



HE AROTAKENGA MANAWAROA – A kaupapa Māori framework for assessing resilience

Shaun Awatere, Garth Harmsworth, Lara Taylor, Nikki Harcourt (Manaaki Whenua – Landcare Research)

SUMMARY

The concept of resilience has recently gained traction in a range of contexts. Its various interpretations and framings are now used to examine a variety of issues and responses, particularly those relating to the human dimensions of national risk and hazardous events, often highlighted through global change. For indigenous Māori in Aotearoa-New Zealand, resilience means many things. Within its many definitions are central notions of building a strong and vibrant social, cultural, environmental, and economic capital base or fabric (tūāpapa, whāriki) on which to grow resilient and sustainable communities and environments. This can be achieved, for example, by enhancing whaiora, oranga tangata – the health and well-being of people, strengthening social capital such as through whanaungatanga (relationships, family) and hononga (social connections, bonds, cohesion), developing a strong economic resource capital base – whai rawa, and sustaining and enriching mauri taiao, protecting the natural capital and mauri (energy, life force) of the environment and resources. A core component for Māori is to build a strong social structure to strengthen culture and cultural identity, with many linkages and networks (tūhono, whakapapa). Marae are obviously an important element within this social and cultural development, as well as the building of community, enterprise, resources and assets.

He Arotakenga Manawaroa is a kaupapa Māori approach and tool presented within an outcome-based sustainable planning framework. It provides a holistic approach for assessing and evaluating resilience within three main interlinked domains or wāhanga. The assessment tool is based on three core values: *Kia whakaora ngā whānau*, *Kia whakahoki te mauri*, and *Kia whakapakari ngā kāenga/kāinga*. It comprises qualitative and quantitative measures (*ngā inenga*) using indicators across the key domains of cultural, social, environmental and economic. It then uses these domains to construct a more complete long-term picture of resilience that can be measured against stated aspirations, goals, and objectives. The approach can be used to assess a level of risk and resilience for Māori communities and enterprise, as well as resources and assets – pre-event and post-event. The derived information can then be used to formulate adaptation and response plans, strategies and actions, in order to build long term sustainable and resilient communities.

This tool provides a Te Ao Māori holistic perspective, and a complementary data set when used alongside economic, scientific, and technically based data, methods, tools for planning. The structure and content of the tool can be tailored for use by local Māori or enterprises wanting to apply their own values or data while the methodology, measures, and process remain consistent and generic.

BACKGROUND

Exposure to risks and hazards – including earthquakes, volcanism, fire, floods, landslide events, coastal inundation and damage, tsunami, and the current and anticipated impacts of climate change – has significant implications for Aotearoa-New Zealand. These can occur at national, regional, district, and local level and may be experienced as disasters – at the least damaging, impacting, and life-changing.

Risk is often presented as the potential for or probability to cause marked change, harm, loss or damage (e.g. living in a high risk zone for earthquake or tsunami) and can be represented locally by calculated, estimated or described consequences or impacts on, for example, whenua/land, taiao/environment, whānau/families, social structure, assets, kāinga/homes, infrastructure, and resources. A hazard is a location-specific event (e.g. landslide, flood) and something likely to cause harm, loss or damage. It is often not anticipated how individuals, whānau, communities, or enterprises will respond to and recover after a major event. A hazard can also be secondary to a main event (e.g. landslide). By building resilience holistically from people and communities within their environment, including their homes, assets, resources and infrastructure, we can help prepare before an event, and limit shock during deleterious events to promote a stronger response to recovery.

This research article describes a kaupapa-based assessment framework and tool to support Maori participation in resilience and sustainability planning (Saunders & Becker 2015). The tool is based on many years of previous work developing kaupapa Māori based concepts, frameworks and indicators in freshwater (Awatere & Harmsworth 2014; Awatere et al. 2017a, Taura et al. 2017), and on recent presentations that have extended these mātauranga Māori based concepts to risks, hazards, and resilience (Awatere et al. 2018) and sustainability planning (Saunders & Becker 2015). He Arotakenga Manawaroa is designed to help identify, plan, and strengthen key Māori domains and capitals that provide the cornerstones of community resilience, such as social, cultural, and environmental, including taonga, resources, and assets (farms, forestry, marae, kāinga, pā) by highlighting their role and importance in fostering appropriate risk and adaptive strategies and actions. Resources and assets play an integral role in Māori economic development and enterprise (Awatere et al. 2017b), and also in the risk cycle, from aspects of critical

infrastructure capability to roles in supporting social and cultural response and recovery.

