

Discussion

This study represents much-needed research on the state of Māori authority readiness for climate change and its effect on whenua Māori utilisation by exploring Māori awareness of, preparedness for and action on climate change in Aotearoa. The key themes that emerged from the findings can be summarised as follows:

- Māori awareness and concern regarding climate change is high.
- Climate change risk is a key consideration for Māori decision-makers and landowners.
- Indigenous knowledge, peoples and approaches can and are contributing to climate change solutions.
- There is a greater need for whānau and landowner engagement.
- Greater access to credible research, information and expertise is required.

At the heart of these themes lies a strong commitment to stewardship of the land and the necessity for a holistic approach to land use that spans economic, environmental, social and cultural considerations.

The high level of awareness and concern among Māori about the risks and impacts of climate change on whenua Māori is evident in the prioritisation of climate change considerations in decision-making processes related to land use. Māori are actively considering and implementing strategies that adapt to and mitigate the effects of climate change. These include exploring renewable energy as well as downstream opportunities from current geothermal power activities (Bargh, 2012), reducing and diversifying stock, and investigating the cultivation of other food crops more suited to a warming climate. The literature points to other opportunities, including native forestry (Pohatu et al., 2020), carbon farming, wood energy and sustainable wood production (Harmsworth et al., 2010). These options indicate that the Māori economy's overexposure in climate-sensitive primary industries (King et al., 2010) may be unavoidable given they are born of the whenua. Māori are, however, exploring alternative, high-value land-use opportunities, such as bioenergy, that are known to mitigate environmental effects (e.g., carbon, water quality and erosion) (Hall & Jack, 2009), while building a knowledge economy that requires and values, as Ruckstuhl et al. (2019) argue, the integration of mātauranga Māori, science and research, and sector-specific expertise.

While an awareness and active consideration of climate change risks to the whenua was demonstrated by participants, this was not always attributed to a climate change response but rather to a fundamental understanding of the taiao and its interconnectedness to the presence or absence of certain tohu indicating changes in the environment. This reinforces the findings of King et al. (2008), who point out that Māori environmental knowledge is an important factor in Māori responses to climatic change. Indigenous-to-Indigenous connections reflect that Māori can and are providing leadership to contribute to climate change solutions. In commenting on the Te Arawa Climate Change Strategy, kaitiaki Doug Macredie emphasises the importance of Māori and Indigenous leadership:

> It is generally accepted that climate change is an unforeseen consequence of colonisation, global forest removal, capitalism, and rampant industrialisation. … The solutions needed therefore must be sourced from a different values base and thought processes and this is why Māori and indigenous peoples must lead climate change solutions rather than just contributing to them. (as cited in Te Urunga o Kea, 2021, p. 4)

Leadership is exhibited as other Indigenous communities and international bodies seek advice from Māori on their experiences in managing environmental impacts on their whenua. The Māori approach to land management, characterised by a balance of economic, social, cultural and environmental factors, aligns with Indigenous understandings of intergenerational stewardship and ecological balance (Harmsworth & Awatere, 2013). Our findings underscore the importance of mātauranga Māori and contemporary scientific understanding, harnessing the strengths of both Indigenous and scientific knowledge systems to effectively address climate change.

Climate change adaptation and mitigation

approaches and initiatives are being considered, even if they have not yet been "formalised" into a specific climate change strategy. For example, reducing debt and keeping debt levels low was one trust's strategy to mitigate the impact of operating in an uncertain, climate-sensitive sector such as farming. This allowed for flexibility and options to transition from current land uses. Affordability, especially for smaller Māori land blocks, is acknowledged as a barrier to climate change adaptation and mitigation. Despite this, whenua Māori entities are showing great resolve by making changes as their balance sheets and capabilities allow.

Climate change considerations are creating a more challenging environment for whenua Māori decision-makers. Some of the challenges include

- additional costs involved with climate change mitigation, let alone adaptation
- longer timeframes to make decisions given the need for greater information sharing and engagement among decision-makers, landowners and whānau
- uncertainty about where and how to access reliable and credible research and expertise
- lack of understanding and experience navigating modern science, acknowledged as a knowledge system that, in conjunction with Indigenous knowledge, will generate required solutions

Despite frequent comments from participants that there was a lack of relevant research and information relating to climate change, participants demonstrated a sound understanding of the issues and impacts of climate change on their whenua and proffered practical solutions to close the information gap. The grounding that Māori have in te ao Māori and their deep relationship with the taiao likely provides an intrinsic knowledge of, or at least a high level of engagement in, how to manage climate change risk on the whenua.

Conclusion

This study sought to understand the state of Māori authority readiness for climate change and its effect on whenua Māori utilisation. Understanding the impacts of climate change on whenua Māori is complex. Still, in some ways, it is not because Māori historically have been adapting to changes in their taiao and surroundings for centuries. Practices like rāhui are applied to regulate human activity when there is a risk to the oranga and sustainability of natural resources—an example of climate change mitigation in many ways but from a te ao Māori perspective. The complexity of climate change partly arises from a lack of appreciation from both within and beyond Māoridom of how Indigenous knowledge and practices have contributed to, and continue to contribute to, addressing climate change risk.

This study has identified examples of Māori drawing on different knowledge systems—mātauranga Māori, contemporary science, sector-specific expertise and Western business approaches—to inform and develop holistic climate change solutions. Māori certainly acknowledge that the complexity of climate change requires input from all aspects. Hence, credible, reliable, relevant information and expertise must be accessible to address climate change risk. Study responses also identified that while Māori are taking action to address climate change, recognising those actions as climate change mitigation and adaptation responses is not always evident.

This study's small sample size and whānau-centred approach present limitations in the diversity and range of responses. However, given the lack of research and literature in this area, this study stands as a useful contribution to understanding how climate change is impacting utilisation of, and decision-making on, whenua Māori. The importance of a holistic and comprehensive approach that combines Indigenous knowledge with scientific understanding, and of whānau engagement in decision-making on sustainable land management is highlighted. Our findings offer climate change–related policymakers and stakeholders insights into the unique challenges and opportunities Māori landowners and decision-makers face.

Glossary

Aotearoa	New Zealand
aronga	worldview
atua	gods
awa	rivers
hāpori	communities
hapū	sub-tribe
iwi	tribe
kaitiaki	guardian, steward
kaitiakitanga	guardianship over people and the environment
kanohi-ki-te-kanohi	face-to-face
Māori	Indigenous peoples of New Zealand
marae	tribal meeting grounds

mātauranga Māori	Māori knowledge
mauri ora	wellbeing
ngahere	forests
oranga	health
Papatūānuku	Earth Mother
rāhui	restriction
rohe	region
taiao	the natural world
tangata	humans
tangata whenua	people of the land; lit. "born of the earth's womb"
taonga tuku iho	cultural heritage
te ao Māori	the Māori world(view)
Te Arawa	a large confederation of iwi and hapū based in the Bay of Plenty region of the North Island
te Tiriti o Waitangi	the Treaty of Waitangi
tikanga	customary practice
tīpuna	ancestor(s)
tohu	signs, signals
Tūhoe	iwi based in Te Urewera in the eastern North Island
tuna	eel(s)
wahi tapu	sacred sites
wai	waterways
wairuatanga	spirituality
whakapapa	identity
whakataukī	proverb(s)
whānau	extended family
whāriki	woven mat
whenua	land; placenta
whenua Māori	Māori land

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CENTRING PŪRĀKAU AS A DECOLONISING FORCE IN LAND-BASED DESIGN IN THE AGE OF HE HURINGA ĀHUARANGI

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Hannah Hopewell†

Abstract

For Māori, pūrākau are oral narratives of place passed through generations and sustained as a weaving of past, present and future connections with land. Pūrākau are a central force in Indigenous knowledges of whenua and essential to meaningful design of Aotearoa environments. Critically, 80% of marae are sited in low-lying coastal or flood-prone areas, amplifying the vulnerability of whenua Māori to the escalating impacts of changing climates. We ask what the role of architectural practice, more specifically, Māori architecture practice, might be in this complex situation of marae resilience when issues present as less about buildings and more about securing an enduring land–people relationality. Pūrākau are approached as method via expressive and analytical drawing practices developed to test their force in the path towards marae resilience. With practice-based threads, this study demonstrates how conventional architectural design techniques alone are unfit for responding to marae resilience. In an expansion of architectural methods, we explore decolonial and indigenised means to tailor a more appropriate response to he huringa āhuarangi.

Keywords

architecture, climate change, indigenisation, land-based design methodology, pūrākau, representation

Introduction

For Māori communities, marae are the heart of practices and ritual, presenting a tangible record of genealogy and spiritual sense of belonging to land. Yet critically, 80% of marae are sited in low-lying coastal or flood-prone areas, amplifying the disproportionate vulnerability of whenua Māori to the escalating impacts of he huringa āhuarangi (S. Awatere et al., 2021). Risk related to climate change for whenua Māori is further materially exacerbated by land uses and management regimes instituted through Aotearoa colonisation and emboldened by ongoing settler-colonial land practices (Rodgers et al., 2023). Property, as enclosure of the Earth, is the necessary precondition for the emergence, expansion

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and endurance of capitalism, and ensures that Māori sovereignty continues to be under threat (Thom & Grimes, 2022). With lands rendered as property, holistic and dynamic relationships between Māori settlement and living ecologies have been divided, compartmentalised and overwritten, resulting in territorial dispossession and the obstruction of lands' self-regulation. Recent scholarship points out that settler-colonialism and its property regime, in which architecture participates, is an act of land appropriation and that any decolonial politic must go beyond cultural recognition to directly address Indigenous authority over land (D. Awatere, 1984; Coulthard, 2014; Dorries et al., 2022; Simpson, 2017). Given this unjust situation, there is urgency for architectural knowledges to resist the spatial limitations of the "property line" and at the same time find tika ways to renew and reinvigorate conventions with Māori knowledge.

The Aotearoa 2023 Cyclone Gabrielle devastatingly highlighted these impacts of colonisation and land practice injustices confronting the resilience of marae—the sacred meeting grounds of Māori communities. In the context of he huringa āhuarangi and the intrinsic intergenerational connections between marae structures and the land with which they are enmeshed, any design strategy suggesting marae retreat or relocation draws forth multiple and compounding challenges. Some of these challenges are highlighted by Bailey-Winiata et al. (2024), such as the deep generational connection to place, funding and land availability issues, along with the need for a more nuanced whānau- and whenua-fueled approach. This article explores what the role of architectural practice, more specifically, Māori architecture practice, might be in the complexity of marae resilience when issues present as less about building itself and more about securing enduring land–people relationality. Grounded in exploration of climate-affected marae in Mitimiti, Tauranga Moana, Te Karaka and Heretaunga, this research builds on the previous engagement with iwi, hapū, whānau, Māori, tauiwi, experts and architects who navigate the space of climate resilience. Asking such a question calls attention to *how* situated Indigenous knowledge might drive design values and processes to acknowledge the reciprocity between architecture, land and Māori identity. We draw from recent allied and Indigenous scholarship to unsettle dominant disciplinary practices with decolonial, rather than inclusive, indigenisation (Gaudry & Lorenz, 2018; Hoskins & Jones, 2020).

This research experiments with ways to counter prevailing architectural methodologies that have been shown to be complicit with the erasure and marginalisation of spaces that affirm Māori ways of life or advance a mode of inclusion by way of recognition that amounts to an unchanged architectural paradigm with Indigenous "stick-ons". We argue that if the indigenisation of architecture is to be wholly transformative, design process norms need a foundational and structural shift grounded by a radically different political imaginary (Bhandar, 2018; Moreton-Robinson, 2015). Decolonial indigenisation, as distinguished from inclusive indigenisation, therefore asserts that knowledge production within land-based design practices must resist the "logics" of property and its ideologies of use and improvement. Instead, architecture must develop alliances with the ground in reciprocity with the people and other beings who inhabit it. What this transformation of architectural design practices might constitute is a matter of collective, situated, Māori-led experimentation.

Acknowledging that decolonisation multiplies relationships with land (Fortin & Blackwell, 2022), what follows contextualises and discusses an experimental occasion of the decolonial indigenisation of architectural methods. We focus the agency of pūrākau as a situated critical power and differentiator in approaching land-based reciprocity and marae resilience. Pūrākau as oral narrative, or kōrero tuku iho, is opened in this occasion to the medium of drawing. Within a Kaupapa Māori research process, pūrākau are engaged as method via expressive and analytical drawing practices developed to test their force towards designing for marae resilience. The medium of (architectural) drawing is explored across tangible and intangible realms arising from multiple sources, including engagement with people from all over the motu (see Figure 1). This study offers whānau a Māori-specific approach to resilience, particularly in challenges like relocation. It explores how Indigenous architectural methods can adapt conventional design techniques to better serve marae needs. The findings provide context-specific insights rather than universal solutions.

As a disclaimer for this kaupapa, we acknowledge the potential risks in generating common or homogeneous collectivising of Māori knowledge when it is obtained from various sources. It is not untypical of academic scholarship to conflate or generalise specific iwi- or hapū-based terms or concepts that may not align with other iwi or hapū local dialects or meanings (Mead, 2016; Smith, 2012). While exploring pūrākau,

FIGURE 1 Antonia van Sitter (2023). *Wānanga* [Diagram]. A diagram of Te Ika-a-Māui depicting the wānanga, hui, noho, kōrero and hīkoi engagement that took place around marae resilience in the changing climates.

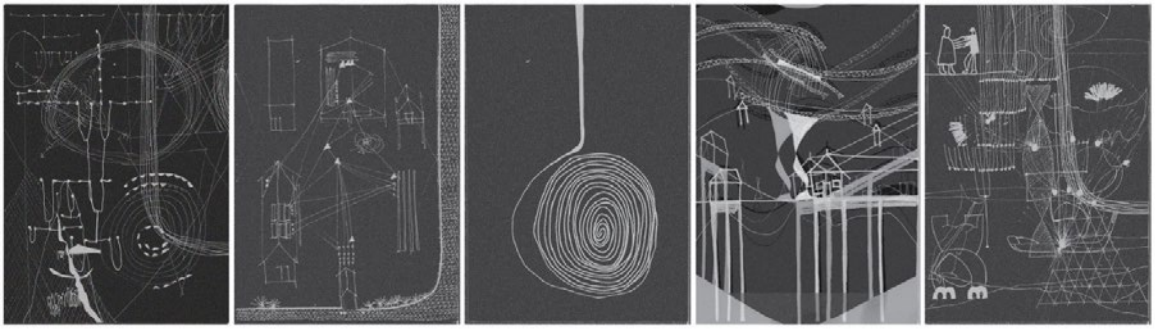


FIGURE 2 Antonia van Sitter (2023). *Utu* [Digitalised drawing, overlayed and inverted]. *Utu* as balance and reciprocity is a series of expressive drawings depicting the spatiality of mihi, pepeha and whakapapa, pōwhiri, karanga and wero, tapu and noa, tikanga and kawa and, lastly, whakataukī, waiata and pūrākau.

which are predominantly and historically conveyed orally, translation is not often direct or sufficient in meaning between te reo Pākehā and te reo Māori kupu. Additionally, different versions of the pūrākau discussed may exist because oral traditions and storytelling can vary across different Māori, iwi and hapū. Pūrākau are practical and usually expressed from accumulated connections, relationships and learnings of the land that we take as living—we therefore proceed with pūrākau as not fixed but open instantiations.

The marae

Māori architecture, specifically of the marae, is not about a discrete object nor about a collection of objects. Marae include the surrounding environments, weather, tūpuna, whakapapa, water, soil, and Papatūānuku and Ranginui, while also drawing in tikanga and kawa, pōwhiri, people and pūrākau. Architects can begin to draw on these elements visually to inform design (see Figure 2). Therefore, the spatial and relational elements of marae architecture extends with these environments and realms. As Brown (2018) indicates, "Architects have realised that the integrity of Māori architecture lies in the wharenui's accommodation and embodiment of cultural practices, or tikanga, not in its decorations or derivative 'bicultural' collisions of form" (p. 122). The marae in its physicality and presence can be understood as a space—or the openness before the wharenui where formal greetings and discussions occur. Coextensively, the marae means manaakitanga and kaitiakitanga. The marae is architecture unique to Aotearoa, holding principles of utu, ōhanga āmiomio and resilience.

The marae is the heart of iwi and hapū, central to everyday life as the tūrangawaewae of mana whenua. As suggested by Matunga (2018), "The pā had been mapped out spatially with the marae and wharenui, the geographic and sociocultural epicentre of our community" (p. 305). Today, the marae is where Māori can collectively be Māori in practice and culture, yet the marae has always been extended to Aotearoa as a whole, especially during times of crises, as Cyclone Gabrielle most recently demonstrated (Yates, 2023). The marae is therefore vital to the social-spatiality of Māori and Pākehā community, and a defining factor in Aotearoa built environments. On marae, Barnett (2021) writes, "They are loci of political agency … It is truly Māori space: spiritual, mental, social, emotional. It is where the flat ontology of Māori socialism is visibly performed. And it is constructed within the practice of utu" (Design section, para. 6). Here, Barnett asserts that marae offer cues to the respatialisation of Aotearoa, away from settler-colonial spatialities that continue to encode spatial relationships foreign to these lands, and towards a "space in which people may gather with their freedoms, with their fellow humans, with the critters for whom they speak" (Design section, para. 4). Given the uniqueness and significance of marae and what they provide for the culture, people and environment, the marae can be seen as Indigenous Māori resilience itself. Therefore, it is critical for Pākehā architects and other land-based practitioners to actively uphold the significance of marae within climate change adaptation design and planning.

Indigenising of knowledge

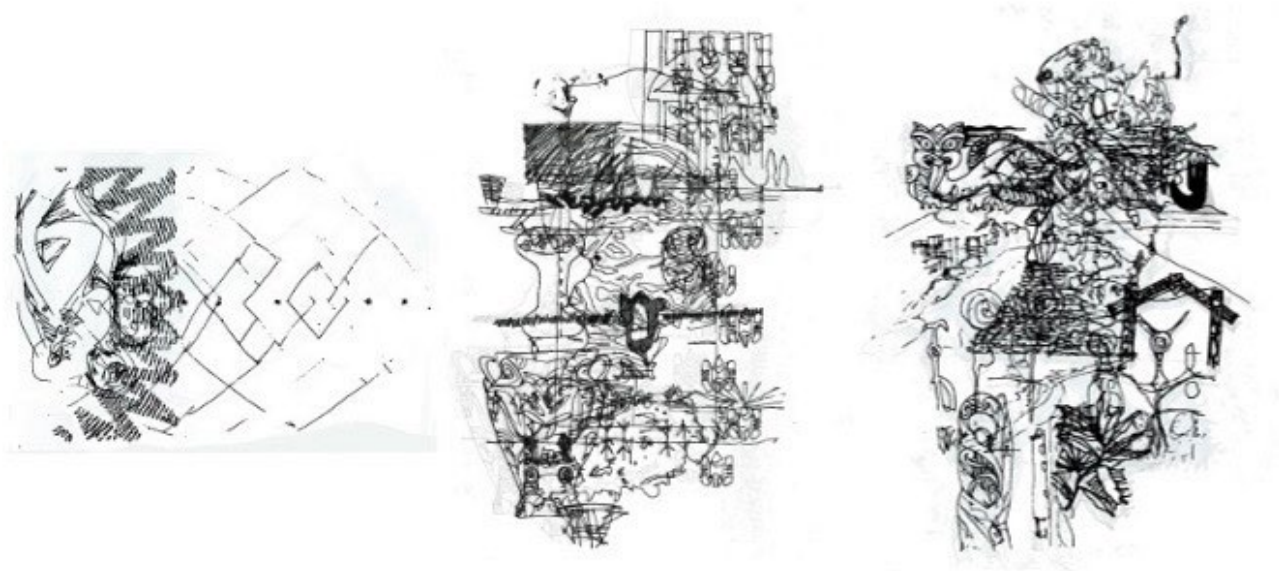
Architecture in Aotearoa, as in other settler-colonial nations, is increasingly open to Indigenous Māori knowledges and values (McKay, 2004). While the quality of this "openness" varies, Māori

influence on public and institutional built environments is progressively moving from invisibility to somewhat visible. We acknowledge the considerable fight undertaken by Māori scholars and land-based practitioners in asserting mātauranga Māori across the many facets of built environment practice, yet also recognise that Aotearoa has a long way to go before the asymmetric power relations between Māori and Pākehā design are overturned. Thomas (2021) affirms that Indigenous knowledge is not a resource but the right and responsibility of Indigenous peoples. Therefore, *how* and *when* Indigenous knowledges are given or deployed across architectural realms are a matter for Māori themselves. Lorde's (2020) well-known statement that "the master's tools will never dismantle the master's house" is apt here in our exploration of architectural "tool-making" by way of pūrākau. As noted by Moana Jackson (as cited in Kiddle et al., 2020), colonisation is an act of replacing one house with another, and living in the colonisers' house is like losing your voice. We consider pūrākau in an architectural realm as having the occasion-based potential to reassert the "voices" of mana whenua through spatial and material expression, and by extension, deepen attendance to how the environment is impacted. Context is vital to Māori knowledge, where "knowledge is not disembodied information but part of a living matrix of encounters and relationships, past and present, natural and spiritual" (Warne, 2019, "A Spirit's Flight" section, para. 6).

Pūrākau

Pūrākau are narratives of place passed through generations with kōrero tuku iho and sustained by mana whenua as a weaving of past, present and future connections with land. Pūrākau have traditionally been practiced orally through the performance of kōrero tuku iho, waiata, haka, mōteatea, karakia, whaikōrero, mihimihi, whakataukī, pepeha and tauparapara (Black et al., 2023, p. 29). We would like to distance ourselves from the misplaced Pākehā-centric interpretation that positions pūrākau as myth and legend, insofar as pūrākau are incommensurate with such notions and instead rooted in lived practicality (Kingsbury, 2022). Pūrākau is storytelling embedded in Māori ontology and epistemology, and increasingly relevant in Māori research (Lee, 2009; Mita, 2000; Pouwahre & McNeill, 2018; Parsonson, 2001; Pouwhare, 2016; Walker, 1990, as cited by Williams & Steagall, 2023). Lee (2009) extends the idea of pūrākau as a narrative towards philosophical thought, epistemological constructs, cultural codes and world views. King et al. (2007)

FIGURE 3 Antonia van Sitter (2023). *Pūrākau Whenua* [Digitalised drawing]. Papatūānuku and Ranginui stand as the strong pou between the pūrākau whenua. Papatūānuku and Ranginui speak of the creation story in te ao Māori, the strong embrace of mother earth and sky father. The tight embrace, their children who make up the natural world, pushed them apart to create the light of day. Between Papatūānuku and Ranginui lie the pūrākau that connect to places affected by the changing climate—Mitimiti, Tauranga Moana, Te Karaka and Heretaunga—through their whakapapa, histories, landmarks and stories.



highlight the benefits of Māori oral traditions surrounding mātauranga taiao and contemporary science. Confirming that knowledge in a Māori context is holistic and interdependent, Carlson et al. (2022) maintain that

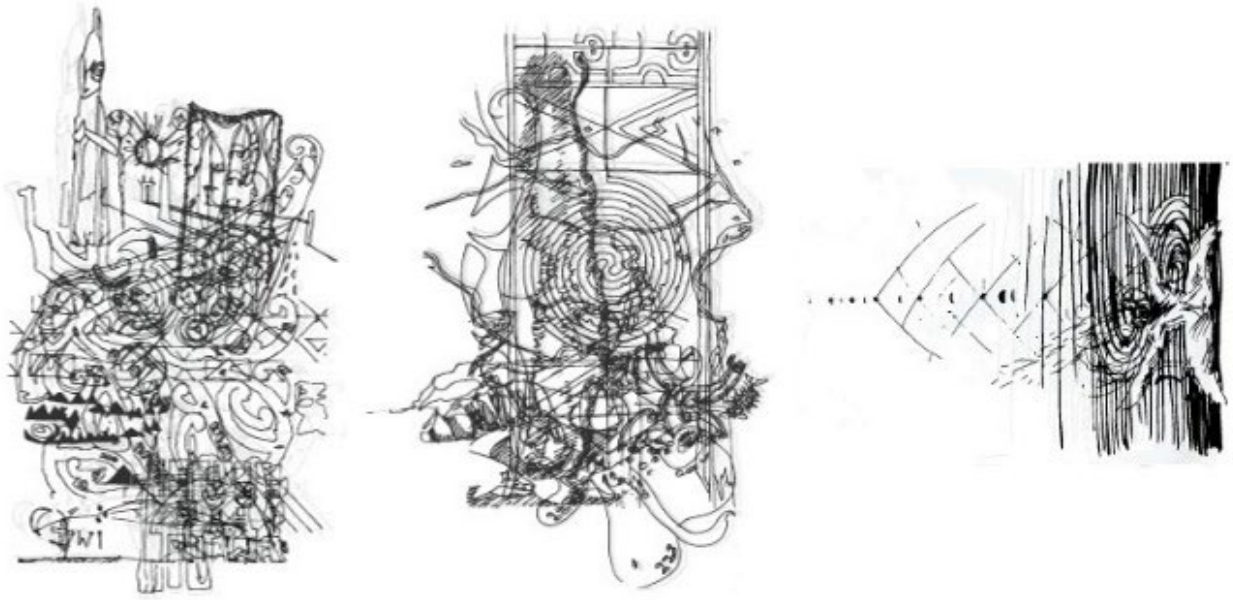
> pūrākau means to see, imagine, (re)tell truth and live our histories ... Pūrākau is our breath; the original tree of life, that takes our carbon dioxide of living and turns it into oxygen, filling our lungs, hearts, and minds with energy. (p. 5)

Pūrākau breathes the mauri and spirituality of te ao Māori and asserts how one does not exist alone but with taiao between Papatūānuku and Ranginui (see Figure 3). Stuart and Thompson-Fawcett (2010) write, "Today we call on our ancestral spirits to guide us and take us into the future … In this kete are the muka, or examples, that can be held up as prototypes for a Māori sustainable future" (p. 9). In the context of this inquiry, this invitation compels a looking back to see what might be "held up" to chart a way forward for marae resilience. It is fitting to appreciate "ko ngā tahu ā ō tapuwai inanahi, hei tauira mō āpōpō" (the footsteps laid down by our ancestors create the paving stones upon which we stand today); in the Māori world view, it is our past that always lies in front of us.

