



Manaaki Whenua  
Landcare Research

# **Te Ao Māori/mātauranga Māori to address regional council Research, Science and Technologies (RS&T) strategies and priorities**

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Prepared for: Nelson City Council  
on behalf of the regional councils and unitary authorities in New Zealand

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# Te Ao Māori/mātauranga Māori to address regional council Research, Science and Technologies (RS&T) strategies and priorities

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## **Executive summary**

### **Project: Te Ao Māori/mātauranga Māori to address regional council Research, Science and Technologies (RS&T) strategies and priorities**

This project, Te Ao Māori/mātauranga Māori, is to address regional council research, science and technologies (RS&T) strategies and priorities and was funded under an Envirolink large advice grant: Regional Council Advice number: 2141-NLCC117. It provides an opportunity to consider, understand, and discuss Te Ao Māori (Māori perspectives) and mātauranga Māori (Māori knowledge) through presentation and explanation of applied Māori research concepts, models and examples. To bridge the gap between mātauranga Māori (Māori science knowledge) and science is essential to build strong relationships and partnerships with Māori organisations, to recognise and give effect to the Treaty of Waitangi and its principles, and to achieve desired environmental, social, cultural and economic outcomes for regional councils and communities.

#### **The key milestone is:**

To provide guidance for bridging the gap between Te Ao Māori/mātauranga Māori and science to help address regional council RS&T strategies and priorities.

#### **Agreed outputs**

- Give an introductory and scoping presentation or workshop with Regional Council (RC) Special Interest Group (SIG) participants, and science managers, interested RC staff, Wellington
- Carry out a literature review of key Te Ao Māori and mātauranga Māori and document the review findings for future reference (to help address RC strategies and RS&T priorities)
- Complete two webinar presentations to help build an understanding of how to bridge Te Ao Māori and mātauranga Māori with science, with particular relevance to RC research and science priorities
- Document findings and make recommendations
- Write a final report summarising findings and recommendations for the Envirolink site.

#### **Methods**

We carried out this work through a range of presentations, virtual and face-to-face meetings and workshops, to help regional councils better understand Te Ao Māori and mātauranga Māori alongside science to meet RC RS&T strategies, and SIG group goals, outcomes, and priorities.

A number of approaches were used from February 2021 to the end of June 2021 to deliver this work to regional councils as part of this MBIE Envirolink. There was a high level of caution during COVID-19 as to how methods would be developed, and how to carry out presentations and workshops in a safe manner with limited contact and travel. The first

workshop, 11 February, was face to face (kanohi ki kanohi) in Wellington (Wellington Regional Council offices) to introduce and scope the topic and aligned with already scheduled regional council SIG meetings. The presentation was widely circulated.

We also searched and collated a range of literature (see Sections 7&8 of this report) that we believed would be useful and contribute to an understanding of how to bridge the gap between mātauranga Māori (Māori science knowledge) and science.

## **Deliverables**

There has been a high level of interest in learning about and understanding Te Ao Māori and mātauranga Māori and how to bring this alongside science, to better meet RC RS&T desired goals and outcomes, improve engagement with Māori communities and organisations, and address specific SIG strategies and priorities.

All regional councils were represented through the two land SIGs, Land Monitoring Forum, the Land Managers Group and the Surface Water Integrated Management (SWIM) SIG. Contact was also made with Ngā Kairapu (the Māori RC SIG) who provided input throughout the duration of the project. Science managers from all councils were informed, and regions chose who should attend the presentations/workshops. Broadening the workshops to include a strong focus on water as well as on land was seen as necessary.

- We completed a literature review of Te Ao Māori/ mātauranga Māori relevant to science and research RS&T priorities and this is documented in the reference section of this report
- An introductory/scoping presentation on Te Ao Māori/ mātauranga Māori was given at a Regional Council SIG and managers workshop, Wellington, 11 February 2021, WRC offices, and as a scoping exercise used to stimulate discussion and introduce the topic
- A presentation/discussion on Te Ao Māori/ mātauranga Māori was presented at the SWIM SIG workshop, April 2021, Wellington
- A virtual presentation on Te Ao Māori/ mātauranga Māori was given in May 2021 at the groundwater symposium with Ngā Kairapu members BOPRC
- Two webinars were given. The first, held in March 2021, focussed on Māori research of wetlands, using examples of Te Ao Māori/ mātauranga and community-based projects. The second, in May 2021, focussed on engagement with local Maori communities, as regards Māori land-use opportunities and decision making and a local case study
- A final meeting with researchers was held in June 2021 to summarise and document findings and to make recommendations. The final report, summarising findings and recommendations, was written for the Envirolink site.



## Results

Concepts and frameworks were demonstrated in this work to help bridge the gap between Te Ao Māori/ mātauranga Māori and science, and this is supported by a large amount of literature given at the back of this report. The concepts, process, and examples given in workshop presentations and in this report provide new ways of working and thinking across various forms of knowledge, and hopefully will lead to better outcomes across multi-dimensional and multi-faceted work programmes. Key points from this process included:

- The level of interest in Te Ao Māori/ mātauranga Māori across Aotearoa-New Zealand (A-NZ) society has grown steadily over the last 10 years, particularly pertinent is what is Te Ao Māori/ mātauranga Māori? What does this look like? Specific examples? And how can we understand and use it?
- The way we use knowledge is changing, particularly towards a broader knowledge set and values that informs research, planning and policy and decision-making
- High demand for suitable frameworks in which to use Te Ao Māori/ mātauranga Māori next to science, and increase Māori participation in research, planning and policy
- High demand for suitable frameworks in which to use Te Ao Māori/ mātauranga Māori next to science, to improve decision-making to achieve shared goals, desired outcomes, particularly in natural resource management.

We clarify and describe a number of terms and expressions such as Te Ao Māori, Māori values, kaupapa Māori, and Māori concepts for resource management. Seven main areas of mātauranga Māori were identified that should be explored between councils and iwi/hapū/whānau to create successful Māori collaborative projects within regions. We then present a number of approaches, frameworks and models in section 4 that can be used by councils to help with implementation, collaboration, and to achieve successful projects and what we would call best practice.

## Conclusion and recommendations

There is a high level of interest for understanding Te Ao Māori/ mātauranga Māori and how it can be used effectively alongside science to better inform policy, planning, and resource management in A-NZ. This is also seen as an essential building block (He korowai o mātauranga Māori) and platform (tūāpapa, taketake) to improve local engagement with Māori communities and organisations. All the SIGs we worked with specified this involvement with Māori as a high priority in their stated outcomes, as outlined through various RC RS&T strategies and priorities. We provided a number of presentations and workshops to strengthen awareness and understanding of Te Ao Māori/ mātauranga Māori and what it actually looks like, pivotal to improving meaningful dialogue and engagement with Māori (iwi/hapū/whānau). Eight main areas are recommended to improve the understanding and use of mātauranga Māori by councils, and to link mātauranga Māori with science including:

- Use some of the existing frameworks, models and steps being developed within councils such (e.g. BOPRC 2019a,b; BOPRC He Korowai Mātauranga, weaving collaborative actions: He Whatunga Muka) or those led by the Māori SIG across councils "Ngā Kairapu". These frameworks can help recognise and implement mātauranga Māori and to

give council staff the tools and capability to understand and incorporate mātauranga Māori in work programmes within, and across councils

- The findings and examples of this Envirolink project should be used in conjunction with recommended collaborative actions prescribed by Ngā Kairapu (e.g. HKM Ngā Kaupapa Matua) and others
- Use some of the concepts, frameworks and examples given in this report to increase understanding and use of mātauranga Māori, especially with council staff and in RC strategies, to address priorities within SIGs
- Create negotiated spaces (he pūtahitanga) as a safe place to discuss and understand mātauranga Māori and Te Ao Māori alongside science, and develop better models for bridging the gap between mātauranga Māori and Te Ao Māori and science
- Use some of the tikanga process methods and steps given in this report, to improve and guide engagement and effective collaboration with iwi/ hapū/ whānau and tangata whenua in regions
- Allocate resources for building council staff capability and capacity (e.g. workshops, training courses) to improve understanding and the use of mātauranga Māori by staff, members of SIGs, and extended networks (e.g. land management, SWIM, groundwater forum)
- Allocate resources for building iwi/hapū/whānau capability and capacity to engage with council and extended science networks
- Develop specific projects that show mātauranga Māori alongside science (i.e. linking mātauranga Māori and science). These projects can be used as exemplars within regions by councils.

# 1 Introduction

The understanding of Te Ao Māori and bridging the gap between mātauranga Māori (Māori knowledge) and science is an essential step in building strong relationships and partnerships with Māori communities and organisations, to recognise and give effect to the Treaty of Waitangi and its principles, and to achieve desired outcomes across environmental, social, cultural, and economic domains. An understanding of mātauranga Māori alongside science creates an important Te Ao Māori and Treaty perspective (often lacking) to inform effective regional council research, planning, policy, and implementation. Adding the Māori perspective and knowledge from Te Ao Māori will greatly contribute to forming meaningful relationships and ultimately strong partnerships with, and inclusion of, whānau/hapū/iwi Māori and Māori organisations.

This project (Te Ao Māori/mātauranga Māori to address regional council Research, Science and Technologies (RS&T) strategies and priorities) provided an opportunity to consider, understand, and discuss Te Ao Māori (Māori perspectives) and mātauranga Māori (Māori knowledge) through presentation and explanation of applied Māori research concepts, models, and case study examples. This was seen as pivotal to achieving many of the regional council RS&T strategies and priorities. This project was funded under the Envirolink large advice grant, Regional Council Advice number: 2141-NLCC117. The key milestone was to provide guidance for bridging Te Ao Māori/mātauranga Māori and science to help address regional council RS&T strategies and priorities.

## 1.1 Partners

The project was developed across councils as a pan-council effort (16 Regional Councils) but submitted through the Nelson City council (NCC). It initially brought together the Land Monitoring Forum and the Land Managers Group to partner in the work, examining the council RS&T responsibilities and priorities particularly those related to Māori. These groups contacted Māori experts and researchers from Manaaki Whenua to help establish the project, with a focus on guidance to help explain Māori concepts and research through workshops and presentations and show how it could be better understood and incorporated into regional council general and science work programmes and then implemented. All regional councils were represented through the two land SIGs, the Land Monitoring Forum and the Land Managers Group, and the SWIM SIG (freshwater science SIG). Contact was made early with Ngā Kairapu (the Māori SIG across regional councils) to provide advice and have input into the direction of the project and review. Science managers from all councils were informed and regional councils chose who should go to the presentations and workshops. Based on council interests and current issues, the resulting workshops had a strong focus on both land and water.

Manaaki Whenua has been active in Māori collaborative research since the formation of the CRIs in 1992 and has grown its capability and capacity in the Māori research area through the 'Māori kairangahau team' (Māori research team). Manaaki Whenua offers considerable knowledge, skills, and expertise, drawing on over 50 projects to date with Māori organisations, iwi/hapū, Māori landowners, government departments (e.g. Ministry of the Environment (MfE), Te Puni Kōkiri (TPK), StatsNZ, Ministry for Primary Industries (MPI),

Department of Conservation (DOC)), and many regional councils and unitary authorities. The work has ranged from local specific community projects (e.g. iwi/hapū research) through to high level participation in national and regional programmes, technical working groups, input and advice on national policies (e.g. National Policy Statements (NPS), Resource Management Act (RMA), plans, and strategies, involvement in regional policy and plans, iwi working groups, with a general focus on collaborative-based science and Te Ao Māori/mātauranga Māori. This includes, for example, short-term regional council contracts with tangata whenua/mana whenua and councils on strategies, plans and policy, as well as longer-term research/science and commercial projects involving a range of topics and themes, e.g. Māori values, taonga species, biodiversity, wetland restoration and indicators, cultural monitoring tools and indicators, cultural impact assessment, environmental databases, state of environment (SOE) assessment and reporting, land use opportunities and development, and climate change. Increasingly, in the last decade, the group has been particularly active in co-designing cultural monitoring approaches at catchment, regional, and national level, across land, water, and biodiversity.

A key area of Māori research since the 1990s has been in the land and soils area, e.g. leadership and provision of services for land resource assessment, research in soil health utilising Māori concepts, environmental assessment, and reporting. At the local and regional level, this work has been mainly with landowner groups, iwi/hapū, and land managers (e.g. trusts, incorporations, Te Tumu Paeroa, Ngā Whenua Rahui DOC) to help identify land and soils potential, land use opportunities, land development approaches, risk management, and improved Māori utilisation and environmental sustainability of land blocks and catchments. At the national level, with various Government agencies (e.g. TPK, MPI, Land Information New Zealand (LINZ), Māori Land Court, MfE), the work has focussed on spatial information and GIS web-based tools based on environmental data, with more recent (~last 5 yrs) substantial input into TPK and the Māori land programme (Whenua Maori knowledge) and MPI agricultural programmes. The team has a long history of co-designing Māori research in various tribal and council regions.

## **1.2 RS&T priorities**

Many regional councils and unitary authorities (hereafter councils), and especially the special interest groups (SIGs) across councils, have priorities to improve and strengthen their working relationships with Māori, better understand Kaupapa Māori/Te Ao Māori, and increase their capacity to engage with Māori groups, organisations, and communities on key issues of high relevance to Aotearoa-New Zealand, communities, and councils. On a daily, monthly, and yearly basis, we are essentially dealing with a myriad of very complex challenges and issues, as well as legislative and policy change.

The needs for this work are responsive to a range of drivers at multiple levels including: international issues (e.g. climate change, sustainable development goals, biodiversity, indigenous rights); national and regional issues; legislation, and policy; and national and regional strategies and priorities from local government. National issues and priorities, Treaty settlements, the evolving nature of relationships between the Crown/Government and iwi/hapū/whānau, and various local legislative and policy changes continue to drive change. There has been transformation in requirements to reform the governance of our natural

resources, and various co-governance and co-management structures and models have emerged for resource management, particularly for water, and to a lesser degree biodiversity and land. Many of these co-governance and co-management arrangements are enacted through geographically and tribally specific legislation (e.g. Waikato River settlement 2010, Whanganui River Claims Settlement Act 2017, Urewera Act 2014) that can be linked back to specific Treaty claims, agreements, and settlements. These governance entities and structures represent a maturing in Crown-iwi/hapū/whānau relations and processes to govern/manage our environment/resources in a more collective responsible way with shared governance and authority. Further to this are a raft of national and regional policy statements and plans (e.g. National Policy Statements) that require implementation, mainly under the RMA, in conjunction with intended reform of the RMA, and next to regional and local plan changes, long-term plans and vision statements, strategies and priorities, and regional economic development strategies. Natural resource decision-making, and especially changes in governance arrangements, raises many questions about the way we govern knowledge and our knowledge systems and requirements for the future, including intellectual property rights.