This holistic approach provides important Māori perspectives, values, and knowledge for assessing resilience to underpin sustainability planning, management, and decision-making, from local to national level, illustrated in the whakataukī that sets the scene for the commencement of planning:

Tē tōia, tē haumātia

Nothing can be achieved without a plan, workforce and a way of doing things

NGĀ KAUPAPA



Figure 1. A dual approach to planning recognises the validity of Te Ao Māori perspectives and empowers Maori positions within planning processes.

HE ANGA – A PLANNING FRAMEWORK



Figure 2. An outcomes-based planning framework provides the context for He Arotakenga Manawaroa. For the evaluation tool to be used effectively Māori positions must

be considered in all stages of He Anga – a planning framework.

MAHI TAHI

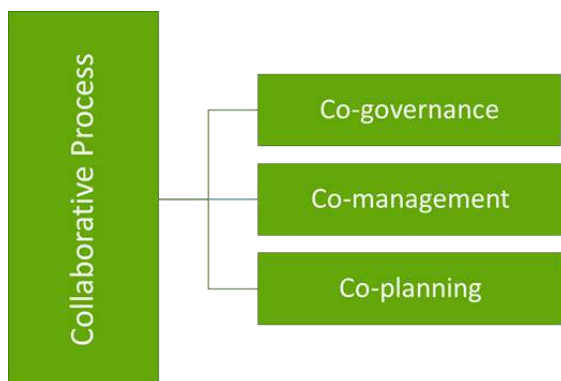


Figure 3. The He Anga – a planning framework supports a progressive kaupapa Māori process in stages from co-governance to co-management and co-planning whereby collaborative process is defined as working together towards common goals and objectives.

Mā te mahi ngātahi, ka eke ki te taumata

Collaboration leads to excellence

TREATY OF WAITANGI COLLABORATIVE PLANNING FRAMEWORK FOR NATURAL RESOURCES

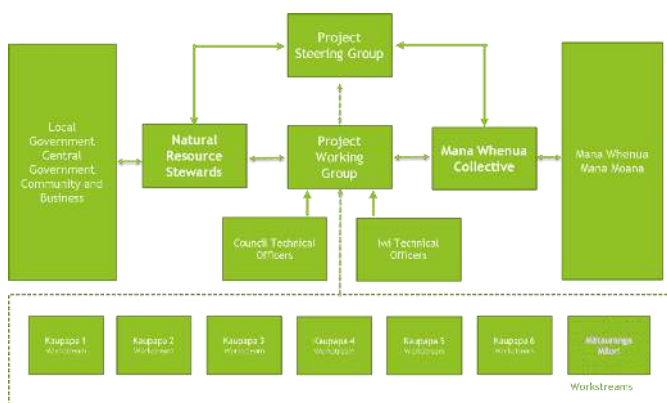


Figure 4. Kaupapa Māori planning is most effective when positioned within a Treaty of Waitangi planning framework. The implementation of outcomes of natural resources will be more informed by Te Ao Māori perspective when iwi/hapū are empowered throughout the planning process from co-governance on project steering groups to co-writing a plan.

NGĀ HUANGA –THE VISION AND OUTCOMES

A vision has been developed for the tool.

NGĀ POU HERENGA – CORE VALUES

He Arotakenga Manawaroa is based on the core values:

- Kia Whakaora ngā whānau,
- Kia Whakahoki te mauri,
- Kia Whakapakari ngā kaenga/kāinga.

Kia manawaroa, Kia puawai ai ngā whānau/hapū/iwi

Resilient and flourishing whānau/hapū/iwi

Figure 5. Three core values lie at the heart of He Arotakenga Manawaroa and provide the basis for key domains or wāhanga.

HE AROTAKENGA MANAWAROA

He Arotakenga Manawaroa provides a holistic approach for assessing and evaluating resilience within three main interlinked wāhanga/pou. It captures information across cultural, social, environmental, and economic capitals on both state and condition through a Māori lens. The assessment can be used to articulate the current state of resilience and risk and then be used to plan and guide communities and enterprises towards greater resilience and sustainability to limit loss and damage. It can also be used to develop strategies for Māori communities and enterprise to respond to risk and hazards in relation to defined objectives and outcomes identified in He Anga (Figure 2).

