

National
SCIENCE
Challenges

**RESILIENCE
TO NATURE'S
CHALLENGES**

Kia manawaroa
– Ngā Ākina o
Te Ao Tūroa



**2021 - 2022
Annual Report**

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Our Challenge

Whiti Ora

Kimihia te pō,
Rangahaua te ao,
Kia lo Rangi, kia lo Whenua.
Kei ngā mata o te ariki,
Kei mata nuku, kei mata rangi,
kei reira koe e Tāne Te Waiora!
Ko ngā maunga Rū,
ko ngā awa Parawhenua,
here uta ki tai ki a Tangaroa e!
Ko koe ko au ko tāua nei,
Whiti ao, whiti whiti ora!
Ara mai te toki!
Haumiē hui ē tāiki ē!

Explore the unknown
Investigate the known
Search heaven and earth
Physical and metaphysical.
Celestial and terrestrial.
From the turbulent realm of
unknown potential, gaining
enlightenment, emerging life!
The roar of mountains and
overflowing rivers, bind land
to sea. An intrinsic connection,
bind you and I together.
We re-emerge, resilient,
with continuing influence!
We call to action!
In this we are united,
collected and agreed.

This karakia was gifted to us by Josh Te Kani (Ngāi Te Rangi, Ngāti Ranginui, Ngāti Pūkenga)



Image above and on cover: Taranaki, New Zealand. Credit: Yoann Laheurte

Ngā Mātāpono

Principles

Mana motuhake

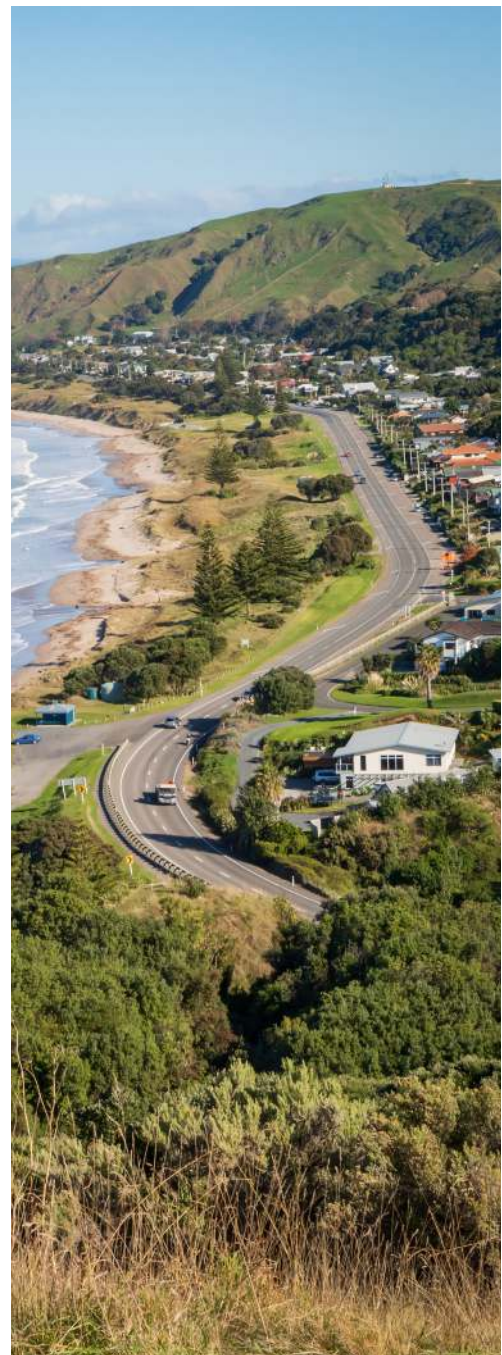
We believe Māori should be in control of shaping their own resilience to natural hazards, according to kaupapa and informed by mātauranga Māori. The Resilience Challenge supports 'by Māori for Māori' research that addresses the resilience needs of Māori communities. In this way we support mana motuhake which describes mana through self-determination and control over one's own destiny.

Rangatiratanga

In accordance with *rangatiratanga*, we respect the mana of leaders from communities and groups we work with and aspire to earn their respect by demonstrating open, inclusive leadership.

Kaitiakitanga

Creating a more resilient Aotearoa New Zealand for future generations evokes the concept of *kaitiakitanga*. In particular, we recognise Māori hold an important role as kaitiaki of their local environments and communities. Māori knowledges of natural hazards and their impacts can inform responses that build resilience for tangata whenua and wider Aotearoa New Zealand.



Ngā Mātāpono

Principles

Manaakitanga

We are motivated and guided by our care for communities at risk from natural hazards. We aspire to embody the concept of *manaakitanga* in our engagement with communities.

Whanaungatanga

We achieve our aims through collaborating with others, for mutual benefit. In keeping with *whanaungatanga*, we are committed to fostering meaningful and respectful relationships with knowledge-holders, communities we are working with, and the people and groups using our research.

Whakapapa

We learn from the concept of *whakapapa*. We look to the past to understand the future. We learn from traditional knowledge-holders, research leaders, affected communities and from the whenua. In turn we enable and nurture the next generation of leaders.