A summary of some of this complex array of issues and priorities councils are now having to fully comprehend and act on are given in this introduction to set context.

### **1.3 National Context**

At a national (Aotearoa-New Zealand) level, many drivers underpin the reasons for improved understanding and linking Te Ao Māori/mātauranga Māori and science:

- Responsibilities under the Treaty of Waitangi
- National goals and priorities, especially environmental goals and priorities
- Changes and amendments to the RMA
- National Policy Statements for freshwater and biodiversity
- Three waters review
- Climate change, national climate change risk assessment, and climate change adaptation plan
- National and regional biosecurity issues
- The Environmental Reporting Act 2015
- The *Future Requirements for Soil Management in New Zealand* 2015
- Identification by the Parliamentary Commissioner for the Environment in the review *Environment Aotearoa*, that the issue of erosion is a priority in the land domain
- Ministry of Primary Industries (MPI) and Primary Sector Council (PSC) food and fibre policy and strategies – (Taiao vision and strategy) a vision for Aotearoa-New Zealand
- Government initiatives to unlock the potential of Māori land
- Crown-Māori economic development and land strategies (strategy and action plan, He Kai Kei Aku Ringa)

- Improved use and economic development of Māori land – Māori landowners and entities (e.g. Te Tumu Paeroa) and services (e.g. TPK, Māori Land Service, Whenua Māori knowledge hub) for improved land use planning in regions
- Second tranche of National Science Challenges, particularly Our Land and Water, Deep South, Biological Heritage, and Resilience to Nature’s Challenges National Science Challenge
- The National Environmental Standard for Plantation Forestry
- The One Billion Trees initiative (e.g. Te Uru Rākau)
- Recent policy reforms relating to Highly Productive Land, Freshwater, Biodiversity.

All these drivers stress the need for a greater understanding of Te Ao Māori and mātauranga Māori. Primarily this is to support improved Māori engagement and collaboration and to recognise the greater role Māori are having in decision-making. The changing nature of engagement and decision-making can already be seen through various co-governance, co-planning, co-management models and examples at many levels (e.g. national, regional, local), especially around whenua (land), waimāori (water), climate (āhuarangi), and taiao (natural environment).

A better bicultural understanding will provide the foundation for better outcomes for Aotearoa-New Zealand across multiple dimensions (economic, environment, social, cultural, political). This work also helps facilitate a fundamental societal and paradigm ‘shift’ in general resource management principles from ‘ownership to stewardship’, ‘ecosystem health’, ‘well-being’, ‘individual to collective benefit’, and ‘resource extraction to resource replenishment/remediation’. This shift also recognises and seeks understanding of important inter-generational Māori values and principles of kaitiakitanga (guardianship), te ao turoa (sustainability), mana and rangatiratanga (authority, prestige, status), and other important Māori values such as whakapapa (ancestral lineage, interconnections, and inter-dependencies to the environment).

As part of this paradigm shift, the National Policy Statement for Freshwater Management (NPS-FM) provides direction to all local authorities on managing the activities that affect the health of our freshwater and seeks guidance from Te Ao Māori and more direct input from tangata whenua.

#### **1.4 Requirements of the National Policy Statement for Freshwater Management (2020)**

The relevant requirements include:

- Manage freshwater in a way that ‘gives effect’ to Te Mana o te Wai through involving tangata whenua.
- Work with tangata whenua and communities to set out long-term visions in the regional policy statement.
- Prioritise the health and well-being of water bodies, then the essential needs of people, followed by other uses.

- Improve degraded water bodies and maintain or improve all other water bodies using bottom lines defined in the NPS-FM.

An expanded national objectives framework also has relevance, including:

- Two additional values – threatened species and mahinga kai – join ecosystem health and human health for recreation, as compulsory values.
- Councils must develop plan objectives that describe the environmental outcome sought for all values (including an objective for each of the five individual components of ecosystem health).
- New attributes, aimed specifically at providing for ecosystem health, include fish index of biotic integrity (IBI), sediment, macroinvertebrates (MCI and QMCI), dissolved oxygen, ecosystem metabolism and submerged plants in lakes. Councils will have to develop action plans and/or set limits on resource use to achieve these attributes.
- Tougher national bottom lines for the ammonia and nitrate toxicity attributes to protect 95% of species from toxic effects (up from 80% in previous standards).
- Avoid any further loss or degradation of wetlands and streams; map existing wetlands and encourage their restoration.
- Identify and work towards target outcomes for fish abundance, diversity and passage and address in-stream barriers to fish passage over time.
- Set an aquatic life objective for fish and address in-stream barriers to fish passage over time.
- Monitor and report annually on freshwater (including the data used); publish a synthesis report every 5 years containing a single ecosystem health score and respond to any deterioration.

Local authorities are also required to give effect to National Environmental Standards (NES), stock regulations, water measurement, and reporting.

## **1.5 National Environmental Standards for Freshwater**

The Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (Freshwater NES) regulates activities that pose risks to the health of freshwater and freshwater ecosystems. The regulations came into force on 3 September 2020; however, subpart 3 of Part 2 (intensive winter grazing) comes into force on 1 May 2021, regulations 12–14 (stockholding areas other than feedlots) and subpart 4 of Part 2 (application of synthetic nitrogen fertiliser to pastoral land) come into force on 1 July 2021.

The Freshwater NES set requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems. Anyone carrying out these activities will need to comply with the standards. The standards are designed to:

- protect existing inland and coastal wetlands
- protect urban and rural streams from in-filling
- ensure connectivity of fish habitat (fish passage)

- set minimum requirements for feedlots and other stockholding areas
- improve poor practice intensive winter grazing of forage crops
- restrict further agricultural intensification until the end of 2024
- limit the discharge of synthetic nitrogen fertiliser to land and require reporting of fertiliser use.

In many cases, people will need to apply for a resource consent from their regional council to continue carrying out controlled activities. Although not specifically Māori focused, Māori input and guidance will be essential, especially the management of land (whenua) and wai (waterbodies, freshwater ecosystems).

## **1.6 Aotearoa New Zealand Biodiversity Strategy**

Te Mana o te Taiao (DoC 2020, launched in August 2020) sets out a strategic framework for the protection, restoration, and sustainable use of biodiversity, particularly indigenous biodiversity, in Aotearoa-New Zealand, from 2020 to 2050. The vision for Te Mauri Hikahika o te Taiao is that the mauri of nature is vibrant and vigorous.

The key objectives for Te Mana o te Taiao 2050 are:

- 1 Governance, legislation and funding systems are in place and enable delivery of the strategy's outcomes
- 2 Treaty partners, tangata whenua, hapū, iwi and Māori organisations are rangatira and kaitiaki
- 3 Biodiversity protection is at the heart of economic activity
- 4 Improved systems for knowledge, science, data and innovation inform our work
- 5 Mātauranga Māori is an integral part of biodiversity research and management
- 6 Aotearoa-New Zealand is making a meaningful contribution to biodiversity globally

People are part of nature and nature supports life and human activity. All aspects of our wellbeing, physical, cultural, social and economic, are dependent on nature and the services that it provides. Natural wellbeing underpins our lives, lifestyles and livelihoods. Nature is valuable for its own sake (intrinsic value) and is linked to our identity as New Zealanders. Our vision for a future with nature that has thriving, vibrant, vigorous mauri will result in thriving wellbeing for the people of Aotearoa-New Zealand (DoC 2020).

Outcome 4 of the Strategy states:

- Treaty partners, whānau, hapū, and iwi are exercising their full role as rangatira and kaitiaki
- Resilient biodiversity enables cultural practices and mahinga kai, contributing to the regeneration of mātauranga Māori
- Restored nature uplifts mana



- Treaty partners, whānau, hapū, iwi and Māori organisations are central to the biodiversity system and recognised as leaders.

## 1.7 National Policy Statement for Indigenous Biodiversity

A draft "National Policy Statement for Indigenous Biodiversity (NPS-IB)" was released for consultation by the New Zealand Government in late 2019. The NPS-IB is intended to function under the RMA. The draft NPS-IB sets out objectives, policies, and implementation requirements to manage natural and physical resources to maintain indigenous biological diversity (indigenous biodiversity) in Aotearoa-New Zealand. It sets national targets and guidelines to ensure indigenous biodiversity on public, Māori, and private land is maintained. It recognises the critical role of landowners as guardians, kaitiaki, and managers of nature and biodiversity. The NPS-IB stresses the need to balance economic, social, and cultural well-being along with maintaining biodiversity for today and future generations. It proposes the NPS-IB use a framework-criterion to identify 'Significant Natural Areas (SNAs)' on all land to enable protection and implementation, and that this criterion be ecologically driven.

Councils and local authorities have some statutory functions under the RMA to maintain biodiversity. This is underpinned by Part 2 principles of the RMA, which includes the need to: safeguard the life-supporting capacity of ecosystems; protect significant indigenous vegetation and significant habitat of indigenous fauna; provide for the relationship of Māori and their culture and traditions with their taonga; have particular regard to kaitiakitanga and the ethic of stewardship; and take into account the principles of Te Tiriti o Waitangi. More specifically, councils currently have these roles under the RMA, 'Habitat protection and restoration', including:

- Soil conservation and river control
- Direct and third-party funding of projects, e.g. fencing
- Pest management
- Support of community driven projects
- Indirect support of species protection through direct and third-party funding of habitat protection projects

The NPS-IB goes much further, and not only states objectives, policies, and implementation requirements for those matters of national significance, but also acknowledges the role Māori have as kaitiaki in all aspects of indigenous biodiversity management.

## 1.8 Regional context

At a regional level, there is a vast array of issues and drivers that require response, strategy, and implementation. Many require strengthening engagement and capability for working with Māori:

- Regional plans, policy and strategies for land, soils, water biodiversity (e.g. RMA, NPSs, Plan changes)
- Regional development and economic planning initiatives

- Māori engagement and relationships
- New governance models for co-management and co-governance of natural resources
- Environmental reporting
- Farm planning, mitigation erosion and sediment
- Improved land use planning and regional land use models
- Protection of highly productive or high value land
- Land and soils monitoring
- Freshwater monitoring
- Māori landowners and entities – improved utilisation of Māori land and development initiatives
- Forestry initiatives, National Environmental Standards for Plantation Forestry
- Recent policy reforms relating to highly productive land, freshwater and biodiversity.

## 1.9 Regional councils' Research, Science and Technology Strategy

In 2007, the Regional Councils' CEO Forum and the Resource Managers Group endorsed the development of a RS&T Strategy and their objectives were to:

- Produce a Strategy that will provide a framework within which Regional and Unitary Councils can pursue the further development of high quality, relevant research and timely and appropriate knowledge transfer mechanisms.
- Provide an overview as to what the Regional and Unitary Councils require in research, science and technology, including a process to achieve goals and objectives contained within the Strategy or formulated from time to time through the pathways set out within the Strategy.

In 2020 the fourth edition of the RS&T strategy was developed. As with previous versions, it sets out the broad context within which regional councils operate and identifies key issues for research engagement and priorities to focus on over the next few years. The research priorities have been developed with input from regional council SIGs. A Māori SIG, Ngā Kairapu, has also been established by the RCs. The revised RS&T Strategy will continue to provide an influential voice for councils to communicate immediate and longer-term RS&T priorities to funding agencies and research providers.

The latest 2020 RS&T strategy includes **Priority 2: Incorporation of mātauranga Māori**, to:

- prioritise the bridging of mātauranga Māori alongside of western science to support diverse knowledge and information systems that inform planning, policy and management.
- increase Māori engagement and participation through a bicultural approach by using and understanding knowledge systems that include mātauranga Māori and Te Ao Māori perspectives.
- drive key activities to advance the use and understanding of mātauranga Māori alongside Regional Council science, planning, and policy that can include:

- developing regional objectives and goals that are informed by diverse knowledge systems and perspectives.
- engagement and collaboration with Māori (e.g. iwi/hapū) on projects and activities that include mātauranga Māori (e.g. Māori environmental frameworks) alongside science.
- collectively understanding complex issues (e.g. environmental, social, cultural) using mātauranga Māori and science to achieve desired or agreed management outcomes.
- investigating processes to co-develop appropriate regional monitoring programmes and indicators to track progress towards desired or stated outcomes.
- understanding mātauranga Māori and perspectives alongside science to support community discussions, advice, and decision making.

## **1.10 Regional Land Special Interest Group Context**

In 2018, the combined Land Monitoring and Land Managers (LMF-LMG) SIG groups completed a new roadmap for 2018-2020. Key reporting through Envirolink is the LMF-LMG Research Roadmap 2018-2020 (e.g. Envirolink project 1831-HBRC231). The original 33 initiatives in the roadmap were refined to 16 initiatives, with 8 deemed to be critical. One critical initiative for LMG and LMF SIG is to 'Understand and incorporate Māori values' (e.g. mahinga kai, kaitiakitanga) within decision making. From this prioritised initiative flows an action to develop work programmes with emerging Te Ao Māori researchers and practitioners to improve understanding of Te Ao Māori perspectives in regional council work programmes.

While the roadmap includes a number of activities that have progressed well, acknowledging a changing legislative and policy framework relating to land and soil and the interaction with freshwater, and action in relation to understanding and incorporating Māori values within decision making has not progressed. While a range of initiatives are underway across the country, the extent and degree to which these have been successful varies depending on capacity and capability both within Councils and across iwi/hapū. There is an urgent need for and enormous benefit from a national discussion through the SIGs on how initiatives, particularly those around Te Ao Māori "to understand and incorporate Māori values" can be progressed, aligned and implemented, and how programmes can be scaled up and adapted to suit each region.

The need to understand a Te Ao Māori perspective and mātauranga Māori, and to improve Māori engagement in discussions around the land environment (taiao) is becoming critically important for all regional councils. Strategies from the SWIM SIG and the Regional Groundwater Forum indicate the need to build capacity and understanding in mātauranga Māori and are outlined are shown below:

### **1.10.1 SWIM SIG**

The SWIM SIG strategy, Beyond 2020, Surface Water Integrated management – Te Rōpū Tiaki I Te Kahu o Te Wai, has outcome 4 which states: Greater capacity and understanding in

mātauranga Māori, and outcomes 7–10 related to a stronger and a more connected SWIM. Key strands of the strategy are:

- Key outcome area: Mātauranga Māori
- Building capacity & making connections
- Te Mana o te Wai

### **1.10.2 Regional Groundwater Forum**

Key priority areas the regional groundwater forum are discussing include:

- Discuss how to give effect to Mātauranga Māori in science, specifically groundwater
- How to apply Mātauranga Māori to groundwater science.