WĀHANGA/DOMAINS

The assessment of resilience for sustainability planning is proposed across three main interconnected or linked wāhanga domains:

- Whakaora Whānau – Resilient and strong whānau/families/ (social/cultural)
- Whakahoki mauri – Ensuring the essence of life and vitality remains intact and connected (cultural, metaphysical, spiritual).
- Whakapakari kāinga – Sustaining and enhancing the built and natural environment (social and cultural capital, biophysical)

Attributes within each wāhanga are identified as integral for assessment. Quantitative and qualitative indicators and measures can then be developed by local communities within each of the attributes. Domains, attributes and indicators could be extended in future and developed to be more locally explicit.

Examples of attributes and indicators are given below.

ĀHUATANGA – ATTRIBUTES

DOMAIN: WHAKAORA WHĀNAU – STRONG AND RESILIENT FAMILIES/WHĀNAU

Attribute: Kia mahi ngātahi – Gaining strength and resilience by working together, in unison, building relationships, social connections and networks.

Attribute: Kia puāwaitia ngā whānau – The whānau/family, relationships and networks are strengthened and blossom through collective strategies and actions.

DOMAIN: WHAKAHOKI MAURI – THE ESSENCE OF LIFE AND VITALITY REMAINS INTACT

Attribute: Kei te ora te mauri – The mauri remains strong and healthy and spiritual connections (tinana, hinengaro, whānau, and wairua) are fostered and strengthened.

Attribute: Hononga ki te taiao – Strong connections and bonds to the environment are retained and strengthened.

DOMAIN: WHAKAPAKARI KĀENGA/KAINGA – A RESILIENT BUILT AND NATURAL ENVIRONMENT

Attribute: Kei te ora nga kāinga – Strengthen dwellings, social and cultural capital, assets and infrastructure important and significant for long-term prosperity and well-being.

Attribute: Kei te ora te taiao – Developing, restoring, sustaining and enhancing whenua, resources, habitats, and taonga as part of flourishing and resilient ecosystems.

NGĀ UARATANGA – GOALS/OBJECTIVES

For each wāhanga and attribute, quantitative and qualitative indicators and measures can be developed and assessed to measure towards or away from specific goals and objectives.

Whakahoki te mauri: The mauri of the taiao is protected, enhanced and maintained by 20XX

Whakaora ngā whanau: The well-being /orangatanga of iwi/hapū, is enhanced by 20XX

Whakapakari ngā kaenga: Kaenga and papakainga of iwi/hapū is enhanced and grows by 20XX

Figure 6. Examples of measurable indicators from each wāhanga.

NGĀ INENGA – INDICATORS/MEASURES

Both qualitative and quantitative information can be collected. In terms of quantified data, scales can be developed to score the indicators within each attribute and domain. Two types of assessment procedure and scoring descriptor are used:

ASSESSMENT EXAMPLES

For the two domains Whakaora Whānau and Whakapakari Kāenga/Kāinga

The scales are aue/low, distressed = 0; to manawaroa strong, supporting, and resilient = 4. This provides a range to assessment, shown in Figure 7. The scale band rankings are:

- aue/low, distressed = 0
- ngoikore/weak and low in resilience = 1
- āhua pai/okay = 2
- kaha ake/becoming stronger = 3
- manawaroa/strong and resilient = 4.

WHAKAORA WHĀNAU

Kia Puāwaitia ngā Whānau	
MANAWAROA 4	Whānau have significant access to health-care services; sufficient kai, potable water, and ablution facilities to meet their daily needs
KAHA AKE 3	Whānau have moderate access health-care services; adequate kai, potable water, and ablution facilities to meet their daily needs
ĀHUA PAI 2	Whānau have occasional access health-care services; some kai, potable water, and ablution facilities to meet their daily needs
NGOIKORE 1	Whānau rarely have access to health-care services; kai, potable water, and ablution facilities to meet their daily needs is rarely available
AUE 0	Whānau have no access to health-care services; kai, potable water, and ablution facilities to meet their daily needs is unavailable
Kia mahi ngātahi	
MANAWAROA 4	Iwi/hapū are full active partners in recovery, marae are fully supported in recovery operations and whanaungatanga is flourishing
KAHA AKE 3	Iwi/hapū are moderately active partners in recovery, marae are mostly supported in recovery operations and whanaungatanga is engaged
ĀHUA PAI 2	Iwi are occasionally partners in recovery, marae are sometimes supported in recovery operations and whanaungatanga is awakened
NGOIKORE 1	Iwi are almost never partners in recovery, marae are rarely supported in recovery operations and whanaungatanga is awakened
AUE 0	Iwi are not active partners in recovery, marae are not supported in recovery operations and whanaungatanga is dormant