Tauututu

The concept of *tauututu*, or reciprocity, underpins all of these mātāpono. Tauututu is cyclical, whereby an act of good will is returned, and through these repeated acts, relationships are deepened and enriched.



Our Challenge

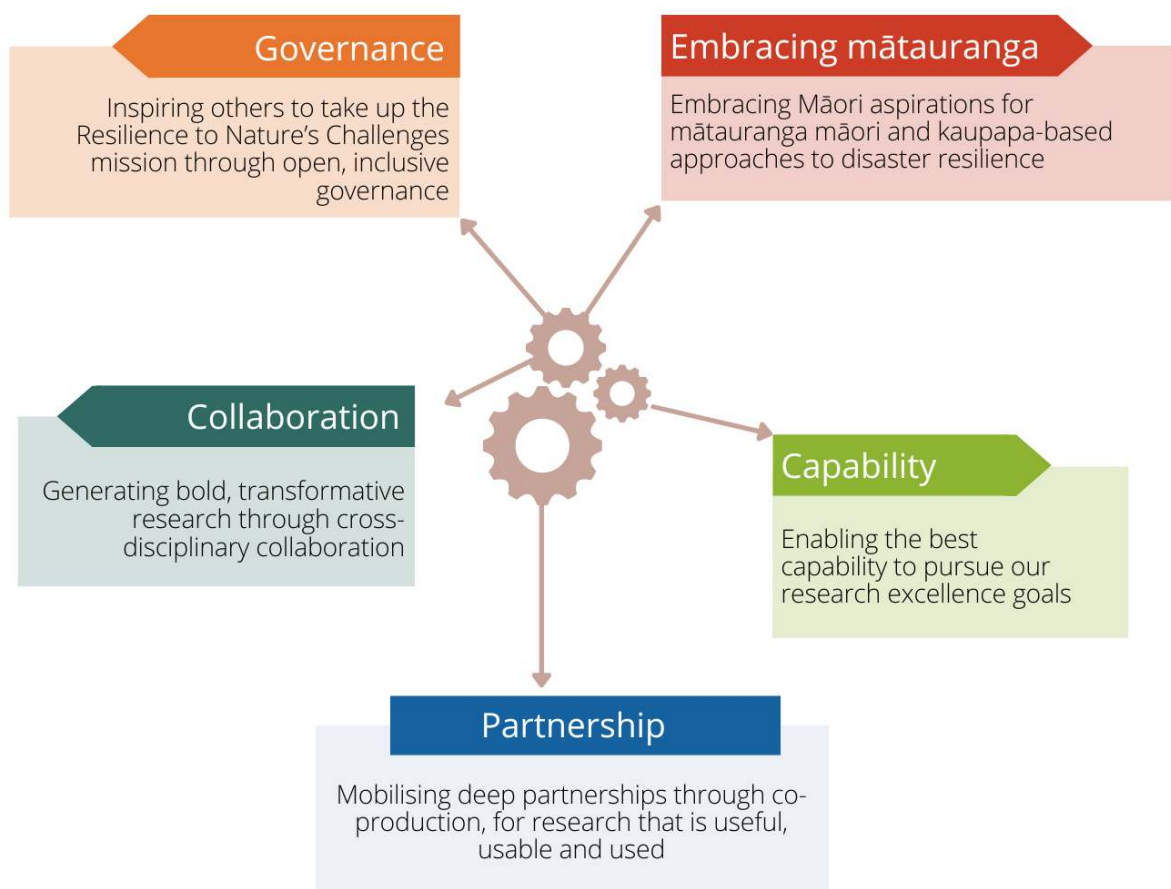
Our Mission

To accelerate Aotearoa New Zealand's natural hazard resilience through innovative, collaborative science

Our Vision

Aotearoa New Zealand has fully embraced natural hazard resilience and actively manages disaster risk, enabled by new knowledge, mātauranga, tools, and ways of working

How we work



Our Research

Our work is organised around two central themes: **Understanding Hazard and Risk** and **Accelerating Resilience**.

These themes address the National Disaster Resilience Strategy and harness the combined research strengths of Phase 1 (2015 - 2019) of the Resilience Challenge and the Natural Hazard Research Platform. Within these two central themes are ten research programmes, which continue to evolve and adapt.

The **Understanding Hazard and Risk** theme comprises new modelling to advance our understanding of natural hazards (such as earthquakes and tsunamis, volcanoes, coastal hazards, high impact weather, and wildfires).



Multi-Hazard
Risk



Earthquake &
Tsunami



Volcanoes



Coastal
Environments



Weather and
Wildfire

The **Accelerating Resilience** theme comprises mātauranga Māori, social science, and engineering research to develop policies, tools and methods to ensure new resilience knowledge becomes part of daily decision making in Aotearoa New Zealand.