## **1.11 Climate change**

New Zealand has made climate change commitments under the United Nations Framework Convention on Climate Change (UNFCCC, the Convention), the Paris Agreement and the Kyoto Protocol. These targets have included:

- to reduce greenhouse gas emissions to 30% below 2005 levels by 31 December 2030 (Paris Agreement)
- an unconditional target to reduce our emissions to 5% below 1990 levels by 31 December 2020 (UNFCCC)
- a conditional target to reduce New Zealand's emissions to between 10% and 20% below our 1990 levels by 31 December 2020
- to reduce our emissions to 50% below 1990 levels by 2050.

A large number of initiatives are occurring in climate change research, planning, and policy at both national and regional level; all of which require Māori involvement and leadership.

Therefore, many Māori have roles participating across these initiatives and programmes, including the Climate Change Commission, Deep South National Science Challenge, Climate Health Aotearoa national research network (tangata whenua), MfE advisory groups, climate change risk assessment, iwi leaders/iwi chairs forum, and different working groups.

Iwi/hapū/whānau groups and other Māori organisations are already involved these initiatives and programmes, and many are increasingly active in this space. Under the RMA, local government is required to consider the effects of a changing climate on communities. Councils are also required to incorporate climate change into existing frameworks, plans, projects, and standard decision-making procedures. A climate change perspective is now integrated into activities such as flood management, water resources, planning, building regulations and transport.

One of the changes introduced by the Resource Legislation Amendment Act 2017 is that 'the management of significant risks from natural hazards' is a new matter of national importance in section 6 of the RMA.

There is a national legislative policy framework in place. New Zealand's main instrument to reduce greenhouse gas emissions is the Emissions Trading Scheme (ETS). The government passed major reforms to the ETS in June 2020, continuing to exempt the country's largest greenhouse gas sector emitter – agriculture – from a price on its emissions until 2025. Aotearoa-New Zealand is one of the few countries to have a zero-emissions goal enshrined in law. The Climate Change Response (Zero Carbon) Amendment Act 2019 will require New Zealand to prepare for, and adapt to, the effects of climate change. To reach its net zero target for 2050, New Zealand plans to use the land use, land use change, and forestry (LULUCF) sector as an emissions sink, utilise carbon market mechanisms, and exempt methane emissions (with a separate methane target). Alongside the development of the Zero Carbon Act, the government established the New Zealand Green Investment Finance Ltd.

A new report, *Inaia tonu nei: a low emissions future for NZ* (June 2021), provides an emissions reduction plan for 2022–2025. It provides advice, budgets, and a pathway for the NZ Government to achieve emissions reduction to 2050. 'All levels of central and local government must come to the table with strong climate plans'. The report reasserts the Treaty of Waitangi and Crown–Māori relationship to achieve emission targets. 'There are obligations to uphold the principles of partnership, protection and participation and equity under Te Tiriti o Waitangi', and 'demonstrating emissions budgets that can be fair, inclusive and equitable'. 'Any targets and associated policies should be developed in partnership with iwi/Māori to avoid compounding historical disadvantages'.

### **1.12 Links to other Envirolink or Council activities**

Councils have specific requirements to assess, monitor, and report on land, soils, and water, particularly under the RMA 1991 and 2020 amendments, and the Environmental Reporting Act 2015. This responsibility is growing and the need to collect and report an extensive amount of quality information and data on our environment is increasing (e.g. the 2018 MfE/StatsNZ land domains report, *Our land 2021*, and the 2019 PCfE report on land domains assessment and reporting).

The importance of understanding Te Ao Māori perspectives and Māori knowledge (mātauranga Māori), has raised the questions – what is kaupapa Māori based research, what are impacts on Māori values in our landscapes, what are Māori cultural approaches for environmental assessment, monitoring and reporting? These are implicit in both the Environmental Reporting Act 2015, and in a raft of new policy and regulatory initiatives proposed and/or enacted within the past 2 years relating to land, water and biodiversity. This includes an increasing responsibility for councils to include Māori in planning, policy, and monitoring with an increasing need to assess and report on cultural information and impacts on Māori values within the land and water domains. There is also a clear signal from Government for responsibilities, including regional economic growth and development, the need to increase agricultural and land productivity within environmental limits, and the need to optimise land performance within regulatory and planning frameworks under the RMA and NPSs.

There is now high-level interest by councils in, for example:

- Current research being undertaken in relation to Te Ao Māori, land science and land management – what is it and where is it?
- How mātauranga Māori can be used in cultural monitoring frameworks and in the co-planning and delivery of land management programmes
- How cultural monitoring can be used alongside science assessment, monitoring and reporting
- How Te Ao Māori /cultural information could be used in SOE reporting at regional and national scales
- How SOE reporting at regional scales can be aggregated up to national level with consistent standards across council regions.

Within recent years, the need for a better understanding of Māori values, and to bring a wider Māori perspective into environmental planning, policy, and implementation, has been recognised by councils. Challenges remain in staying abreast of current Māori research, in facilitating understanding by land managers and land scientists, and how to include mātauranga Māori-based perspectives with science and other knowledge systems. There needs to be links to projects that can demonstrate this within each council.

Previous Envirolink projects have largely focused on cultural monitoring mainly in relation to freshwater with less focus across broader taiao areas such as biodiversity, land, soils, coastal, and climate change. This wider framing across inter-connected environmental domains is essential if it is to fit within a Te Ao Māori (w)holistic worldview where knowledge and understanding is a pre-requisite for the management of resources across all aspects of the environment including all ecosystems and human beings. Striving for a complete understanding across all parts of the environment, and its interconnections and interdependencies, is a central basis for kaitiakitanga (environmental guardianship). Therefore this project extended understanding and learning to land, soils and biodiversity stressing links to water and climate. For example, the paucity of cultural information and knowledge in the land and soils area still remains a key requirement for effective monitoring and reporting of land (whenua), and is a key outcome area for land use, land management, and soil health.

### **1.13 Building capacity and capability in councils**

In councils it is essential to build capacity to effectively implement Te Ao Māori/mātauranga Māori alongside science to achieve desired outcomes through regional council RS&T strategies and priorities. This could be through dedicated specialist teams within or across councils. Ngā Kairapu is the lead Māori SIG within the regional sector and is already leading much work in this area. Its membership consists of Māori specialists from within councils and is seen as integral to building capacity within councils, and for engagement with iwi/hapū/whānau Māori.

Initiatives to date from councils alongside this envirolink indicate that capability and capacity building could be in the following key areas:

- Prioritise bridging the gap between mātauranga Māori and western science to support diverse knowledge and information systems that inform planning, policy, and management
- Increase Māori engagement and participation through a bicultural approach by using and understanding knowledge systems that include mātauranga Māori and Te Ao Māori perspectives
- Drive key activities to advance the use and understanding of mātauranga Māori alongside council science, planning, and policy that can include:
  - Developing regional objectives and goals that are informed by diverse knowledge systems and perspectives
  - Engagement and collaboration with Māori (e.g. iwi/hapū) on projects and activities that include mātauranga Māori (e.g. Māori environmental frameworks) alongside science
  - Collectively understanding complex issues (e.g. environmental, social, cultural) using mātauranga Māori and science to achieve desired or agreed management outcomes
  - Investigating processes to co-develop appropriate regional monitoring programmes and indicators to track progress towards desired or stated outcomes
  - Understanding mātauranga Māori and perspectives alongside science to support community discussions, advice, and decision making.

## 2 Project activities

Between February 2021 and the end of June 2021 several activities were undertaken to deliver this programme of work. These activities included a range of presentations, virtual and face-to-face meetings, and workshops. There was a high level of caution during COVID-19 on how methods would be developed, and how to carry out presentations and workshops in a safe manner with limited contact and travel. The first workshop 11 February was face-to-face (kanohi ki kanohi) in Wellington (Wellington Regional Council offices) to introduce and scope the topic, which aligned with an already scheduled regional council managers and SIG meeting. The presentation was widely circulated.

We also collated a range of literature (see Section 8) we believed would be useful and contribute to an understanding in this area of **bridging the gap between mātauranga Māori and science**.

The following deliverables were included in the workplan (as per Envirolink contract 2141-NLCC117):

- Present an introductory/scoping workshop with council science managers and SIG members Wellington
- Conduct a literature review of key Te Ao Māori and mātauranga Māori and document the review for future reference (to help address RC RS&T priorities)
- Complete two webinar presentations to help build an understanding of the necessity of bridging the gap between Te Ao Māori and mātauranga Māori and science, with relevance to council research and science priorities

- Document findings and make recommendations
- Write a report summarising findings and recommendations for the Envirolink site.

### **Approach (as in Envirolink contract 2141-NLCC117)**

Through a greater understanding of Te Ao Māori/mātauranga Māori/kaupapa Māori, we will help facilitate a 'programme of action' to enable councils to better address their strategies and priorities. It was intended to frame and increase this understanding by giving relevant and regionally applicable examples, covering topics such as land/soil, biodiversity, climate change, and water projects to develop an understanding on how to incorporate Te Ao Māori/mātauranga Māori into current council work programmes, with an emphasis on how to meet the RS&T Strategy objectives. The workshop and webinars were intended to initiate discussion about key areas including:

- Understanding Te Ao Māori/mātauranga Māori and how to link mātauranga Māori and science to support diverse knowledge and information systems that inform planning, policy, and management
- How to increase Māori engagement and participation through a bicultural approach to developing and understanding knowledge systems that include Te Ao Māori perspectives and mātauranga Māori
- Improving engagement and collaboration with Māori (e.g. iwi/hapū) on projects and activities that include mātauranga Māori (e.g. Māori environmental frameworks)
- Addressing complex issues (e.g. environmental, social, cultural) using mātauranga Māori and science
- Investigating processes to co-develop appropriate regional environmental monitoring programmes that include cultural monitoring/cultural indicators for land, soil, water wetlands, and biodiversity
- Understanding mātauranga Māori and perspectives alongside science to support community discussions, advice, and decision making.

## **3 Deliverables**

As specified in contract 2141-NLCC117, a number of key deliverables and tasks were agreed. Results from the project, from February 2021 and 30 June 2021, included delivery of an initial scoping workshop (Wellington, Feb 2021), 2 webinars, and a closing discussion to document findings and make recommendations. A literature review on mātauranga Māori, Māori values, and kaupapa Māori was also completed and included in this LC report. All presentations and webinars were made available to council staff. Statistics for the two webinars are given below.

All regional councils were represented through the two land SIGs (the Land Monitoring Forum and Land Managers Group), science managers and planners, the SWIM SIG, and the Groundwater forum. Contact was also made with Ngā Kairapu (the Māori SIG), who jointly presented at some of the workshops and advised this Envirolink (see Appendix 1 for a list of key contacts). Science managers from all councils were informed, and regions could select who should go to these workshops and discussions, while webinars and virtual presentations



allowed a large number to register interest and participate (see below). From the onset of the project there was agreement to broaden the workshops to include a strong focus on water as well as on land. The work started early in February 2021 and ran through to the end of June 2021. In terms of delivery from February 2021 to June 2021, the main outputs are:

### **Introductory/scoping workshops/presentations with RC SIGs**

- 1 An in-person introductory/scoping presentation on Te Ao Māori/ mātauranga Māori was given at a Regional Council SIG members and science managers workshop on 11 February 2021 at the Wellington Regional Council offices in Wellington. The presentation was a scoping exercise used to stimulate discussion and introduce the topic Te Ao Māori/mātauranga Māori and how to link Te Ao Māori/mātauranga Māori with science. We worked with ‘...representatives of all 16 regional councils, particularly the Land Monitoring Forum and the Land Managers Group.’
- 2 A second in-person presentation on Te Ao Māori/ mātauranga Māori was given at a Regional Council SWIM SIG workshop in Wellington on 13–14 April 2021. The presentation was invited by Jean-Charles Perquin, Natural Resources Science Manager, NCC, who has had an on-going strong interest and connection with this topic. Kataraina O’Brien, BOPRC coordinating Ngā Kairapu also presented. The presentation aligned with the discussion on the SWIM SIG strategy (Beyond 2020, Surface Water Integrated management – Te Rōpū Tiaki I Te Kahu o Te Wai).
- 3 A third presentation (virtual) was given to the Groundwater SIG workshop/Regional Groundwater Forum on 10 May 2021 in Auckland. This presentation was invited by Rebecca Morris, Senior Groundwater Scientist, Greater Wellington Regional Council. Anaru Vercoe, Pou Whāinga (principal Advisor) Policy and Planning BOPRC and Gina Mohi, BOPRC, both members of Ngā Kairapu also presented. The presentation:
  - Updated the SIG and Forum on Ngā Kairapu SIG
  - Discussed how to give effect to Mātauranga Māori in science, specifically groundwater
  - Discussed how to apply Mātauranga Māori to groundwater science

### **Literature review of key Te Ao Māori and mātauranga Māori**

We completed a literature review of Te Ao Māori/mātauranga Māori. The list of key references is found in Section 8.

## **Webinar presentations that address RC research and science priorities**

Two webinars were hosted that focused on different aspects of RC research and science priorities.

### *Webinar 1: Te Ao Māori – values-based research and wetland health*

Presenters: Mahuru Wilcox and Yvonne Taura

Date: 13 April 2021

Summary: Te Ao Māori (Māori world view) and mātauranga Māori (Māori knowledge) are essential considerations when developing research strategies and priorities in Aotearoa. As tangata whenua and Treaty partners, iwi and hapū have important traditional and customary rights, and have an essential role to play in research, co-design, decision-making and leadership, especially when it comes to managing our natural environment. This contributes to the development and advancement of collaborative governance and management alongside government agencies. Through collaboration, we can achieve the desired environmental, social, cultural, and economic outcomes for iwi, regional councils, and other communities. The webinar discussed some useful approaches to collaborative governance and management illustrated through wetland case studies from the Waikato. It also discussed some useful monitoring tools that iwi and hapū groups are currently using in their aquatic and terrestrial environments.

Recording: [Te Ao Māori values-based research and wetland health - YouTube](#)

Statistics: 294 people registered for the webinar and 134 people watched the live webinar. At 30 June 2021 the recording has had at least 161 views via YouTube. Another 89 people watched the recording who did not make the live session (i.e. they registered to attend but watched the recording afterwards).