WHAKAPAKARI KĀENGA/KAINGA

Kei te ora ngā kainga	
MANAWAROA 4	Mātauranga Māori design guide is fully implemented, whakapapa is always referenced in design, and all homes are healthy and liveable
KAHA AKE 3	Mātauranga Māori design guide is partially implemented, whakapapa is often referenced in design, and most homes are healthy and liveable
ĀHUA PAI 2	Mātauranga Māori design guide is developed, some whakapapa is sometimes referenced in design, and some homes are healthy and liveable
NGOIKORE 1	Mātauranga Māori design guide is partially developed, whakapapa is rarely referenced in design, and few homes are healthy and liveable
AUE 0	Mātauranga Māori design guide is not developed, whakapapa is absent in design, and no homes are healthy and liveable
Kei te ora te taiao	
MANAWAROA 4	The whakapapa of taonga species (recruitment, habitat, and foodwebs) is very strong, mahinga kai are flourishing and there is minimal impact from natural disasters
KAHA AKE 3	The whakapapa of taonga species (recruitment, habitat, and foodwebs) is mildly impacted, mahinga kai are growing and there are mild impacts from natural disasters
ĀHUA PAI 2	The whakapapa of taonga species (recruitment, habitat, and foodwebs) is moderately limited, mahinga kai are expanding and there are moderate impacts from natural disasters
NGOIKORE 1	The whakapapa of taonga species (recruitment, habitat, and foodwebs) is severely limited, mahinga kai are improving and there are numerous impacts from natural disasters
AUE 0	The whakapapa of taonga species (recruitment, habitat, and foodwebs) is very severely limited, mahinga kai are dormant and there is widespread impact from natural disasters

Figure 7. Examples of scores for domains Whakaora Whānau and Whakapakari Kāenga/Kāinga

For the domain Whakahoki te mauri/Hononga ki te taiao

For Whakahoki te mauri/Hononga ki te taiao, the scales are mauri noho/weak and diminished = 1 to mauri ora/intact and strong = 4. The broad scale band rankings are:

- mauri noho/weak and diminished = 1
- mauri oho/awakening = 2
- mauri piki/connecting = 3
- mauri ora/strong and supporting = 4.

WHAKAHOKI MAURI

Kei te ora te mauri	
MAURI ORA	4 Your gut feeling, hearing, smell, sight, and taste are invigorated when returning to rebuild kainga/homes/town/city
MAURI PIKI	3 Your gut feeling, hearing, smell, sight, and taste are engaged when returning to rebuild kainga/homes/town/city
MAURI OHO	2 Your gut feeling, hearing, smell, sight, and taste are awakened when returning to rebuild kainga/homes/town/city
MAURI NOHO	1 Your gut feeling, hearing, smell, sight, and taste are dormant when returning to rebuild kainga/homes/town/city
Hononga ki te taiao	
MAURI ORA	4 Tangata tiaki are invigorated when reconnecting with restored mahinga kai
MAURI PIKI	3 Tangata tiaki are engaged when reconnecting with restored mahinga kai
MAURI OHO	2 Tangata tiaki are awakened when reconnecting with restored mahinga kai
MAURI NOHO	1 Tangata tiaki feel disconnected when reconnecting with restored mahinga kai

Figure 8. Examples of scores for the wāhanga domain Whakahoki mauri/hononga ki te taiao

METHOD

To improve the consistency of assessment, interpretation, and presentation, effective collaboration with Māori organisations is essential to determine the tikanga (e.g. principles, correct steps, and process). This approach can then be used to support sustainability planning across key wāhanga domains.