Pūrākau and the changing climates

Pūrākau speak of the intrinsic connection Māori have with the environment. Hikuroa (2017) highlights that te ao Māori relationships with the atmosphere and climate trace back to the creation of the world. Attendance to changing climates therefore demands attentiveness to the embrace of Papatūānuku the earth mother and Ranginui the sky father with their children who make up the natural world. Papatūānuku, Ranginui and the Māori atua manifest the strong connection and relationship with the natural, physical and spiritual environments. Stokes (2022) accentuates this spatial dimension, noting that "pūrākau attending to space often express intimate phenomenological relationships between tangata and te taiao" (p. 202).

Pūrākau can refer to and warn of natural disasters. Kingsbury (2022) outlines, for example, the importance of taking taniwha seriously and remaining open to the knowledge about place they carry. The taniwha is both a kaitiaki and a monster particularly associated with water and can warn of tapu, mana and significance (Hikuroa, 2019). In line with the environment, taniwha and pūrākau assert specific historical events and predict periodic changes and characteristics of the environment. Hikuroa's (2019) work discusses the practicality of understanding taniwha pūrākau to reduce disaster risk by acting as warning signs. Kingsbury (2022) describes how taniwha are increasingly foregrounded in land developments, such as an opposition to building the Ngāwhā prison, Matatā and the flicking lizards' tail, and contentions with state highway developments that displace urupā. To offer a further example,



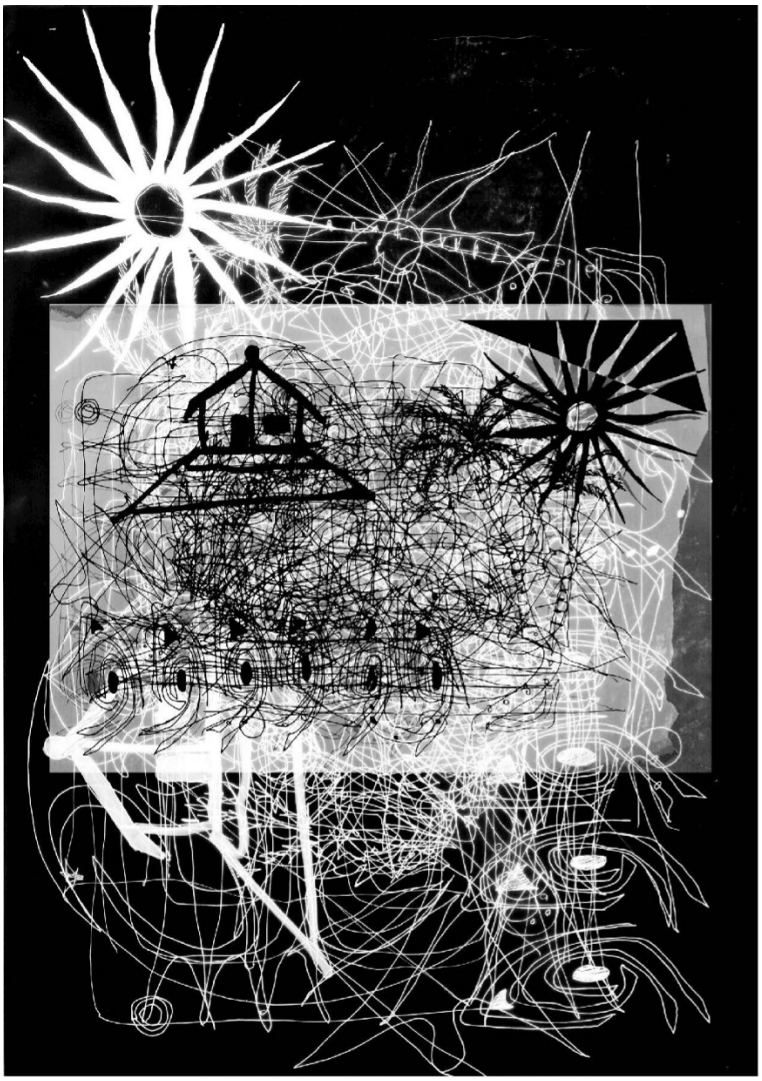


FIGURE 4 Antonia van Sitter (2023). *Marae Ātea* [Digitalised drawing, overlayed and inverted].

when the Waitepuru Stream floods through the community of Matatā, local Māori conceptualise the stream as a taniwha in the form of a lizard. The headwaters are the head, the primary drainage course is the body, tributaries form its legs, and where the river flows onto the Rangitāiki Plains is its flicking tail. Significant flood events periodically cause the lower part of the channel to overrun its banks and change course. Historically, mana whenua knew not to build infrastructure where the tail flicks (Hikuroa, 2017).

Our review of pūrākau as narratives of resilience in natural disasters took in both written and kōrero tuku iho, and indicated multiple practical pathways when designing for marae resilience. This study focused on the potential of raising up, returning to higher ground, protecting the people and the taonga, not building where the awa stretches and breathes, and the utilising of navigational skills.

Pūrākau in built environments

Matunga (2018) asserts that Indigenous architecture at its essence is a critical mechanism for expressing or articulating narrative in built form. It follows, therefore, that Māori architecture must be "constructed" from narrative, from Indigenous knowledge/s, values and processes, to be Indigenous architecture. It is critical to acknowledge how for Māori, architecture from its very inception is more than form. Linzey (1990) writes, "Māori intuition that the whare whakairo, carved house, is a living presence is richer than any mere simile. It is beyond the idea of metaphor or representation" (p. 49). Therefore, they continue, "the house is not like an ancestor, it is the ancestor" (p. 49). Such a reality challenges Western ontologies that hold realms apart with a linear sense of time, and in turn, epistemologies of measurability, upon which prevailing architectural practices rest. This ontological-epistemological discord is a critical point

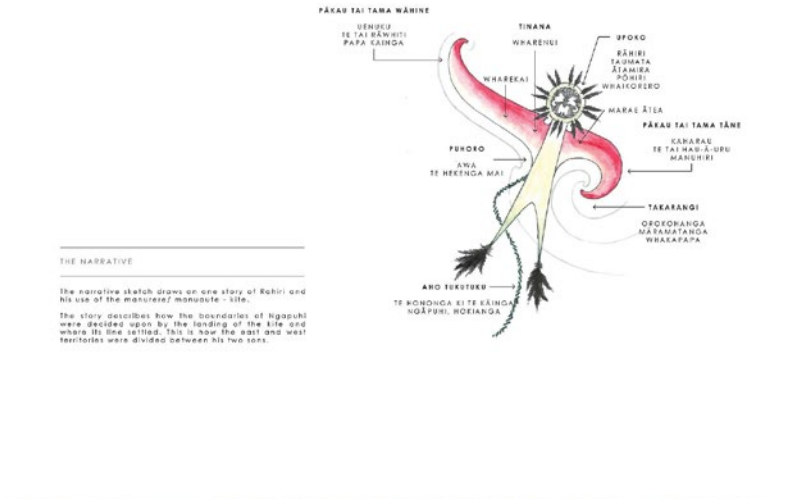


FIGURE 5 TOA Architects (2023). *Te Taumata o Kupe—The Narrative* [Diagram]. A narrative of Rahiri and his use of the manurere/ manuaute to determine architectural placement on Te Māhurehure Marae as the pūrākau determined the boundaries of Ngāpuhi between his two sons. This can be used as method to determine the designing of environments.

in the decolonial indigenisation of architecture in Aotearoa; at stake here is a matter of retooling the means through which architectural expression emerges. Such a shift shakes the representational devices that underpin dominant forms of architectural communication and pursues expression that might in the first instance be unrecognisable to "architecture". The use of pūrākau is certainly not new in the designing of Māori spaces and environments and what follows introduces both traditional and contemporary examples.

Wharenui

The wharenui is one of the prime examples of traditional Māori architecture and a traditional example of how pūrākau manifests the architecture. The wharenui manifests the history and culture of Māori; the first whare built in Aotearoa were said to be upturned waka, which consequently became the earth-sunken rectangular gabled whare (Brown, 2009, p. 24). Pūrākau is present in the placement, ancestral form, carved and weaved taonga, and how kawa and tikanga were practised. Therefore, not only does pūrākau perform practicality in the shaping of the wharenui but it also designs for the intangible, subjective features of a site through the spirituality of mauri and wairua. Key features in this hapū-centred expression include the tekoteko, the hapū ancestor; maihi, barged boards as outstretched arms among upright carvings either side of the whare as the legs; tāhuhu, the centre beam as the backbone; and heke, the rafters as the ribcage.

Expanding outside of the wharenui is the marae. The *Marae Ātea* (see Figure 4) drawing depicts the interconnectedness and relationality of the surrounding environments present; weather, atua, pūrākau, tikanga, and kawa. I produced the drawing to represent tangible and intangible essences of marae, which is more than the open

FIGURE 6 TOA Architects (2023). *Te Taumata o Kupe* [Photograph]. Pūrākau in form and drawn onto stained glass.

space surrounding the wharenui. The different textures and expressions create a dynamic cartography of mauri and wairua phenomena (Stokes, 2022). These are the Indigenous Māori methods that could create Māori architecture.

Te Taumata o Kupe Nuku—TOA Architects

Te Taumata o Kupe Nuku is an award-winning Māori community hub located in Tāmaki Makaurau on Te Māhurehure Marae. Designed by TOA Architects (2022), the architecture is centred around the sharing of mātauranga. Te Māhurehure (the first author's hapū) migrated south from Wāima in the Hokianga to Tāmaki Makaurau following the end of the Second World War (TOA Architects, 2022). Te Māhurehure Marae, located in Point Chevalier, became an urban place of cultural identity for Māori. The specifics of these narratives have been embedded into the architecture through Rahiri and his use of the manurere/manuaute (see Figure 5).

This Kaupapa Māori design process included drawing and layering of these situation-specific pūrākau with the conditions of site to propose programme and spatial organisation of the designed spaces. A fundamental feature of the whare is the stained-glass facade. Architect Matekitātahi Rawiri and celestial navigation tohunga Matua Rereata Makiha developed mahi toi and kōrero tuku iho to manifest te Hokinga ki Hawaiki (see Figure 6). This pūrākau channels the journey of Kupe, the great navigator, through the Pacific 1,000 years ago, hinting at specific locations and times throughout his voyage (Designers Institute of New Zealand, 2023).

Te Taumata o Kupe Nuku articulates Māoritanga through its indigenising of architectural methodologies *as well as* its final form to foreground the potential of pūrākau in carrying histories and traditions into contemporary architecture. Giving presence to the pūrākau through the acts of architectural drawing generates the emergence of form that ultimately becomes material architecture, while also affirming the mana of the hapū with a tika design process. Manifesting tūpuna through drawing as agent in the architectural design process has been shown to be both a powerful and a practical method for evolving distinctive, place-centric, wholly Māori architecture. Judges in the Best Design Awards commented

on how the project "harness[es] the warmth of Tamanui-te-rā, lifting all those that enter in its manaaki ... myriad of skillsets to weave storytelling into every aspect and detail of the building's bones" (Designers Institute of New Zealand, 2023). Yet how might the methods generated in this highly successful whare extend beyond a single building? How might pūrākau as method drive relationships with designed landscapes?

Pūrākau and the landscape

As indicated, the technology of property and its tools of survey are entirely opposed to how Māori inhabit and spatialise territory. While Pākehā institute firm lines through the landscape marked out in wooden pegs, Māori relied on more complex social substance. As described by O'Regan (as cited in Barber, 2023), "Sometimes trees were planted or stones placed to reinforce and define a known limit ... and as the genealogies were recited and *waiata* chanted, the oral pegs were hammered into the land" (para. 12).

Seeking land-based spatialisations other to the ascendency of property is crucial when pursuing decolonial design methods. Attendance to catchments can offer such a route. The catchment determines the health of the awa and therefore the health of the people (Tapsell & Dewes, 2018, p. 73). Catchments are drainage systems utterly unique to their specific environment and critical to understanding the interdependencies between people and a particular river, while showing how their landscape performs through time, especially landscapes prone to flooding and erosion. Their analysis also opens a set of land-based dynamics that transcends the confines of the "property line" to signal relational and transitional qualities. Catchments and their nested subcatchments are mappable, drawn into design processes to depict otherwise unseen multiscale land relationships (see Figure 7). Indigenous knowledge by way of ki uta ki tai, or the narrative of water's journey from the mountains to the sea, is essential to this understanding, and as Joy (2018) writes, a catchment can be understood via pepeha—the maunga, waka, awa, moana, tūpuna, iwi, hapū and marae.

The use of pūrākau is increasingly recognised as part of life in Aotearoa. Ko au te awa, Ko te awa ko au (I am the river and the river is me) is commonly cited in relation to the Whanganui River and its catchment. In 2017, the Whanganui became the first river in the world bestowed with personhood rights, recognising how Māori hold the river as tupua, an ancestor they are part of and "a living whole that stretches from the mountains to the sea, including its physical and metaphysical elements" (Te Aho, 2016). This endorsed aliveness of the river and catchment has inflected Aotearoa bearings of landscape architectural practice towards an understanding of land as vital material. While any detailed elaboration is beyond the scope of this article, it is evident pūrākau are an influential force in provoking shifts to established (Western) design methodology, most expressly in landscapes involving water.

Pūrākau and expression

As demonstrated, pūrākau as method within design practice is not rooted in new knowledge but taken up as the very core of mātauranga and te ao Māori. Further, the use of pūrākau unsettles any reliance upon established architectural representations of land knowledge. It is an increasingly common tactic in the design disciplines to consider Indigenous knowledges through "cultural mapping" of maunga, marae, urupā, and so on. Often this means "putting (publicly available) traditional knowledge and important cultural information onto a digital map", yet it frequently leaves off the intangible dimensions so critical to Māori knowledge. The reasons for omission are many and remind us of the autonomy of mātauranga as belonging to mana whenua.

What follows draws on a situated exploration of how pūrākau could be adapted further into the design process—most specifically for architecture in Aotearoa towards marae resilience in the changing climates.

An initial touch point for this exploration was seeking signs for practice in the first known maps drawn by Māori (see Figure 8) and whakapapa plotting (Stokes, 2022) as methods of drawing pūrākau (Kelly, 1999), and bringing these realms together with whakapapa plotting (see Figure 9), which, as deliberated by Stokes (2022), is shown to be an "Aotearoa-specific method of spatial communication" (p. 200). The unseen was drawn out to produce a hybrid mapping tool. Whakapapa plotting is polyvocal, with the process of layering multiple essences of voice, place, whakapapa, landmark and pūrākau, in such a way that favours spatial elementation (p. 203). Stokes (2022) points out that time experienced is given primacy in this plotting rather than the objectifying of space (p. 203), which points to how these forms of mapping open situated relationalities unable to be given presence by conventional means. Through drawing and layering, a hybrid technique was developed as an Indigenous place-based practice. This was brought together with the normative use

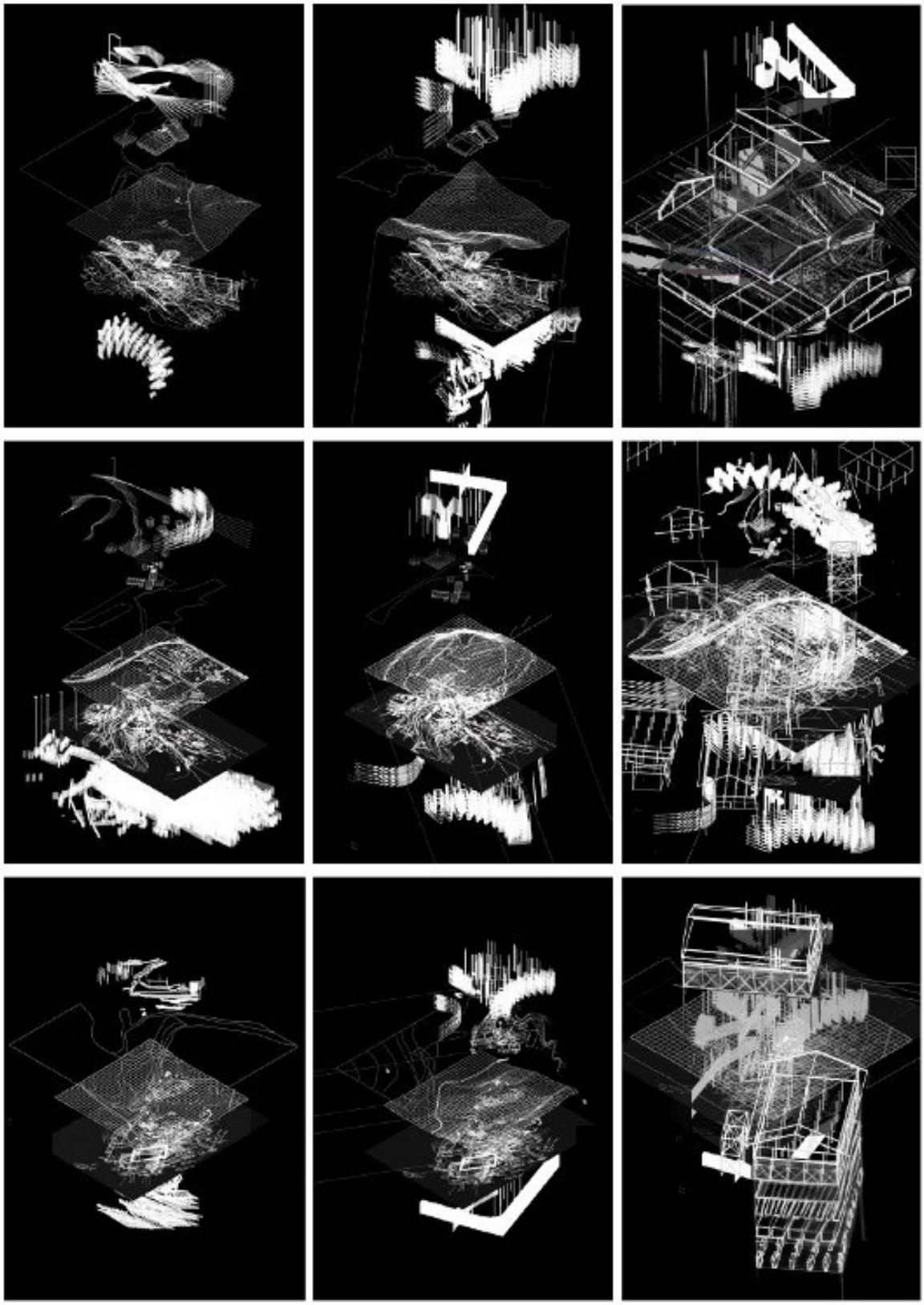


FIGURE 7 Antonia van Sitter (2023). *Whaitua Whakapapa* [Digitalised drawing, overlayed and inverted]. The series of nine tests the three marae in Mitimiti, Tauranga Moana and Te Karaka on their specific resilient design moves at the catchment scale, which resulted in a key finding that the actual building becomes less important when all the other relational factors are considered. This highlights that pūrākau mapping is critical to understanding place.

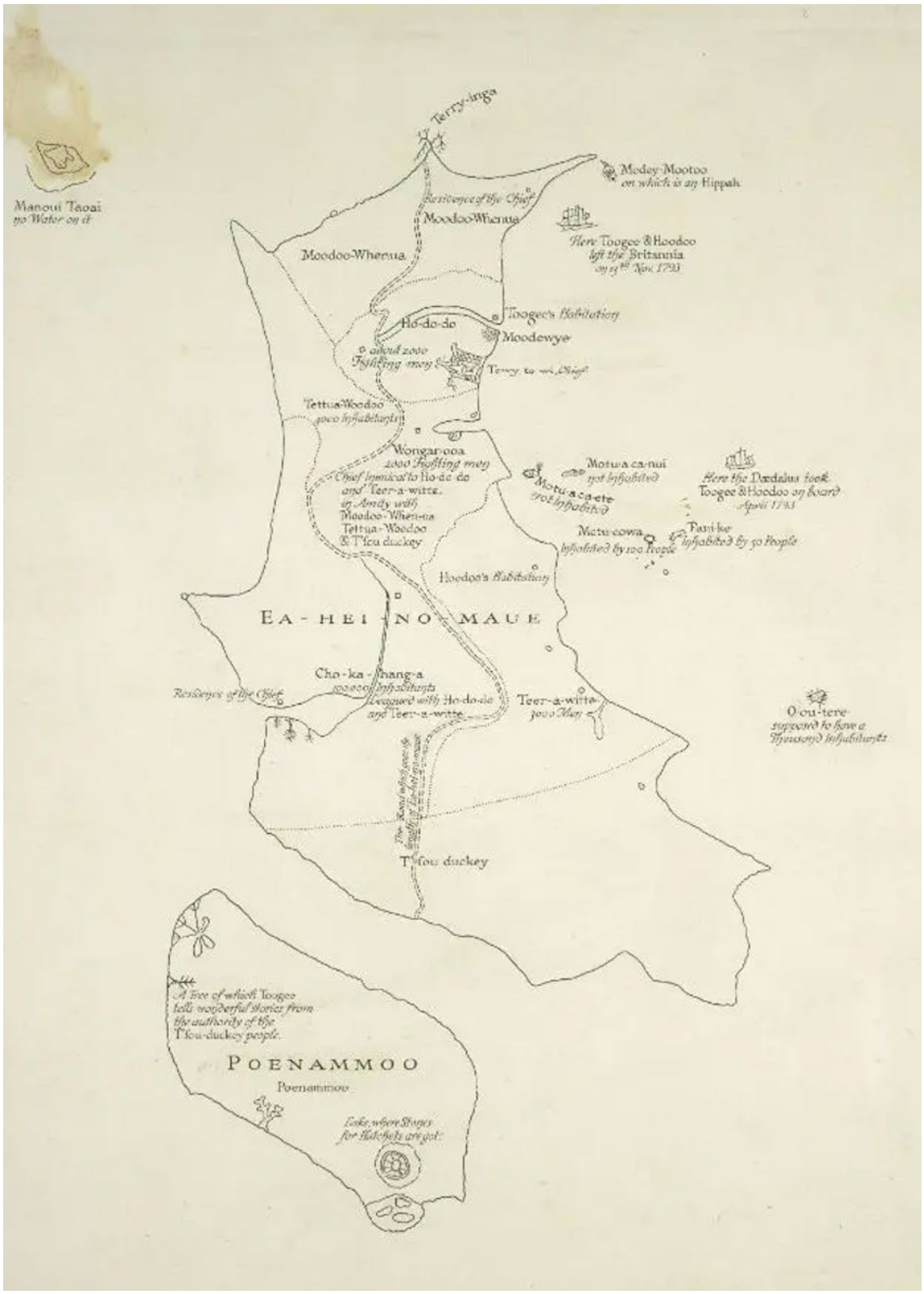


FIGURE 8 National Library of New Zealand (1791). *Map by Tukitahua of Ōruru* [Photograph of drawing]. http://www.TeAra.govt.nz/en/zoomify/10797/maori-map-of-new-zealand

FIGURE 9 Georgina Stokes (2022). *Tūrangawaewae: Whakapapa Plot 2* [Illustration].

of land-based knowledge—ArcGIS. The "indigenised" mapping process tested abilities to draw forth diverse relationality and intangible knowledges associated with the specific whenua into filiation with climate-affected marae in Mitimiti, Tauranga Moana, Te Karaka and Heretaunga.