# MWLR WEBINAR

Our Land and Our Future – Tō tātau whenua, mō āpōpō

**Invitation to join us for a webinar:**

## **Kia Manawaroa Kia Puawai Enduring Māori Livelihoods**

**Presented by Shaun Awatere & Nikki Harcourt**  
Manaaki Whenua – Landcare Research

Our waterways are under pressure, their mauri (life-force) has diminished; our economic growth is fast approaching environmental limits, almost 4000 of our indigenous plant and animal species are currently threatened with or at risk of extinction, and our biodiversity has declined significantly.



Increasingly stringent regulations are being rolled out by policy makers to protect natural systems, but these are framed by Eurocentric measures and concepts. If we are to achieve our vision to improve the health of te taiao (the environment) and our people, we need to change the way that people interact with their environment from a position of extractive resource use to one of reciprocal exchange.

Te Ao Māori thinking offers us a pathway forward to achieving sustainable livelihoods that enable both the natural world and humans to prosper. In this presentation we showcase the operationalisation of He Waka Taurua, a framework for collaborative partnership based on the dual elevation of both Te Ao Māori and western science knowledge systems, through a Māori agribusiness case study.

Date: **Tuesday 4<sup>th</sup> May**

Time: **10.30am – 11.00am**

**You can register to attend this webinar via this link:**

\*insert link

*Webinar 2: Kia Manawaroa Kia Puawai Enduring Māori Livelihoods*

Presenters: Shaun Awatere and Nikki Harcourt

Date: 4 May 2021

Our waterways are under pressure, their mauri (life force) has diminished; our economic growth is fast approaching environmental limits; almost 4000 of our indigenous plant and animal species are currently threatened with or at risk of extinction; and our biodiversity has declined significantly. Increasingly stringent regulations are being introduced by policy makers to protect natural systems, but these are framed by Eurocentric measures and concepts. If we are to achieve our vision to improve the health of te taiao (the environment) and our people, we need to change the way people interact with their environment from a position of extractive resource use to one of reciprocal exchange. Te Ao Māori thinking offers us a pathway to achieving sustainable livelihoods that enable both the natural world and humans to prosper. This webinar showcased the operationalisation of He Waka Taurua, a framework for collaborative partnership based on the dual elevation of both Te Ao Māori and western science knowledge systems, through a Māori agribusiness case study.

Recording: <https://www.youtube.com/watch?v=DjQ8zBFfNA>

Statistics: 217 people registered for the webinar and 85 people watched the live webinar. At 30 June 2021 the recording has had at least 51 views via YouTube and another 67 people have watched the recording who did not make the live session (i.e. they registered to attend but watched the recording afterwards).

# MWLR WEBINAR

Our Land and Our Future – Tō tātau whenua, mō āpōpō

**Invitation to join us for a webinar:**

## Te Ao Māori Values-based research and wetland health

**Presented by Mahuru Wilcox & Yvonne Taura**

Manaaki Whenua – Landcare Research

Te Ao Māori (Māori world view) and mātauranga Māori (Māori knowledge) are essential considerations when developing research strategies and priorities in Aotearoa.

As tangata whenua and Treaty partners, iwi and hapū have important rights, thought leadership, and contributions when it comes to our natural environment, and progressing collaborative governance and management alongside government agencies. Through collaboration, we can achieve the desired environmental, social, cultural and economic outcomes for iwi, Regional Councils and other communities.

We will discuss some useful approaches to collaborative governance and management illustrated through wetland case studies from the Waikato. We will also discuss some useful monitoring tools that iwi and hapū groups are currently using in their aquatic and terrestrial environments.



Date: **Tuesday 13<sup>th</sup> April**

Time: **10.30am – 11.00am**

**You can register to attend this webinar via this link:**

<https://attendee.gotowebinar.com/register/6926467371501947147>

*Other webinars of interest:*

**Te Kura Huna o Te Urewera** (The Hidden Treasure of Te Urewera) addresses the revival and intergenerational transfer of Tuawhenua kawa (protocols and etiquette), tikanga (procedures and guidelines), and mātauranga (traditional knowledge) as they relate to the kererū or New Zealand pigeon (*Hemiphaga novaeseelandiae*), which is recognised by Tūhoe as a manu

rangatira (chiefly bird species). Manaaki Whenua – Landcare Research researchers Phil Lyver and Puke Timoti, together with the Tūhoe Tuawhenua Trust, worked closely over several years with the Ruatāhuna community to explore Tuawhenua’s relationship with the kererū and Te Urewera. They interviewed more than 60 kaumātua and community members over that time. Part Two – Te Kura Huna o Te Urewera: He Whenua Kura - explores the genealogical connection, purpose, and cultural expressions about Tuawhenua’s unique relationship to the kererū. ‘We can use the information captured through kōrero-a-waha (spoken knowledge fixed to memory, the art of remembering, portraying or delivering knowledge), and the many kaiwaka (portrayal of knowledge through mediums such as waiata and mōteatea) that support the ahurea (cultural expressions) of the people necessary to transfer those learnings to future generations,’ says Puke. ‘At the heart of a Tuawhenua whakatauki (proverb), Ko te wai te toto o te whenua, ko te whenua te toto o te tangata (For water is the blood of the land, and the land is the blood of the people) is the description of the reciprocal relationship people have to their land and the responsibilities of preserving it. In turn the land nourishes the community with kai (sustenance), wairua (spirituality), and mātauranga.’ A haunting mōteatea (lament) about the kererū and its connection to mana whenua features at the end of Part Two. It was composed specifically to portray the importance of the bird to Tuawhenua, and to capture and transfer this knowledge to future generations through song.

<https://www.youtube.com/watch?v=ZJzkQTnCoxc>

[https://www.youtube.com/watch?v=leEfKY\\_q2C8](https://www.youtube.com/watch?v=leEfKY_q2C8)

### **Write a final report summarising findings and recommendations for the Envirolink site.**

This report brings together findings from a number of presentations/workshops, virtual meetings, two webinars, and discussion to synthesise findings and make recommendations. There has been a high level of interest in understanding Te Ao Māori and mātauranga Māori and bring it alongside science to better meet RC RS&T desired outcomes, improve engagement with Māori communities and organisations, and help address specific special interest group (SIG) strategies and priorities. Presentations given in this work to 30 June 2021.

Harmsworth GR 2021. Te Ao Māori/mātauranga Māori to address Regional Council RS&T priorities and strategy. Greater Wellington Regional council offices, Wellington, 11 February 2021.

Harmsworth GR 2021. Te Ao Māori/mātauranga Māori to address Regional Council RS&T priorities and strategy, 13<sup>h</sup> April 2021. SWIM hui – Shaping SWIM’s future, Wellington, 13–14 April 2021.

Harmsworth GR 2021. Te Ao Māori/mātauranga Māori and groundwater. Virtual presentation. NZ Groundwater forum, Auckland, 10 May 2021.

Mahuru Wilcox and Yvonne Taura 2021. Te Ao Māori – values-based research and wetland health. Manaaki Whenua Webinar, 13 April 2021.

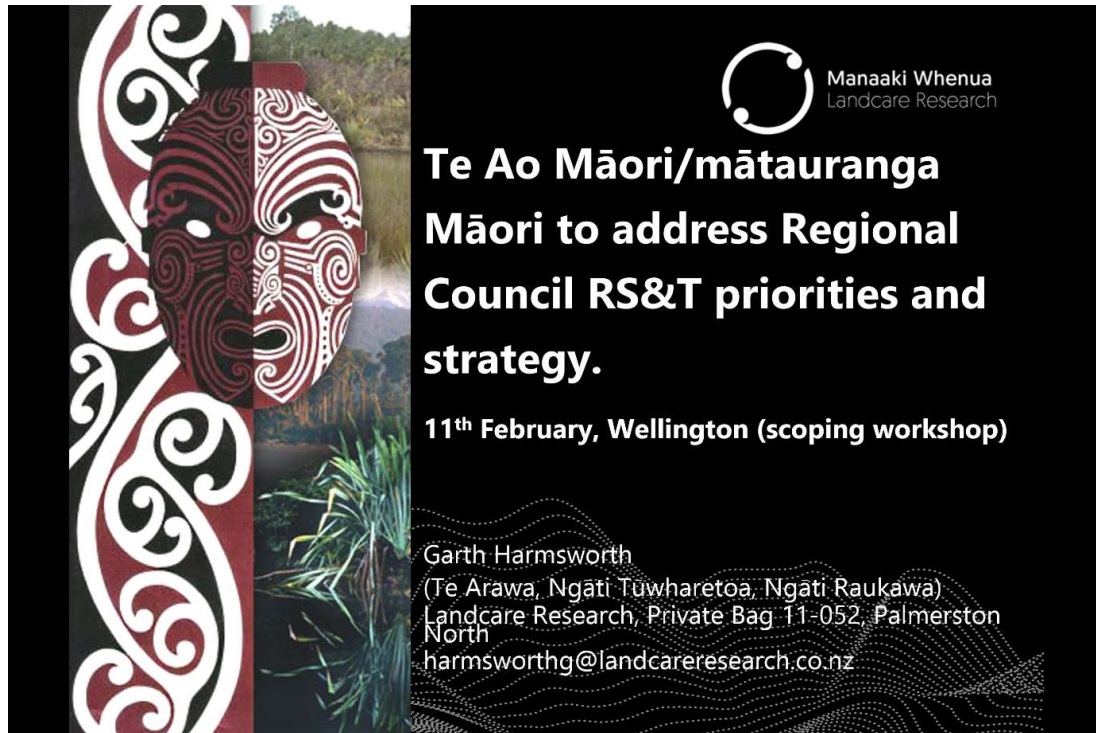
Shaun Awatere and Nikki Harcourt 2021. Kia Manawaroa Kia Puawai Enduring Māori Livelihoods. Manaaki Whenua Webinar, 4 May 2021.

## Topics covered in workshops/presentations

Title of talk: Te Ao Māori/mātauranga Māori to address regional council Research, Science and Technologies (RS&T) strategies and priorities

Date: Thursday, 11 February, ~1.00–2.00 p.m.

Venue: Wellington Regional Council offices, Wellington



Theme: The aim of this presentation was to introduce the topic of using mātauranga Māori alongside science in a general and (w)holistic way, have an informal discussion of how mātauranga Māori is relevant to RCs and their science and policy priorities, and then provide specific examples of mātauranga Māori led work across various domains: e.g. freshwater, wetlands, coastal, land, soils, Māori land development/economic development, etc. Demonstrate how mātauranga Māori can sit alongside and complement science, as two contrasting but rich knowledge systems, to inform research, policy, planning, and strategic direction, especially strengthening engagement and building capacity with Māori organisations, iwi/hapū/whānau and tangata whenua. The framing of many priorities and the necessity for this work are given in the introduction section of this report.

The facilitation of the workshop and the following presentations and webinar series focussed on Priority 2: Incorporation of mātauranga Māori in the Regional Council RS&T strategy, to address requirements in the LMF-LMG Research Roadmap 2018–2020 and SIG strategies and priorities, and in this work was regarded as ‘beyond business as usual’. Some of the main areas for discussion included:

- Demonstrating how to bridge the gap between mātauranga Māori and western science to inform improved planning, policy, and management (e.g. to support co-governance, co-management, co-design of projects)

- Providing examples and information on how to increase Māori engagement and participation through bicultural approaches by using and understanding knowledge systems that use mātauranga Māori and Te Ao Māori
- Showing how to create activities that advance the use and understanding of mātauranga Māori next to Regional Council science, planning and policy.
- Providing successful models of engagement and collaboration with Māori (e.g. iwi/hapū) to show a range of projects and activities that include mātauranga Māori (e.g. Māori environmental frameworks) alongside science
- Using mātauranga Māori and science to achieve desired or agreed management outcomes
- Showing examples of cultural monitoring programmes and cultural indicators that can be used in regional and catchment programmes
- Understanding mātauranga Māori and perspectives to support community aspirations and decision making.

The extensive range and diversity of Māori research in New Zealand is not well known, especially in the environmental research space. This work is seldom discussed in any detail within and across domains to show how it can address both regional council priorities and responsibilities, and iwi Māori issues, and that there are many areas of common ground and agreement to determine goals and objectives (e.g. water, land, biodiversity, climate change, strong communities). It is unique for this type of forum to proceed between regional council staff, science managers, SIGs, and kaupapa Māori researchers.

Participation and presentation at a second workshop, April 2021, to the SWIM group below:


  
**Te Ao Māori/mātauranga  
Māori to address Regional  
Council RS&T priorities and  
strategy.**
  
**RC SWIM SIG 13<sup>th</sup> April, Wellington**
  
Garth Harmsworth  
(Te Arawa, Ngāti Tuwharetoa, Ngāti Raukawa)  
Landcare Research, Private Bag 11-052, Palmerston  
North  
harmsworthg@landcareresearch.co.nz



## 4 Approaches to bridge Te Ao Maori/mātauranga Māori with science

Few opportunities exist to have key players from all regional councils together to discuss current and emerging Māori research work in Aotearoa-New Zealand, using examples from across the country, and discussing the project's origin, its characteristics, objectives and application, and its resulting outcomes. This Envirolink work has provided an important forum to enable interactive discussion between council science managers, scientists, policy and planning staff from various SIGs, and Māori researchers to discuss addressing council strategies and SIG priorities. It is important to show how Te Ao Māori (Māori perspectives) and mātauranga Māori (Māori knowledge) can be used and understood, as part of a tikanga based and bicultural engagement process across regions. This facilitates new thinking and approaches to develop collaborative research, co-design and planning of projects that better meet council needs to build and/or strengthen relationships and partnerships between councils and iwi/hapū/whānau and tangata whenua. Approaches that successfully bridge Te Ao Māori/mātauranga Māori with science result in better power-sharing arrangements and provide best practice examples for the future, as we tackle an increasing array of complex problems and challenges across environmental, social, political, economic, and cultural domains, for which we need collective action.