The data collected by using the scoring method and descriptors should be augmented with a narrative or korero to supplement details and knowledge for the assessment. Supplementary and additional information can be provided by mātauranga Māori and local narratives (e.g. pūrākau, pakiwaitara, waiata, mōteatea, karakia, whakataukī) reflecting the historical, cultural, and metaphysical/spiritual connection iwi/hapū/kaitiaki Māori have to place, kāinga, sites, resources, and enterprise.

AROTAKENGA – EVALUATION

Assessment and evaluation are important approaches for gauging where a Māori organisation, iwi/hapū, or community is at a point of time, and through time, as regards resilience and within the risk cycle. This can identify the level of vulnerability, exposure, and risk of people, places, communities, marae, resources, and assets and the steps required to strengthen this position.

To date, Māori have had little involvement in developing their own methods for assessing resilience and risk or as a basis for sustainability planning, particularly to develop resilience strategies and actions to manage risk and hazards to limit impacts on their communities, enterprises, resources and assets (Awatere et al. 2017b). They also lack the kaupapa Māori based tools to evaluate and underpin their own strategies for measuring and increasing resilience, prosperity, and well-being.

It is envisaged that He Arotakenga Manawaroa can therefore be used before, during, or after an event to strengthen resilience and to limit disruption, damage, harm or loss from risk and hazards. It can also be used after an event to support recovery. When used regularly in consecutive years, the attributes, indicators and measures can be used to evaluate progress towards objectives, and outcomes.

IMPLEMENTING HE AROTAKENGA MANAWAROA

Whāia te mātauranga hei oranga mō koutou

Seek after learning for the sake of your well-being

A core component of resilience for Māori is being able to understand the current state and condition of their lives, communities, and environments, the inter-connections between these, and their relationship to well-being. In this model, it is important to build and strengthen capitals across the three main domains, Kia Whakaora ngā whānau, Kia Whakahoki te mauri, and Kia Whakapakari ngā kāinga to reach and maintain a state of manawaroa.

It is envisaged the tool will be used locally, regionally, and nationally to develop strategies for Māori communities and enterprise to gauge and respond to risk and hazards in relation to defined objectives and desired outcomes (Figure 2). Implementing He Arotakenga Manawaroa should be within a sustainable planning framework (Saunders & Becker 2015). It is hoped the approach will be widely accepted and applied to assess Māori resilience and to help communities identify and articulate risk, hazards, and potential impacts on communities, Māori enterprise, resources, and assets. Kaupapa Māori assessment approaches should be used alongside mainstream technical and science approaches.

Local Maori organisations will have the ability to refine and adapt this tool for local application and use. It can be used to determine locally specific desires, outcomes, goals and objectives and develop measurable attributes and indicators that are locally meaningful to specific needs.

A key issue for implementing these types of kaupapa Māori-based tools is to empower Māori communities and enterprise to deliver outputs and recommendations that allow them to achieve their own aspirations and desired outcomes. Therefore, it is important that within co-management and co-planning (Figure 3), Māori are more than just stakeholders and can make equal contributions to resilience strategies and sustainability policy and planning processes, to mitigate and manage risk and hazard, that are 'fit for purpose'.

However, we also believe He Arotakenga Manawaroa has a place for defining and evaluating resilience wider than just for risks and hazards and could have broader application to assessing Māori prosperity and assets, living standards, and well-being.

MĀORI AND RESILIENCE

Ehara taku toa i te toa takitahi

Engari, he toa takitini

My strength is not the strength of one

It is the strength of many

Resilience is presented and discussed in this article within the context of hazards and risks (Procter et al. 2018).

Hazards and risk can be understood from both a Te Ao Māori mātauaranga based lens, of stories, concepts, and traditional and historic knowledge handed down through generations, and often from very locally specific iwi/hapū/whānau and marae-based knowledge (Gabrielsen et al. 2017). It can also be understood from a more recent scientific and technical/planning lens with vastly improving knowledge and discovery about our world. The two worldviews are complementary and conflicting.

Recent Māori scholars have presented an understanding of resilience, for example, especially in light of the 2010/2011 Ōtautahi/Christchurch earthquakes. Lambert (2013) noted the importance of connections, "the considerable network of people and resources" especially through whānau, marae, and kura, and described the Māori experience as "endurance" and that resilience was a very slow process (Lambert 2013). Pauling (2017) described details of iwi Māori aspirations as an important part of recovery and rebuild and elaborated on the principles and goals that guided these actions.