The online tool Māori Maps offers a top-down method of ingoa wāhi o Aotearoa: Māori land blocks, Māori districts, marae and access to iwi, rūnanga, hapū, rōhe, whare, religion, battalions, community trusts and towns (Māori Maps, 2013). Combined with the ArcGIS flood map, qualities of site, topography, land cover and waterways created tangible qualities that wove the narratives of adaptability and relocation.

By layering pūrākau onto arcGIS mapping and Māori maps, knowledge of the specific tāngata and whenua of place, some coherency began to emerge, setting ground to respatialise and programme. Together these methods create a multigenerational approach, grounded by the past yet leaning towards the future. They highlight the need to augment the useful tools of topographical information and flood modelling with the historical and present narratives when identifying potential sites of relocation to fit with hapū or iwi priorities. Here, the study encourages multiple knowledge sets to inform more whānau-centric decision making (Maxwell et al., 2020).

The *Marae Whakapapa* (see Figure 10) projected the mauri and wairua, pōwhiri, whenua and wharenui, Ranginui and Papatūānuku, and marae and whenua over three marae situated in Mitimiti, Tauranga Moana and Te Karaka. A specifically Kaupapa Māori methodology, the drawing of spiritual elements (what is absent in Western-centric architectural drawings) aids in the resilient moves of relocation, alongside the Pākehā architectural drawing techniques of plan and, in this case section, in a Māori–Pākehā engagement (Hoskins & Jones, 2020). As discussed by Kawiti et al. (2025), re-indigenising architecture needs to be more than ornamentation and facade; bringing spiritual narratives into the drawing promotes the Indigenous way of learning from the past to adapt today.

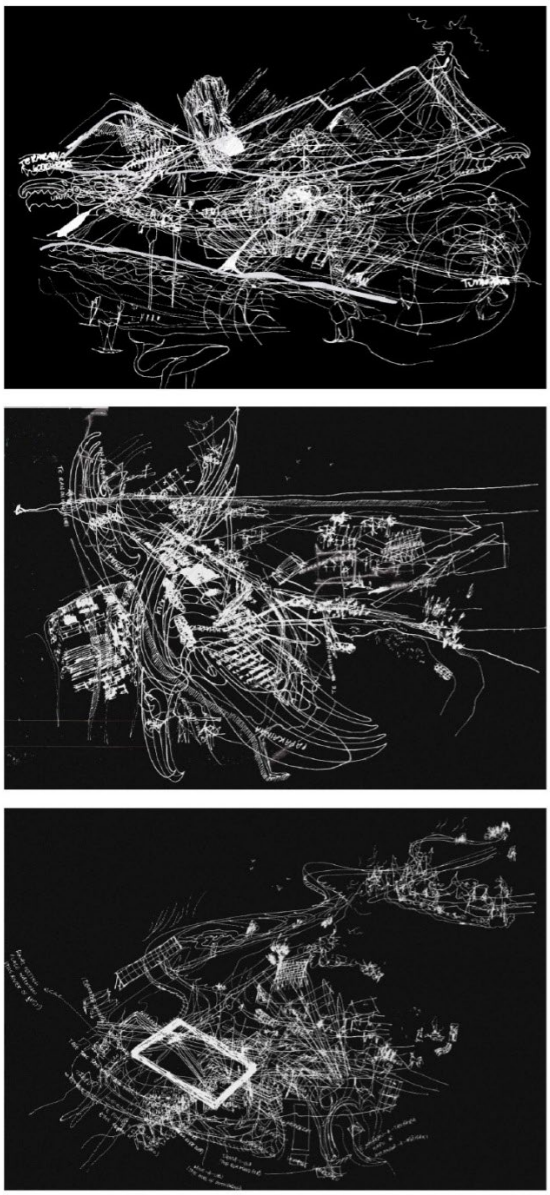


FIGURE 10 Antonia van Sitter (2023). *Marae Whakapapa* [Digitalised drawing, overlayed and inverted].

Developing architectural tactics with pūrākau

Moving from the mapping exampled above, a series of expressive drawings developed from a situated non-hierarchical array of site information and pūrākau gifted by mana whenua. Through the layering of these complex relationalities, a methodology for architectural practice was generated. The emergent drawing practice was shown to be essential in revealing connections across realms conventionally held apart in architectural drawing. Drawing pūrākau, layering each narrative and the blurred lines signify dynamism of the relational, where the imprecision and ambiguity invite the interpreter to weave their narratives along the way. Analogue drawing paired with digital media is a hybrid means of manipulating elements. Each drawing process performs relearning the narrative to critically enter and maintain architectural modalities as dynamic and alive.

With drawing and redrawing being the mode of refinement, spatial moves were made evident. The tapu spaces, such as the wharenui, ātea, church, wānanga space and taonga storage, were drawn over the top of the pūrākau embedded in the whenua. The noa spaces, such as the wharekai, wharepaku and kohanga spaces, were drawn outside of the pūrākau. This type of spatial planning, if deliberated between whānau and practice, creates diverse dialogue, which will not only make climate resilience in relocation easier but also enhance the moves by learning from these narratives. The methodology allows decision-makers to make informed choices that honour the mauri of the whenua and whakamana whānau by actively incorporating socio-spiritual attributes aligned with whānau priorities.

Reflections

We believe that this wide-ranging experimental design has the potential to help whānau engaged in climate change adaptation to make more informed architectural choices that reflect their kinship-based ideology. Most expressly, it has contextualised and trialled how a narrative-based spatial method can give rise to a dynamic and lived drawing process that evolves from and with Indigenous values and principles (see Figure 11). Here, values and principles are not theoretically pasted upon Western architectural conventions, but rather enter and materialise through situated Māori issues, peoples and places. Pūrākau, as narratives of natural disasters, written and kōrero tuku iho, indicate practical ways of resilience for marae, demonstrating that ancestral knowledge carries embedded strategies for adaptation and survival. Pūrākau are affirmed as fundamental to mobilising this unique and non-systematic design process, bringing forward situation-specific conditions laden with meaning. Through drawing, this research found new meaning for what coherence within architectural practice might be—meanings that are open to change, interpretation and the future, nonetheless rooted in place and people. An example of this is seen in the drawings in Figures 12–14), the result of the method of drawing from pūrākau, arising from the repetitive process of layering the information, both site-specific and whānau driven, which allowed the narrative of

FIGURE 11 Antonia van Sitter (2023). *Section Te Karaka* [Digitalised drawing, inverted].

FIGURE 12 Antonia van Sitter (2023). *Plan Te Karaka* [Digitalised drawing, inverted].

survival by listening to the tohu of where to place the architecture.

By looking to the past, a speculative mode of mapping allowed the inhabitation of time as multiple, opened towards a possible future. In different ways, the drawings became the relational centre and pivot through which the research opened a space between mana whenua and architecture. Manifesting the pūrākau through phased drawing practice acknowledges and honours the presence of the atua, rangatira and tūpuna as critical to the land and situation, and invites guidance for the wicked problem of climate change. The materialisation of tūpuna and kaitiaki in architectural processes is not to be underestimated as an essential and enduring aspect of architectural practice in Aotearoa. Additionally, this approach repositions the conversation by acknowledging that buildings themselves become less important when all the relational factors are considered.

Living with vulnerability to the changing climate is destabilising and traumatic, especially for

FIGURE 13 Antonia van Sitter (2023). *Pātaka Putanga* [Digitalised render].

FIGURE 14 Antonia van Sitter (2023). *Approaching the Proposed Resilient Marae* [Digitalised render]. A render of what Te Karaka could look like, utilising the three r's of raise, return and relocate, as testing of resilient design moves in the changing climates.

Māori whose lands, due to the multiple injustices resulting from colonisation, are disproportionately at risk. Given the threat climate change poses to the continuity of inhabitation for many hapū and whānau, and with it the probability of displacement, the architecture profession would be wise to avoid affirming such terms as "managed retreat" and "relocation", which undoubtedly chime with a governance of removal. By refraining from the vocabulary of relocation and allowing language to arise in the process of engaging climate concerns at the level of the people, any creation of outcomes will be more in tune with whānau aspirations. Here, the weaving of ancient and inspiring pūrākau and new resilient pūrākau into the design process makes for pathways unforeseen by architectural convention, and in doing so, decolonises design methods. By shifting the focus to relationships, connections and the continuity of whānau life beyond structures, a more holistic and culturally grounded pathway forward emerges.

Acknowledgements

"Ehara taku toa i te toa takitahi engari he toa takitini [It is not our strength alone, but the strength of many that contribute to this success]"—Whakataukī.

This research would not have dug to the depths that it did without the engagement from all over the motu. Major contributors of knowledge were thanked with koha in the form of putea, mahi toi and mihi. The engagement findings that this research refers to were granted human ethics approval 0000031005 Vs 1 for the project titled Toitū te Marae.

Glossary

Aotearoa	the land of the long white cloud; now used as the Māori name for New Zealand
ātea	open area in front of the wharenui
atua	god
awa	river
haka	performance
hapū	subtribe
Hawaiki	homeland which Māori migrated from
he huranga āhuarangi	changing climate
heke	rafter
Heretaunga	Hastings, city in the North Island
hīkoi	walk
hui	meeting
ingoa	name
iwi	tribe
kaitiaki	guardian
kaitiakitanga	guardianship, stewardship
karakia	prayer
karanga	ceremonial call, welcome call
kaupapa	topic
Kaupapa Māori	Māori approach
kawa	customs of a house
kete	basket
koha	gift, token
kohanga	nursery
kōrero	discussion
kōrero tuku iho	history, stories
kupu	word, vocabulary
mahi toi	art
maihi	the facing boards on the gable of a house, the lower ends of which are often ornamented with carving
mana	pride
manaaki	support
manaakitanga	hospitalisty
mana whenua	territorial rights
manurere/manuaute	kite
Māori	Indigenous people of New Zealand
Māoritanga	Māori way
marae	the open area in front of the wharenui
Matatā	town in the North Island
mātauranga	Māori science, knowledge
mātauranga taiao	environmental knowledge
maunga	mountain
mauri	life principles, life force
mihimihi	greeting
Mitimiti	town in the North Island
moana	ocean, sea
mōteatea	a grieving chant
motu	country, land, nation
muka	prepared flax fibre
Ngāwhā	town in the North Island
noa	free, ordinary
noho	stay, remain
ōhanga āmiomio	circular economy
pā	settlement
Pākehā	non-Māori of New Zealand
Papatūānuku	earth mother
pepeha	tribal saying
pou	support, pole, pillar
pōwhiri	welcoming procedure
pūrākau	narrative
putea	money
rangatira	chief
Ranginui	sky father
rōhe	region
rūnanga	council
tāhuhu	ridge pole of a house
taiao	natural environment
Tāmaki Makaurau	Auckland
Tamanui-te-rā	son of the sun
tāngata	people
tangata Tiriti	people of the treaty
taniwha	water spirit
taonga	treasure
tapu	sacred
tauiwi	non-Māori
tauparapara	to begin a speech
Tauranga Moana	city in the North Island

te ao Māori	Māori world view
Te Karaka	town in the North Island
tekoteko	carved figure on the gable of a meeting house
te reo Māori	Māori language
te reo Pākehā	English language
tika	right, correct
tikanga	protocol
tohu	guide, instruct
tohunga	expert
tupua	supernatural
tūpuna	ancestor
tūrangawaewae	standing place
urupā	cemetery
utu	reciprocity
wāhi	location, place
waiata	song
wairua	spirit
waka	water vessel, boat
wānanga	discuss, consider
wero	challenge
whaikōrero	speech
whakairo	carving
whakamana	validate, empower
whakapapa	lineage
whakataukī	proverb with unknown orignator
whānau	family
Whanganui	town in North Island
whare	house
wharekai	dining hall
wharenui	meeting house
wharepaku	toilet
whenua	land

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HE PĀ ANAMATA

A marae-based tikanga framework for the future

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Abstract

In response to the global climate crisis, Te Herenga Waka—Victoria University of Wellington embarked on an ambitious Living Pā building project to construct a 3,000-square-metre three-storey learning, teaching, research and engagement space as part of Te Herenga Waka Marae on its Kelburn Campus. While preparing to move into the new building, a research team investigated how the International Living Future Institute's Living Building Challenge™ sustainability principles that underpin the Living Pā project could complement the tikanga Māori that regulate the marae community. This article shares a tikanga framework developed to bring the philosophies of te ao Māori and living buildings together, explaining the key components of the framework and providing case study examples of how it applies in practice. Ultimately, this research sought to support a marae community into more climate-adaptive and resilient practices that could mitigate climate change without compromising on tikanga to achieve he pā anamata, a marae for the future.

Keywords

tikanga, marae, sustainability, Living Building Challenge™

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Introduction

Since 1980, Te Herenga Waka—Victoria University of Wellington has had a marae on its Kelburn Campus. In 1986, that cultural space grew to include an ornate whare whakairo where staff and students have been able to learn about and practise being Māori ever since (Higgins & Hall, 2011). Victoria University of Wellington was the first university with such a space. Today Te Herenga Waka Marae is home to the Māori Studies curriculum and research and engagement activities, and is a place where tikanga Māori prevails. Even in the 1980s, the long-term vision of Te Herenga Waka Marae was to continue to grow and adapt alongside the changing scale and interests of Māoridom, to serve the Māori population and support Māori students to confidently face the future as Māori.

By 2021, that future was being increasingly affected by changes to the climate, brought on through pollution and human exploitation of the world's resources. Indigenous peoples worldwide were looking for ways to reverse the impact of climate change (Gray et al., 2022). Against that backdrop, the university's marae community sought ways to continue to develop and stay fit-for-purpose, while being more conscious of the strain being placed on Papatūānuku. Led by Professor Rawinia Higgins, a proposal was developed for Victoria University of Wellington to embark on an ambitious Living Pā building project to construct a 3,000 square-metre three-storey learning, teaching, research and engagement space as part of Te Herenga Waka Marae. The Living Pā project was designed to meet the International Living Future Institute (ILFI)'s Living Building Challenge™ (LBC)—a performance-based certification framework that sets the highest standards for sustainability in the built environment (Victoria University of Wellington, n.d.).

As part of the preparation to move into the new building, a research team investigated how the sustainability principles that underpin the Living Pā project and the LBC could complement the mātauranga and tikanga Māori that regulate the marae community. This article focuses on how the Te Herenga Waka university-based marae community is adapting to climate change and learning to live and work in a more connected and sustainable way. It shares the tikanga framework developed by the He Pā Mataora: Learning to Live with the Living Pā project to bring the philosophies of te ao Māori and LBC together, explaining the key components of the framework and providing case study examples of how it applies in practice. Ultimately, this article is about sharing the learning as the marae community moves into more climate-adaptive and resilient practices without compromising on tikanga.

Background context

To date, only five universities in Aotearoa New Zealand have a fully functioning marae on-site. As pan-tribal, urban marae operate in an unusual context. They are managed by Māori but ultimately report to non-Māori vice-chancellors. They also do not have the tribal infrastructure of community marae, instead being structurally part of the university, with all of the policy and practice that comes with it. In the case of Te Herenga Waka Marae, its very existence is intertwined with the origins of Victoria University of Wellington.

The 1868 University Endowment Act set aside land to be used for the establishment of a colonial university, including 10,000 acres of land in Taranaki confiscated under the New Zealand Settlements Act 1863. This led to the New Zealand University Act 1870, which established the University of New Zealand, an examining "colonial university" (Barrowman, 1999, p. 11) that received land endowments from the Crown. Later, the Victoria College Act 1897 established a Victoria College in association with the University of New Zealand, which received an endowment of 4,000 acres in Blocks I and V of the Nukumaru Survey District administered by the Crown under the Land Act 1892.

It took until 1908 before two Māori politicians and scholars, Sir Apirana Ngata and Te Rangihiroa Peter Buck, were able to raise the idea of teaching Māori subjects at university. This was eventually approved by the University of New Zealand Senate in 1928 (S.M.Mead, 1983; Sorrenson, 1986), but it was another 48 years before Professor Sir Hirini Moko Mead was appointed as the first professor of Māori Studies at Victoria University of Wellington in 1975. Mead set about establishing an independent Māori Studies unit (the subject had previously been taught as part of the Anthropology programme), which became the basis for the current School of Māori Studies, known as Te Kawa a Māui. He also worked with colleagues to develop the unit's groundbreaking curriculum (which is still the basis of the programme offered today) and initiate a project to build a marae on campus.

In a letter to the Rt Hon. Mr Justice Richardson, Professor Whatarangi Winiata describes Te Herenga Waka as being a "multi-tribal marae (or widely considered as such)" (Winiata, personal communication, 1984). Initially housed at 36

Kelburn Parade, the venue for the marae shifted to 46 Kelburn Parade in 1985 and the clearing of a site for a whare whakairo began. In January 1986, the mauri was buried, after which construction continued at pace, culminating in the whare whakairo Te Tumu Herenga Waka being opened on 6 December 1986. In the programme for the opening pōwhiri, it states that the first thing done was "lifting the tapu" and "ko Taranaki kei te taa i te kawa" [this was done by Taranaki iwi].

It was envisaged by Mead and others that the marae would "belong to the students" even though it was geographically located in the rohe of Te Āti Awa. The idea of the marae as a laboratory and classroom for learning about te ao Māori is strong in early letters and reports, as is the idea of the marae as a bastion or stronghold of Māori culture and identity for both Māori and non-Māori students and teachers within the university. There is also mention of the university's hope that the marae would help to attract and retain Māori students.

Te Herenga Waka Marae became the centre of Māori activity at the university. Whether hosting lectures or seminars, events like hui or conferences, or welcoming graduates and their whānau to Te Hui Whakapūmau each year, the marae has been a tikanga-led sanctuary for Māori staff and students. Affordable lunches are provided daily, and space is available for students to study, socialise and be Māori. This function was paused for a time—a whakamoe ceremony was held in April 2021 to close the marae to enable the building of the Living Pā structure. However, the marae community was able to celebrate the reopening of Te Herenga Waka Marae with its new, cutting-edge Living Pā building named Ngā Mokopuna, in December 2024.

Living Pā aspiration and context

At its original opening in 1986, the wharenui was described as "the most important part of the marae complex" with its "uniquely Māori" structure and links to the ancestors, but it was also noted that there were still parts of the complex yet to be completed (H.M.Mead, as cited in Higgins & Hall, 2011, p. 11). Today, the Ngā Mokopuna building created through the Living Pā project is seen as the next phase in the development of the marae complex, built on this strong base.

At its most basic, the Living Pā project was the redevelopment of 42–50 Kelburn Parade—five villas that used to sit in front of Te Tumu Herenga Waka. However, the project's vision, much like the vision for the wharenui, was to draw together mātauranga Māori and sustainability practices as an incubator for innovation and a place for multiple communities and disciplines to come together to discuss how to build a more equitable, fair and sustainable society.

The Living Pā project worked to the LBC specifications and sustainable development principles, as articulated by the ILFI. The LBC philosophy is to actively "do good" rather than "less harm" through the advancement of seven design principles (outlined in more detail later in this article). The climate-mitigation measures required by the LBC include, for example, materials use that reduces the extraction of natural resources, and technology that reduces energy consumption and increases energy efficiency in buildings. The ILFI has set an extremely high standard to achieve, meaning that there are currently very few Living Buildings in Aotearoa, especially in dense urban environments.

Learning to live with the Living Pā

The core of the research project He Pā Mataora: Learning to Live with the Living Pā was to blend traditional and contemporary mātauranga Māori with the most climate-resilient practices available for living and working in the Living Pā. The project explored the ways that tikanga, te reo Māori, ako and taiao can be applied to the Living Pā and contribute to reversing climate change. The project takes its name from the Living Pā Mission Statement: "He pā mataora—a thriving community, he pā kaiao—a living lab, he pā anamata—a bright future." The research team used the rare opportunity afforded in the lead-up to the opening of the Living Pā building to explore the needs and challenges of moving an entire Māori community into more climate-adaptive and resilient practices. He Pā Mataora was a chance to rethink, as a Māori community committed to living more sustainably, about the whenua. It provided an ideal context to learn about and practise adapting to and mitigating climate change *as Māori* and then share those learnings with others.

One dimension of the project, known as the Pātaka Tikanga—that is, a system or framework of customary practices—was particularly focused on developing a tikanga Māori guide to support living, learning and working in the Living Pā. Even before anyone stepped foot in the new building, the research team looked for a way to guide the marae community's decision-making towards critical adaptations and transitioning to a less carbon-intensive lifestyle. Thus, the development of a bespoke tikanga framework was deemed appropriate as a way to articulate the various

"conceptual regulators" (E. Durie, 1994, p. 4) of tikanga Māori and the LBC that needed to remain at the forefront, informing policy and practices once Te Herenga Waka Marae reopened.

Building the tikanga framework

Tikanga is a living and evolving Māori system designed to maintain social order and avert problems or dangers and their consequences, while also aiming to sustain or improve wellbeing (Joseph et al., 2019). The challenge for the He Pā Mataora research team was to figure out how to blend the mātauranga that informs the established cultural practices of Te Herenga Waka Marae with the design principles of the LBC, so as to maximise the potential of both. The development of a tikanga framework was settled on as a conceptual way to represent key components of this intersection in a way that was clear and concise.

What is a tikanga framework?

The first step for the research team was to determine what a tikanga framework was, and what it needed to be, for the purposes of this project. We were not seeking to develop a theoretical framework, which is generally understood to be a basic conceptual structure underlying a system or study. A theoretical framework sets out the organising ideas to either establish or better understand the way a system works. However, while they describe the elements of the structure that enable a system, concept or text to occur, such frameworks need to be tested before they can be considered the basis of an empirical model.

The research team also had to settle on an agreed meaning of *tikanga*. A general understanding of the term is that tikanga are "correct procedure, custom, habit, lore, method, manner, rule, way, code, meaning, plan, practice, convention, protocol–the customary system of values and practices that have developed over time and are deeply embedded in the social context" (Moorefield, n.d.). In other words, tikanga can also be understood as "the Māori way of doing things". The term derives from the word *tika* meaning "to be correct", and the idea behind tikanga is that they are the "right" ways to behave to maintain Māori cultural standards and expectations. Tikanga are both values based and process orientated—that is, they are about doing the right thing in the right way. The values must remain consistent over time, while the processes—established through precedents—have a flexibility to respond to challenges of the day. Tikanga also tends to be well understood and consistent across Māoridom, so that while tribal contexts—historical and environmental—may differ across the country, collective Māori commitment to tikanga values does not (H.M.Mead, 2003).