Resilience, Policy
& Governance



Whanake te
Kura i Tawhiti
Nui



Built
Environments



Rural
Communities



Urban
Communities

Research Structure

Understanding Hazard and Risk

	Multi-Hazard Risk	<ul style="list-style-type: none"> Multi Hazard Risk Case Study Dynamic Assessment of Impacts Multi-hazard Forecasting and Impact Modelling Embedding Models within Robust Decision Making Maori Perspectives on Risk
	Earthquake & Tsunami	<ul style="list-style-type: none"> Fault Model Construction Catalogue Testing and Verification Ground Motion and Co-seismic Landslides Testing Early Warning Systems Probabilistic Tsunami Model
	Volcanoes	<ul style="list-style-type: none"> Time Varying Multihazard Forecasting Volcanic Impact Model - the eVolcano Testing Lab Volcanic Resilience
	Coastal Environments	<ul style="list-style-type: none"> NZ's Changing Coastline Coastal Flooding Integrated Scenario
<i>with Weather & Wildfire</i>		<ul style="list-style-type: none"> Quantification of Urban Flooding Resilience
	Weather & Wildfire	<ul style="list-style-type: none"> Very High Resolution Future Case Studies Improving Weather and Wildfire Communication Better Protection of Maori Cultural Footprints

Accelerating Resilience

	Resilience, Policy & Governance	<ul style="list-style-type: none"> De-risking Resilience Enhancing Resilience and Well-being Building Resilient Futures
	Whānake te Kura i Tawhiti Nui	<ul style="list-style-type: none"> Whāinga Tuatahi Whāinga Tuarua Whāinga Tuatoru
	Urban Communities	<ul style="list-style-type: none"> Smart Resilience Cities Pathways to Urban Resilience Inclusive Urban Communities
	Rural Communities	<ul style="list-style-type: none"> Disaster Resilient Outcomes for Rural NZ Rural Disaster Risk Decision Making Understanding Our 21st Century Rural Communities and Industries Disaster Resilient Rural Aotearoa - NZ Co- Creation
	Built Environments	<ul style="list-style-type: none"> Horizontal Infrastructure Vertical Infrastructure Integrated Scenario
<i>with Weather & Wildfire</i>		<ul style="list-style-type: none"> Performance & Management of Infrastructure Networks

Challenge Management

2021 - 2022 at a glance

Directorate & Governance

Dr. Richard Smith *Challenge Director*

Delia Tamsen *Challenge Manager*

Caitlin Carew *Senior Science
Communications Advisor*

Jenny Stein *Science Communications Advisor*

Josh Te Kani *VM Knowledge Broker*

Nicky Smith *Challenge Coordinator*

Jenn Bestwick *Chair - term ended 30/6/2022*

David Middleton - *term ended 30/6/2022*

Greg Orchard

Ian Simpson

Jessica Hutchings

Melanie Mark-Shadbolt

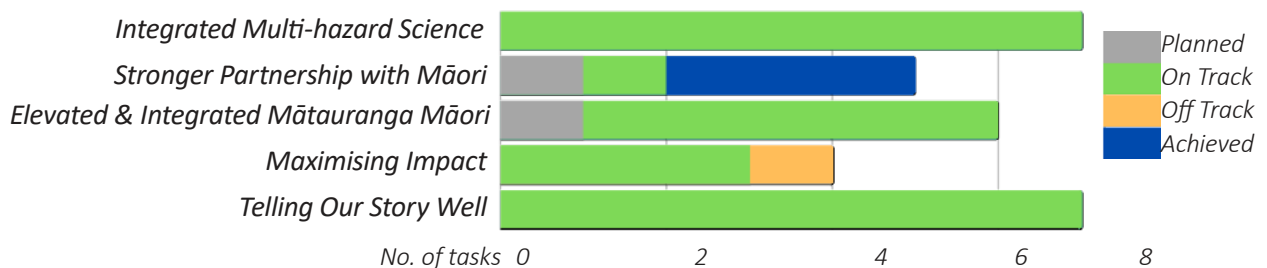


58%
*identify as
women*

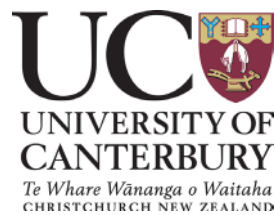


25%
*identify as
Māori*

Strategic Priority Area Progress



Our Challenge Parties



Our research partners include...

- Ministry of Business, Innovation and Employment
- Ministry for Primary Industries
- National Emergency Management Agency
- Ministry for the Environment
- The Treasury
- Te Puni Kōkiri
- Earthquake Commission
- Alpine Fault Magnitude 8 (AF8)
- DEVORA
- QuakeCoRE
- Tonkin + Taylor
- Te Pūnaha Matatini
- Health Research Council
- Royal Society
- World Meteorological Organisation
- Transpower
- International Rescue Committee
- University of Oxford
- Auckland Transport
- Environment Canterbury
- Building Better Homes, Towns and Cities NSC
- Sustainable Seas NSC
- The Deep South NSC

Partnerships with iwi & hapū include:

- Ngāi Tahu
- Ngāti Rangī
- Ngāti Tūwharetoa
- Ngāti Mutunga Ki Parihaka
- Ngāti Kahungunu Ki Wairarapa
- Te Taiwhenua o Heretaunga
- Ngāi Tai ki Tāmaki
- Ngāti Porou
- Ngāti Awa
- Ngāti Tūhoe
- Ngāti Apa
- Ngāti Kūia
- Rangitāne o Wairau
- Ngāti Koata
- Ngāti Rarua
- Ngāti Toa
- Ngāti Kūri
- Taranaki Iwi
- Ngāti Wai
- Te Arawa
- Ngāti Ruahine