It is important to recognise Councils statutory responsibilities and obligations to Māori, that actually become opportunities (BOPRC 2019a, b). The importance of a Te Ao Māori view and Māori decision-making is recognised in many areas. Under the He Korowai mātauranga framework developed by BOPRC, a number of key drivers were listed for the need to have these types of frameworks, including the Treaty, legislation, and statutory provisions:

- Te Tiriti o Waitangi (1840)
- Resource Management Act 1991:
  - National Policy Statements
  - National Environmental Standards
  - Iwi and hapū resource management plans
- Local Government Act 2002
- Treaty settlement legislation
- Mana Whakahono-ā-Rohe:
  - Iwi participation and partnership arrangements (e.g. Treaty Settlement Acts, Mana Whakahono-ā-rohe, co-governance and co-management arrangements, inclusivity for Māori decision-making)
- Policy statements, regional plans
  - Inclusion of tangata whenua, mana whenua, iwi/hapū/whānau as stated in the NPS-FM, climate change adaptation strategies, and other local government policies

To support the weaving of the korowai to achieve stated outcomes, to give effect to the Treaty, to respond to legislation, provisions, and national and regional policy, and to bridge knowledge systems, requires appropriate guidance, adequate resourcing, and building regional council staff and iwi/hapū/whānau capacity. Many councils have been discussing and developing approaches for bridging or linking mātauranga Māori and science. Several

frameworks and models have been produced within councils (e.g. BOPRC 2019a, b; He Korowai Mātauranga 2020–2023) that can guide this process.

He Korowai Mātauranga (BOPRC) contains concepts, principles, and goals to support the way mātauranga Māori is received, recognised, recorded, and informs relevant decision-making. He Korowai Mātauranga encompasses three main stages:

- Te Aho – the binding;
- Te Iro – the strands; and
- Te Taura – the attachments.

The intertwining of knowledge through the weaving of the muka strands improves understanding of mātauranga Māori, bridges the gap between the traditional and contemporary worlds, and recognises and protects mātauranga Māori. The “He Korowai” framework is structured into a series of progressive tikanga-based steps from the beginning to the end facilitated by a weaving. These are divided into main parts: the vision (moemoeā), the purpose (aronga), and guided by a set of principles (ngā mātapono, tikanga, kaupapa) to increase iwi/hapū participation and bridge mātauranga Māori and science. The framework is based on shared goals (uara, uaratanga) and objectives (ngā whāinga) to achieve a stated purpose. This purpose is woven by the various strands (muka) that link the kaupapa (basis for the work) to the actions/mahi that are carried out (the work, whakamahi, mahinga). The framework then finally shows the implementation phase (te mahere, whakatinana) and the expected achievements (tūtukihia). Within the framework are ngā tohu, tohutohu or signposts to monitor the actions during the weaving process to assess the progress, implementation, and achievements. All these steps take place within a given timeline – rārangi wā. By supporting staff to be culturally aware and responsive we are better equipped to provide for, and achieve, community outcomes and Council priorities.

#### **4.1 Manaaki Whenua approaches used to bridge mātauranga Māori (Māori knowledge) with science**

We discuss some of the approaches Manaaki Whenua have used in collaborative projects that have led to successful outcomes, helped strengthen relationships with iwi/hapū/whanau/tangata whenua, and developed the correct (tikanga) foundation and process for bridging the gap between mātauranga Māori (Māori knowledge) and science. First, a summary and review of key terminologies and concepts explaining some of the differences and distinctions when using these terms and giving some specific examples that were covered in presentations and workshops (Including Te Ao Māori, mātauranga Māori, Māori values, Māori principles and Kaupapa Māori, and Māori concepts for resource management). We then present what we would term successful models and approaches to achieve best practice based on this underlying knowledge. We introduce the expression “working in a negotiated space”, which is at the interface between Te Ao Māori/mātauranga Māori and science and describe this more fully. We then provide examples of collaborative approaches (e.g. the waka taurua model), and tikanga based process steps we have successfully used in Māori collaborative research and freshwater management to achieve desired outcomes.

### 4.1.1 Te Ao Māori

Te Ao Māori is often understood as a Māori worldview, particularly within a modern contemporary context. It is a 'cultural indigenous space' for Māori guided by values (tikanga tuku iho) and supported by knowledge (mātauranga), in which to form ideas, perspectives, and opinion (whakaaro). Most notably through a Māori cultural lens it draws on traditional beliefs, teachings, knowledge, and values that help Māori make sense of and comprehend the world today. Since ~1840, with the onset and influence of colonisation, Te Ao Māori has increasingly drawn on science, next to more traditional and customary forms of knowledge. therefore Te Ao Māori, especially in last 100 years, has not been restricted to a singular form of knowledge, or singular set of values. In today's society Te Ao Māori enhances the dynamic and evolving form of mātauranga Māori next to other forms of knowledge. Te Ao Māori acknowledges the interconnectedness and interrelationship of all living and non-living things, their dependence on each other (through concepts such as whakapapa), and the links between the life-supporting capacity of healthy ecosystems and people's well-being (Harmsworth & Awatere 2013). It often seeks to understand the whole system (not just one small part/or component of it), to help understand the whole and then restore balance/equilibrium to the system (e.g. te mauri). This could, for example, concern environmental or ecological health (te ao turoa, kaitikitanga, whakapūmāutanga) or human health (hauora, whaiora, oranga).

Te Ao Māori (the Māori world view) provides a genuine and safe place in which Māori can explore and express themselves as Māori, through Māori knowledge, values, experiences, and realities to strengthen cultural identity and achieve Māori aspirations (e.g. self-determination, health and well-being, economic prosperity). This could be at an individual level (self), extended family (whānau/hapū/iwi), within the environment or ecosystem, or at regional and national scales and priorities. Aspirations within this cultural space can be guided by kaupapa Māori, mātauranga Māori, and tikanga Māori to help achieve rangatiratanga (e.g. self-determination) or mana motuhake (e.g. a degree of independence, especially away from the state).

Five main areas arise when explaining and exploring Te Ao Māori, as contrasting to a non-Te Ao Māori view:

- Māori beliefs (going back to the beginning, e.g. whakapapa, Papatūānuku, Ranginui, Atua)
- Tikanga (Māori values, principles, customs, and protocols)
- Māori knowledge systems (e.g. mātauranga Māori, mōhiotanga, māramatanga, wānanga, tohungatanga) – that draw on ancient and traditional knowledge through to contemporary forms
- Te Reo Māori (ngā kupu Māori, kōrero, terms, and expressions)
- Te Tiriti o Waitangi (esp. the Māori version and its interpretation)

#### 4.1.2 Mātauranga Māori (Māori knowledge)

Mātauranga Māori or Māori knowledge systems are specific to indigenous Māori people, and the term has its origins in Polynesia and Aotearoa New Zealand (Best 1924a,b; Buck 1950; Marsden & King 1975; Marsden 1988, 1989; Mead 2003; Mead & Grove 2001; Black 2014; Hikuroa 2017; Mercier 2018). The term has many definitions that cover belief systems, epistemologies, values, and knowledge, in a traditional, historic, and contemporary sense (Harmsworth & Awatere 2013; Awatere & Harmsworth 2014; Awatere et al. 2017; Mercier 2018, NZAS 2019, 2020; EPA 2020). Mātauranga Māori can be defined as the knowledge, comprehension or understanding of everything visible and invisible existing in the universe (Williams 1997).

The status of mātauranga Māori is recognised in legislation and in the Treaty of Waitangi, and is defined in reports such as WAI 262. The Wai 262 claim (Waitangi Tribunal 2011) defined mātauranga Māori as ‘the unique Māori way of viewing the world, encompassing both traditional knowledge and culture’. Through this claim, the claimants were seeking to preserve their culture and identity, and the relationships from which their culture and identity are derived. Mātauranga Māori, which involves observing, experiencing, studying, and understanding the world from an indigenous cultural perspective, is often equated with ‘wisdom’. It encompasses the physical through to the meta-physical, including but not limited to, empiricism or logic (whakaaroaro), ethics (mata tika, tikanga), epistemology (whakaponotanga), resource management (kaitiakitanga), and spirituality (wairuatanga), and is a dynamic and evolving knowledge system (Harmsworth & Awatere 2013; Awatere & Harmsworth 2014; Awatere et al. 2017). As with western knowledge, in terms of epistemology mātauranga Māori has both qualitative and quantitative aspects.

It is important to recognise the multifaceted and dynamic nature of mātauranga Māori, which is a continuum from ancient to modern. Various explanations by many authors have been given, including:

- A large body of knowledge of Polynesian origin, ~5000yrs of indigenous knowledge coming from Polynesia and then Aotearoa – it is dynamic and evolving (Harmsworth, slides)
- Reference to the source of the knowledge, the three baskets of knowledge: kete aronui, kete tuauri, kete tuatea (Harmsworth, slides)
- Derived and translated through each generation from ancestors and elders (Harmsworth, slides)
- Localised specific to iwi/hapū/whānau (tribes) (Harmsworth, slides)
- Mātauranga Māori first used in a restrictive fashion to refer to knowledge created under the inspiration of a ‘ngā atua Māori’ (non-Christian ‘god(s)’) – the preserve of ‘tohunga Māori’ (late 1800’s) – to reinforce and distinguish the Māori belief system (Royal 2009)
- Mātauranga Māori now used in an all-encompassing, global way to refer to all knowledge created by Māori according to their experiences, history, worldview, culture and aspirations (20<sup>th</sup>/21<sup>st</sup> century) (Awatere et al. 2017)
- Often used synonymously with wisdom and experience (Marsden 1988, 1989; Williams 1997; Royal 2009; Black 2014; Mercier 2018)

- Encapsulates a Māori worldview and involves observing, experiencing, studying and understanding the world from an indigenous cultural perspective (Marsden 1988; Mercier 2018)
- Providing foundation and meaning for the modern 21<sup>st</sup> century Māori worldview, beliefs, values, innovation, research, thoughts, ideas, frameworks, models, technologies and practices etc (Awatere & Harmsworth 2014; NZAS 2019, 2020; EPA 2020)
- Contemporary, historic, local, and traditional knowledge (Harmsworth et al. 2002)
- Systems of knowledge transfer and storage, as well as the knowledge itself (Harmsworth et al. 2002; Black 2014)
- Achieving goals, aspirations and solving issues from an indigenous perspective (Harmsworth et al. 2002)
- Mātauranga Māori not only refers to the knowledge Māori have, but encompasses the Māori way of knowing and the connectedness that knowledge has with the environment out of which it was derived (BOPRC 2019b)
- Mātauranga Māori is an embracing and inclusive term that includes all of the aspects of Māori culture from the past, present, and future (BOPRC 2019b)
- Contemporary definitions: Knowledge that arises from, is based on, or contributes to the distinct culture, identity and collective experience of Māori' (FRST, pers. comm.)

In terms of specific examples of mātauranga Māori, a good place to start is to document Māori ngā kupu/te reo Māori (words, terms) for parts of different ecosystems. Some of these terms were discussed in the various workshops, presentations, and webinars as part of this study. We give three examples below, one from water, one from wetlands, and a third from soils to show the nature of this mātauranga Māori as a starting point for conversation and to illustrate the relevance and depth of this type of knowledge.

Water has been classified into many component parts and locations depending on form/character/type (āhua, momo), use and values associated with bodies of water (Douglas 1984; Harmsworth et al. 2002; Harmsworth 2014; Kitson et al. 2018). A very general and generic Māori classification of water types is given below in Table 1. Many local tangata whenua/iwi/hapū/kaitiaki groups have up to ~70–80 names for water, often related, for example, to description, character, properties, and form (āhuetanga), use, activities, and regulation. Kitson et al. (2018) developed a Murihiku (southland/Te Waipounamu) cultural water classification system based on 'enduring partnerships between people, disciplines and knowledge systems', which was drawn from local mātauranga Māori and other knowledge and now provides guidance to freshwater management and helps give effect to Te Mana o te Wai in Southland.

**Table 1. Māori terms/description for water – a classification of water and its connection to mauri (from iwi/hapū groups) (Douglas 1984; Harmsworth 2014)**

<b>Wai ora</b>	The purest form of water, such as rain-water, it is the spiritual and physical expression of Ranginui's (sky father) long desire to be re-united with Papatūānuku (earth mother). Pure water is termed 'te waiora a tane' and to Māori it contains the source of life and well-being. Contact with papatūānuku gives it purity as water for human consumption and for ritual. Traditional water could only remain pure without being mixed and was protected by ritual prayer. Traditionally, waiora had the potential to give life, sustain well-being, and counteract evil.
<b>Waitohi</b>	Areas of pure water, ceremony, baptism, to remove tapu (whakanoa)
<b>Waipuna</b>	Generally pure spring water that comes from the ground (e.g. hillside or underground springs)
<b>Waimāori</b>	Freshwater water, water for normal consumption – water becomes waimāori when it comes into unprotected contact with human beings (e.g. running streams, lakes). It therefore becomes normal, usual, or ordinary and no longer has any particularly sacred associations. Waimāori is often used to describe water that is running and unrestrained, or water that is clear or lucid. Waimāori has a mauri (which is generally benevolent) and was controlled by ritual.
<b>Waiwera</b>	Hot water used for healing purposes, bathing, recreation.
<b>Waitapu</b>	Sacred waters used in rituals. Rituals used running water, sometimes termed wai matua o Taupapa (virgin water as it flows from the earth). Water was applied using certain plants, not human-made vessels.
<b>Wai whakaika</b>	Ritual waters, pools, ceremonial.
<b>Wai whakaheketūpāpaku</b>	Water burial sites.
<b>Wai kino</b>	Literally means bad or impure water (e.g. stagnant pools). Often associated with past events, polluted or contaminated water. Includes water that is dangerous, such as rapids.
<b>Wai mate</b>	Water that has lost mauri, is degraded, and is no longer able to sustain life. Mate is associated with death, and waimate may have been used in places of contamination and tapu, historic battles, dead, damaged or polluted water, where water has lost the power to rejuvenate itself or other living things. Waimate, like Waikino, has the potential to cause ill fortune, contamination or distress to the mauri of other living things or spiritual things including people, their kaimoana or their agriculture. The subtle difference between waikino and waimate seem to be based on a continued existence of mauri (albeit damaged) in the former, its total loss in the latter. Waimate also has geographical meaning: to denote sluggish water, a backwater to a mainstream or tidal area, but in this sense the waimate retains its mauri.
<b>Wai tai</b>	Seawater, saltwater, the surf or the tide – used to describe any water that is tidal, influenced or related to the sea (the domain of tangaroa) and includes waves, surf, estuaries, tidal channels, river mouths (e.g. salt water). It is used to distinguish sea water from fresh water (waimāori, waiora). Waitai was water that was returned to tangaroa. Māori often thought in cycles and processes of generation, degradation, and rejuvenation. It had uses for seafood (kaimoana), bathing and healing.
<b>Waimātaitai</b>	Significant estuarine or brackish waters.