Frameworks already exist for several related topics. For example, a values framework has been created to explain how human values underpin everyday life practices and decisions and provide "an underlying structure of the concept of human values that presents the concept with categories and clarifies their interrelations to facilitate understanding and working with them" (Kheirandish et al., 2020). However, while comprehensive, this framework is not focused on Māori practices or beliefs, so is not sufficient for the context of Te Herenga Waka Marae.

Another example is the tikanga framework that was developed for Māori cultural and intellectual property rights. Created by a Māori scholar, the tikanga framework for Matauranga Maori me o ratou Taonga Katoa (Solomon, n.d.) has some of the qualities relevant for the context of Te Herenga Waka Marae. Designed to protect and promote the use of Māori knowledge and things of value, the framework is described as "flexible enough to take account of issues that affect Maori" while ensuring the "protection and promotion of rights and obligations to control, manage, protect, utilize, and develop resources in accordance with Maori cultural values, protocols and tikanga" (Solomon, n.d.). It expressly acknowledges te Tiriti o Waitangi, tikanga, customary laws and values, and international customary laws and conventions, and also incorporates the New Zealand legal system, government policy and regulations, and relevant national and international codes of ethics and research guidelines. However, despite being firmly based on Māori cultural practices and principles, the focus of the framework is too niche to apply to broad marae operations.

Other examples of existing tikanga frameworks include Ngā Tikanga Paihere (Stats NZ, 2020), which sets out 10 tikanga to help establish goals, boundaries and principles that guide and inform data practice, and Te Ara Tika: Guidelines for Maori Research Ethics (Hudson et al., 2010), a Māori ethics framework established by a group of Māori scholars to guide research activity. Despite being focused on the upholding of tikanga Māori, neither of these frameworks have the necessary breadth or relevance to sustainability and climate change to meet the needs of the community of Te Herenga Waka Marae.

Mead's tikanga list

While other existing tikanga frameworks aligned with the principles underpinning our He Pā Mataora research, the research team determined that a source of guidance around the tikanga that should and do inform Te Herenga Waka Marae had already been set out by Mead. As part of his book, *Tikanga Māori: Living by Māori Values* (2003), Mead provided a helpful introduction to tikanga Māori, highlighting how Māori ways of being and doing continue to evolve from the past into practices in the present, and offer adaptability for the future. In the book, he explored a range of tikanga elements underpinning te ao Māori, listing seven he thought played a key role:

- manaakitanga (hospitality)
- mana (prestige)
- tapu (the state of being set apart)
- noa (neutrality)
- *take* (cause)
- utu (reciprocation)
- ea (satisfaction). (H.M.Mead, 2003, p.13)

While not an exhaustive list, the He Pā Mataora research team considered this a relevant and appropriate set of fundamental tikanga Māori for the operations of Te Herenga Waka Marae and a starting point to develop a unique tikanga framework for the university marae. Each tikanga concept, in turn, could be applied to the marae environment and community, and used as a guide for blending marae practice with sustainability actions that mitigate climate change.

The tikanga of manaakitanga is the notion of being generous, hospitable, and caring for others. H.M.Mead (2003) says that "all tikanga are underpinned by the high value placed on manaakitanga–nurturing relationships, looking after people, and being very careful about how others are treated"(p. 29). For a marae community, the ability to welcome and host visitors not only is a cultural obligation but can also determine the regard in which you are held by the broader community. In that sense, it is a common measure of marae performance and a direct determinant of the degree of mana that the marae and its members enjoy. This tikanga concept seemed particularly relevant for Te Herenga Waka Marae given that the official values of the university, as articulated in its Strategic Plan, include manaakitanga (Victoria University of Wellington, 2024).

If showing manaakitanga is a measure of mana, then mana itself can be understood as authority and control (M. H. Durie, 1998; Marsden, 2003) based on a history of consistent performance and authenticated use of power (Kruger, 2020, as cited in Coates & Irwin-Easthope, 2023). While mana is often ascribed in relation to an individual, who can acquire or lose mana through their deeds and talents, mana can also be applied to groups, places or even objects. Thus, the community and facility of Te Herenga Waka Marae can be considered to have mana, and an interest in preserving and increasing that degree of mana, through the ability to show hospitality and maintain the cultural rituals and standards expected of a traditional marae.

The tikanga concepts of tapu and noa are distinct, yet related, and are pervasive components of Māori life and thought (Benton et al., 2013, p. 404). As Vivian Tāmati Kruger (2020, as cited in Coates & Irwin-Easthope, 2023) explains, "Every aspect of the physical and spiritual world holds elements of tapu and noa and people can transition between them"(p. 69). Tapu is understood as the use of restrictions to keep people and kaupapa safe. In certain rituals or periods, people and things are considered to be in a higher state of tapu to protect and guide them to safety, caution and warn them of danger, and protect their mauri (Temara, 2020, as cited in Coates & Irwin-Easthope, 2023). As Professor Tā Pou Temara (2020, as cited in Coates & Irwin-Easthope, 2023) explains, it is also a mechanism to govern the behaviour of communities (p.70). In contrast, the concept of noa relates to the state of being ordinary or free from restrictions (Benton et al., 2013). It is in this state that Māori people consider they can go about their everyday activities, in relative safety and freedom. Certain processes can remove or neutralise tapu and bring on a noa state, such as eating food or washing with water. At Te Herenga Waka Marae, there are certain areas that are considered more tapu than others, and the state of tapu can fluctuate during pōwhiri, tangihanga and other important occasions.

A breach of tapu is considered a serious matter and can give rise to a *take*. Traditionally, *take* could erupt into debates or disagreements (Benton et al., 2013) and even fights or battles, or manifest in ailments or afflictions to people or the environment. Today, as Te Herenga Waka Marae is located on a campus of Victoria University of Wellington, there are a range of formal and informal processes for conflict resolution, which are outlined in university policy and procedures, including an official tikanga Māori process that is overseen by the deputy vice-chancellor Māori (Victoria University of Wellington, 2022).

Part of the goal in sorting out concerns or issues was to return the individuals involved to a place of balance through the process of utu. In general terms, utu is about reciprocity and seeking to find balance, although the concept can apply to a range of contexts, including between parties in a dispute or finding balance between humans and nature (Ahu et al., 2011). At Te Herenga Waka Marae, this maintenance of balance can be extended to the university's core function of teaching, research and service; its duties to students, staff and the surrounding community; and its operations and relationships with the whenua.

Ultimately, if a matter is resolved and balance is restored in a Māori context, it is believed to lead to a state of harmony, often referred to as ea. This harmonious state can relate to the restoration of relationships or the restoring of environmental norms.

While Mead's seven tikanga concepts each play a key role in ordering and guiding Māori society, together they provide a framework for understanding what matters most to Māori and how that state of balance and harmony can be achieved.

The Living Pā petals

While separately having clear and important meanings and applications, the seven tikanga Māori outlined in the previous section were identified by Mead as working together to articulate a Māori way of being, understanding and relating to the world around us. On their own, they provide a guide or indeed a framework for Māori actions and processes to keep Te Herenga Waka Marae safe and functioning. However, they do not explicitly take account of climate change and the challenges facing communities across the globe, including at Te Herenga Waka Marae. Thus, the He Pā Mataora research team explored the potential of incorporating some of the philosophies of the ILFI's LBC into a tikanga-based framework.

The research team were immediately drawn to the design principles, known as "petals" of the LBC (see Neumann Monson Architects, 2024). Work had already been done to translate the petals into te reo Māori to better blend mātauranga Māori and apply Māori understandings to the concepts underpinning the LBC. In summary, in te reo the petals are:

1. Tauranga. This design principle guides the site selection of Living Buildings and ensures that places are restored and protected once developed. It covers such matters as location, the protection of plants and animals, community engagement, and food production.
2. Pūngao. Considered one of the "hard" or most challenging petals, this design principle requires the completed Living Building to produce 105% of its energy on-site using renewable, non-combustible resources.
3. Rauemi. This petal sets requirements around the chemicals to avoid based on an extensive "Red List" (ILFI, n.d.), the need to source local products, and ensure sustainable waste disposal. It also encourages those involved in Living Building processes to engage in industry-level advocacy.
4. Wai. The water design principle is concerned with water capture, treatment and management processes. Ultimately, the goal of this petal is to reduce water use and the use of energy and chemicals for transporting, purifying and pumping water.
5. Hauora. Described as one of the "soft" petals, this design principle is focused on connecting building residents with nature, and ensuring they have access to healthy air, light, ventilation and clean facilities.
6. Tōkeke. The petal is focused on the building's properties and on ensuring the building is designed and used to provide accessibility, inclusion, potential, opportunity and prosperity.
7. Ātaahua. Finally, this design principle recognises that beautiful buildings can enhance public spaces, celebrate culture and nature, and educate people about the need to build and behave in more sustainable ways.

Together, these petals make up the performance criteria of the LBC. To achieve full certification, a building and its community need to fulfil all seven. But the question remained whether the philosophical underpinnings of the petals resonated with tikanga Māori.

Alignment and confirmation

The research team became interested in the idea that Mead's tikanga list could be overlaid with the seven performance criteria of the LBC. Members of the team held wānanga to talk through possible alignments, tease out meanings and interpretations, and began to surface the interconnections with mātauranga Māori, particularly in relation

to the taiao. The team also drew on the advice and experience of Tāmati Kruger and Kirsty Luke, who had led their own Living Building process in Tāneatua with Te Kura Whare (Ngāi Tūhoe, n.d.) and remained focused on how to give effect to living/being Māori through tikanga while applying the North American framing of the LBC petals.

As part of the methodology for exploring this alignment, the research team looked at key compositions that were important to members of the marae community. The first, a waiata ōhākī, was "Kāore Taku Raru" , composed by tohunga Te Rangiahuta Alan Herewini Ruka Broughton (1986) to mark the creation of the whare whakairo Te Tumu Herenga Waka. In it, Broughton references the environment, and the expectations he had for the future of the marae and its community members. The research team also examined a more recent tauparapara composed for the Living Pā project (see Red Stag Timber Lab, n.d.) to, again, test the alignment with the proposed tikanga framework approach. The ideas and phrasings from both compositions were found to support a tikanga framework based on Mead's list matched with the LBC petals, as outlined below. Through this process, the research team was able to make the following connections and a bespoke tikanga framework for Te Herenga Waka Marae began to evolve:

- Manaakitanga and tauranga. The tauparapara features the line "Tōia mai rā ngā waka i te au a Tāne" [Drag forth the canoes on the currents], referencing both the local currents and the idea of drawing visitors (metaphorically described as waka) to the marae to be welcomed and find place.
- Mana and pūngao. The waiata is full of phrasing that conjures up a sense of energy, movement and power, such as "Kei te aukume/Kei te aurona/Kei te aukaha/Te tau a Whiro" [And creates a whirlpool/An ever deepening whirlpool/That gathers strength/And causes Whiro to sing].
- Tapu and rauemi. The waiata includes reference to "E hūhū rā he hiku taniwha pea ngē", a warning to avoid danger (whether that be a heightened state of tapu or exposure to dangerous chemicals) akin to the "tail of the taniwha" and for the marae community to "Kia toka ia nei/Te paepae tapu" [Make strong/ The sacred benches/ Of the speakers of Tāne].
- Noa and wai. The tauparapara includes several phrases about water, such as welcoming people to "ngā waikarekare, pareārohirohi o Te Whanganui a Tara" [the choppy, shimmering waters of Wellington] and to the base of Ahumairangi, the ridge near where the marae is located. Ahumairangi literally means "originating from Rangi", indicating a source of water.
- Take and hauora. The tauparapara includes the lines "He pā kaiao. Ka takina Te Kawa a Māui, te iho o te whakaaro ahumainuku, i Ahumairangi", which describes the "living lab" aspect of the marae complex as having Te Kawa a Māui's leadership at its core, to guide the community in all aspects of its development and operation. It later refers to "Tihei mauri ora!"—the ultimate expression of life and health and the goal of the Living Pā, to connect to the origins of humankind and to the ongoing need for fresh air, and relationships with nature.
- Utu and tōkeke. Both the waiata and the tauparapara call for all members of the marae community to stand up for what they believe in and uphold the principles of the marae ("E tū e hine mā, e tama mā" [Stand up, one and all]).
- Ea and ātaahua. Finally, the waiata describes the marae as "Ko te pātaka kai iringa hoki/O te kupu o te kōrero/A te kāhui kāhika o ngā rā ki tua" [The storehouse from which suspends/The words and history/Of past times]. This echoed in the tauparapara: "Te pātaka kai iringa o te kupu o te kōrero" [The storehouse of words and knowledge]. In other words, Te Herenga Waka is a storehouse of knowledge that can be used to educate students—just as the Living Pā is more than just a building, it is an educator, a model and a guide.

Application of the tikanga framework

To test out the tikanga framework, two case studies were developed to provide examples of how it relates to common activities at the marae. The first case study relates to the pōwhiri process for new university students and the second focuses on kai. Both case studies step through the tikanga concepts in turn and identify relevant considerations and connections to the LBC petals.

Case Study 1: Pōwhiri process for new tauira

At the start of each academic year, Te Herenga Waka Marae hosts a new-student pōwhiri to welcome them all to campus in a distinctly Māori

way. The ritual includes karanga, whaikōrero and waiata and finishes with shared kai. Outside of graduation ceremonies, this is one of the biggest events of the year for the marae, so it is important that the tikanga framework applies and is relevant to this process.

The practice of manaakitanga and the principle of tauranga fundamentally underpin the pōwhiri process. They also explicitly extend to the metaphor in the name of the marae—"herenga waka" means "place where a canoe is moored", suggesting a community that shares the same tūrangawaewae while they are enrolled in the university. It is a completely Māori tauranga—the architecture, carvings, language and formality of moving into the space is physically, socially and spiritually distinct. The site is also located at the headwaters of the Kumutoto Stream, a significant waterway for local mana whenua, Te Āti Awa. It was culverted in 1866 but, through the Living Pā project, the stream's waters have been opened up and made visible, reinforcing the important message of regeneration and sustainability.

As part of the pōwhiri process, the new students are welcomed onto the marae complex, and its mana and the principle of pūngao are both represented through the quality and efficiency of the facilities provided. The Ngā Mokopuna building uses stack ventilation processes, and has a rooftop covered in photovoltaic panels to generate the energy required to meet 105% (including resilience) of the building's needs, which eliminates reliance on grid power.

Both tapu and the principle of rauemi are heightened by the pōwhiri process, with the physical movement through the waharoa to the marae ātea indicating that the marae becomes a sacred place as part of the ritual of encounter. The surrounding buildings are clad with a timber façade and use planter boxes to provide shading where required and help connect the building and occupants to the external environment. Participants enter the domain of Tūmatauenga where debate and emotions are displayed. The safety of the new students, their whānau and the haukāinga is maintained through this tapu state and the safety measures taken on-site; agreements are made to offer and receive manaakitanga, an exchange of energy to bring to life the relationship, and participants are protected and guided throughout the pōwhiri process.

The removal of tapu and return to noa begins towards the end of the ritual with the hongi process. This creates space to form new relationships with people in the present but also connect to tupuna and the obligation to manaaki whenua mana wai. Kai is also used to whakanoa participants in the pōwhiri. Within Ngā Mokopuna, an intricate water system collects water from the roof, uses evapotranspiration from the planters, and a complex tank wastewater treatment plant including a membrane bioreactor system, to produce clean, healthy and sustainably sourced water for occupants of the marae to drink.

The practice of *take* and the principle of hauora are expressed through groups of people coming together in a safe way where a shared set of rules and guidelines are understood and practised by all to ensure everyone is catered for and looked after. The pōwhiri is also a place to raise issues on the marae ātea, to analyse and critique, and to establish expectations of the incoming students' academic journeys.

Utu and the principle of tōkeke are expressed in the pōwhiri process as diverse communities with people with diverse abilities and interests come together. It is the beginning of a reciprocal relationship with students, forming an agreement to support them during their time at Te Herenga Waka and hopefully beyond, forming sustainable relationships. The pōwhiri focuses attention on the need for equitable Māori student outcomes and increasing the number of Māori graduates, but it is also an opportunity to introduce students to the sustainable and climate-mitigation practices of Ngā Mokopuna.

Ultimately, ea and the principle of ātaahua are achieved when the new students are settled into the physical, cultural and sustainable features of the marae. Their experiences of being and learning in the space are enhanced through the whakairo depicting ancestors, and the sharing of knowledge about climate change and sustainability guides both students and staff.

Case study 2: Kai

The second case study focuses on kai, the provision of which is a key component of Māori cultural practice—and, on the global scale, a significant contributor to climate change. By considering the food-related practices of the marae in relation to the tikanga framework, the research team was able to articulate a culture of mindful consumption that helps individuals and the marae community as a whole to decrease our carbon footprint and help mitigate our climate impact.

Providing delicious kai at a marae complex is a fundamental part of manaakitanga and honouring visitors. However, when matched with the principle of tauranga, another layer of expectation is added.

The menus served at Ngā Mokopuna are based on seasonal foods that have been sourced locally and are designed to leave minimal waste, which minimises the extraction of natural resources and contributes to climate change mitigation. Marae community members are learning more about the local environment, partnering with local growers and producers and paying closer attention to how the marae food is grown, presented and valued.

Both mana and the principle of pūngao are connected through kai—the reputation of the marae is dependent on its ability to provide kai for its people and guests, and the building's ability to generate more energy than it needs directly affects that kai production. Members of the marae community are closely monitoring energy consumption and have modified their usage accordingly. They also share their knowledge and skills about sustainable kai and catering processes and thereby engage with the energy of diverse groups of students, staff and members of the community.

In relation to kai, the notion of tapu and the principle of rauemi are connected through a focus on the management of resources, food processing and packaging. Exploration of low-carbon products and appropriate conservation and regeneration of food sources are a priority when planning hosted events and daily functions at the marae complex. Also, close scrutiny of the way foods are prepared off-site and how they are handled on-site, as well as the sustainability of packaging, are key considerations of the procurement process.

The element of noa, aligned with the principle of wai, ensures reflection on how the Ngā Mokopuna collects water, and how it is used by marae community members. Water is necessary to sustain the marae complex over different daily activities and diverse functions. Processes that involve wai are both physical and spiritual, and close monitoring of water use ensures there is sufficient supply for the production and preparation of kai.

If any *take* arise in relation to kai, they are likely to involve hauora. Kai is fundamental for both physical and spiritual wellbeing, and it would not be appropriate for Te Herenga Waka Marae to serve poor-quality, unhealthy or unsustainable kai. This heralds a new era in which traditional and contemporary practices in kai preparation are fused together, and new technologies are experimented with. Wellbeing considerations guide kai choices, and the pricing and serving portion size of kai for students and staff have been carefully set and monitored to be both affordable and sustaining physically.

If issues around food are raised at the marae, the process of utu and the principle of tōkeke apply, and a resolution that balances the community members' needs with the limits of nature will be sought. Job opportunities have been created by the marae, including preparing and serving kai, and the marae community hosts regular engagement events that highlight eating together as a way for people from diverse backgrounds to gather for a common purpose.

Ultimately, ea and the principle of ātaahua are achieved when carefully prepared and beautifully presented kai is served to visitors on attractive, sustainable table settings, furniture and decor. The labour of sourcing and preparing the kai is secondary to the manaaki and aroha shown to manuhiri and others in the creation of a beautiful, communal meal experience.

Conclusion

The He Pā Mataora project began with a simple premise: to learn about living in the Living Pā so that the marae community could adapt and progress to meet the expectations of the LBC. As it turned out, tikanga Māori led us to develop a detailed response to climate change centred on Te Herenga Waka Marae. By blending tikanga concepts with LBC design principles, a tikanga framework has been developed that can be applied to all dimensions of marae operations. It can also be the basis for policy development and processes for working through future climate adaptation and change. The tikanga framework will need more testing to become more embedded in marae and broader university processes, but the two case studies presented here show the potential and agility of the framework.

The research team hopes that these findings will encourage other Māori-led LBC projects or versions of them. There are hundreds of marae across Aotearoa that are facing challenges related to climate change, and the tikanga framework may be useful in decision-making and designing a process to achieve ea. If nothing else, sharing this framework supports Te Herenga Waka Marae's responsibility to achieve the ātaahua design principle around public education, encouraging others to take up the cause of living more sustainably and building "he pā anamata".

Glossary

ako	learning; teaching
anamata	time to come, hereafter, future
Aotearoa	Māori name for New Zealand
aroha	love
ātaahua	beauty
ātea	forecourt
ea	state of harmony
haukāinga	local people of a marae
hauora	health, wellness
hongi	pressing of noses representing the sharing of breath and coming together
hui	meetings
iwi	tribe
kai	food
karanga	calls of welcome
mana	prestige, status, authority, influence, integrity, honour, respect
manaaki	showing of respect
manaakitanga	respect; hospitality, kindness; mutual
manaaki whenua, mana wai	look after the land and waters
mana whenua	tribal authority over the land
manuhiri	guests
Māori	Indigenous peoples of New Zealand
marae	Māori cultural space
mātauranga (Māori)	(Māori) knowledge
mauri	life force; sacred offering
mokopuna	grandchildren
noa	not sacrosanct, having no restrictions/prohibitions; free from tapu
pā	village
Papatūānuku	Earth Mother
pōwhiri	ritual of encounter
pūngao	energy
rauemi	materials
rohe	territory
taiao	environment
take	issue, concern, cause
Tāneatua	small town in the Bay of Plenty region of the North Island
tangihana	funeral, rites for the dead
taniwha	water spirit, monster, dangerous water creature
tapu	sacrosanct, prohibited, protected, restricted
Taranaki	iwi based on the western cape of the North Island
tauparapara	formulaic chant
tauranga	place
te ao Māori	the Māori world
Te Āti Awa	iwi with traditional lands in the Taranaki, Wellington and northern South Island regions
Te Hui Whakapūmau	marae graduation
te reo Māori	the Māori language
te Tiriti o Waitangi	the Treaty of Waitangi, founding document of New Zealand
tikanga (Māori)	(Māori) protocols and practices
tohunga	priest
tōkeke	equity
Tūmatauenga	deity of conflict and resolution
tupuna	ancestors
tūrangawaewae	place to stand
utu	revenge; reciprocity
waharoa	entrance to a pā, gateway, main entrance
wai	water
waiata	song
waiata ōhākī	death-bed song of lament
waka	canoe(s)
wānanga	discussions
whaikōrero	formal speeches
whakairo	carvings
whakamoe	to put to sleep
whakanoa	to remove tapu
whānau	families
wharenui	meeting house
whare whakairo	carved meeting house
whenua	land
Whiro	deity of things associated with evil, darkness and death

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TE KAHU HURUHURU O KOHIKOHI

Weaving a Kaupapa Māori methodology for climate change research

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Abstract

This article introduces Te Kahu Huruhuru o Kohikohi, a Kaupapa Māori methodology developed to address the need for Indigenous perspectives in climate change research. Climate change policy has traditionally relied on quantitative methods, often neglecting Māori worldviews and holistic environmental understandings. In Aotearoa New Zealand, Māori values, knowledge and practices are often overlooked in climate planning, despite their role as kaitiaki of the land. This methodology bridges Māori ways of knowing with Western research, drawing on whakapapa and incorporating Kaupapa Māori and bricolage to create an adaptable, multiperspective approach. The kahu huruhuru metaphor represents the diverse experiences of Kāi Tahu ki Murihiku and other Māori communities in responding to climate change. By honouring Māori epistemologies and engaging in community dialogue, the methodology offers a decolonising approach for climate change adaptation, combining Western and Indigenous perspectives for meaningful solutions.