Local Government partnerships include:

- Waikato Regional Council
- Queenstown Lakes District Council
- Hawke's Bay Regional Council
- Nelson City Council
- Tasman District Council
- Whakatāne District Council
- Northland Regional Council

Our research partnerships generated:

in cash co-funding

\$1.07M

in-kind co-funding

\$21.4M



2021 - 2022 Impact Case Studies

These impact case studies were submitted to the Ministry of Business, Innovation and Employment as part of our 2021-2022 annual reporting.

Models and Tools for Decision-making

In the 2021-22 year, RNC research outputs and tools have informed decisions relating to coastal planning, infrastructure planning, and emergency management.

Consistent engagement over many years between Volcanoes programme researchers and Taranaki Civil Defence and Emergency Management (CDEM) has led to significant uptake of programme research into the region's hazard planning. Research led by Dr Alana Weir of the University of Canterbury involved a collaborative process with Taranaki CDEM to develop a set of scenarios for potential eruption pathways. Through several workshops, this resulted in a modular scenario design that was responsive to the needs of Taranaki CDEM. The scenarios were designed to have strong scientific credibility

and built on earlier research in the Resilience Challenge and Natural Hazards Research Platform. The interchangeable modules give end-users the ability to adapt and modify the scenarios beyond the life of the current research and projects.

The framework has now been adopted by Taranaki CDEM for eruption preparedness, communication, and resilience planning within the region, and has been used as the basis for custom scenarios for infrastructure stakeholders. For example, Transpower are using research insights from the work to plan for the effects of volcanic hazards on the design and operation of electrical transmission infrastructure in Aotearoa.

In 2020-21 we reported on our Weather & Wildfire programme's wind-modelling work in Tāmaki Makaurau Auckland, which was able to provide analysis on the high wind event that led to damage to the

Auckland Harbour Bridge. This work, led by Dr Richard Turner of NIWA, has generated interest from Ports of Auckland container facilities. They have sought to better understand their site wind climates and the effectiveness of their wind sensors in monitoring for high winds. Our modelling tools are being used to check wind loads on containers, with the goal of improving operations and site safety.

Meanwhile, our Multihazard Risk team is working with multiple organisations and agencies seeking to utilise the MERIT (Measuring the Impact of Resilient Infrastructure) socio-economic modelling tool to assess local economic impacts from natural hazard event scenarios. An example of this is a project underway in Canterbury led by Dr Garry McDonald of MERResearch, funded by NEMA, and involving Canterbury Lifelines Group, Canterbury CDEM, and researchers from Resilient

Organisations, MEResearch and the University of Canterbury. The project is focused on connecting council-held infrastructure GIS layers, with and without hazard impacts included, to the MERIT tool. This will enable a rapid, region-specific assessment of the socio-economic impacts of natural hazard events. The project is also serving as a stocktake of what are steps required to create an online assessment tool.

As previously reported, our Coastal team is partway through an ambitious project to map the entire shoreline of Aotearoa New Zealand, to identify trends in coastal changes and erosion hotspots. The team, led by Dr Mark Dickson and Dr Murray Ford of the University of Auckland, have completed Northland, Nelson/Tasman, Southland, and South Taranaki, and are now focused on the West Coast, North Taranaki, Otago, Auckland and the Bay of Plenty. Northland Regional Council is already using data from the shoreline mapping project in their adaptation planning work.

In October 2021, NIWA in conjunction with Tonkin & Taylor released a journal paper on flooding and inundation within Tauranga harbour, as part of our Coastal Flooding project co-led by NIWA's Dr Scott Stephens. The study was based on work commissioned by the Tauranga City Council, the Western Bay of Plenty Council and the Bay of Plenty Regional Council. The team studied the effects of incremental relative sea-level rise on exposed land areas and found coastal flooding was the biggest threat to coastal areas, rather than coastal erosion, and that low-lying areas likely to be impacted sooner than expected. In a [media article](#), Bay of Plenty Regional Council Policy and Planning Manager Julie Bevan said local councils had been using the information to improve climate change resilience through the resource consent process for new development, while Western Bay of Plenty Council Resource Management Manager Phillip Martelli said it had used the findings to release new coastal erosion and flooding maps for Waihi Beach, Tauranga Harbour and Pukehina.



Vulnerable coastline. Cape Palliser Road. Source: Mark Dickson.

Responsive Science for Emergencies

The response to the January 15 Hunga Tonga–Hunga Ha’apai eruption and tsunami involved significant New Zealand science capability, including that of Resilience Challenge (RNC) researchers.

Volcanoes team member Assoc Prof Carol Stewart of Massey University is co-director of the International Volcanic Health Hazard Network (IVHHN), and member of the New Zealand Volcanic Science Advisory Panel (NZVSAP) and the New Zealand Volcanic Impacts Study Group (VISG). After the eruption, Carol and her VISG colleagues were approached by Tongan community leaders here in Aotearoa who wanted simple, practical advice about precautionary health measures that could be taken by their friends and family back home.