Many wetland terms and definitions are given in Taura et al.'s (2017a) "Te Reo o Te Repo – The Voice of the Wetland: connections, understandings and learnings for the restoration of our wetlands." These were further expanded in work on the national land cover databases and remote sensing technologies (Tables 2&3; Harmsworth 2020a) to explore Māori classifications that align with scientific classifications and terms.

**Table 2. Māori terms for wetland types – for the main 'level 1' hydrosystem wetland types (Harmsworth 2020a, Clarkson et al. 2003; Johnson & Gerbeaux 2004)**

<b>Phase 1 Wetland classification – Level 1 Hydrosystem</b>	<b>Maori equivalent terminology</b>	<b>Associated taonga features and/or taonga species (examples – see Appendix 5)</b>
Marine (saline, coastal, subtidal)	Nō te moana, mātaītai, taimoana, taiwaitai, matāwhanga, rohe-a - tangaroa, paetai, ara o Hinekirikiri, tahatai, ākau	Kaimoana, ika-a-moana, mahinga mātaītai, rimurimu, kōura, ika, tiora, pāoraora
Estuarine (estuaries, lagoons, etc.)	Pūahatanga, mātaītai, wahapū, hāpua, pūwaha, ngutuawa, koraha – e.g. mudflats	Kaimoana, pipi, toheroa, kuku, pūkeko, kōpūngāwhā, patiki, kanae raukura, wīwī, nana, kina
Riverine (rivers, streams, creeks)	Awa, manga, waimāori	Tuna, kōkopu, īnanga, kōaro, <i>Galaxiass spp</i> , kākahi, ika-a-awa, whio
Lacustrine (lakes, ponds)	Roto, moana, waimāori	Kuta, raupō, harakeke, kōura, pūkeko, weka, ika-a-roto, pāteke, kawangau
Palustrine (emergent plants over freshwater, swamps, bogs, marsh)	Repo, wairepo, wharu, rohe kōreporepo, kōrepo, kūkūwai, ngaere, Hūhi, mātātā, nowaiwai	Harakeke, kahikatea, tī kōuka, wīwī, poniu, pūkeko, weka,
Plutonic (underground water, from springs, possibly limestone or karst terrains)	Rarowhenua, manawa whenua, puna manawa whenua, ana-a-pākeho	Waipuna (Culturally significant springs are the surface expression), wētā
Geothermal (warm to hot subsurface and surface water)	Waiariki, Wai puia, Ngāwhā, Waiwera, Waipuna (Springs)	Ngāwhā, Waiwera, Waipuna (Springs)

**Table 3. Māori terms for wetland classes based on a NZ wetland classification (Harmsworth 2020a)**

<b>II. Wetland class (a level based on substrate, water regime, nutrients, pH) – giving the wetland type</b>	<b>Māori equivalent term</b>
Bog	Repo, kōrepo, wairepo, rohe kōreporepo, oru (boggy, marshy, quagmire), wharu, pōharuharu, kūkūwai, ngae, ngaere, tāpokopoko (bogginess, bogged, bogged, soft, sink in mud), hūhi, mātātā, nowaiwai, rei – swampy ground, peat, mire Monoku – damp, wet, moist (boggy) Onekupuru – an organic soil found in wet situations
Fen	Repo, kōrepo, wairepo, kūkūwai, ngaere
Swamp	Repo, kōrepo, wairepo, rohe kōreporepo, ngaere, kūkūwai, mātātā, rarawa, nowaiwai, hūhi (Pīpī, kūkūwai, tihau, tokakawa – swampy)
Marsh	Repo, kūkūwai, ngaere
Seepage	Papītanga
Shallow water	Pāti wai, kāraraha wai, pāpaku awa, pāpaku roto, kōrepo (shallow swamp), pākihikihi (to be shallow water)
Ephemeral wetland	Wairangatahi, rangatahirepo, rangitahiawa
Pākihi and gumland	Pākihi (to be dried up), pākōkō (dried up, such as a spring, to be infertile), rake (barren land), tuakau, koraha, hahore (sterile land, wasteland, barren land), whenua akeake
Saltmarsh	Toterepo, waitote, ngaere, (spp. mākaka, nana, rimurehia), mātaitai, totetote

Research under various projects, and more recently soil health (Harmsworth 2018; Hutchings et al. 2018), has presented an in-depth understanding and shown the importance of traditional and contemporary Māori soils knowledge next to science (Roskrige 2007, 2020; Harmsworth & Roskrige 2014a, b; Hutchings & Smith 2020; Harmsworth 2020a). Table 4 provides some of the Māori names and terms for soils (Harmsworth 2020b; Roskrige 2020), where over 100 Māori soil names for different types of soil in different areas of Aotearoa-New Zealand have been identified. Much of this is built on local traditional knowledge. Māori landscape terms have also been documented.



**Table 4. Selected examples of Māori soil names (Harmsworth 2020b, Roskrug 2020)**

Māori soil names and English description	Māori soil names and English description
Oneone – general name for soil	One-matua – typically loam
One-pū – sand	Oneware, onemata – dark fertile soil
One hunga – sea sand, sandy beach, sometimes mixed with mud	One paraumu – very dark fertile soil, friable
One-pārakiwai – silt	Oneware – greasy soil
Parahua – silt	Onetakataka – a friable soil
Paru, paruparu – mud, dark mud	Onewawata – a lumpy soil
Kere was used as a prefix for some types of clay, including keretū, onekeretū, kerematua, kerewhenua	Pūngorongoru – (soft spongy) A light, loose soil
Kōtore, pākeho – white clay	Rei – Peat
Keretū – heavy clay	Onekopuru – An organic soil found in wet locations
Kere whenua – yellow clay	Pungapunga (also purupuru) – pumice soils
Kenepuru – sandy silt	Pungarehu – ashes
Uku – unctuous clay, white or bluish clay	Onekōkopu – Gravel or very gravelly soil
Uku whenua – plastic clay (old traditional name)	Tiapu, onetaipu – Fertile lands – especially sandy alluvial soils
Ūkui – wash, wipe away	

### 4.1.3 Māori values

Māori values (Henare 1988; Marsden 1988, 1989; Barlow 1991; Harmsworth 1997; Mead 2003) are derived from the traditional belief system based on mātauranga Māori. Values (e.g. whakapapa, whanaungatanga, manaakitanga, kaitiakitanga, wairua) can be defined as instruments through which Māori make sense of, experience, and interpret their environment (Marsden 1988, 1989). They form the basis for the Māori worldview (Te Ao Māori), and provide the concepts, principles, and lore Māori use to varying degrees in everyday life. They also help establish ethics, principles, and guiding behaviour. Māori values are based on the traditional Māori belief and knowledge system, which is the foundation from which Māori understand and comprehend their world. These traditional concepts and values still resonate strongly in the contemporary world. Values and knowledge, often iwi/hapū specific, are used to commonly guide all cultural (tikanga) process (Pere 1982; Marsden 1988; Barlow 1993; Henare 2001; Mead 2003; Harmsworth et al. 2013), and are instrumental in Māori planning, resource management, and decision-making. Some of the more commonly used core (internal) or intrinsic Māori values are described below (Table 5). Based on core values, more external Māori values are manifest or expressed within the environment (e.g. wāhi tapu, wāhi taonga, flora and fauna, cultural heritage sites, sacred sites, taonga species). Understanding Māori values locally, regionally, and nationally was highlighted as essential in the various workshops, presentations, and webinars as part of this study.

**Table 5. Māori values that guide decision-making and actions especially with regard to environmental and resource objectives**

<b>Māori – tangata whenua values</b>	<b>Description and meaning (and application to health)</b>
<b>Whakapapa</b>	Ancestral lineage, genealogical connections, relationships, interconnection to all ecosystems, basis for genetic assemblage. The bonds of interconnection to the natural environment are preserved in traditions
<b>Tikanga</b>	Customary practice, cultural values, customs, protocols, the right or correct way to do something, basis for principles
<b>Rangatiratanga</b>	Chieftainship: embraces the spiritual link Māori have with papatūānuku (earth mother), encompasses drives for self-determination, sovereignty
<b>Mana whenua</b>	Authority and status over land and water resources derived from whakapapa and continued occupation
<b>Kaitiakitanga</b>	Links to rangatiratanga and mana, loosely translated to environmental guardianship, acts to protect and enhance the natural environment
<b>Ora, Oranga, Hauora</b>	Health and well-being
<b>Whānau ora</b>	Links to ora and whānaungatanga. The health of the natural environment is paramount for human well-being. To restore and maintain the health of one is to restore and maintain the health of all
<b>Arohatanga</b>	The notion of care, respect, love, compassion
<b>Whānaungatanga</b>	Building and maintaining relationships and family connections, to ensure future sustainability of resources and human well-being
<b>Manaakitanga</b>	Acts of giving and caring for, nurturing the natural environment, to provide resources for human well-being and mana through acts such as hospitality
<b>Whakakotahitanga</b>	Unified, reaching consensus by working together, respect for individual differences and participatory inclusion for decision-making
<b>Wairuatanga</b>	The spiritual dimension, the health of the natural environment or system is paramount to human physical and spiritual well-being. If the mauri or life force of our natural environment is strong, then the people are strong

Māori values are tangibly represented or expressed in the environment. What constituted values, was a central part of discussion throughout this Envirolink project, and a large number of examples were presented (Figure 1). Strong interest from regional council participants in these workshops was to learn more about Māori values from local iwi/hapū/whānau, and that it should form an essential part of ongoing conversations in future workshops with councils. It was agreed a greater level of understanding could lead to successful collaborative work programmes with Māori groups to help bridge the gap between mātauranga Māori and science. Many Māori values are represented in the landscape and natural environment, and many iwi/hapū/whānau and kaitiaki groups have lists over 100 Māori values and taonga species. Priority lists of key species can show what Māori groups are trying to protect, sustain, and enhance and why (Figure 1). Discussion on Māori values is an excellent place to start in collaborative work where goals for the management, protection, maintenance, and enhancement of certain species, ecosystems, communities, and habitats can be identified. Values are not restricted solely to flora and fauna. Recognising cultural heritage sites,

significant landscapes, Māori classifications and ngā kupu, kōrero, and other types of Māori values are important when framing research and management projects.



**Figure 1. Māori values were discussed throughout this Envirolink project and a large number of examples presented.**

The importance of Māori values is most notably demonstrated through the development and construction of the kaupapa Māori research principles below.

#### **4.1.4 Principles of Kaupapa Māori**

Kaupapa Māori theory is based on key principles. Graham Hingangaroa Smith (e.g. GH Smith. 1990, 1997) initially identified six principles or elements of kaupapa Māori. These elements and principles have since been expanded by other kaupapa Māori theorists such as Linda Smith (e.g. Smith 1997, 1999), Leonie Pihama (e.g. Pihama 2001; Pihama et al. 2002, 2015), and Taina Pohatu (e.g. Pohatu 2004). Other theorists who contributed to the development and growth of kaupapa Māori methodology include Russell Bishop (e.g. Bishop 1998, 2008), Kuni Jenkins (e.g. Jenkins 1991), Cheryl Smith (2002), Helen Moewaka Barnes (e.g. Barnes 2000), Fiona Cram (e.g. Cram 2009) Jones et al. (2010), and others (Table 6).

**Table 6. Key Māori values and principles from kaupapa Māori literature (adapted from Taura et al. 2020)**

<b>Māori Principles</b>	<b>Explanation</b>
<b>Tino Rangatiratanga</b>	<b>Self-determination</b> relates to sovereignty, autonomy, control, self-determination, and independence. The notion of Tino Rangatiratanga asserts and reinforces the goal of Kaupapa Māori initiatives: allowing Māori to control their own culture, aspirations, and destiny.
<b>Taonga Tuku Iho</b>	<b>Cultural Aspiration</b> asserts the centrality and legitimacy of Te Reo Māori, Tikanga, and Mātauranga Māori. Within a Kaupapa Māori paradigm, these Māori ways of knowing, doing, and understanding the world are considered valid in their own right. Acknowledging their validity and relevance, also allows spiritual and cultural awareness and other considerations to be considered.
<b>Ako Māori</b>	<b>Culturally Preferred Pedagogy</b> acknowledges teaching and learning practices that are inherent and unique to Māori, as well as practices that may not be traditionally derived but are preferred by Māori.
<b>Kia piki ake i ngā raruraru o te kainga</b>	<b>Socio-Economic Mediation</b> asserts the need to mediate and assist in the alleviation of negative pressures and disadvantages experienced by Māori communities. This principle asserts a need for Kaupapa Māori research to be of positive benefit to Māori communities. It also acknowledges the relevance and success that Māori derived initiatives have as intervention systems for addressing current socio-economic issues.
<b>Whānau</b>	<b>Extended Family Structure</b> sits at the core of kaupapa Māori. It acknowledges the relationships Māori have to one another and to the world around them. Whānau, and the process of whakawhanaungatanga, are key elements of Māori society and culture. This principle acknowledges the responsibility and obligations of the researcher to nurture and care for these relationships and also the intrinsic connection between the researcher, the researched, and the research.
<b>Kaupapa</b>	<b>Collective Philosophy</b> refers to the collective vision, aspiration, and purpose of Māori communities. Larger than the topic of the research alone, the kaupapa refers to the aspirations of the community. The research topic or intervention systems therefore are considered to be incremental and vital contributions to the overall kaupapa.
<b>Te Tiriti o Waitangi</b>	<b>The Treaty of Waitangi</b> is a crucial document that defines the relationship between Māori and the Crown in New Zealand. It affirms both the tangata whenua status of whānau, hapū, and iwi in New Zealand, and their rights of citizenship. The Tiriti therefore provides a basis through which Māori may critically analyse relationships, challenge the status quo, and affirm the Māori rights.
<b>Āta</b>	<p><b>Growing Respectful Relationships</b> is a transformative approach within the area of social services. The principle of āta relates specifically to the building and nurturing of relationships. It acts as a guide to the understanding of relationships and well-being when engaging with Māori. Āta focuses on our relationships, negotiating boundaries, working to create and hold safe space with corresponding behaviours. Āta gently reminds people of how to behave when engaging in relationships with people, kaupapa and environments. Āta intensifies peoples' perceptions in the following areas:</p> <p><i>It accords quality space of time (wā) and place (wāhi).</i></p> <p><i>It demands effort and energy of participants.</i></p> <p><i>It conveys the notion of respectfulness.</i></p> <p><i>It conveys the notion of reciprocity.</i></p> <p><i>It conveys the requirement of reflection, the prerequisite to critical analysis.</i></p>