Keywords

bricoleur, climate change, Indigenous, Kaupapa Māori, methodology

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Introduction

There is a call within global climate change research, policy and planning literature for stronger inclusion of Indigenous communities' experiences and responses to climate change (Kenney & Phibbs, 2021). In Aotearoa New Zealand, this includes approaches that recognise the intergenerational, cultural and locale-specific nature of mātauraka Māori and tikaka (Kaiser & Kenney, 2022). Key international plans, policies and agreements, such as the Paris Agreement and the 2020–2030 United Nations Secretariat Climate Action Plan, address Indigenous peoples as generic, providing one-size-fits-all frameworks and principles. In Aotearoa, national plans, polices and legislation (e.g., the Zero Carbon Act, First National Adaptation Plan) are built from a top-down approach. Often policy consultation with Māori happens late in the drafting process, if it occurs at all (Carter, 2018; Kenney & Phibbs, 2020; Matunga, 2013) and te ao Māori are flattened into simplified and generic narratives. In response, Indigenous peoples are increasingly developing climate change plans and strategies for governments to consider (Kaiser & Kenney, 2022). Yet, research that applies Indigenous methodologies to exploring Indigenous peoples' views, experiences and responses regarding climate change is limited (Awatere et al., 2021; H. A. Smith & Sharp, 2012). Research on climate change impacts has largely been quantitative in nature, a format that takata whenua have highlighted as generic and ill-fitting for the diverse and holistic worldviews within te ao Māori (King et al., 2010). Bespoke work by and for Indigenous peoples that is culturally and locale specific is required to understand the diverse experiences and approaches for responding to climate change.

Background: Indigenous responses to climate change

Government and institutional recognition of Indigenous autonomy and rights to sovereignty over traditional lands and tribal environments remains highly problematic within global, national and local policy spheres (Ramos-Castillo et al., 2017). While this relationship is enshrined in Aotearoa under te Tiriti o Waitangi, the foundational treaty between the British Crown and Māori), claims have been lodged regarding breaches of te Tiriti in relation to climate change issues (Iorns, 2020). The history of Treaty breaches suggests that further legislated recognition of the kaitiakitaka of takata whenua in responding to climate change within their takiwā is urgently required.

Research, policy and planning literature indicates that climate change is a high priority issue for iwi and hapū across Aotearoa and that a range of actions and mechanisms are being utilised by Māori when responding to climate change impacts (Kaiser & Kenney, 2022). Additionally, climate change issues and related mitigation measures are increasingly being considered in planning documents, and iwi and hapū are beginning to release their own culture-led climate change strategies, which articulate Māori concerns and priorities, as well as adaptation and mitigation measures for their whānau (e.g., Te Rūnanga o Ngāi Tahu, 2018; Te Urunga o Kea: Te Arawa Climate Change Working Group, 2021). However, there continue to be issues with the Aotearoa government and local bodies not taking Māori values, priorities, strategies and aspirations into account when developing policies and plans related to climate change. The Resource Management Act 1991 is an exemplar of legislation that showcases this disregard. The Act states that developers, when preparing plans and policy statements, and considering resource consents, must take into account any relevant planning document recognised by a hapū or iwi authority (e.g., s 61(2A)(a), s 66(2A)(a), s 74(2A) and s 104(1)(c)). Yet, a 2019 study into the use of iwi and hapū management plans (IHMPs) found that some councils had little to no awareness of the existence of these documents, despite the stipulations in the Act (Saunders & Kaiser, 2019).

There are also challenges for the Aotearoa government as well as local and regional councils in giving effect to te ao Māori knowledge, worldviews and practices within climate change mitigation and adaptation (Ministry for the Environment, 2007). The marginalisation of Māori mātauraka, rakatirataka and tikaka has contributed to significant Māori resources being underutilised (Awatere et al., 2021). Hudson and Hughes's (2007) research on the 2004 Rangitikei flooding event in the Manawatū region found that iwi and marae are well positioned to respond to major disasters because of their inherent cultural attributes. Values such as manaakitaka and cultural infrastructure that encompasses sleeping spaces as well as commercial kitchens usefully support large groups of people during disasters. A 2024 Government Inquiry into the Response to the North Island Severe Weather Events of February 2023 acknowledged the important role of iwi and hapū in the disaster readiness, response and recovery system (Department of Internal Affairs, 2024). Yet, the key role that iwi and hapū have in climate change adaptation activities is not clearly

articulated in government response policies and practices, and Māori climate change interventions remain discrete and operational exemplars are limited to a few natural hazard events.

In accordance with the principles of te Tiriti o Waitangi, iwi and hapū are to be treated as partners with the Crown government of Aotearoa. But this statutory relationship has been ignored in the development of key climate change legislation and plans. A study by Parsons and Crease (2024) analysed the submissions of iwi and hapū representative bodies for the Zero Carbon Act 2019 (ZCA). Their research concluded that iwi and hapū were relegated to advisory or stakeholder roles in the submission process, contrary to their status as te Tiriti o Waitangi partners. They argue that the Aotearoa government "remains willing to acknowledge Māori identities and cultural values but unwilling to explicitly acknowledge Māori [rakatirataka] in the ZCA and other legislation" (Parsons & Crease, 2024, p. 10). They further state that government recognition that "Māori retain their [rakatirataka] would raise important legal and political questions about the fundamental nature of settler colonial sovereignty in Aotearoa" (Parsons & Crease, 2024, p. 10).

In 2022, the Aotearoa government published its first National Adaptation Plan for climate change, and Rauora, a parallel Māori-centred framework for climate change adaptation, was also released. Rauora articulates that "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" (Ministry for the Environment, 2022, pp. 28–30). Examples of takata whenua experiences of climate change within the plan are drawn primarily from iwi and hapū residing in the North Island of Aotearoa, and only one mention is made of South Island-based iwi or hapū (Ngāi Tahu). How this framework, as well as the plan's relevancy to different iwi and hapū groups across Aotearoa, will be put into practice may be contested. Tribal differences throughout New Zealand suggest it is not possible to develop a singular theoretical framework for understanding takata whenua views and responses to climate change. The significant gap within the literature on climate change responses led by takata whenua is the result of limited government interest in and targeted funding available for research on this topic. However, there is a desire within te ao Māori for research conducted with whānau, hapū and iwi across various takiwā that will contribute to developing scholarship on the impacts and implications of climate change for Māori. The original research discussed in this article contributes to addressing that knowledge gap. A Māori-centred theoretical and methodological framework for investigating climate change issues developed during doctoral research is presented and discussed in this article. The methodology is underscored by Kaupapa Māori theory and a bricolage of qualitative Kaupapa Māori methodologies and methods. It showcases a new framework for the interpretation, analysis and dissemination of culturally and locationally based Māori knowledge.

Whakapapa theoretical framing

To understand how Māori communities conceptualise and respond to the challenges of climate change, the concept of whakapapa must be elucidated. Skerrett White (2003) describes whakapapa, breaking it down into its core elements, whaka (to make) and papa (layers of land):

> Both those phenomena occur when our tohunga, (experts) versed in whakapapa, recite whakapapa. They whakapapa back to the land and then beyond, to the outer (or inner) layers, histories, knowledges, to the core of creation, te ira, te kore (the void). (p. 74)

Māori scholars have used the concept of whakapapa with Western philosophies and epistemologies to create blended theoretical frameworks. For example, the layering of whakapapa is reflected in Kenney's (2009) use of whakapapa with Foucault's (1977/1975) genealogy of knowledge. Knowledge is inscribed through layer upon layer of genealogical interpretation. Roberts (2013) articulates a blended ontological and epistemological framework using whakapapa, mātauraka and wānaka as a body of knowledge used in conjunction with Western zoological and botanical science. Roberts (2013) envisions whakapapa as "the repository of information about the world. Names provide additional information, and when organised (classified) into lineages vertically and horizontally, the narrative(s) then add 'flesh' (knowledge) to the 'bones' of this skeletal framework" (p. 107). Ngawhare (2019) articulates a different metaphorical framing of whakapapa as "windows" where information and practices flows in multiple directions. She determines it is "potentially the tikanga that restores tapu and noa, an extension of balance in how one perceives knowledge, time,

and location through their connection to pūrākau tūpuna, and whenua" (Ngahere, 2019, p. 19).

An additional consideration for the use of whakapapa in theoretical framing is the concept of time. Challenging the linear notion of time used in Western discourse creates the opportunity for Indigenous researchers to account "for multiple ways of conceptualising time across culture" in order to "create more culturally specific ontologies" (Reid et al., 2020, p. 2336). The challenges of, and responses to, climate change occur across multiple temporalities. These are formed by knowledge inherited from ancestors, enabled through temporally responsive strategies of kaitiakitaka for future descendants.

At the heart of whakapapa is intergenerational storytelling. Climate change research is largely dominated by quantitative research and modelling. Yet, storytelling is central to understanding the impacts on people and communities. Analysing Indigenous climate change stories and gaining understanding about effective Indigenous approaches to managing the climate change are best achieved using qualitative research methodologies, which are most appropriate for in-depth examination of culture-based narratives. Indigenous researchers commonly apply qualitative analytical methods to participants' interview talk because they generate contextually nuanced and accurate perceptions of Indigenous knowledges and the value of traditional knowledges in everyday life.

Qualitative Kaupapa Māori methodology

Denzin and Lincoln (2011) describe qualitative research as a creative, interpretive and political process in which researchers "create narratives, braided compositions woven into and through field experiences" (p. 22). Nash et al. (2005) describe qualitative methodologies as multimethod approaches for studying social settings in order to make sense of them and the meanings that people ascribe to things. Qualitative research seeks to "empower individuals to share their stories, hear their voices and minimise the power relationships that often exist between a researcher and the participants in a study" (Creswell & Poth, 2016, p. 45). Moreover, qualitative methodological approaches generally focus on details, narratives, discourses and dialogue to be interpreted (Nash et al., 2005).

Historically, climate change research has drawn heavily on quantitative models and data to determine impacts and projections. Scientists are, however, increasingly recognising the importance of storytelling and narratives for climate change evidence and communication (Moezzi et al., 2017). For Māori communities, intergenerational storytelling is a key component of ontological and epistemological understandings of the world and particularly te ao Māori. This is underscored by tikaka and pūrākau. To understand the impacts of climate change and Māori-led responses, effective research needs to privilege both storytelling and Kaupapa Māori ways of knowing.

Kaupapa Māori theories and methodologies provide space for Māori voices and perspectives, methodologies and analyses, whereby Māori realities are seen as authentic (Cram et al., 2006; G. H. Smith, 1997). This means working outside the binary opposition of Māori and Pākehā and centring te ao Māori conceptualisations of the world (Pihama, 1993; Royal, 2012). Utilising a Kaupapa Māori perspective requires the consideration of "fundamental ethics of traditional Māori society", which are derived from core beliefs (that which is tika), that emphasise "connection with the spiritual realm, the sacredness and vitality of all things, and the significance of reciprocity in human relations" (Henry & Pene, 2001, p. 23). Kaupapa Māori methods of research advocate that the self is placed centrally within the research (Pihama, 2001). L. T. Smith (2013) expands on this notion, stating that Māori have been positioned as the "Other" or have been represented or excluded from various accounts: "Indigenous peoples want to tell our own stories, write our own versions in our own ways, for our own purposes" (p. 28). One such consideration is that until the mid-18th century, Māori society was an oral culture and that

> the telling of tales, the singing of songs, the reciting of genealogy and proverb are still today the main forms of transmitting the people's history. New events become part of the tradition. New waiata are composed to tell history, and old ones adapted. Tradition is not static. There is a constant dialogue between past and the present, and the patterns of thought are still primarily those of an oral culture. (Binney & Chaplin, 1990, p. 28)

Underlining a te ao Māori philosophical approach to understanding and interpreting reality is the notion of whakapapa providing a framework for social relations, relationships to the environment and protocols governing knowledge creation and transferal (Bishop, 1999; Graham, 2007). Iwi, hapū and whānau have developed many unique methodologies that are responsive to the priorities being investigated. Haami (2017) puts forward a Ngāti Ruaka methodology for preserving taonga and waiata. In addition, Cleaver (2020) articulates

a methodology specific to wāhine Kāi Tahu for informing social work research. These diverse Māori methodologies reflect the broader Kaupapa Māori philosophy, which is grounded in a distinctly Māori epistemological framework.

Because Kaupapa Māori methodologies are deeply rooted in whakapapa and tikanga, they stand in contrast to Western philosophical approaches to knowledge. As Nepe (1991) describes:

> Māori knowledge is not to be confused with Pākehā knowledge or general knowledge that has been translated into Māori. Māori knowledge has its origin in a metaphysical base that is distinctly Māori. Kaupapa Māori is esoteric and tūturu Māori. It is knowledge that validates a Māori world view and is not only Māori owned but also Māori controlled. (p. 17)

While the philosophies should not be confused, there are avenues of alignment to help understand the multicultural reality some researchers operate within (Bishop, 2005; Cram et al., 2006; MacFarlane & MacFarlane, 2018), particularly when exploring social science theory in bricolage with Kaupapa Māori theory.

Indigenous bricoleurs

For the purposes of this research, a modified bricolage methodology has been developed through weaving together elements of qualitative and Kaupapa Māori methodologies, and the new methodological framework has been piloted and trialled during this research. Denzin and Lincoln (1999) conceptualised bricolage qualitative inquiry as a critical, multiperspectival, multitheoretical and multimethodological approach to inquiry. The authors point to the French etymological foundation of bricolage referring to a craftsperson (a bricoleur) as a "maker of quilts" who "uses the aesthetic and material tools of his or her craft, developing whatever strategies, methods, and empirical materials are at hand" (Denzin & Lincoln, 1994, p. 4). The anthropological root of bricolage points to ad hoc, improvised or made-up structures to explain the world (Hawkes, 1977). Clarke (1976) explored bricolage as a form of fashion discourse, reassembling meanings and signs, and in doing so, constructing different messages. Hebdige (1979) built on Clarke's concept of bricolage as a discursive form of meaning making, framing his research on subcultures as bricoleurs who juxtapose two apparently incompatible realities, creating an "explosive junction" (p. 361). An interpretive bricolage researcher is one who "understands that research is an interactive process, shaped by his or her own personal history, biography, gender, social class, race and ethnicity, and by those of the people in the setting" (Denzin & Lincoln, 1999, p. 6). Kincheloe and McLaren (2005) advocates that the multidisciplinary nature of bricolage requires "a new level of research consciousness" (p. 316) requiring the researcher to have familiarity with multiple methods but also be cognisant of how the bricolage is influenced by his or her perspective, social location and personal history.

Bricolage research is a political act deliberatively constructed in response to "the history of research that has often demeaned Indigenous knowledge, history and experiences" (Lee, 2009, p. 7). A recognition that "for indigenous researchers to participate in the research academy not only requires a return to our own epistemological frameworks, but the reworking of existing conventional research practices" (Lee, 2009, p. 7). A bricolage approach that embraces "webs of relationships" and a focus on processes, interconnections and associations acts as an appropriate framework for weaving together Kaupapa Māori research and social science research. Adapting the Lévi-Strauss (1966/1962) concept of the "bricoleur" to describe the qualitative researcher, Lee (2009) proposes an "Indigenous bricoleur" with a focus on Māori weaving instead of Denzin and Lincoln's aforementioned French quilts. European theorists ascribe elements of amateur hobbyist notions to their conceptualisation of bricoleur. In many Indigenous cultures globally, weaving is considered a sacred art conducted by skilled practitioners. This Indigenous bricoleur draws on decolonising methodologies (L. T. Smith, 2021), Kaupapa Māori theory and methods, and other qualitative narrative inquiry techniques. Lee uses pūrākau as a bricolage methodology to examine ako in the Aotearoa education systems. Lee (2009) argues that an Indigenous bricolage methodology is not only useful but necessary for an Indigenous researcher:

> in response to the history of research that has often demeaned Indigenous knowledge, history and experiences, to participate in the research academy not only requires a return to our own epistemological frameworks, but the reworking of existing conventional research practices. (p. 7).

Using a culturally bound methodology to examine the impacts and responses to climate change is

necessary to give appropriate visibility to the complex challenges of responding to climate change from a specific tūrakawaewae. For the purposes of this research, the lead author has woven a metaphorical kahu huruhuru.

Whatu: Weaving the foundation of the cloak

Whatu is a name given to the art of finger weft-twining weaving in Māori culture. Traditionally, artists use muka, a silky fibre made from processing harakeke materials (Tamarapa, 2019) for the foundation of woven items. Muka is seen by some weavers as "a concrete way to represent wairua, or life force, but also as powerfully symbolic of the unseen—the spiritual element, that, to Māori, permeates all aspects of life" (Tamarapa, 2019, p. 34). Woven items included practical everyday objects such as kete, fishing nets, mats and clothing (Tamarapa, 2019). Kahu huruhuru, made from harakeke and, most commonly, the feathers of birds, involves the intricate handweaving of aho and whenu of flax and feathers. It is only when all interconnecting parts come together and the here of the kākahu is tied that a korowai is complete and can be worn by the individual (Te Kanawa, 2006).

Tamarapa (2019) describes kākahu as repositories of knowledge. Examiners of a kākahu can glean information about the purpose of the cloak (shelter and warmth, status, spiritual and physical protection), the resources available at the time of the weaving through materials used and stories and designs specific to iwi and hapū that are woven into the cloaks. They are imbued with the mana of the whānau, hapū and iwi of the wearer. In contemporary Māori life, kākahu continue to play key roles adorning wearers at important events such as weddings, graduations and other ceremonies. They are also used at funerals, draped over the coffins of the recently deceased to smooth the passage between life stages (Henare, 2005).

Weaving as an artform is primarily associated with wāhine as the traditional experts. H. Smith (2019) constructed a kāhuku whatuora and embodied practice of weaving to explore stories of Māori wāhine: "Each cloak has been carefully crafted and is imbued with story. It speaks of those things—good and bad, that surround us, and form and inform who we are and how we 'see' the world we live in" (p. 7). A kahu huruhuru exists as a taonga in multiple temporalities. From the gathering of materials and weaving of the garment, through the adorning of ancestors to the careful preservation for future descendants, each adding to the narrative of the item.

To engage in the practice of weaving, artists often used karakia and other cultural practices to enter an optimum state of being (te whare pora) to receive knowledge: "It was believed that the karakia endowed the student with a receptive mind and retentive memory. They would become possessed with quick understanding and a thirst for deeper knowledge. Initiated weavers became dedicated to the pursuit of a complete knowledge of weaving, including spiritual concepts" (Te Papa, n.d.). The authors draw upon a metaphorical te whare pora to create an appropriate and ethical framework for conducting the kahu huruhuru research.

For the purposes of this research, te whare pora is drawn upon as a purely metaphorical concept to describe the preparation and readiness for data collection in the research. Qualitative research involving methods such as interviewing, wānanga and other kōrero methods often require ethical approval. To conduct this research in a culturally safe manner, the lead author drew upon Kennedy and Cram's (2010) work to construct a Kaupapa Māori ethical framework, illustrated by principles of aroha ki te takata, whakawhanaukataka, whakaoraka kōrero, kia tūpato, manaaki ki takata and kia mahaki.

Te kohikohi i ngā hou: Data collection

Kohikohi means "bringing together" in te reo Māori, and ngā hou refers to the feathers of birds. For H. Smith's (2019) research, she interpreted feathers as

> the feathers of our parents, our grandparents, our tūpuna. These feathers tell us who we are, where we are from, where we belong, all of which help us to be well and live well in this world. These storied feathers connect us to our past and project aspirations of our future. (p. 6)

For the purposes of our kahu huruhuru model, ngā hou are also the data or artefacts woven into the kahu huruhuru. These include mātauraka Māori, kōrero, pūrākau, waiata, wānakahikoi, Western planning and policy, scientific models, data and emergency management practices. Kōrero and narratives from interviewees are woven into the kahu huruhuru, creating an overarching pattern, but each participant's story also exists as a separate and unique narrative of personal truth. Therefore, the various commentaries reflect the different realities of participants as well as the collective nature of Māori whānau, rūnaka and iwi narratives. The use of interviews in this research aligns with a broader Māori storytelling tradition, in which knowledge is transmitted through narratives that

hold both individual and collective significance. One such form of narrative is pūrākau, which encapsulates Māori philosophies, worldviews and cultural teachings.

Pūrākau, a traditional form of Māori narrative, contains philosophical thought, epistemological constructs, cultural codes and worldviews that are fundamental to our identity as Māori. These oral narratives should not only be protected but also understood as a pedagogical-based anthology of literature that are still relevant today (Lee, 2009). Murihiku-based pūrākau explore our strong links with Takaroa and Te Ara a Kiwa. These pūrākau demonstrate our strong relationship with the moana culturally and influence participants' views of climate change. While pūrākau offer rich insights into Māori relationships with the environment and perceptions of climate change, other forms of documentation also serve as valuable sources of knowledge. Written records, policy documents and archival materials provide additional layers of context, complementing oral traditions in understanding and addressing contemporary challenges.

Documents, including both mainstream and Indigenous policy, planning and strategy documents, are an important component of the research. In Indigenous cultures, narrative is a means of codifying knowledge and facilitating the process of knowing (Archibald, 2008). According to Ware et al. (2017), "indigenous narratives explain their origins; locate them physically, socially, environmentally, culturally and spiritually; and often transcend time and space" (p. 46). Māori researchers have drawn on narrative analysis for kōrero, pūrākau and other oral forms of communication (Erueti, 2015; Hollis-English, 2012; Lee, 2005, 2009; Ruwhiu, 2008). Written plans and documents are also narratives, transmitting and reifying culture, history and values (Ware et al., 2017). Policies and plans represent a collective process of meaning making and prioritisation. IHMPs and district plans inform us of the values and priorities of the communities they represent. These tools are therefore rich for understanding collective identity, history and decision-making (Saunders, 2017). Analysing and comparing non-Indigenous policies and plans alongside Indigenous documents and kōrero can assist in highlighting useful Indigenous planning narratives and discourses that may be hidden from wider perusal. Indigenous planning theory frames the narrative analysis of these documents. It not only provides a framework for analysing policy and strategy documents but also highlights the narratives that shape community priorities and decision-making. To gain a fuller picture of climate change responses, these narratives must be examined in conjunction with other knowledge sources, including scientific data and models.

Scientific data and models are also ngā hou to be woven into the kahu huruhuru. Data tools and models, such as the NZ SeaRise programme, provide locationally specific combinations of sea level rise and tectonic displacement data for the public. However, quantitative or numerical scientific information often uses complex language or lacks important context, which may render meaning and understanding inaccessible and even irrelevant to some members of the public. Drawing on climate change models and data, along with other forms of ngā hou, can help build a more coherent and contextualised narrative of climate change risk and response. Scientific data offers precise measurements and projections, but without cultural context, it risks being disconnected from the lived experiences of communities. By weaving together multiple strands of knowledge—scientific, policy-based and Indigenous—a more holistic and meaningful understanding of climate change risks and responses can emerge.

Whatu kākahu: Data analysis

There is a deeply embedded tradition of passing down mātauraka Māori and tikaka through kōrero kanohi ki te kanohi, and these attributes are intertwined with whakapapa and identity. It is therefore important to reject notions of hui and interview narratives as discrete forms of data separate to the participants that can be "cut up" and assembled (Somers, 1997). The aforementioned data collection methods underpin an approach to narrative analysis that draws on decolonising paradigms, respects narratives in their entirety and disrupts the potential power imbalance of the "I" researcher and the "they" researched. Instead, researchers and participants collaboratively construct narratives as a "we", respecting the mana of participants. This is particularly important when discussing potentially traumatic topics of climate change impacts that may emerge during the research.