Although they hadn’t yet received an ash sample, Carol and colleagues at the University of Canterbury, GNS Science and NIWA prepared messages that were translated by community leader Emeline Afeaki-Mafile’o and given to Massey University design student Matt Luani to be turned into infographics. Associate Professor Siautu Alefiao of Massey University’s [Niupatch](#) organised for the fliers to be printed and added to aid boxes being sent to Tonga. The entire effort took less than four days.

In [an interview](#), Carol reflected on the tension that exists in the initial aftermath of an eruption, between getting advice out rapidly with incomplete information, versus waiting for better information that may come too late. When an ash sample finally arrived on January 22, collected by the New Zealand Defence Force from beside the runway during their delivery of aid supplies, Professor Shane Cronin of The University of Auckland (former RNC director and member of our

Volcanoes team) met the sample at Whenuapai airport and sent subsamples round the country for analysis. Within 48 hours the IVHHN/ NZVSAP team had produced a peer-reviewed report on the grain size distribution of the ash, with chemical analyses reported a few days later.

This information was used to confirm and refine the earlier advice about precautionary measures that did and did not need to be taken with food and drinking water exposed to volcanic ash, and whilst cleaning-up the ash.

Carol observed that Hunga Tonga–Hunga Ha’apai was a valuable opportunity for IVHHN and NZVSAP to rehearse their systems for the next eruption, whether that’s here in Aotearoa New Zealand or elsewhere.

The Hunga Tonga–Hunga Ha’apai eruption and tsunami also provided an opportunity for members of our Volcanoes team to contribute their risk modelling expertise. Researchers from GNS Science and the University of Canterbury, working alongside Tongan emergency response agencies, undertook risk modelling in response to the eruption and tsunami. By inputting available information on volcanic ash thickness and tsunami inundation, along with established impact functions, into RiskScape, the team were able to start modelling how buildings and infrastructure might have been impacted by volcanic ash and tsunami inundation.

The project involved development of a multi-hazard pipeline for RiskScape to calculate combined losses, including the calculation of clean-up requirements. RiskScape is now better equipped to model impacts of complex multi-hazard events here in Aotearoa New Zealand.

Meanwhile, relationships that have been built over two decades between iwi kaitiaki and researchers at

Massey University and GNS Science are enriching volcano science and resilience-building in the Ruapehu area. Ohakune-based iwi Ngāti Rangi holds traditional knowledge based on hundreds of years of observations, and the results of their environmental monitoring activities are frequently in synergy with those of science agencies. During a period of heightened unrest at Ruapehu Maunga earlier this year, which saw the GeoNet alert level for the volcano raised to Level 2, Prof Jon Procter and Ngāti Rangi volcano expert Che Wilson spoke in the [media](#) about the new perspectives and opportunities afforded by engagement between scientists and kaitiaki. Jon (Muaupoko, Ngāi Tahu) leads a project in our Volcanoes programme exploring volcanic co-governance arrangements to ensure mātauranga and kaitiakitanga are incorporated into volcanic decision-making, resilience-building, and emergency management around our active volcanoes.

This work is taking place alongside other [research](#) from our Volcanoes team that is providing insights into past eruptions at Ruapehu Maunga, and informing forecasts and scenarios of future behaviour.

Our Resilience, Policy and Governance programme co-lead Dr Nick Cradock-Henry is involved in an expert

group set up by the DIA Community Resilience programme and NEMA to provide advice on flood recovery for the Buller region.

As these examples demonstrate, our researchers have the agility and relationships that allow them to add value during emergencies – by inputting science into decision-making processes, contributing to public commentary, and collecting data that helps build resilience ahead of the next event.

Partnership as the Pathway to Impact

In January, the Taranaki Civil Defence and Emergency Management Group Office (TEMO) published a [series of posters](#) about volcanic processes associated with Taranaki Maunga. Our Volcanoes team provided science advice for the project, and the information was based on Volcanoes programme research, with support from the National Emergency Management Agency, GNS Science and the Transitioning Taranaki to a Volcanic Future Endeavour programme.

Taranaki Maunga is an active volcano and TEMO’s top priority for response planning. The project team conducted focus groups with council staff and the public and found that people



Hunga Tonga–Hunga Ha’apai volcano a day before the main blast.
Source: Tonga Geological Services / ZUMA press

wanted to know two things: what they could do to keep themselves safe during an eruption, and what the impacts of that eruption would be.

The team broke down the complex nature of a volcanic eruption into different processes, each with their own ranges of potential impact and risk in different areas and over different periods of time. Each process then became a separate poster in the series. Danielle Charlton of GNS Science, supported by members of the Volcanoes team, oversaw the design of the posters. To ensure that information was presented clearly and effectively, she used eye-tracking studies of how people view maps to determine where to put the most vital information on the posters. Teresa Gordon of TEMO [reports](#) the public response to the posters has been really positive.