In terms of whānau resilience (Waiti 2015) within our domain of 'Whakaora Whānau' it is important to consider a wide range of other Māori concepts, frameworks and

models, such as [Te Whare Tapa Wha](#), which are integral to defining resilience and well-being from a Te Ao Maori perspective and for providing valuable information on a holistic view of whānau and individual health and well-being and determining desired, goals and indicators.

CONCLUSIONS

This tool provides a Te Ao Maori holistic perspective and a complementary data set when used alongside economic and scientifically based data, methods, models, and tools for planning. The structure and content of the tool can be tailored for use by local Māori or enterprises wanting to apply their own values, measures, or data, while the methodology, measures, and process remains consistent and generic. We are building new knowledge and tools that underpin a broad-spectrum resilience in our unique rural, urban, coastal, and Māori communities to risk and natural hazards, including earthquakes, volcanoes, landslides, tsunami, weather, coastal hazards, and rural fire hazards.

As part of this empowerment, central government, relevant agencies, and local government (as the delegated authority from the Crown) need to enact the principles of the Treaty of Waitangi (Figure 4), including the principle of partnership – the duty to interact in good faith to form relationships, collaboration, and partnerships. A meaningful and enduring partnership will provide opportunities for Māori to participate effectively in all sustainability planning – from technical advisory groups to governing entities. It is therefore important to have empowered, well-resourced, and well-informed Māori contributions, particularly at a technical level where plans, policies, rules, recommendations, and deliverables are developed and actioned.

Kaupapa Māori based tools such as He Arotakenga Manawaroa are building capability and capacity for Māori to undertake their own assessments and evaluation, especially within their own frameworks for planning, policy, and governance. Meaningful relationships and partnerships between agencies/institutions and Māori organisations create positive opportunities for Māori to participate more actively and effectively in risk and hazard identification, planning, and management, with a central goal of disaster risk reduction and increased community resilience and well-being.

GLOSSARY

Assets	Things of value, useful, resources
Risk	A situation or consequence involving potential and exposure to cause danger, harm or loss
Hazard	Location specific event, and something likely to cause harm, loss or damage
Resilience	The capacity to recover quickly from difficulties; toughness. Ability to withstand and rebound from crisis or adversity. Endurance.
Māori enterprise	Range of Maori organisations that can generate prosperity from assets and resources

GLOSSARY OF MĀORI WORDS

Ae	Yes, agreed
Āhua pai	Okay in appearance, shape, form
Auē	Expression of distress
Arotakenga	Assess, evaluate, review, critique
Hui	Meeting, gathering
Hapū	Sub-tribe
Hononga	Connections, relationships, bonds
Huanga	Outcomes, the benefit, advantage
Inenga	Measurement, assess
Iwi	Tribe
Kao	No
Kāenga/kāinga	Home, address, residence, dwelling, habitat
Kaha	Strong, able, energetic
Kaha ake	Stronger, getting stronger
Kaimahi	Reviewer, evaluator, assessor
Kaitiaki	Maori resource manager
Kaupapa Māori	Maori ideology, Maori based
Korero	Language, conversation
Kupu	Word
Mahi	Work, activity
Māori	Indigenous people of Aotearoa
Mauri	Life force or life essence, energy
Mauri noho	Energy remaining, at a place
Mauri oho	Energy, life essence awakening, enhance
Mauri ora	Energy/life essence to support well-being
Mauri piki	Connecting, climbing levels of mauri
Manawaroa	Resilient, having stamina
Marae	Māori cultural and social centre
Mātauranga Māori	Māori knowledge
Ngoikore	weak, listless, feeble
Ngātahi	Work collectively, work as one
Pakeke	Mature, grown-up, adults
Pou	Goal post

Puāwaitia	Blossoming, enhancing
Rohe pōtae	Tribal region
Roto	Lake
Taiao	Nature, natural environment, conserve
Takiwā	Region, area
Tangata	People
Taonga	Precious, treasured resources, cultural-based keystone or iconic species
Tohu	Direct, Indicate, guide, signal, show
Tikanga	Custom, values, practice
Uaratanga	Desire, wish, goals, objectives
Wairua	Spirit, soul, spiritual dimension
Wānanga	Workshop, working meeting
Whakahoki	Put back, return, restore
Whakaora	Restore to health
Whakapakari	To strengthen, develop
Whakapapa	Ancestry, lineage, connection
Whakataukī	Proverb, saying
Whānau	Family, extended family

ACKNOWLEDGEMENTS

This work was carried out using funding from the Resilience to Natures Challenges, National Science Challenge (Funded by MBIE NZ) as part of the Vision mātauranga programme.