The data collected for this research includes interview and hui kōrero, documents, images and pūrākau. While the forms of these data are varied, they may all be understood as different forms of narratives. According to Elliott (2005), narratives have an important social dimension and are told in a specific social context for a particular purpose. Somers (1997) describes narratives

as constellations of relationships, embedded in time and space and constituted by causal emplotment (the assemblage of elements in a story). She explores four categories of narratives that frame the social world and our social identities : ontological narratives (personal narratives), public narratives (attached to cultural and institutional formations), conceptual narratives (social science theory) and meta narratives (master narratives such as climate change, colonisation and neoliberalism) (Phibbs, 2008). The context and purpose of narratives is particularly important for understanding how stories are constructed and how they operate at different levels.

No narrative exists independently of others; they are co-constitutive and relational, transcending defined fields (Somers, 1994). Therefore, a nested analysis approach has been taken during this research to address the different levels of narratives and the intersections between ontological and whānau narratives, public and Māori narratives, conceptual narratives and meta narratives. The nested narrative approach is useful for exploring the sociopolitical context of climate change broadly because it remains a contentious issue in ontological and public spaces in contrast to the science sector, where climate change is readily acknowledged as a critical reality. The whatu kākahu approach (outlined above) for analysis uses a narrative analysis framework to explore the interrelations, influence and expressions of the hou of nested narratives (Gergen & Gergen, 1988) and their potential tensions at intersections with identity within the data.

Te Kahu Huruhuru o Kohikohi: The cloak of Kohikohi

As previously referenced, kohikohi means "bringing together"; it is also the name of the lead author's tupuna who inspired the kahu huruhuru methodology. The cloak pictured in Figures 1 and 2 belonged to Kohikohi, and was donated to Te Hikoi Museum by Ulva Belsham (QSO) in 1990. Whatu techniques for this kākahu utilise a candlewick kaupapa and embrace traditional materials such as harakeke as well as feathers from bantams and roosters that were likely brought over by the colonial whalers who settled in the Oraka-Aparima area. The kahu huruhuru is woven using many different patterns, textures and colours, as well as inherited knowledge, which combine to

Figure 1 (left): Lead author with the kahu huruhuru, Te Hīkoi Museum (July 2021)

Figure 2 (above): A close up image of the kahu huruhuru, Te Hīkoi Museum (July 2021)

Figure 3 Te Kahu Huruhuru o Kohikohi methodology

produce a beautiful and protective cloak passed down through whakapapa.

The kākahu bricolage methodology (outlined in Figure 3) combines te ao Māori and Western knowledge and practices to build patterns and meaning. It is woven using a Kaupapa Māori qualitative methodology as the muka thread, with whakapapa binding together the elements. It is adorned with colourful ngā hou, kōrero, mātauraka Māori, tikaka Māori, pūrākau and hikoi representing intergenerational narratives of whānau experiences with climate change. Other forms of narratives and data in the form of Māori and non-Māori planning and policy documents and climate change research and practices provide complementary and contrasting ngā hou feathers.

Ultimately, Te Kahu Huruhuru o Kohikohi is the methodological framework to develop an intergenerational locationally, culturally and temporally relevant kahu huruhuru resource to serve whānau adapting and responding to climate change impacts. While the physical kahu huruhuru is currently in storage at a museum to be carefully preserved as a taonga for future generations, it is the author's intention for the Te Kahu Huruhuru o Kohikohi methodology and accompanying academic research to be actively used, for whatever purposes current and future generations deem to be important.

Tying off the strands: Conclusion and recommendations

This methodology in many ways is a response to calls for greater inclusion of Indigenous voices in the climate change research, policy and practice arenas. It is imperative that Indigenous voices can be heard in order to respond effectively to the challenges of climate change. Yet, there is significant diversity in the autonomy, contexts and experiences of Indigenous peoples and in the ways they respond to current extreme weather-related events and plan for a future, increasingly challenged by climate change. Research methodologies used by Indigenous academics when working with their communities should also be diverse and reflect the local priorities, knowledges and cultural adaptation practices of these groups. Te Kahu Huruhuru o Kohikohi is one such methodology, uniquely developed during and for this particular study and for the individuals, whānau, rūnaka and iwi members who participated in the research.

Te Kahu Huruhuru o Kohikohi weaves together an innovative methodological framework underpinned by localised rūnaka and whānau knowledges that responds to the urgent call for increased inclusion of Indigenous agency and voices in climate change research. Throughout this project, the diversity of Indigenous experiences is emphasised, challenging the one-size-fits-all frameworks often presented in global and national climate change policies. This methodology underscores the importance of a Kaupapa Māori perspective, where Māori realities, values and worldviews are seen as central to both research and the practice of climate change adaptation.

One of the most significant contributions of Te Kahu Huruhuru o Kohikohi is its focus on the bricolage approach, combining elements of

qualitative, Kaupapa Māori and Western methodologies. This approach allows for a flexible and adaptive research process that respects the mana of the participants while recognising the complexity of the issue at hand. Climate change, with its global scope and local impacts, requires a framework that can account for multiple-layered temporalities and ontologies. Te Kahu Huruhuru o Kohikohi achieves this through its focus on whakapapa. By framing knowledge in this genealogical context, the research can highlight the intergenerational storytelling and responsibilities that are central to Māori communities' responses to climate change.

The importance of storytelling cannot be overstated. As the article highlights, much of the mainstream climate change research is rooted in quantitative models, and often ignores the rich narratives that voice Indigenous peoples' lived experiences. For Māori, these stories are not just data points; they are the foundation of ontological and epistemological understandings of the world. Through the integration of pūrākau, wānanga and hui, Te Kahu Huruhuru o Kohikohi enables a deep engagement with Māori knowledge systems, ensuring that research on climate change reflects the lived realities and cultural practices of the communities involved.

The methodology also addresses gaps in current climate change policy and planning, particularly the tendency to overlook the specific needs and values of Māori communities. In doing so, it provides a framework for policymakers to engage meaningfully with Māori-led strategies for climate resilience and adaptation. By centring Māori voices and honouring local experiences, this methodology not only enriches climate change research but also serves as a methodological model for other Indigenous communities in Aotearoa and globally.

In conclusion, Te Kahu Huruhuru o Kohikohi offers a transformative and culturally grounded approach to climate change research. The narratives and information collected through this research stand as a record of participants' experiences and mātauraka, and their hopes for the future in adapting and responding to climate change. The methodology also provides a rich resource for planning responses to climate change, through determining what the priorities and risks are for Māori, as well as identifying what takata whenua value and what needs to be preserved for future generations. This methodology will continue as a resource for Southern whānau, rūnaka, hapū, and iwi as they navigate the ongoing impacts of climate change and work towards a sustainable future for their communities and future generations. More broadly, this korowai stands as a testament to the resilience of Māori knowledge systems and the necessity of Indigenous-led research in addressing one of the most pressing global challenges of the current era.

Glossary

aho	vertical strands in weaving
ako	pedagogy
aroha ki te takata	respect the people you are working with
hapū	Māori subtribe
harakeke	flax
here	cord
hikoi	journey
hou	feathers
hui	meeting
iwi	Māori tribe
kahu huruhuru	feathered cloak
Kāi Tahu	an iwi or tribe based in the South Island of Aotearoa New Zealand, otherwise known as Ngāi Tahu
kaitiaki	guardian or steward
kaitiakitaka	guardianship or stewardship
kākahu, kāhuku	garment
kanohi ki te kanohi	face to face
karakia	incantation
kaupapa	foundation
Kaupapa Māori	Māori values or foundation
kete	baskets
kia mahaki	be humble
kia tūpato	be cautious
kohikohi	coming together
kōrero	interviews or discussion
korowai	cloak
mana	prestige, authority
manaaki ki takata	be generous in sharing with people
manaakitaka	generosity or hospitality
marae	communal meeting house
mātauraka, mātauranga	knowledge
moana	sea, ocean
muka	a silky fibre made from processing harakeke materials

Murihiku	southern South Island, Southland
ngā hou	feathers or data
Ngāti Ruaka	tribe based in the southeast of the North Island of Aotearoa New Zealand
noa	profane
Pākehā	New Zealander of European descent
pūrākau	intergenerational stories
rakatirataka	self-determination
rūnaka	regional iwi governance bodies
Takaroa	deity associated with the sea
takata whenua	Indigenous peoples of Aotearoa New Zealand
takiwā	region
taonga	treasured items
tapu	sacred
Te Ara a Kiwa	Foveaux Strait
te ao Māori	the Māori world or Māori worldviews
te reo Māori	the Māori language
te Tiriti o Waitangi	the Treaty of Waitangi
te whare pora	the house of weaving
tika	true
tikaka, tikanga	cultural practices
tupuna	ancestor
tūpuna	ancestors
tūrakawaewae	a place of belonging where Māori with ancestral links to the locale can stand and speak
tūturu	permanent
wāhine	women
waiata	song or songs
wairua	lifeforce
wānaka, wānanga	workshops
wānakahikoi	journey
whakaoraka kōrero	listen first, speak later
whakapapa	genealogy
whakawhanaukataka	build relationships
whānau	families
whatu	handweaving
whatuora	methodology
whenu	horizontal strands in weaving
whenua	land

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CLIMATE CHANGE RESILIENCE IN AFRICA

The case of Kenya and Zimbabwe

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Abstract

This paper looks at the current issues related to funding climate change in Africa, specifically in Kenya and Zimbabwe, and shows how industry has worked with the Indigenous population to adapt to and mitigate the effects of climate change. Climate change has led to reduced water resources, instances of desertification, reduced food production, and poor human health outcomes, particularly the health of women and children. Deforestation has led to rivers getting less water and these countries having difficulties in the generation of hydroelectric power. This has led to increased levels of poverty for locals. To adapt to and mitigate the effects of climate change, communities have shared Indigenous knowledge with industry, resulting in improved outcomes such as food production. This paper examines the local and Indigenous-focused adaptation strategies Africans are utilising to overcome the challenges of climate change.

Keywords

climate change, desertification, funding, Indigenous knowledge

Introduction

The United Nations Conference on Environment and Development, also known as the Rio Conference or the Earth Summit, was a major United Nations conference held in Rio de Janeiro from 3 to 14 June 1992. Since 1992, members of the United Nations Framework Convention on Climate Change and the Conference of the Parties (COP) have convened every year. They reflect on their activities and establish how to adapt and mitigate the effects of climate change on the planet.

Africa is among the continents that are most vulnerable to the impact of climate change. In 2023, COP28 took place in Dubai from 30 November to 12 December. In the lead-up to COP28, the Africa Climate Summit (4 to 12 September) was held in Nairobi. The Nairobi Declaration (African Union, 2023) demanded that major polluters commit more resources to help poorer nations. There

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is a huge gap in climate change financing. Access to capital is a strong barrier to climate change mitigation and adaptation.

Many countries in Africa take the effects of climate change seriously and have engaged in implementing adaptations that satisfy the population. They consider the following issues when thinking about adaptations to climate change: (a) the economic barriers to adaptation and mitigation options (Makate et al., 2017; (b) public interest in the options (Singh et al., 2020); (c) whether the options align with Indigenous knowledges (Singh et al., 2020); (d) whether the options affect people's earnings, such as moving small-scale farmers who depend on farming in government forests to conduct reforestation; (e) whether the options displace people from their ancestral homes, affecting their sense of identity, world views and sense of place (Tschakert et al., 2017); (f) whether the options increase or reduce inequalities related to gender or indigeneity; and (g) whether the options displace Indigenous people from their lands.

People in Kenya and Zimbabwe continue to experience increased effects of climate change, ranging from longer and more severe droughts, intense floods, and wide-ranging forest fires and bushfires. Issues related to climate change are numerous, and they cut across all spheres of life. This paper addresses matters related to wood fuel, eco-farming and tree planting. We examine how Kenya and Zimbabwe have responded to these three matters, and we explain what Indigenous communities have done to adapt to and mitigate climate change.

Literature review

African leaders recognise the significant climate change challenges that Africa faces and seek adaptation solutions. African Union leaders at the African Climate Summit (African Union, 2023) expressed concern that

> many African countries face disproportionate burdens and risks arising from climate change-related unpredictable weather events and patterns, including prolonged droughts, devastating floods, out-of-season storms, and wildfires, which cause massive humanitarian crisis with detrimental impacts on economies, health, education, peace, and security, among other risks. (p. 2)

Scholars who have studied the effects of climate change in Africa have argued that climate change causes extreme events such as floods and droughts that have economic and health, social and economic effects on the people (Williams & Kniveton, 2011). Frequent droughts and severe flooding caused by climate change have severely affected farmers in Africa, particularly in Kenya and Zimbabwe. In comparison, small-scale farmers who depend on subsistence farming have been affected more than the extensive farmers (Chepkoech et al., 2018; Government of Kenya, 2012; Ochieng et al., 2016). Women and children also bear the brunt of the effects of climate change (Government of Kenya, 2012; World Bank Group, 2021). This has resulted in poverty for many families. The small-scale farmers rely on rainfall when it comes (Chepkoech et al., 2018; Government of Kenya, 2012; Ochieng et al., 2016) while many of the large-scale farmers have sunk boreholes on their land.

The effects of climate change, such as prolonged droughts, extreme flooding, and sea level rise, have displaced people from their homelands. This causes a "loss of connection to country, sense of place and belonging" (Tschakert et al., 2017, p. 7). Extended droughts in many countries in Africa, such as Sudan and Ethiopia, have also forced migration of people across borders. This type of migration places a huge burden on the host countries, such as Kenya, which has for the past decade hosted large numbers of displaced persons and economic migrants.

Climate change poses huge financial challenges to individual countries and their people. Significant funds are required if the world is to adapt to and mitigate the effects of climate change on the planet. Unfortunately, the big polluters are usually not willing to pay for polluting the environment. The Nairobi Declaration (African Union, 2023) demanded that major polluters commit more resources to help poorer nations. The African leaders pointed out that "Africa was not historically responsible for global warming, but bore the brunt of its effect, impacting lives, livelihoods, and economies" (African Union, 2023, p. 1). Africa receives only about 12% of the nearly $300 billion in annual financing it needs to cope with the challenges of climate change.

In the following section, we address climate change adaptation in Kenya and Zimbabwe, where work is underway in reforestation, use of Indigenous knowledge in food production, and partnerships with industry to adapt to climate change.

Adaptations to climate change in Kenya

The Government of Kenya (2018) recognises the following impacts of climate change in Kenya: (a)

social impacts, such as displacement of people and closure of schools due to floods and droughts, local conflicts as livestock farmers displaced by drought search for pastures for their animals, and scarcity of water, which compromises hygiene for women and girls; (b) environmental impacts, such as rising sea levels, melting glaciers on Mount Kenya, which is a source of many rivers in Kenya, landslides and forest fires; and (c) economic impacts, such as floods that destroy roads, cash crops and subsistence crops, and livestock and contributes to food insecurity. Kenya is guided by the Climate Change Act (2016) in its response to the issues that it faces.

The Government of Kenya is proactive in devising climate change mitigation and adaptation strategies, which are outlined in the Climate Change Policy (2016). Some farmers in Kenya, although willing to adapt to climate change, have not done so due to financial constraints, such as the inability to get credit from institutional lenders and a "lack of knowledge regarding adaptation measures" (Ochieng et al., 2017, p. 204). In this paper, we adopt the definition of climate change adaptation in human systems as used by the Intergovernmental Panel on Climate Change (2019) as a "process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities" (p. 804).

Several researchers (Bryan et al., 2013; Chepkoech et al., 2018; Kinuthia et al., 2018; Mudekhere et al., 2023; Okumu et al., 2023; Waaswa et al., 2021) have done some research on climate change adaptation in several communities in Kenya. They found that Kenyan farmers had adopted strategies such as changing the time crops are planted, increasing the use of manure and water harvesting, and planting more trees. Indeed, Kenya seeks to plant more than 15 billion trees by 2032 with the aim of reducing greenhouse emissions and restoring forest cover.

In 2021, Kenya was ranked 152 out of 181 countries that are highly vulnerable to climate change impacts (World Bank Group, 2021, p. 3). The ranking shows that the impact of climate change in Kenya is very high. The report indicated that Kenya's vulnerability is caused by a combination of political, geographic and social factors. Therefore, to mitigate and adapt to climate change, political, social and economic solutions need to be sought. Kenya has a climate adaptation policy (Climate Change Act, 2016) that guides climate change adaptation and mitigation. It states that "climate change adversely impacts key sectors that are important to the economy and society: environment, water and forestry; agriculture, livestock and fisheries; trade; extractive industries; energy; physical infrastructure; tourism; and health" (Climate Change Act, 2016, p. 4). It acknowledges that Kenya needs to prioritise climate adaptation and mitigation. As a result, several adaptation strategies have been devised at both the national and the local level, including planting crops that are more tolerant to little rainfall and the use of irrigation, among others. In their study, Bryan et al. (2013) found that farmers were adapting to climate change in various ways, such as using climate-smart agricultural practices that include changing crop varieties, changing planting dates and crop types, decreasing livestock numbers, diversifying, changing or supplementing livestock feeds, changing fertiliser application routine and adopting new soil and water conservation practices (p. 31). Kabubo-Mariara and Karanja (2007) found that the Government of Kenya provides support to farmers to adapt to climate change in the form of training, credit, farm inputs and advice from extension officers.

The Government of Kenya has partnered with communities in afforestation, reforestation, and documenting and disseminating Indigenous knowledges (Alliance for Food Sovereignty in Africa, 2020). Using Indigenous knowledge, many farmers have resorted to growing Indigenous foods that are drought resistant, for instance, amaranth, sweet potatoes, sorghum, millet and cassava. Such shared Indigenous knowledge has led to improved food production. Surplus food is sold in markets, adding to the family income revenue.

Kenyans are adapting to energy-efficient cooking stoves. The new stoves are more energy efficient because they consume less wood. They have reduced smoke and so offer benefits to users, who can now spend more time attending to household chores or, for students, more time for study, rather than spending time in health centres. Students attend school regularly and so improve their literacy and numeracy skills. Since the new stoves use less wood, there are fewer risks of deforestation, and this leads to more rain and better farming. Consequently, there is more food production.

Studies (Mudekhere et al., 2023; Waaswa et al., 2021) have found that farmers, both large and small, have adapted to new technologies to understand weather patterns and variability, and have used these technologies and Indigenous knowledges to adapt to climate change.

Adaptations to climate change in Zimbabwe

Government policy

Geographically, Zimbabwe is part of the Southern African region and, like other countries of this region, faces challenges of being in a semi-arid region (close to the Kalahari and Namib Deserts). Zimbabwe has been experiencing climate change–induced prolonged droughts and incessant rainfall resulting in floods. There are also problems of deforestation, droughts and dry spells, and cyclones and floods. The Government of Zimbabwe has thus come up with a Zimbabwe Climate Policy (2016), which has suggestions on what needs to be done to mitigate climate change. The suggested approaches include promoting research on climate change, programmes on educational awareness of climate change, implementation of mitigation processes, resource mobilisation, and collaboration with national and international bodies such as non-governmental organisations (NGOs). The majority of Zimbabweans live in rural areas, and climate change, caused by human activities and other natural processes, is a major threat to their livelihoods. They rely on agriculture to feed their families as well as to earn a living by selling some of the produce. Government and NGOs have been working hand in hand to introduce measures that reduce the impacts of climate change.

The Zimbabwe Climate Policy outlines principles on which the policy is based. These principles aim to address issues concerning weather and climate, vulnerability and adaptation, low carbon development, and other cross-cutting issues. The rest of the policy document provides details on approaches and other issues that the government would need to consider in addressing climate change.

The Zimbabwe National Policy Report (Government of Zimbabwe, 2022), a follow-up to the above Zimbabwe government policy and produced by the Participatory Ecological Land Use Management (Government of Zimbabwe, 2022) association, concludes that "there is evidence of clear interest by government and civil society organizations to support the agroecological concept as a responsible and effective approach to climate change challenges" (p. 23).

The following sections of this paper discuss the different approaches that the Government of Zimbabwe has taken in trying to address climate change issues, especially as climate change affects rural small-scale subsistence farming communities.

Government approach to mitigate climate change

As a follow-up on the above policy recommendations, several approaches have been and are being put in place in the country. These include the establishment of an agroecological school; a national tree planting ceremony and a feminist climate action academy, among other approaches.

Zimbabwe offers a useful case of agroecology at the Shashe Agroecology School, where Indigenous knowledge from local communities is used to mitigate climate change. The Shashe farming area is in the Mashava district in Masvingo Province, about 294 kilometres from the capital, Harare. In the early 2000s, the land was barren, with no hope that the soils could be suitable for farming. This land was previously used for cattle ranching and, as a result of overgrazing and adverse weather conditions, had turned semi-arid. Livestock were dying due to hunger while trees succumbed to deforestation. Water levels in the nearby Shashe River had decreased because of siltation. At present, more than two decades later, the Shashe area has transformed into a reputable farming hub. This is a result of agroecology that includes using locally available resources such as growing traditional grains, rehabilitating the area by planting trees, water harvesting to conserve water and venturing into poultry to get manure to improve soil fertility. A subsistence smallholder farmer stated that:

> When I harvest crops in the fields, I make sure that I put aside seeds in preparation for the next season. ...
>
> By digging contours that channel water in our fields, we have improved the chances of receiving rainfall in Shashe. Even during the dry season, we receive rainfall which was not common when we first arrived. (as cited in Matiashe, 2023, paras 6–7)

The Shashe farming area has evolved into a learning area. Farmers around Zimbabwe and beyond the borders come to learn agroecology at the Shashe Agroecology School, a centre of agroecology that basically conserves the land and environment.

The concept of agroecology involves strengthening the resilience of smallholder farmers through the diversification of agroecosystems, that is, organic soil management and water harvesting for conservation. In the Shashe farming area, smallholder farmers grow a variety of food crops, including grains (millet and sorghum), cereals, legumes, vegetables, fruit trees and medicinal

plants. They also rear livestock, including cows, sheep, goats, pigs and chickens. Grains such as sorghum and millet are drought-resistant crops, which means that smallholder farmers can still have some harvest even during droughts.

Almost everything on the farms is recycled. One farmer had this to say: "Livestock are our biggest source of manure. We collect crop residues from the fields and feed the cattle. Then we collect waste and make organic manure in compost" (as cited in Matiashe, 2023, para. 22).

The smallholder farmers in this area also have fish ponds, where they farm different species such as catfish and breams. Fish farming, poultry and crops depend on each other for survival, an example that illustrates the concept of agroecology. A farmer stated, "We feed fish with chicken droppings and worms. We keep worms in the composts we make for manure. The water from the fish ponds after harvesting is channelled to the garden because it is highly nutritious" (as cited in Matiashe, 2023, para. 25). Smallholder farmers in the area are also able to feed and clothe their children and grandchildren using proceeds from agroecology farming in the Shashe area.

Smallholder farmers keep seeds for the next agriculture season to ensure that traditional grains critical in providing high yields amid climate change do not run into extinction. They supply other farmers in Shashe and around the country with seeds and pass agroecology knowledge and skills to them. For example, knowledge about planting and maintaining Indigenous trees as part of reforestation efforts is shared in the community. A farmer explained: "Agroecology is the way to go. As a woman, I have been able to look after myself and my family" (as cited in Matiashe, 2023, para. 35).

The agroecology initiative in Mashava and Bikita has reached about 500 smallholder farmers, according to a regional project manager for Voluntary Service Overseas, a charity supporting farmers in the area. Affordable and less resource-input farming practices such as agroecology are important to enhance agricultural production and increase food security at the household level. In Zimbabwe, agriculture production is dependent mainly on rainfall. Smallholder farmers in marginalised areas contribute more than 70% of food production in the country, yet they do not have the financial capacity to purchase synthetic inputs. The regional project manager for Voluntary Service Overseas had this to say:

> In Mashava, most soils are loamy sands to sandy which are prone to acidification, leaching and poor structure and can barely support plant life. The use of organic fertilisers and green cover crops that bind the soil help to replenish such soils and enhance microbial activity that supports plant life while sequestering carbon dioxide from the atmosphere. (as cited in Matiashe, 2023, para. 39)

Agroecology in Mashava has empowered women and the youth, who are usually marginalised and vulnerable. It has enhanced their productive capacity and empowered them to have diversified food sources and income-generating activities. Agroecology promotes the growing of Indigenous crops and crop diversity that are well suited to low rainfall areas like Mashava. As a result, farmers are guaranteed to get some food despite severe droughts. It has promoted local diets and culturally acceptable foods that are nutritious and healthy for the local people.