Meanwhile, Dr Darren Ngaru King (Ngāti Raukawa) of NIWA has been leading a long-running collaborative project at Rangitoto ki te Tonga / D'Urville Island to uncover geological evidence of past wave inundations described in Māori oral histories. Drawing upon these histories, researchers and hapū representatives obtained sediment cores from Swamp Bay on the northern side of the island. Analysis of the sediments points to a marine deposit that is thought to have been laid down by a tsunami associated with the 1855 Wairarapa earthquake. By weaving together Māori knowledge and earth science, this project aims to deepen understanding of the likely sources and recurrence intervals for large to great tsunamis across Raukawa Moana / Cook Strait. The project has been a partnership between NIWA, Ngāti Koata Trust and Te Rūnanga o Ngāti Kūia, and has also involved expertise from GNS Science and The University of Auckland.

A related project with Te Rūnanga a Rangitāne o Wairau Trust and Rangitāne o Wairau Settlement Trust led by Dr Darren Ngaru King and Rūnanga chair Corey Hebbard has focused on the production of new Māori narratives about co-seismic tsunami hazard and history from Te Pokohiwi (Wairau Bar) and Mataora-Wairau Lagoon. Our Ākina Te Tū Kaupapa Māori Research Fund is contributing to a 'science to art' project that will incorporate kōrero tuku iho alongside scientific knowledge, and traditional as well as contemporary visual and sensory transformations of Māori knowledge. Preparations are underway to hold a Rūnanga-based exhibition to share the outcomes of this work with whānau and the wider public at Rangitāne House in Blenheim later this year.

A team led by Prof Regan Potangaroa (Ngāti Kahungunu ki Wairarapa) of Massey University is trying to provide solutions to the complex issue of 'earthquake-prone' marae. Approximately 70% of Aotearoa New Zealand's 1,300 marae expected to have buildings classified as 'earthquake-prone' over the next

20 years. While some older marae may exceed the new threshold for structural safety (34% of New Building Standards), this cannot be determined without a structural engineer's report. The high cost of getting such reports means many marae may not meet the deadline for seismic assessment prescribed by the Building Act, and so will have their pre-1976 buildings designated 'earthquake-prone' by default.

Regan is working with three marae communities in Te Whanganui-a-Tara Wellington, Te Ore Ore Masterton and Heretaunga Hastings, while his colleague, independent researcher Maire Kipa (Ngāi Tahu, Ngāti Tuwharetoa, Ngāti Kahungunu) is working with marae in Ōtautahi Christchurch. They are seeking to identify affordable and practical solutions. For example, how could a tailored approach to engineering reports achieve efficiencies and save money for individual marae communities? If strengthening work is required, Regan favours what he calls "whānau-isation"—the pooling of resources to take a hands-on, community-driven approach that could enable many marae to cost-



Te Ore Ore Marae, Masterton, circa 1891. Source: Regan Potangaroa

effectively upgrade their buildings for safe and continued use. Regan, Maire and marae representatives will present their research at an upcoming webinar.

Science for Resilience Policy and Practice

A recent focus for the Resilience Challenge (RNC) has been ensuring the development of new legislation is informed by research findings. We have sought to maximise our influence during a busy period for policy development and legislative change, in particular the legislation replacing the Resource Management Act, the review of the Civil Defence Emergency Management Act, and the National Adaptation Plan.

In late 2021, the RNC directorate co-delivered a series of ‘science to policy’ workshops for Ministry for the Environment staff working on the new Climate Adaptation Act. These featured Prof Iain White (the University of Waikato), Dr Sarah Beaven (the University of Canterbury) and Dr Judy Lawrence (Te Herenga Waka Victoria University of Wellington). Dr Lawrence’s co-authored report [Enabling Coastal Adaptation](#) investigated current planning practice to identify opportunities for better use of existing legislation during the transition period, and priorities for new legislation.

Māori researchers have sought to ensure new planning legislation aligns with and provides for Māori values, that partnerships with tāngata whenua are authentic and enabling, and that Māori rights and interests are empowered so they can manage and adapt in relation to their taonga and natural resources into the future. Lara Taylor of Manaaki Whenua—Landcare Research leads a project within *Whanake te Kura I Tawhiti Nui* analysing reform implications for Māori communities and testing them

against Māori resilience needs. Lara was a lead author (alongside other Māori planners) of submissions on the [Exposure Draft of the Natural and Built Environments Bill](#) and the Draft National Adaptation Plan on behalf of Papa Pounamu, the cohort of Māori and Pasifika planners within the New Zealand Planning Institute. Wānanga with Māori planners, practitioners, and kaitiaki on this topic and co-writing the submissions has contributed to Lara’s research aims.

Several case studies in the Draft National Adaptation Plan featured RNC research: *The Growing Kai Under Increasing Dry* symposium and report on drought and the primary sector, co-delivered with two other National Science Challenges; our wildfire preparedness project at Mt Iron, Wānaka; and the Clifton to Tangoio Coastal Hazards Strategy 2120 in which our *Phase 1 Living at the Edge* team trialled the Dynamic Adaptive Pathways Planning approach.