<b>Māori Principles</b>	<b>Explanation</b>
	<i>It conveys the requirement of discipline.</i>
	<i>It ensures that the transformation process is an integral part of relationships.</i>
	<i>Āta incorporates the notion of planning.</i>
	<i>Āta incorporates the notion of strategizing.</i>
<b>Working principles of kaupapa Māori research</b>	
<b>Whakapapa</b>	Defined generally as being 'genealogy', also encapsulates the way in which Māori view the world. It is a way of thinking, of learning, storing, and debating knowledge. In terms of Kaupapa Māori research, whakapapa is integral as it allows for the positioning and contextualising of relationships between people, communities, participants, landscape, and the universe as a whole.
<b>Te Reo</b>	The Māori language is integral to Kaupapa Māori; the Māori world view is embedded in the language. The way in which we communicate using Te Reo Māori provides insight into the way we interact with the world and the way in which we build and maintain relationships.
<b>Tikanga Māori</b>	Customary practices, ethics, cultural behaviours, considerations, and obligations. Tikanga Māori is important in order to enable us to appropriately navigate and operate within a Māori context, and make judgements and decisions within this space.
<b>Rangatiratanga</b>	Related to the Principle of Tino Rangatiratanga (self-determination, autonomy, power, control). The notion of Rangatiratanga, or chiefly status, chieftainship, provides the right to exercise authority and leadership. It is relevant in the research process in terms of allowing Māori to control and lead their own research processes and methods.
<b>Important values and principles from other sources</b>	
<b>Arohatanga</b>	To form a caring, respectful, and supportive environment and ensure a project is safe, for the extent and continuity of the project and its members.
<b>Āwhinatanga</b>	To care, help, support, stewardship, and assistance. Embracing the team or collaboration through respect and support for individual members.
<b>Hononga</b>	The union, connection, relationship, and bond that establishes networks, and helps link people and their perspectives and knowledge forms. It underpins mahitahi (work together, collaboration, cooperate) and respects diversity.
<b>Kawa</b>	Localised protocols, customs, e.g. marae.
<b>Kotahitanga</b>	Unity, togetherness, collective action.
<b>Manaakitanga</b>	Showing care, respect for others. Principle of 'respect' for other peoples' perspectives and knowledges, indigenous Māori perspectives, that drives communication, dialogue, and aims for equality. Supports kotahitanga but also embraces diversity.
<b>Mana Motuhake</b>	Achieve independence and autonomy driven by kaupapa Māori. Mana motuhake can be achieved through rangatiratanga and tino rangatiratanga (status, leadership).
<b>Mātauranga Māori</b>	Māori knowledge (mātauranga Māori) as a dominant knowledge form/system provides the basis for the Te Ao Māori worldview that is recognised within integration. Includes a wide spectrum of culturally based knowledge (Māori beliefs, te reo Māori, cosmology, religion, Māori philosophy, ethics) and provides the foundation for tikanga (customs, values) and kawa (ceremonies, procedures, protocols).

<b>Māori Principles</b>	<b>Explanation</b>
<b>Mōhiotanga</b>	Knowing, knowledge, understanding, awareness, perception, respect for knowledge, and understanding.
<b>Pāhekoheko</b>	To combine, join, unite. The principle of integration, cooperation, and interaction from a Māori perspective that drives interconnections and interdependencies across knowledge forms and disciplines.
<b>Tautokotanga</b>	To guide and support a project towards goals and outcomes, and to support all its participants and researchers during this journey. Guidance is generally based on tikanga and kawa.
<b>Te Ao Māori</b>	<b>A Māori world view</b> or (w)holistic perspective based on knowledge.
<b>Tikanga</b>	Following correct cultural or customary protocols, process, rules in a relationship. Tikanga ensures correct process and steps are followed from the onset to the end of a project, e.g. towards integration and collaboration.
<b>Tohungatanga</b>	Specialist knowledge, specialised in Te Ao Māori and mātauranga Māori, having expertise, a principle to honour in-depth knowledge, expertise, and skills.
<b>Tūhono, Tūhonotanga</b>	Processing connection and bonds.
<b>Whakamāramatanga</b>	Understanding, explanation, clarification of knowledge and perspectives. Linked to mātauranga Māori and mōhiotanga.
<b>Whanaungatanga</b>	Relationship, kinship, forming relationships that are binding, and strengthening family and ancestral connections. Develops kinship rights and obligations.
<b>Whakawhanaungatanga</b>	Forming relationships and connections. Relating well to others.
<b>Whakaurunga</b>	Entry, participation, and introduction into a collaborative process, or research project.
<b>Whakaute</b>	Showing respect, caring, and legitimisation of all things Māori.

#### **4.1.5 Māori concepts for resource management**

Many important Māori concepts and frameworks based on Te Ao Māori/mātauranga Māori were presented and thoroughly discussed in this Envirolink project. A few generic examples from various presentations, significant to environmental management in Aotearoa-New Zealand, are given below (Figures 2 & 3). It is important that the integrity and understanding of these concepts, especially for Māori, are respected and retained, and not assimilated or diluted into mainstream resource management and science. These concepts are originally based on local mātauranga Māori and Māori values and are best expressed and articulated at the local level by iwi/hapū/whānau, mana whenua and tangata whenua. A brief outline of key generic Māori concepts was given in the paper of Harmsworth and Awatere (2013) and included:

Māori values underlie important Māori environmental concepts (Henare 1988, 2001; Marsden 1988; Barlow 1993; Durie 1994; Kawharu 2000; Harmsworth et al. 2002; Mead 2003; Awatere et al. 2011) and form the basis for Māori perspectives when seeking to understand Te Ao Māori, ecosystems, and environmental management. Some of the key environmental concepts are:

- Whakapapa – The connection, lineage, or genealogy between humans and ecosystems and all flora and fauna. Māori seek to understand the total environment or whole system and its connections through whakapapa, not just a part of these systems, and their perspective today is holistic and integrated.
- Kaitiakitanga – stewardship or guardianship of the environment, an active rather than passive relationship (Marsden & Henare 1992; Roberts et al. 1995).
- Mana – having authority or control over the management of natural resources.
- Ki uta ki tai – a whole-of-landscape approach, understanding and managing interconnected resources and ecosystems from the mountains to the sea (the Māori concept of integrated catchment management).
- Taonga tuku iho – intergenerational protection of highly valued taonga, passed on from one generation to the next, in a caring and respectful manner.
- Te Ao Turoa – intergenerational concept of resource sustainability.
- Mauri – an internal energy or life force derived from whakapapa, an essential essence or element sustaining all forms of life. Mauri provides life and energy to all living things, and is the binding force that links the physical to the spiritual worlds (e.g. wairua). It denotes a health and spirit, which permeates through all living and non-living things. All plants, animals, water and soil possess mauri. Damage or contamination to the environment is therefore damage to or loss of mauri.
- Ritenga – the area of customs, protocols and laws that regulate actions and behaviour related to the physical environment and people. Ritenga includes concepts such as tapu, rahui, and noa, which were practical rules to sustain the well-being of people, communities and natural resources. Everything was balanced between regulated and de-regulated states, where tapu was sacred, rahui was restricted, and noa was relaxed or unrestricted access.
- Wairua, Wairuatanga – the spiritual dimension, a spiritual energy and dimension as a concept for Māori well-being.

## Finding balance in the system – the principle of mauri



“Traditionally Māori acknowledged a natural order to the universe, a dynamic system built around the living and the non-living. Any shift in a system, for example through human interactions and/or impacts, cause shifts in the mauri of immediately related components. As a result, the whole system eventually becomes affected and degraded.

All activities and relationships are bound up and governed by principles and ethics and regulated by an elaborate system of tikanga, ritenga or rules.

The process is still used by Māori to guide resource use and management. Therefore, a key outcome for kaitiakitanga is to restore balance back the whole system, to maintain or restore the mauri, and to ensure this balance is maintained between people and the natural and spiritual worlds”.

Figure 2. The principle of mauri is a powerful concept in Māori resource management and needs to be carefully explored at local level.

## Te Ao Māori conceptual framework (source: Hirini Matunga)

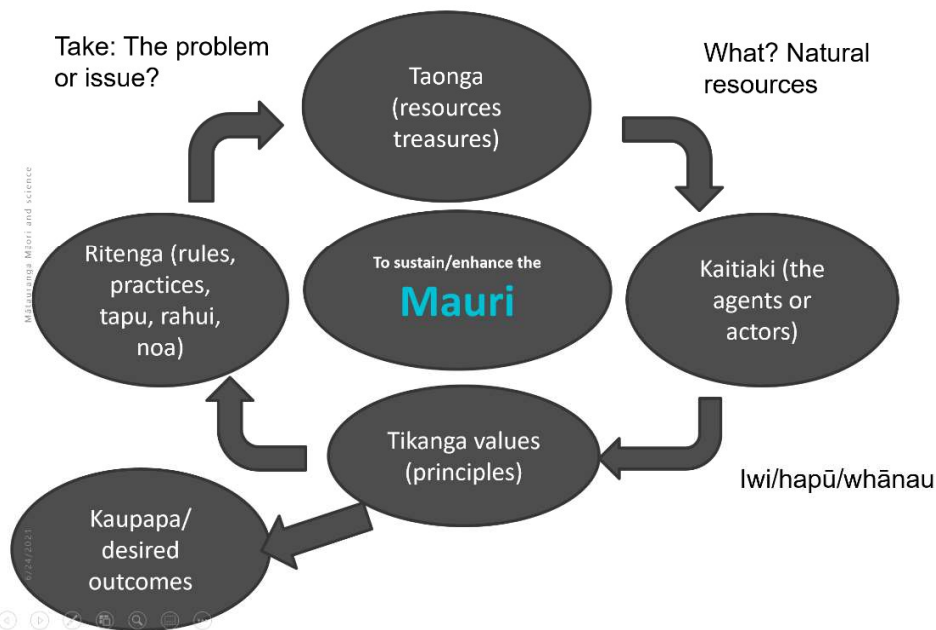


Figure 3. A contemporary model underpinning Māori resource management decision-making, based on strong elements of mātauranga Māori.



#### 4.1.4 Working in a negotiated space

When intending to share knowledge, work together, develop collaborative projects, or co-design integrative projects, it is important that non-Māori (e.g. scientists, planners, policy staff) and Māori (rangahau/Māori researchers, kaitiaki, iwi/hapū/whanau, tangata whenua) work respectfully in a 'negotiated' or 'dialogue' space. A set of Māori led collaboration principles and guidelines for engagement are given in Appendix 2. It takes time to build respect and trust with various groups, which also depends at what stage the relationship is at. This is also a space for introducing principles and tikanga (customary rules, ethics, and practice) that guide the relationship and exchange. This groundwork will be fundamental to the success of the longer-term relationship, which should be enduring if collaborative research, co-governance, or co-management are to succeed. Progression towards this negotiated space is shown in the three figures below presented in the workshops, and builds on an understanding and discussion of very distinct and separate Te Ao Māori and Te Ao Pākehā worldviews in 1840, as they are now, and the potential to work more in this space between worldviews for developing new ideas, as a place of learning, sharing knowledge, creating new knowledge, etc. (Figures 4, 5 & 6).

Figure 7, from Hudson et al. (2012), shows the way we build this knowledge exchange and perspectives together, to inform and support ambitions and priorities. The negotiated space (Figures 6 & 7) should be a respectful and safe place to give recognition to Te Ao Māori, to understand Te Ao Māori/mātauranga Māori, and to initiate a pathway towards shared learning, with the introduction of other knowledge (such as western science) alongside mātauranga Māori. This leads to a better and shared understanding (e.g. common language, co-learning, understanding taiao/the world) of indigenous worldviews, values, and practices, alongside western or non-indigenous approaches and knowledge, such as science. Once created, it provides the place to bring science and mātauranga Māori together into the same working environment, in an equitable way, while respecting the integrity of the contrasting knowledge systems or forms (i.e. not assimilating one form of knowledge into the other, or fitting or diluting one knowledge form/system into another). A discussion on the Te Ao Māori and Te Ao Pākehā worldviews, comparisons, and convergences was given in workshop presentations (Harmsworth 2021a, b, c).

Te Ao Māori (1840)	Te Ao Pākeha (1840)
Iwi/hapū/whānau/marae based Perspectives – world view (cultural lens) Beliefs (Io, <b>Papa-tū-ā-nuku, Ranginui, Ātua</b> , whenua) Values, concepts, practices (e.g., <b>Whakapapa</b> , Kaitiakitanga, manaakitanga, whanaungatanga, tapu, mauri, ritenga, communal, collectivism, hapū, rangatira, ariki) Aspirations, needs Issues/priorities Māori society-tribal collective (iwi/hapū/whānau/marae) Tikanga, kawa, lore, Frameworks, concepts, models Research approaches: e.g., Kaupapa Māori, wānanga, science Māori land collective-communal, tribal, pa, papa kainga, marae Knowledge – Beliefs, te reo Māori, mātauranga Māori, ancestral, history, local, indigenous, traditional	Individual, family, group based, sector Perspectives – world view (European) Beliefs (Religion, supreme God, mankind) Christianity Values: human, social, economic, social, intrinsic, land use, architecture, recreation, trade, etc. Aspirations, needs Issues/priorities European society-family unit, community, towns, villages, roads, industry-sector Legislation, planning, policy, goals, objectives Frameworks, concepts, models Research methods, western science methods, specialist methods Land ownership, survey, private title, planning, pastoralism-landscapes, towns Knowledge, language - English, history, understanding, beliefs, religion, science

**Figure 4. Distinct worldviews are shown at 1840 Te Ao Māori and Te Ao Pākehā. The Te Ao Māori world was predominantly based on Māori belief systems, mātauranga Māori, tikanga, and Māori values.**

Te Ao Māori	Te Ao Pākeha
Iwi/hapū/whānau/marae based Perspectives – world view (cultural lens) Issues/priorities Aspirations Values, concepts, practices (e.g., Kaitiakitanga, manaakitanga, whanaungatanga) Tikanga, lore, policy, goals, objectives Iwi/hapū management plans Kaitiaki plans Frameworks, concepts, models Research approaches: e.g., Kaupapa Māori, wānanga, science Monitoring, evaluation: Tohu – Cultural indicators Knowledge – beliefs, te reo Māori, mātauranga Māori, ancestral, history, local, indigenous, traditional	Individual, group based, industry Perspectives – world view Issues Aspirations Values: human, economic, social, ecological, intrinsic, recreation, etc. Legislation, policy, goals, objectives Regional plans, Unitary plans, spatial plans District plans LTCP Frameworks, concepts, models Research methods, western science methods, specialist methods Monitoring, evaluation: environmental performance indicators Knowledge, language-English, history, understanding, beliefs, religion, science

**Figure 5. Through time Te Ao Māori has increasingly drawn on other forms of knowledge to make sense of and comprehend the world.**

Kaupapa Māori/mātauranga Māori	Science
<p><b>Origin:</b> Polynesian origin - ~5000yrs BP Make sense, comprehend and understand the world/universe/phenomena, find meaning and balance to life systems, develop technology, solve problems.</p> <p><b>Principles</b> Underlying Māori values and principles Keep the object and subject connected, values, religion, philosophy to guide collection/creation</p> <p><b>Holistic, integrated, subjective</b> Often starts with the whole 'big picture', tries to find interconnections to validate the truth, to understand the whole and find a balance between the physical and spiritual worlds</p>	<p><b>Origin:</b> Greek/Egyptian/Asian (~600BC) Enquiry – Find the truth, facts, understand phenomena. Comprehend/understand the world /universe, develop technology, solve problems.</p> <p><b>Principles</b> Underlying science principles Remove the subject and the subject – remove myth, from the facts Organised enquiry to find the truth/ scientific method and process.</p> <p><b>Reductionist</b> Tends to be more reductionist, studies parts/components of a system in order to find answers because of complexity – requires integration to make sense of the whole and interconnections of system</p>
<p><b>Methods:</b> Mainly oral, subjective, wānanga, hui, te reo, narratives, frameworks, concepts, observation, kaupapa Māori, experiment, observation,  Knowledge 'handed down', systematic</p>	<p><b>Methods:</b> Mainly written and oral, objective, hypothesis/prediction, theory, concepts, data, models, experiment, observation, repeatable, measurements, maths, universal laws, and verification, etc Knowledge documented/peer reviewed, systematic, organised</p>

Interface of knowledges  
Co-creation of knowledge  
Co-design  
Co-innovation

Figure 6. Between Te Ao Māori and Te Ao Pākehā worldviews, the co-creation of new knowledge and understanding often takes place in this interface between worldviews.