Zimbabwe has set aside the first Saturday of every December as a national tree planting day since 1980. The motive is to create awareness of forests, mitigate against climate change and encourage the nation to plant and conserve trees. People are encouraged to plant trees throughout the year—any tree anywhere across the country. In 2021 the national target was 25 million trees, which is estimated to translate to about two trees per capita. Zimbabwe loses 300,000 hectares of trees each year to deforestation. The drivers of deforestation are agriculture, settlement expansion, wood energy harvesting, bricks moulding, mining activities and veld fires. Subsequently, land degradation becomes a threat to many rural citizens whose livelihood depends on natural resources (Forestry Commission Zimbabwe, 2022).

A Zimbabwean local NGO, the Economic Justice for Women Project (EJWP; Feminist Academy for Climate Change [FACA], 2023) established a feminist-focused climate action academy in a bid to enlighten women on how they can meaningfully contribute towards the agenda of climate change mitigation.

FACA was launched in Hwange, one of the semi-arid areas of Zimbabwe, and became one of the first organisations to place young women at the centre of spearheading the climate change agenda. Speaking to NewZimbabwe.com media on the development, the EJWP executive director said the academy sought to comprehensively train women from the grassroots level and strengthen a community-based transformative feminist movement of climate justice activists. The executive director had this to say:

> The Hwange community seconded a committee that will coordinate and lead their agreed follow-up actions. FACA will provide a unique platform for empowering women and gender non-conforming individuals to actively engage in climate action, addressing the intersectional challenges of climate change and gender inequality.
>
> By combining feminist principles and climate advocacy, FACA will foster knowledge, skills, and leadership development to drive sustainable, inclusive, and gender-responsive solutions at all levels. (Vinga, 2023, paras 3–4)

The project is in sync with climate challenges bedevilling women in Zimbabwe, who are often at the receiving end of the changing environmental order. During extreme weather such as droughts, cyclones and floods, women tend to work more to restore and secure household livelihoods. This leaves them with less time to access training and education, develop skills or participate in the economic mainstream; thus, gender equality remains low.

The program targets women and gender non-conforming individuals from diverse backgrounds, including rural communities and communities at risk of climate emergencies, local activists, community leaders and civil society organisations working on climate change and gender equality. FACA intends to develop a comprehensive curriculum integrating climate change, gender studies, feminist principles and sustainable development. The organisation also recruits and trains a diverse team of qualified instructors, including experts in climate science, gender studies and advocacy.

The above are only three of the many approaches that the Government of Zimbabwe, working with some NGOs, has taken to try to mitigate the effects of climate change, especially as it affects rural subsistence farmers in the country. Only with time will the results of these approaches be fully realised. At the moment, the above discussion on activities at the Shashe Agroecology School, the National Tree Planting Ceremony and FACA has shown that there are some positive outcomes from the government's attempts to mitigate the effects of climate change.

Discussion and conclusion

The strategies to mitigate the effects of climate change presented here include the introduction of energy-saving stoves, an increase in the planting of Indigenous trees that are usually drought resistant and the planting of drought-resistant crops such as sorghum and millet as well as tubers such as cassava, yams and sweet potatoes. Several success stories show increased food production and the sale of surplus food to feed other populations. Indigenous people have partnered with agricultural extension officers, industry and NGOs to keep rural communities informed about climate change, resulting in improved educational outcomes, particularly in literacy and numeracy related to climate change. Industry has also helped with the construction of boreholes. This has led to increased production of healthy Indigenous foods that are drought resistant and easy to produce. Families have turned to Indigenous foods, shunning expensive processed foods. In addition, farmers are involved in organic soil management by using manure generated from the livestock (pigs, goats, cattle and chicken) to improve the soil quality. Fish farming has also led to an interesting agroecology in which fish are fed with chicken droppings and worms from the poultry compost manure. Highly nutritious water from the fish ponds is used in the gardens. These activities positively adapt to and mitigate the effects of climate change.

In this paper, we have demonstrated that climate change poses huge challenges in Africa. Some of these challenges are extended droughts, extensive flooding and poor health outcomes. Africans continue to use Indigenous knowledges to assist in adapting to and mitigating the effects of climate change. Poor nations may have the knowledge to assist in mitigating climate change but they have limited resources to meet such challenges. The cost of mitigating climate change can best be met by governments and industry working together. Better still, the huge polluters should be encouraged to pay more towards adaptation and mitigation of the effects of climate change.

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AS WE HAVE ALWAYS DONE

Sharing Māori, Anishinaabe and Gàidheil responses to climate challenge

*Lewis Williams**

Abstract

Indigenous peoples throughout the world are under considerable cultural and ecological pressure in the face of a rapidly warming world. While contexts and Indigenous knowledge systems are specific, there is much that can be learned from knowledge exchange and collaborations with other Indigenous communities. This article reports on a growing conversation across diverse cultural biospheres (Aotearoa New Zealand, Turtle Island, and Alba/Scotland) regarding inclusive Indigenous-led strategies of multigenerational resilience addressing human-environmental wellbeing. Drawing on indigenist research methodologies, it integrates recent research pertaining to each geo-cultural context, with online international Wisdom Councils collectively participated in by the three regions. Māori systems of healing, Anishinaabe renewable energy-harvesting protocols, and Gàidheil "cultural darning and mending" climate challenge strategies are discussed, including the potential of their cross-context relevance. Attention to non-binary ways of conceptualising Indigenous identities (human and more-than-human), including attention to diverse gender and sexual identities within Indigenous-led climate emergency responsiveness, are also discussed as a critical cross-cutting strategy.

Keywords

climate, Indigenous, intergenerational, resilience, non-binary identities, gender-diverse

Introduction

Throughout the world, many economically developed countries are racing to achieve net zero carbon emissions by 2050 within the business-as-usual narrative of economic growth. As a result, neocolonial corporate-driven extractive approaches to renewable energy (Contreras et al., 2023; United Nations, 2022) and Western human-centric approaches to climate justice predominate (Parsons et al., 2021). For peoples still Indigenous to place, these threaten whole cultural biospheres, lifeways, and related intimacies of ancestral connection as well as Indigenous approaches to intergenerational knowledge transmission (Climate Action Network International, 2023; Herman-Mercer et al., 2016). Yet Indigenous peoples throughout the world are resisting these neocolonial pressures while asserting innovative placed-based approaches to

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climate and cultural-ecological resilience (Black, 2021; Johnson et al., 2023; Richmond et al., 2024; Williams, 2022a).

These place-based knowledges are shared across generations and grow from a complex relational system that view the Earth as alive and emphasise the reciprocal responsibilities between humans and the rest of the natural world (McGregor, 2021; Panelli & Tipa, 2007). In essence, they shape cultural identity and belonging and help people come to know that they have responsibilities to act in ways that demonstrate reciprocity and interconnection (Chiblow & Meighan, 2023; Johnson et al., 2023). Despite the disastrous impacts of the fossil fuel industry and related climatic changes on Indigenous communities and their ecosystems, Indigenous lifeways have persisted. Accordingly, the place-based knowledge systems of Indigenous peoples have a much-needed potential to be a key grounding influence for Indigenous wellness and healing (Lipsham, 2023), and climate adaptation and mitigation.

In recent years, the global push to net zero and resulting politics of renewable energy—that is, the combined efforts of governments and multinational corporate entities to rapidly decarbonise and accelerate the accumulation of capital wherever possible—has threatened to effect new forms of erasure on Indigenous communities. Energy colonialism (Batel & Devine-Wright, 2017; Contreras et al., 2023) is now widespread. Global corporate entities in collusion with nation-states proclaim the virtues of renewable energy while "intensifying neo-extractivism and inequalities in populations and territories of the Global South and the peripheries of the Global North" (Contreras et al., 2023, p. 2), including the Indigenous communities described in this article. Energy colonialism threatens entire linguistic and cultural systems as the scale of land transformation required by renewable energy infrastructure often results in ecosystem destruction, possibly intensifying climatic change (Persson et al., 2022). For the most part, such climate mitigation projects adopt a centre-periphery relationship whereby Indigenous lands provide ecosystem services for the economic and social benefit of the wealthy multinationals and the entities and communities they service.

Climate justice movements are increasingly being led by young Indigenous peoples to draw attention to the significance of restoring relationships between people and place as a pathway for healthy planetary futures (MacKay et al., 2020; Williams, 2022a). However, Indigenous lifeways, including those of the communities discussed here, are also threatened by disassociation from the land due to confiscations and subsequent occupation of ancestral lands by the wealthy elite, depopulation and lack of employment and housing opportunities, and urbanisation and intergenerational disconnection from the forests and seascapes (Awatere et al., 2021; Black, 2021; Menzies et al., 2022). While there are many excellent examples of Indigenous youth utilising technology for environmental activism purposes, over-reliance on online communication is contributing to environmental distancing (Herman-Mercer et al., 2016) and learning about traditional ecological knowledge is further challenged by rapidly changing climates and ecosystems. Yet, Indigenous youth are also resisting these pressures by retrieving, reasserting, and making anew the ways of their ancestors (Black, 2021; The IEJ Project, 2022). As research findings directly related to this article testify, this also includes resistance to colonial norms of blood quantum theory and Western heteropatriarchy, as well as generational shifts of non-binary ways of relating to Indigenous, gender, and sexual identities, which have important implications for climate emergency leadership (Carthy & Landesman, 2023; Williams et al., in press).

This article reports on a conversation across diverse cultural biospheres—Tauranga Moana, Aotearoa New Zealand; Deshkan Ziibi, Southwest Ontario, Turtle Island; and the Gàidhealtachd (Gaelic-speaking Highlands and Islands of Alba/Scotland)—regarding inclusive Indigenous-led strategies of multigenerational resilience addressing human-environmental wellbeing. These dialogues are concerned with building collaborations and knowledge sharing in ways that can inspire and assist local Indigenous efforts to address the climate emergency. Supported by an evidence pathway of secondary and field research (semi-structured interviews and Wisdom Councils [WCs] or focus groups), past and current research is presented. Aligning recent research findings from three distinct studies by the author in Tauranga Moana, Deshkan Ziibi, and the Gàidhealtachd to inform new possibilities for regional climate challenge strategies, the article then builds further on these findings through focusing on a series of multigenerational WCs participated in by the same regions, centred around place-based knowledge in contemporary contexts of climate and cultural-ecological challenge. Following descriptions of key concepts and research contexts, the current placed-based strategies of rongoā Māori, Indigenous energy-harvesting protocols, and the "cultural darning and mending strategies" being

asserted in each context respectively are discussed. Relevant findings from the WCs relating to the significance of non-binary identities to climate and cultural-ecological resilience are then discussed.

The article concludes by discussing the potential of each regional strategy to offer insights into Indigenous-led climate strategies within the other geo-cultural contexts while advocating the importance of non-binary approaches to Indigenous identities as a critical cross-cutting strategy. The main title of this article draws on the name of Anishinaabe scholar-activist Leanne Betasamosake Simpson's (2017) book *As We Have Always Done: Indigenous Freedom through Radical Resistance*. In this vein, the climate challenge strategies suggested here are not new but rather a *renewal* of Indigenous ways of being which hold newfound relevancies for contemporary times.

Key concepts

Three key concepts underpin the theory and practice described in this research. The first, *Indigenous intergenerational resilience*, refers to the human-ecological resilience necessary for collective planetary wellbeing through Indigenous-led practices that nurture human intergenerational and interspecies knowledge transmission and connectivity. Its focus on kincentricity aligns with Indigenous environmental justice (McGregor, 2021), which centres the reciprocity and flourishing of all beings of creation, including all living beings and entities that broader society does not consider to be alive. Furthermore, Indigenous intergenerational resilience practice views our human-planetary predicament as not just an environmental challenge but also a cultural-ecological crisis (Williams, 2022a) that has accepted commodification of the Earth (McGregor, 2021) and related axes of oppression such as white supremacy, growing economic and power disparities, heteropatriarchy, and gender-based violence (Perkins, 2019; Williams, 2022a). Addressing cultural-ecological crisis therefore requires cultural restoration work which remakes or heals the fractured whakapapa between all kin.

Significant to cultural restoration and Indigenous intergenerational resilience practice is the second key concept underpinning this research: *the re-naturalisation or re-indigenisation of non-binary gender, sexual, and Indigenous identities*. This is consistent with Indigenous environmental justice (McGregor, 2021), which seeks to acknowledge and reconcile the rights and responsibilities of *all* entities—animate and, in the Western sense, inanimate. Contrastingly, in writing about how colonial systems presume racialised distinctions between "primitive" and "civilised" gender and sexuality, decolonial scholar Scott Morgenson (2012) points out that colonisers have attempted to indigenise Western colonial norms of heteropatriarchy and binary sex gender "onto new lands to prove the premise that the totality of life can conform to them" (p. 13). Conversely, Indigenous knowledge honours creation in its diversity—difference is not treated as deviance but as normal. In this sense, Indigenous knowledge can "be considered queer because it honours epistemic diversity and multi-temporalities" (Awasis, 2020, p. 840). These connections between emplaced queer epistemologies and identities are important as they facilitate the re-naturalisation of non-binary identities (including those of some of the WC participants; see below) across a range of Indigenous (human and more-than-human) gender and sexual identities.

The work of Indigenous intergenerational resilience in the context of the climate emergency is closely linked to the third key concept in this research: *environmental repossession* (Nightingale & Richmond, 2022; Richmond et al., 2024). Broadly describing global Indigenous resurgence activism, this concept recognises that as communities draw on their own processes, protocols, and knowledge systems to apply repossession, individual place-based efforts are "adapted to each geographical and cultural context" (Nightingale & Richmond, 2022, p. 2). These can range from treaty claims and Land Back occupations to practices which reconnect Indigenous peoples to ancestral lands, lifeways, and worldviews.

Research contexts and climate challenge

In the following sections, I describe each Indigenous community context in relation to climate change and colonialism together with a brief description of key elements of Indigenous worldviews of each.

Colonialism and changing climates

Tauranga Moana is an ecologically diverse area which runs from the Kaimai Range to the Bay of Plenty coastline of the North Island of Aotearoa, encompassing native forest, wetlands, and tidal estuaries. At the time of colonisation, it was a rich and fertile area. As a result of colonial invasion in the 1850s and 1860s and subsequent land confiscations and "development", Tauranga Moana Māori increasingly struggled to be in control of their ancestral landscapes (Waitangi Tribunal, 2010), experiencing reduced access to bush and seascapes. Vast tracts of Indigenous forests were

cleared during the 1880s. Through a series of legislative assaults by the Crown, in 2010 Māori-owned land in the Tauranga Moana amounted to less than a quarter of the land they held in 1886 (Waitangi Tribunal, 2010). Flooding, ocean-warming, and acidification and knock-on effects of environmental impacts on taonga species are among climate change impacts affecting the area (Tauranga City, 2023). Today, a substantial number of the city's urban Māori—who make up 17% of Tauranga's population—are alienated from their traditional lands, foods, and lifeways, with some experiencing food insecurity (Beavis et al., 2019; Graham et al., 2022).

Deshkan Ziibi (meaning "deer-antlered" in Anishinaabemowin) refers to the river system and surrounding woodlands which lie at the heart of Southwestern Ontario, Turtle Island. The First Nations of this territory, which runs adjacent to the Great Lakes, have been heavily impacted by the fossil fuel industry, including Chemical Valley, which contains more than 60 chemical plants and oil refineries, and the installation of oil pipelines through their territories (Awasis, 2021). These industries, together with historical and ongoing forms of colonisation; including dispossession of lands, environmental impact assessments, and structural racism, have all contributed to the health and wellbeing disparities experienced by Anishinaabe and other groups Indigenous to this area (Ramnarine, 2023; Wiebe, 2016). Climate change has resulted in additional wellbeing pressures, including new forms of energy colonialism (Contreras et al., 2023) as global corporate entities negotiate large-scale implantation of renewable energy infrastructure in ways which largely ignore Anishinaabe traditional knowledge and lifeways. Other climate change–related impacts include decreased ice flows and increased algae blooms in the river system (Ramnarine, 2023).

The Gàidhealtachd encompasses mountainous and coastal regions of Scotland, including the Inner and Outer Hebrides, and is home to 17% of the Scottish population. It experienced colonisation from the 1600s onwards which intensified through the Land Clearances of the 18th and 19th centuries (Gibson, 2023) and associated practices of racialisation, such as banning of the Indigenous language Gàidhlig and key cultural practices. This resulted in intergenerational disconnection from the matrix of land and language. It also decimated various Indigenous lifeways, including fishing and peat and medicinal harvesting practices. The authority of clan chiefs was broken, and thousands of Gàidheil were forcibly put on boats and shipped to British colonies (Williams, 2024), contributing to the widespread Gàidheil diaspora—many of whom are now caught up in the structures of neoliberalism—in Aotearoa and Turtle Island. The impacts of colonisation are ongoing in terms of socioeconomic and ecological challenges faced by Gàidheal today (MacKinnon, 2018). Accompanying changes in weather systems, other key climate change impacts include the displacement of local crofting communities and ecological degradation through corporate renewable energy initiatives (Dick, 2023; Eilean Mo Ghaoil, 2023; Williams, 2024).

Epistemologies of interconnectedness

While Indigenous worldviews are specific to place, they share a common epistemological orientation and a kincentric approach to life (Salmòn, 2000) in which all beings have agency, are deeply interconnected, and "the land is alive and thinking" (Watts, 2013, p. 4). For Māori, whakapapa lies at the heart of their worldview, representing "cosmologically derived kinship relations between the spirit, natural and human world based on common descent" (Johnson et al., 2023, p. 3). Whakapapa forms the fundamental ontological principles of how to live well and is actively enacted through whakawhanaungatanga, the active establishment or maintenance of kinship relations through cultural practices.

Anishinaabek Gkendaasowin is similarly embodied, and land-based traditional knowledge is lived and experienced through kincentricity (Awasis, 2020). Gkendaasowin is enacted through listening and learning from the spirit, natural, and human worlds, and informs Anishinaabe people that all of life is interconnected (Chiblow & Meighan, 2023).

The Gaelic concept of dùthchas is understood as an "ontology and methodology which expresses the interconnectedness of people, land, culture, language, and an ecological balance among all entities, human and more than human" (Chiblow & Meighan, 2023, p. 7). As a practice, dùthchas forms the basis of traditional ecological knowledge (Mhathúna, 2021) and was also a system of law or native title associated with the traditional clan society, collective rights, and land practices (MacKinnon, 2018, p. 284). Today, throughout the Gàidhealtachd, dùthchas as a concept and practice is being revitalised as a wellspring of transformative energy for place-based revitalisation (Dziadowic, 2022).

Methods

Based on Wilson's (2007; see also Concordia University, 2016) concept of indigenist research, which prioritises Indigenous epistemologies and philosophies, the methodology applied in this research recognises that Indigenous worldviews share broad ontological, epistemological, and axiological principles (Wildcat & Voth, 2023) while respecting the specificity of these to places and communities (Kovach, 2021; Smith, 2021). My positionality in relation to this research is shaped by both my Ngāi Te Rangi (Ngāi Tukairangi hapū ki Tauranga Moana, Aotearoa) and my Gàidheal (Nan Argeantaich, Eilean Arainn, Alba) whakapapa. I am of also of takatāpui identity and have spent much of the last 20 years living and working on the traditional territories of Plains and Woodland Cree, Coast Salish, Anishinaabe, and Haudenosaunee Nations on Turtle Island. In keeping with an indigenist research framing which emphasises the efforts of the researcher/s to align with the Indigenous worldviews of a place, rather than whether one is Indigenous to a particular place or not, in each study I have drawn on my experiences of these positionalities, while acknowledging that I can never fully know the experiences of those who are Indigenous to another place.

Drawing on qualitative inquiry, this study utilises semi-structured individual interviews and focus groups—here called Wisdom Councils [WCs]—as data collection methods and an inductive approach to data analysis (Kovach, 2021). The research uses critical pedagogical approaches to knowledge production, developed by scholars in Indigenous education and research methods (Restoule, 2019; Restoule & Snow, 2023). It prioritises holistic ways of knowing, placing equal emphasis, for example, on knowledge gathered through empirical cognitive methods or intuitive ways such as dreaming, sensing, and feeling.

The first subsection of the Findings section below relates to three studies conducted from 2019 to 2024 with each of the regions represented in the WCs. While the potential value of each regional strategy to another region was not the focus of the subsequent WCs per se, these activities nevertheless informed the contexts from which participants spoke. These earlier projects, together with their respective Human Behavioural Ethics Boards approvals, are as follows:

1. Toitū te Taiao—Toitū te Tangata (Tauranga Moana, Project ID 2019_42, Aotearoa Research Ethics Committee)
2. The Cultural and Generational Dimensions of Climate Crisis (Deshkan Ziibi, Project ID 2020_193, University of Saskatchewan)
3. Climate Change and Contemporary Expressions of Gàidheil Place-based Knowledge (the Gàidhealtachd, Project ID 123591, University of the Highlands and Islands)

An Anishinaabe summer student was hired to undertake an inductive qualitative research approach to analysing the findings from WCs 1 and 2, with members checking the emerging themes for accuracy. Ethics approval was not required for these WCs as they were deemed to be occurring in a public space. However, on the advice of the Non-Medical Research Ethics Board, University of Western Ontario, we asked participants to sign a two-staged consent form for the video recordings of these sessions in advance of their open access publication on the website of the Alliance for Intergenerational Resilience (AIR), a Canadian-based not-for-profit organisation whose focus is Indigenous-led approaches to social-ecological resilience. Names are used alongside quotes in the Results section from these first two WCs as the videos are publicly available on YouTube. Ethics permission was obtained from the Non-Medical Research Ethics Board for the Queering Climate Crisis WC Series (Project ID 12295).

Wisdom Councils

Building on a previous international land-based learning forum (Williams, 2022a) engaging youth and elders Indigenous to Aotearoa, Turtle Island, and Alba, WCs emerged out of a need to keep place-based knowledge exchange practices active during the COVID-19 pandemic. These were held under the auspices of AIR in partnership with Vancouver Island University and Western University in Canada. Engaging youth and elders between 16 and 78 years of age from the aforementioned countries, these gatherings drew on holistic methodologies including ceremony, film, and arts-based and dialogical practices.

Utilising participatory and process-orientated methods (Wilson, 2007), each online WC requires a combination of individual and group meetings as part of their preparation and includes joint decision-making with prospective participants around content and process. These discussions also include particular modalities (e.g., dialogue, poetry, song, traditional stories) of wisdom sharing. Engaging in ceremony led by an Indigenous elder at the beginning, each WC aims to create

a container which enables spiritual, emotional, and analytical depths to be reached during the gatherings. In part an attempt to disrupt the settler foundations of education and society and Western normative approaches to online learning (Tessaro & Restoule, 2022), the WCs deliberately engage head (intellect), heart (spirit, intuitive knowing, and emotion) and hand (practical action) in holistic learning and wisdom distillation.

WC 1, "The Language of the Land" (February 2021) and WC 2, "Climate Crisis and Multigenerational Resilience" (March 2022) engaged Indigenous youth and elders from Tauranga Moana, Aotearoa, and Vancouver Island, Canada; and Deshkan Ziibi, Vancouver Island, and Alba, respectively. Participants were asked to respond to one of the following questions:

- How do you experience the language of the land? (WC 1)
- What are the Indigenous and traditional perspectives and practices that can strengthen intergenerational relationships and resilience in these times of climate crisis? (WC 2)

In April 2023, work started on a related but distinct series of WCs (3 and 4) on "Queering Climate Crisis Response" (QCCR). For reasons too lengthy to go into here, this research is undergoing methodological revision, two WCs having been held to date. This series of WCs asks Indigiqueer youth and elders to respond to the question "What do you consider to be the impact of and unique agencies that Indigiqueer people may have in response to climate and cultural-ecological crisis?"