Richard Mowll and colleagues from our Resilience, Policy and Governance team have developed a preliminary infrastructure Planning Emergency Levels of Service (PELOS) framework for Wellington. The work has been [published](#) and is progressing toward the creation of an operationalised framework. The concept is currently being considered NEMA for inclusion in an update of the Civil Defence Emergency Management Act.

In our Weather & Wildfire team, Dr Sally Potter and Dr Sara Harrison of GNS Science investigating the effectiveness of impact-based severe weather warning. Impact-based warnings are triggered by potential impacts such as disrupting traffic or power, rather than the magnitude of a hazard, such as wind speed.


The World Meteorological Organization (WMO) advocates for this approach to help make warnings more meaningful to the public and

MetService has been moving towards impact-based warnings for several years. Sally and Sara are helping MetService identify what data is needed for impact-based warnings, where that data is held, and how improved collaboration between organisations could get the data to those who need it to develop meaningful warning messages.

Through several publications and Sally’s role co-leading the WMO High Impact Weather research programme’s Communication Task Team, Sally and Sara’s work is also informing international best practice.

Lisa Langer of Scion leads a project preparing the Mt Iron community, located at the rural-urban fringe in Wānaka, for ever-increasing wildfire risk. The project is a collaboration with FENZ and Queenstown Lakes District Council and involved workshops with local residents and stakeholders. The results have been published in a [Fire Technology Transfer Note](#) and two further transfer notes are being prepared.

The study, which received additional support from the Ministry of Primary Industries’ Sustainable Land Management and Climate Change fund, resulted in 170 mitigation recommendations being made available to residents, grouped in the following five categories: When building or remodelling a home, When landscaping or designing outdoor spaces and property infrastructure, When making a wildfire plan, When preparing for the start of each wildfire season, When a wildfire occurs. The transfer note reports that some Mt Iron residents are very aware of wildfire risk and have started taking household and community preparedness actions, and concludes that ongoing engagement is needed between agencies and residents to ensure information is made available to new residents, and to achieve wider uptake of mitigation actions.



In the 2021- 2022
year, the Challenge
funded:

111

full-time equivalent
researchers and students

21

percent of this time was
dedicated to Kaupapa
Māori research

Ākina Te Tū

Kaupapa Māori Research Support Fund

*Ko te iwi Māori te kaipupuri o te mātauranga.
Ākina, kia tū rangatira!*

*Māori are the holders of knowledge, to be supported to
stand empowered.*

In 2021, we developed the Ākina Te Tū Kaupapa Māori Research Fund to support further engagement and capability development for our tangata whenua partners across the Resilience Challenge.

In the inaugural round of the fund, we have provided \$158,460 to ten projects across the Challenge.

The fund supports the Challenge's Strategic Priority Area Two: *Stronger Partnerships with Māori*, through supporting the growth and development of tangata whenua capability and capacity, and furthers our goal to leave a lasting legacy in the research sector and in our community.

Successful 2021 recipients:

Project Leads	Project	Programme	Funded
Shari Gallop, Akuhata Bailey- Winiata	Decolonising Managed Retreat	Coastal	\$20,000
Mark Dickson, Millie Grant-Mackie	Millie's Honours Project	Coastal	\$4,000
Chris Kumeroa	Mātauranga in Regional Civil Defence Planning	Volcanoes	\$20,000
Kelvin Tapuke, Iwiroa Wairua	Pou-Taiao Wharekauri	Urban	\$10,500
Kelvin Tapuke, Patrick Tangaere	Te Kura Kaupapa Māori o Te Whare Tapere o Whatonga	Urban	\$8,500
Sylvia Tapuke	High Impact Weather and Ngāi Tai ki Tamaki	Weather & Wildfire	\$20,000
Darren King, Corey Heberd	Te Rūnanga a Rangitāne o Wairau Trust and the Rangitāne o Wairau Settlement Trust	Whanake Te Kura i Tawhiti Nui	\$40,000
Dan Hikuroa, Te Kerekere Roycroft	Te Kerekere's PhD	Urban	\$13,460
Taiarahia Black	Ngā Toenga – Tangata Whenua Engagement	Whanake Te Kura i Tawhiti Nui	\$22,000
Total Funding in this Round			\$158,460

Understanding Hazard and Risk

2021 - 2022 at a glance

156 researchers



35%
identify as women



42%
are students



10%
identify as Māori

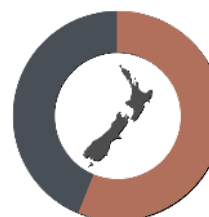
55 publications



44%
published in top 25 journals



40%
international collaborations



56%
domestic collaborations

17 projects

currently underway across programmes in this theme.



of projects are dedicated to empowering and embedding mātauranga Māori.

Accelerating Resilience

2021- 2022 at a glance

166 researchers



43%
identify as women



53%
are students

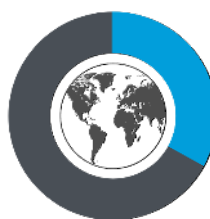


18%
identify as Maori

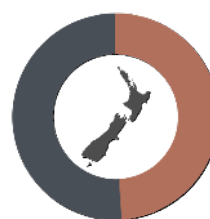
84 publications



36%
published in top 25 journals



33%
international collaborations



49%
domestic collaborations

20 projects

currently underway across programmes in this theme.



of projects are dedicated to empowering and embedding mātauranga Māori.