Acknowledgement and thanks go to all reviewers, and the editor and graphic designer of Manaaki Whenua.

No reira, ngā mihi nui ki a koutou katoa.

CONTACTS

Shaun Awatere (Ngāti Porou)

Manaaki Whenua – Landcare Research, Private Bag 3127, Hamilton

AwatereS@landcareresearch.co.nz

Garth Harmsworth (Te Arawa, Ngāti Tūwharetoa, Ngāti Raukawa)

Manaaki Whenua – Landcare Research, Private Bag 11052, Palmerston North

Harmsworthg@landcareresearch.co.nz

REFERENCES

Awatere S, Taylor, L. Harmsworth G 2018. He Arotakenga Manawaroa. 31st Haratua 2018. National Emergency Management Conference 2018 – Partners for Resilience.

Awatere S, Robb M, Taura Y, Reihana K, Harmsworth G, Te Maru J, Watene-Rawiri E 2017a. Wai Ora Wai Maori – a

kaupapa Maori assessment tool. Policy Brief No. 19 (ISSN: 2357-1713). Hamilton, Manaaki Whenua – Landcare Research.

Awatere S, Mika J, Hudson, M, Pauling C, Lambert, S, Reid J, 2017b. Whakatipu rawa ma ngā uri whakatipu: optimising the “Māori” in Māori economic development. *AlterNative: An International Journal of Indigenous Peoples* 13(2): 80–88.

Awatere S, Harmsworth G 2014. Ngā Aroturukitanga tika mo ngā Kaitiaki: Summary review of mātauranga Māori frameworks, approaches, and culturally appropriate monitoring tools for management of mahinga kai. Hamilton, Landcare Research.

Gabrielsen H, Procter J, Rainforth H, Black T, Harmsworth G, Pardo N 2017. Reflections from an indigenous community on volcanic event management, communications and resilience. *Advances in Volcanology*. Pp. 1–17. Springer Link. DOI 10.1007/11157_2016_44
https://link.springer.com/chapter/10.1007/11157_2016_44

Lambert S 2013. Impacts on Māori of the Ōtautahi/Christchurch earthquakes, Working Paper 2013-01, Te Whanake, Faculty of Environment, Science and Design, Lincoln University,
[https://researcharchive.lincoln.ac.nz/bitstream/handle/10182/5641/Lambert Maori-Resilience 2013.pdf](https://researcharchive.lincoln.ac.nz/bitstream/handle/10182/5641/Lambert%20Maori-Resilience%202013.pdf)

Pauling C 2017. Whakaoratia Ōtautahi: Ngāi Tahu Aspirations for Christchurch recovery & rebuild.
<https://ngaitahu.iwi.nz/wp-content/uploads/2013/06/Whakaoratia-Otautahi.pdf>

Procter J, Kenney C, Black T, Harmsworth G, Saunders W, King D, Awatere S, Potangaroa R. 2018. Methods to build resilience in indigenous communities: A case study from Māori, New Zealand. *Geophysical Research Abstracts*, Vol. 20, EGU2018-PREVIEW, 2018. EGU General Assembly 2018. © Author(s) 2018. CC Attribution 4.0 license.

Saunders WSA, Becker JS 2015. A discussion of resilience and sustainability: Land use planning recovery from the Canterbury earthquake sequence, New Zealand. *International Journal of Disaster Risk Reduction* 14(1): 73–81.
<https://doi.org/10.1016/j.ijdrr.2015.01.013>

Taura Y, Reihana K, Awatere S, Harmsworth G, Forrest E 2017. Wai Ora Wai Maori – a kaupapa Maori assessment tool for Ngāti Tahu-Ngāti Whaoa. Hamilton, Manaaki Whenua – Landcare Research. Ngā Tohu o te Taiao: Sustaining and Enhancing Wai Māori and Mahinga Kai. 8 p.

Waiti J 2015. Whakaoranga Whānau: A whānau resilience framework. Unpublished PhD thesis. Massey University, Palmerston North.



Manaaki Whenua
Landcare Research