All WCs held thus far have been recorded. WC 2 was shown at an online public dialogue forum, and the recordings of WCs 1 and 2 are publicly available through the AIR website.

Findings

Context-specific approaches to climate and cultural-ecological emergency

Rongoā Māori. Māori climate response plans in the Tauranga Moana and the wider Bay of Plenty are in their early stages. However, Māori community leaders are undertaking work to reconnect whānau and hapū to the land, including growing traditional foods and plant medicines (see, e.g., Ngāpeke Permaculture, n.d.), including the restoration of rongoā Māori (Williams, 2022a; see also Titoki Education, n.d.). Rongoā Māori encompasses values, protocols, and healing practices that are Indigenous to and have been practised in Aotearoa for more than a thousand years. It is ultimately an Indigenous environmental philosophy and set of practices which engender a reciprocal relationship of care with te taiao, including the cosmos (Williams, 2022a). These connections are fundamental to wellbeing and promote medicinal practices that can heal both people and the land, strengthening people's relationship with the land (Awatere et al., 2021). Furthermore, while Indigenous species are slower growing than fast-growing exotic pines—which are commonly utilised by multinationals for carbon credits—they are more efficient in terms of stopping soil erosion and keeping sediment out, providing cover to younger flora, and have longer-term viability regarding carbon sequestration over time (Blundell, 2019). Rongoā Māori, then, is a potentially powerful practice with which to address the climate and cultural-ecological emergency.

Indigenous energy harvesting. Anishinabek Gkendaasowin has significant potential for informing climate mitigation strategies on Indigenous lands of renewable energy governance (Chiblow & Meighan, 2023) that are now occurring across Canada on significant scales (Hoicka et al., 2021). Yet the implementation of renewable energy across Canada has been fraught with conflict and in the case of Indigenous communities highlights the tensions between settler and Indigenous institutions and legal orders (Williams, 2022a). Research by Hoicka et al. (2021) claims that, at best, there has been increased equity for Indigenous peoples in terms of community benefit and coownership with private entities. However, some Anishinaabe oil pipeline opponents and scholars (e.g., Awasis, 2021) are proposing the application of Anishinaabe harvesting protocols (reciprocity, relationality, responsibility) to energy governance, rather than the predominant colonial subjugation of more-than-human life in renewable energy arrangements. These honour the winds, waters, and sun, for example, as having unique responsibilities to all beings as well as rights. Listening to the needs of these more-than-human beings has strong potential for "renewable energy to be honourably harvested if the rights and responsibilities of non-humans are not infringed upon and benefits are shared in an equitable manner" (Awasis, 2021, p. 18). While it is early days, Indigenous and, in this case, specifically Anishinaabe harvesting protocols have significant potential for climate justice action that is restorative for Indigenous cultural ecologies.

Cultural darning and mending. A resurgence of Gàidheil culture is underway, with the revitalisation of Gàidheil lifeways being increasingly applied to issues of climate and cultural-ecological resilience (McFadyen & Sandilands, 2021; Williams, 2024). While clans continue to occupy and reoccupy their ancestral lands (see, e.g., Urras Oighreachd Ghabhsainn, n.d.a) throughout the Gàidhealtachd, the severance of clan governance by colonisers poses significant sovereignty challenges for the Gàidhealtachd (MacKinnon, 2018). Despite these challenges, there are increasing numbers of strong examples of successful community buyouts of land from corporate entities and the restoration of Indigenous lifeways, including moves for community control over renewable energy initiatives (Williams, 2024; see also Urras Oighreachd Ghabhsainn, n.d.-b). However, the intergenerational disruption and colonial denial of access to "the matrix of belonging through land and culture" (McFadyen & Sandilands, 2021, p. 169) for others across the Gàidhealtachd has resulted in the employment of various "cultural darning and mending strategies" (McFadyen & Sandilands, 2021), which invite disconnected Gaelic peoples to reconnect with their own culture and language, redeveloping an ethical relationship with the land (see, e.g., An Àirigh | The Shieling Project, n.d.). Another example is the use of traditional storytelling as means of learning local Gàidheal toponymy and the rich layers of Indigenous meaning within Gàidligh place names (McFadyen & Sandilands, 2021). Repairing colonial lacerations within the fabric of Gàidheal being and thinking in these ways makes vital contributions to rebuilding contemporary Gàidheil collective identities grounded in the wellbeing of place. These are of critical importance in terms of providing the basis for Indigenous-informed approaches to the climate and cultural-ecological emergency that can resist colonial technological approaches grounded in profit rather than place and people.

Wisdom Council findings: Resisting colonial binaries

This section focuses on the significance of resisting colonial binaries in the context of re-indigenisation of non-binary interspecies, gender, sexual, and Indigenous identities within climate and cultural-ecological resilience work. This theme spontaneously arose in the first two WCs and is being expanded upon within the ongoing QCCR WCs.

Resistance to colonially imposed binary categories or sharp divisions between human and more-than-human and Indigenous and non-Indigenous identities has been powerfully evident in our WCs. These forms of categorising are seen by participants as weakening relationality between life forms in ways that run counter to our vision of multigenerational resilience. For example, the Indigenous practice of honouring kinship across human and more-than-human realms, including recognition of humans as among the younger earthly kin, was evident in the sacred Māori creation waiata "Te Pū", sung by Ngāti Ranginui/Ngāti Porou panellist Christina in WC 1 (AIR, 2021, 17:21), which bridges the spiritual and material realms. It closely weaves together unfolding stages of creation and their co-constituent elemental entities, including more-than-human lifeforms, making up the entire te taiao, including the cosmos. From an Indigenous perspective, singing waiata animates the mauri of the entities within it, beyond Western linear conceptualisations of time and space (Awasis, 2020). The resulting *affect* speaks to the *whole being* of the listeners, going well beyond discursive exchange and mind-body duality.

In the second WC, within the context of connecting to her Cree ancestry, a young Two-Spirited participant named Carmin talked about the importance of honouring their whole being, including more holistic rather than truncated connections with human and more-than-human ancestors. Elaborating on this, Carmin said: "Also, in that like all the interconnection pieces of the land and what our responsibility is and just honouring my whole being and sharing that humility and all of the different ancestral ties that I do carry" (Williams, 2022b, 1:04:39).

Towards the conclusion of the same WC, to further illustrate their point, Carmin, who is also an artist, showed their painting *Interconnections* (see Figure 1 on p. 91) to the other participants. In Carmin's words:

> This spirit painting symbolises the interconnections between all beings … the roots connected to sprit, fire, ancestors, land, community, and my Woodland Cree culture. Finding my way, all elements are important in understanding who I am, where I am from and where I am going … my journey. (Williams, 2022b, 1:07:08)

In the same WC, a young Anishinaabe man named Dion raised the limitations imposed on the reclamation of Indigenous identities and lifeways by the ongoing fixations with blood quantum within Canadian society:

> Over here there's a big thing with blood quantum and how much to get your status card and all of these different issues that stunts people's exploration into being an Indigenous person … that they're only 5% or whatever. They feel like they're less-than and can't really reach out for those supports. (Williams, 2022b, 1:01:54)

Notwithstanding the still pervasive influence of blood quantum on Indigenous identities in Canada, the relational ways of emphasising genealogical connections to people and place that Dion is alluding to have been for some time gaining ground both within Tauranga Moana and the Gàidhealtachd (Williams, 2022a, 2024). For example, in recent years Ngāi Te Rangi have begun running wānanga on Ngāi Te Rangi whakapapa and traditional knowledge for uri in the large urban centre of Auckland (three hours from their traditional territory). In terms of climate challenge, these initiatives are significant as they make opportunities available for people of Indigenous descent to come to know and potentially operationalise their ancestral Indigenous cosmologies within their own lives, thereby potentially strengthening climate and cultural-ecological resilience.

The presence of openly identifying Two-Spirit and Indigiqueer youth on the WCs raised the profile of issues regarding the impacts and unique agencies of these groups in relation to cultural-ecological and climate emergency. This led to the development of the aforementioned QCCR WC series, with participants consisting of the research team (six members who either identify as Two-Spirit or Indigiqueer) as participant-researchers. Two online WCs have been held to date. In these discussions, Two-Spirit and Indigiqueer peoples are both vocal about experiences of homophobia in their communities, as well as the importance of including their voices in Indigenous climate change initiatives. For example, before the commencement of the QCCR WCs, one Two-Spirit participant had the experience of being asked by a Two-Spirit elder to help make a Two-Spirit Eagle Staff (the Eagle Staff is a symbol of Anishinaabe culture and clan system) and dance it into their home community powwow. However, the First Nation Powwow Committee, which was elder-led but comprised of all heterosexual members, denied the Eagle Staff entry into the powwow on the basis that a Two-Spirit Eagle Staff was not considered suitable for the ceremony. The Two-Spirit QCCR WC member interprets this action by the Powwow Committee to be due to the result of the incursion of colonial heteronormativity into Anishinaabe society, whose traditional cultural lifeways have previously valued the place and role of Two-Spirit people. In the subsequent QCCR WC, while speaking about the exclusion of some Indigenous people from ceremony (including 2SLGBTQI+), they made the following observation:

> [I]t wasn't until I aligned myself with my Two-Spirit elders and mentors that they said that's [i.e., exclusion] exactly the opposite of our teaching. They say come as you are, come as you are, and if we look at creation … that's not [exclusion] what the land teaches us.

The prevalence of climate emergency discourse positioning queer and Indigiqueer people as "vulnerable" rather than having unique agencies in relation to climate crisis was raised by the QCCR WC participants, a view which is also expressed in recent literature (Carthy & Landesman, 2023; Kihara, 2023). One participant also alluded to the negative impacts of the reality of unexpressed agency for 2SLGBTQI+ peoples through relating a traditional North American Indigenous teaching about the beaver. In congruence with Indigenous environmental justice ethics (McGregor, 2021), within these teachings all beings and species are born with specific responsibilities to the Earth community. The beaver's particular gift is wisdom for the way in which they use their skills, knowledge, and attributes for survival—that is, being able to chew through the trees wisely for the benefit of their family and altering their environment in a way that is environmentally friendly and sustainable. However, the QCCR WC elder also pointed out that if the beaver is not given the opportunity to use this gift, their teeth will eventually grow out, rendering them unable to chew, causing eventual starvation. The elder used this traditional teaching to draw a parallel to the potential harmful impacts on 2SGLBTQI+ peoples of being positioned as solely vulnerable rather than being given opportunities to utilise their unique agencies within climate emergency response.

In considering the unique agencies that 2SLGBTQI+ people have in relation to climate and cultural-ecological resilience, a Two-Spirit QCCR participant discussed Indigiqueer agency in the following way:

> The land is queer … But I am also thinking that climate and climate change are queer. How this is happening is different everywhere, and it's even different within the same places from year to year and how these processes are happening … [A]nd I

FIGURE 1 *Interconnections* by Carmin Bear Bloomberg

> am thinking about the horned serpent [Mishipizhu, an entity associated with water-land-sky relations].

They then went on to say that people talk about Mishipizhu as both the cause of climate change and the restorer of balanced relationships in response to fossil fuel extraction (Nelson, 2013)—by "keeping the balance between the sky and the underworld". In relation to the last comment, they added, "We're obviously very out of balance now and I think how Two-Spiritedness is really like an in-between, like a balance as well between men and women."

In a forthcoming article, the unique challenges and potential capacities of peoples whose identities lie at the intersections of Indigenous, gender-diverse, and sexual identities to contribute not only to climate adaptation and mitigation but more broadly to Indigenous futurities and planetary wellbeing will be further explored (Williams et al., in press).

Discussion and conclusion

Collaborative partnerships and knowledge-sharing opportunities for knowledge exchange and interregional and international network development can strengthen collective efforts and collaboration across climate or socioecological innovations (Moore et al., 2015). Each of the above-mentioned initiatives has potential to inform climate and cultural-ecological resilience strategies across other contexts. For example, the rongoā Māori movement has the potential to reinspire and reconnect people of the Gàidhealtachd back to the cleared moors, which are a rich source of traditional food and medicine. In addition, they also contain peat, which can act either as a reservoir for carbon storage or as a source of fossil fuel. (Activities surrounding communal peat cutting and preparation are key elements of cultural and community connection.) Some Gàidheil argue that the small-scale use of peat, for example, on individual crofts, in conjunction with community-controlled renewable energy sources (rather than corporate-owned renewable energy entities) is culturally and environmentally sustainable, and an important source of cultural-ecological restoration (Williams, 2024).

Anishinaabe energy-harvesting protocols and their processes of implementation could inspire similar processes for the Gàidhealtachd and Tauranga Moana in terms of wind and hydro energy, respectively. Thinking about the rights and responsibilities of wind and water beings in this way would provide a grounded means and framework for assessing the sustainability of renewable energy initiatives from a non-human-centric Indigenous environmental justice

perspective (McGregor, 2021). The cultural darning and mending strategies of the Gàidhealtachd could provide a useful metaphor and means of ethical environmental connection for urban and culturally disconnected Indigenous peoples living in and around Deshkan Ziibi and Tauranga Moana. These groups rarely participate in climate emergency decision-making and strategy because of the fragmented nature of their lives and their cultural disconnection from place and community. Yet, ironically, it is because of their starting point of cultural brokenness that the strategies of climate and cultural-ecological resilience being employed by the Gàidheil may have much to offer urban disconnected Indigenous peoples in other countries.

The issues of non-binary approaches to Indigenous and gender and sexual identities raised by Indigenous peoples on the QCCR WCs foreground the need for a more inclusive approach to climate mitigation and adaptation, and the active engagement of Indigenous cultural resurgence within Indigenous intergenerational resilience practice for climate and cultural-ecological resilience. There is a dearth of research on the impacts of climate change with respect to Indigenous genders and sexualities (Ramnarine, 2023; Williams et al., 2018), let alone active inquiry into the unique contributions these groups might make to climate and cultural resilience (Williams et al., in press). This forms a significant cross-cutting piece of the three aforementioned climate challenge strategies, with younger Indigenous peoples appearing in the main to be driving this critical aspect of change. Indeed, resilient Indigenous futurities rely on such regenerative forms of cultural-ecological resurgence.

Glossary

Te reo Māori

hapū	subtribe
Māori	Indigenous peoples of Aotearoa
mauri	life force
rongoā Māori	Māori systems of healing
takatāpui	Māori LGBTQ+
taonga	treasured
te taiao	the natural world
uri	descendants
waiata	song(s)
wānanga	educational forums
whakapapa	genealogy between living entities
whakawhanaungatanga	the making of kinship relations with all living entities
whānau	family or extended family

Anishinaabemowin

Anishinaabe	Indigenous peoples of Southwest Ontario and the Great Lakes region
Anishinaabemowin	the language of the Anishinabek Nation
Anishinaabek Gkendaasowin	Anishinaabe knowledge

Gàidligh

Alba	the Gàidligh word for Scotland
dùthchas	interconnected ontology of land, people and culture
Gàidhealtachd	Gàidligh-speaking Western Islands and Highlands of Scotland
Gàidheil	Indigenous peoples of the Western Highlands and Islands of Scotland
Gàidhlig	the Scottish Gaelic language

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COMMENTARY

NAVIGATING THE CONTOURS OF CHANGE

What we can learn from mātauranga Māori

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Abstract

Mātauranga Māori and mātauranga whakatere waka are fundamental to revitalising Indigenous communities, strengthening planning for climate change and resilience to climate change impacts. Despite concerns about the risks of climate change to contemporary voyaging, navigators are motivated by their responsibility to maintain and pass on their knowledge of voyaging practices, to raise environmental awareness and to advocate for the environment. Adaptation to climate change is already taking place, and navigators discuss their practice as a way of life. Climate change impacts who they are, and they act on their intrinsic motivation and responsibility to kaitiakitanga to maintain voyaging traditions. Voyaging is a core element of their identity, and through this deep connectedness with the environment they act in pro-environmental ways.

Keywords

non-instrument navigation, Aotearoa, climate change, mātauranga, kaitiakitanga

Introduction

Prehistoric voyaging in the Pacific was highly sensitive to changes in weather and climate (McDonald, 2022). Major climatic events, including mega-droughts and El Niño events, contributed to the departure of Polynesian ancestors from Eastern Polynesia to Aotearoa New Zealand. Migrations aligned with the

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"Little Climatic Optimum" (850–1300 AD), which was characterised by peaks of global warmth, persistent trade winds, clear skies, limited storminess and other favourable conditions for voyaging (Bridgman, 1983). Once Polynesian settlement had taken place in Aotearoa, geographical, environmental and climatic change, alongside the social and cultural changes forced by colonisation, contributed to an erosion of the voyaging cultures throughout the Pacific.

Drawing on mātauranga to respond to human-induced climate change

Waka voyaging and its related knowledge—mātauranga whakatere waka—forms a part of the wider body of mātauranga Māori (including traditional environmental, ecological, navigational, meteorological, astronomical, marine and other forms of knowledge). Mātauranga Māori and mātauranga whakatere waka are fundamental to Māori culture, identity and livelihoods. Revitalising and continuing this mātauranga brings Indigenous communities together to strengthen their own self-determined planning for climate change, self-reliance and resilience to climate change impacts (Intergovernmental Panel on Climate Change, 2022; Whyte, 2017).

The project described here was the first to consider the impact of modern human-induced climate change on Pacific voyaging through the perspectives of contemporary Māori navigators trained in traditional non-instrument navigation. Seven navigators identified the key impacts of anthropogenic climate change, particularly the increased frequency and intensity of storms due to ocean warming. Cyclones are also more frequent outside of the traditional cyclone season, reducing the window of opportunity for safely voyaging (see Figure 1).

Additional climate change impacts discussed by the navigators included a decline of ocean species which are critical to navigation. Navigators recognised that this was not due solely to climate change but to a range of human activities. Birds and marine mammals, in particular, are key navigational tohu, and fish are used as a source of food; however, declines in populations are already being experienced by the voyaging community. Navigators did not think that celestial observation, which is at the centre of non-instrument navigation, would be affected by human-induced climate change, except to say that light pollution in some areas of Aotearoa negatively affects the teaching and learning of navigation on land.

Key findings

Mātauranga helps to maintain vital human relationships with the ocean and environment. The navigators suggest a global shift in thinking, grounded in two key concepts: (1) Relatives vs Resources, based on whanaungatanga; and (2) Connection = Protection, based on kaitiakitanga. These concepts address the underlying mindset and behaviour continuing to drive climate and environmental degradation (see Figure 2).

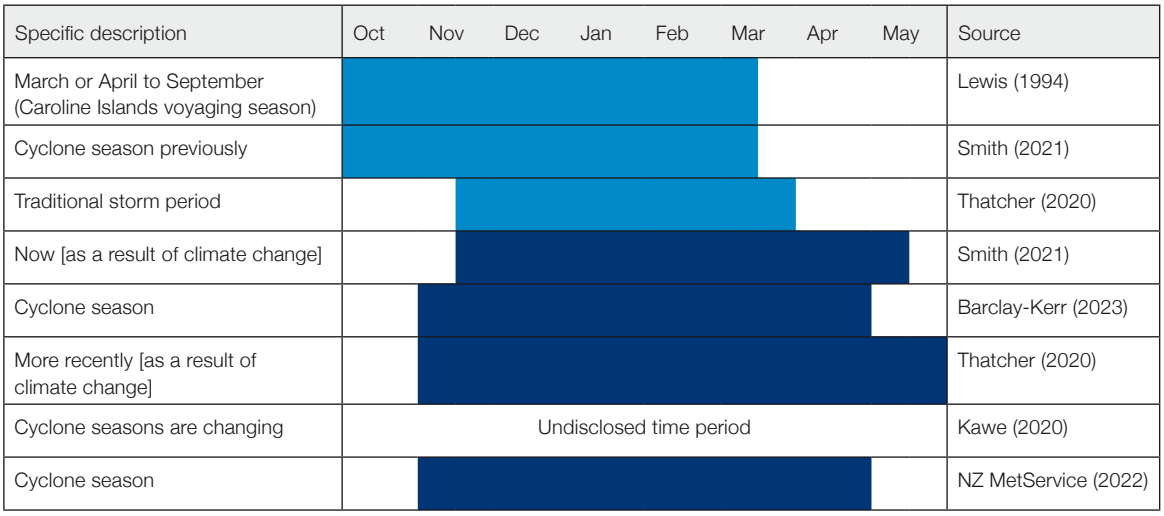

FIGURE 1 Changes in the cyclone season due to climate change (light blue = traditional; dark blue = recent)

FIGURE 2 Key concepts derived from the findings, demonstrating how mātauranga can contribute to a climate change response

Relatives vs Resources

Relatives vs Resources is based on whanaungatanga with everything in the natural world, both living and non-living, and both human and more-than-human. Māori creation narratives outline the Māori worldview and the whakapapa of humankind within the rest of the natural order and our responsibilities to our more-than-human relatives. These responsibilities are evident in the conduct of the navigator as a steward of food, water, people and the canoe, both on and off the water. The responsibility of the navigator as a medium between the natural and meta-physical realms and their ability to communicate with more-than-human relatives also speaks to the belief of human relatedness to everything in creation and responsibilities to protect them. Relatives vs Resources is the underlying theory and belief that drives behaviour, which leads to the second key concept, Connection = Protection.

Connection = Protection

Connection = Protection operates on the assumption that the greater one's sense of connection to the environment, the more likely one is to act in pro-environmental ways. This theory is underpinned by the Māori understanding of kaitiakitanga—that is, reciprocal responsibilities of guardianship with the rest of the natural world. Our conservation traditions are underpinned by kaitiakitanga and our responsibility to ensure the protection and conservation of natural materials for the future. In the case of the navigators, the waka has literally been a vehicle that has facilitated a deep connection, understanding and appreciation of the environment. The recognition of whakapapa with the environment, alongside the navigators' voyaging knowledge and experiences, have motivated personal acts of kaitiakitanga. These included writing submissions, beach clean-ups, being educated in environmental matters, household recycling, working alongside councils around wastewater, thinking critically about how their actions affect the ocean and leading by example. The underlying beliefs navigators have about the environment dictated not only the way they acted on the waka but also the actions they took to protect the environment in their everyday lives.

Changing climate, changing practices

While concern has been expressed about the risks of climate change to voyaging in the future, navigators demonstrated a commitment to ensuring voyaging traditions are never lost again. Motivated by their responsibility to maintain and pass on the knowledge, they work tirelessly to maintain voyaging practices, educate others, raise environmental awareness and advocate for the environment, among other actions. In this sense, adaptation to climate change is already taking place.

For example, during the national lockdowns in response to the COVID-19 pandemic, the voyaging community adjusted their approach by maintaining wānanga through online platforms, and voyaging connections through celestial observation, published materials, teaching tamariki, and other activities on the ocean, such as stand-up paddle boarding and waka ama, until voyaging was possible again.

The voyaging community is already adjusting their sailing in response to human-induced climate

change. For example, they are adjusting their voyaging times to the shifting cyclone season, and some are sailing locally rather than long distance. The navigators discussed their practice as a way of life; climate change, therefore, impacts who they are. In this sense, they do not need policy or national plans to drive them when their work is so personal to them. Instead, they act on their intrinsic motivation and responsibility to kaitiakitanga and maintaining voyaging traditions as a core element of their identity. Through this deep connectedness with the environment, they act in pro-environmental ways, and this is something we can all learn from.

Glossary

kaitiakitanga	reciprocal responsibilities of guardianship
mātauranga Māori	Māori knowledge
mātauranga whakatere waka	knowledge related to waka voyaging
tamariki	children
tohu	indicators
waka	ocean-going canoe
waka ama	outrigger canoe racing
wānanga	meetings
whakapapa	genealogy
whanaungatanga	relationality

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