Strategic Priority Areas

Looking ahead to 2022 - 2023

1 Integrated Multi-hazard Science

To connect and coordinate across RNC Programmes, to ensure our portfolio of multi-disciplinary research is well integrated and aligned, to enable robust impact model development with the widest possible benefits and opportunities

2 Stronger Partnership with Māori

Mana enhancing partnerships with Māori based on Te Tiriti.

3 Elevated and Embedded Mātauranga Māori

Enhanced VM leadership and mātauranga embedded across the Challenge

4 Maximising Impact

We will partner with others across the resilience and research 'systems' to ensure our research is useful, useable and used, and to make it simpler for research users to connect with ours and related science

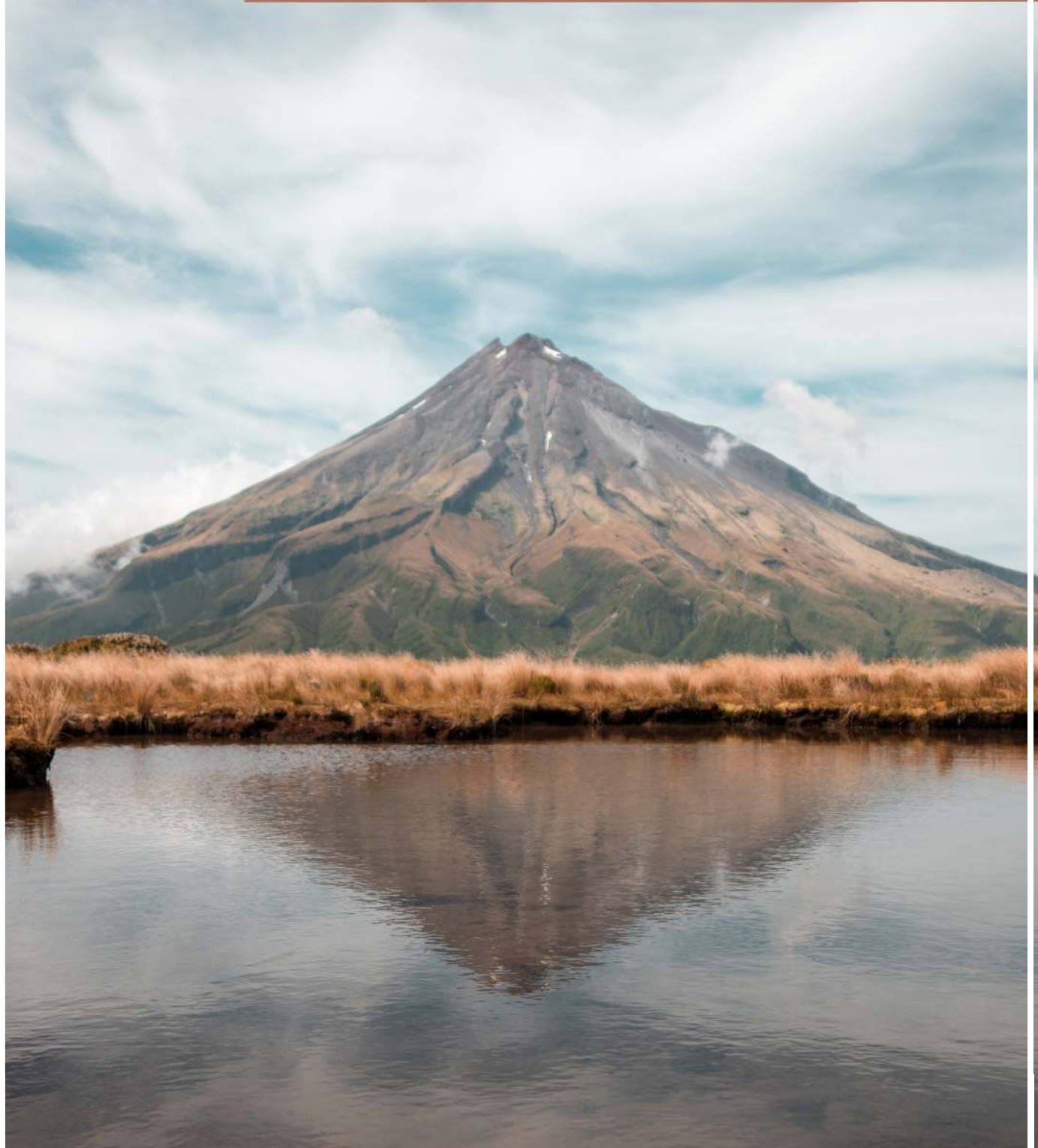
5 Telling Our Story Well

To develop and deliver quality, effective science communication targeted to our different audiences

6 Kawa Āwhina: Our Enduring Legacy, Finishing Well

To undertake the planning and engagement needed to ensure on-going value from the decade of RNC research investment and partnership development

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