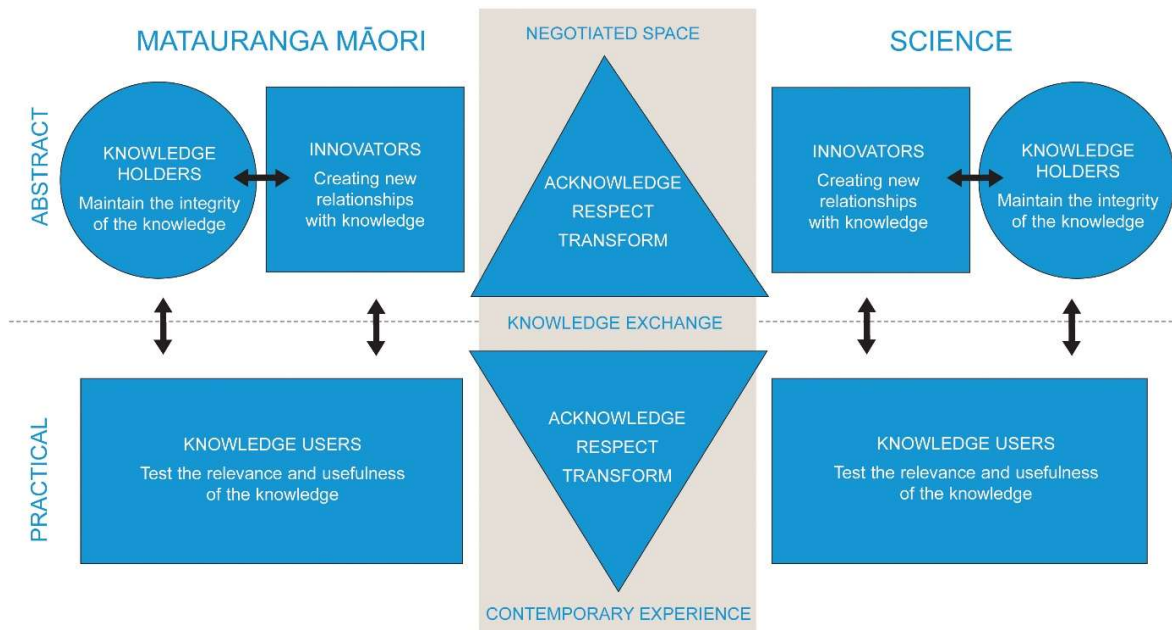
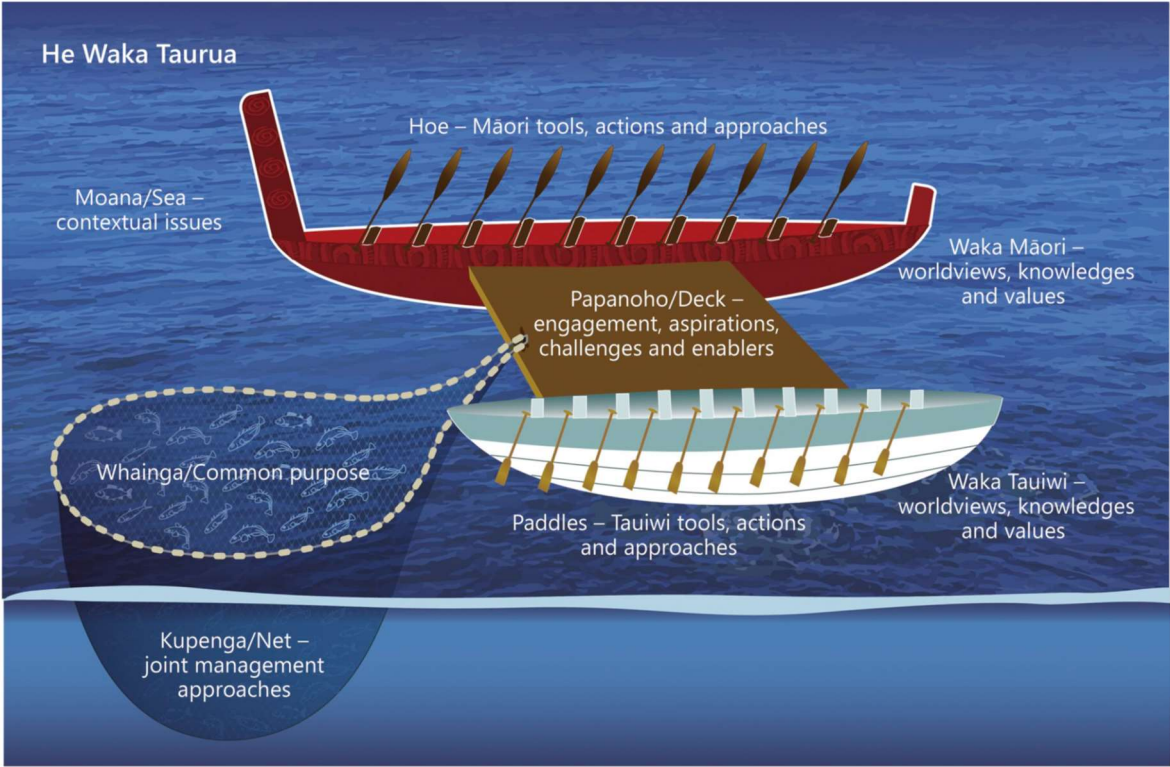


Figure 7. The negotiated space or dialogue space (source: Hudson et al. 2012).

To recognise indigenous worldviews, values, and practices alongside non-indigenous or western approaches such as science, has led to the development of many indigenous models and frameworks (Harmsworth & Awatere 2013, 2014; Maxwell et al 2020) that can guide development and understanding side by side (e.g. Crown and iwi/hapū, council and iwi/hapū). These types of models and frameworks are important as they build relationships, trust, and respect and provide a place and process for bridging our understanding in an environment of co-learning and co-understanding. The Waka-Taurua framework model (Figure 8) is one of these (Maxwell et al. 2020). This framework was constructed around using different approaches to reconcile differences and perspectives in international initiatives, such as ecosystem-based management (EBM), and to embrace different worldviews that are being developed and introduced. It is a metaphorical framework (sometimes known as waka hourua, double-hulled ocean-going canoes) for collaborative initiatives, such as co-governance/co-management, but can be potentially applied in many other circumstances, i.e. cross-cultural research, collaborative research, bridging the gap between mātauranga Māori and science. It takes place within the negotiated space described above.

The Waka-Taurua model is formed by the lashing of two waka (canoes). Each waka/canoe represents the worldview and values of the people who are coming together to achieve a common purpose/whāinga. It recognises that each group is or maybe inherently different, and the knowledge, values, and actions of each are not made to fit into the other.



**Figure 8. The waka taurua model first developed and described in the paper Maxwell et al. (2020) and presented by Awatere and Harcourt (2021) in this Envirolink 2021.**

Each canoe remains a safe space to know and be in its own way, and this reflects the right of rangatiratanga (self-autonomy to develop). The hull/hiwi represents fundamental, non-negotiable values forming the basis of a society's culture. Additionally, each waka comes with its own set of paddles/hoes which represent the tools, actions, and approaches derived from the knowledge system of each respective canoe. In cases where a tool is not mutually beneficial, the taurua may go around in circles and not achieve the common objective. While each canoe has its own space, the papanoho (deck) between the two, represents a shared engagement space. This space can be likened to the 'negotiated space model', which is a contextual intercultural space for consented, purposeful engagement of distinctive worldviews and knowledge systems, hopefully emerging with the most optimal solutions. The negotiated space goes beyond mere knowledge exchange and further into innovation and understanding (whakamaramatia, whakamaramatanga). The framework model was given by Awatere and Harcourt (2021), to recognise equal consideration of indigenous (and shared) values within contextual issues such as land management. The papanoho (deck) is where the two parties reconcile power sharing world views and develop capacity.

The shared engagement space in Figures 6 and 7 provides a useful space or interface for creativity, co-design, shared thinking and learning, transformation, and innovation between Te Ao Māori and Te Ao Pākehā (non-Māori). This space can only be developed and arrived at with the right engagement model (e.g. waka taurua, Figure 8). It can therefore provide a respectful place for different perspectives, and the development of complementary linkages between mātauranga Māori and science approaches (Harmsworth et al. 2011; Lyver et al. 2018a).

#### **4.1.7 Specific project examples in a negotiated space – cultural monitoring**

For example, a large number of culturally-based and Māori-led cultural monitoring activities have been developed around Aotearoa-New Zealand since about 1998 (Rainforth & Harmsworth 2019). Many of these methods and tools are developed from knowledge from both Te Ao Māori and Te Ao Pākehā, with many of the tools having a strong kaupapa Māori base and science-merged component to them. Table 7, based on Harmsworth et al. (2016a), shows many examples now being used for freshwater assessment, cultural and environmental reporting, Māori decision-making, and bicultural management of water resources. The selected references are given in Harmsworth et al. (2016) and described more fully in Rainforth and Harmsworth (2019). Many of the culturally-led tools and methods are based on mātauranga Māori and science, draw on knowledge from both sides, and were largely developed in response to iwi/hapū needs to strengthen connection with local environments, Government initiatives that promoted environmental monitoring through local government, and national policy and legislation, especially Government agencies requirements for national environmental reporting (e.g. Environmental Performance Indicators programme led by MfE, NPS-FM 2014-2020, Environmental Reporting Act 2015). Many of these programmes have led to an increase in Māori participation in cultural and environmental monitoring and activities that sustain and enhance the cultural and physical environment (such as wetland restoration, riparian and native planting, improvements in water quality, soil health, protection of cultural sites, etc). They also help fulfil responsibilities of kaitiakitanga and mana whenua.

**Table 7. Key Māori-led cultural monitoring approaches and tools that have been developed in Aotearoa-New Zealand**

<b>Name of approach</b>	<b>Specific examples</b>	<b>Selected references</b>
Monitoring, sampling and recording of significant/ key taonga species (e.g. flora and fauna)	Kōura (freshwater crayfish) Tuna (eel) Freshwater mussels Kanakana/pihirau-Lamprey  Native fish species such as <i>galaxiids</i> spp., e.g. inanga, kōkopu, koaro,  Plants such as kuta, raupō, harakeke, etc.	Kusabs et al. (2015a,b); Williams et al. (2014); Rainforth (2008) Te Ao Marama Incorporated & Waikawa Whānau (2010); Kitson et al. (2012) Morris et al. (2013) Kapa & Clarkson (2009)
Mapping cultural habitats	Mahinga kai, cultural harvest sites	Stewart et al. (2014), Maxwell & Penetito (2007)
Sampling contaminants	Risk, customary resources	Kaitiaki tools; Stewart et al. (2014)
Report cards	2016 Pilot Waikato River report card: methods and technical summary Framework and methods guided by river iwi	Williamson et al. (2016)
The Cultural Health Index (CHI) for rivers and streams	CHI method and application: has been used extensively by iwi/hapū groups to inform decisions, and provide knowledge to support collaborative processes  ( <a href="https://www.mfe.govt.nz/sites/default/files/chi-for-streams-and-waterways-feb06-full-colour.pdf">https://www.mfe.govt.nz/sites/default/files/chi-for-streams-and-waterways-feb06-full-colour.pdf</a> )  Adaptations have been made for freshwater and estuarine environments	Tipa (1999); Tipa & Tierney (2003, 2006a,b); Townsend et al. (2004); Pauling et al. (2007); Nelson & Tipa (2012); Tipa & Associates (2013); Tipa & Nelson (2012)  Walker (2009) – Tiakina Te Taiao; Young et al. (2002); Townsend et al. (2004); Taranaki District Council (2007); Hughey & Taylor (2009); Harmsworth et al. (2011)
Baselines	Cultural health assessment	Pauling et al. (2005)
Cultural flow	Cultural flow preference studies	Tipa (2009, 2012); Tipa & Severne (2010); Tipa & Nelson (2012); Tipa & Associates (2013); Rainforth (2014)
Historic data and information	Mapping of Māori values, historic places, cultural resources, etc.	Harmsworth (1997, 1998); Tipa (2013)
Significance assessment method	Significance assessment method for determining Māori values/tangata whenua river values	Tipa (2010)
Tribal/regional state of environment reporting – State of Takiwā	A 'toolbox' for iwi environmental monitoring and reporting – Te Waipounamu/South Island: developed by the iwi Ngāi Tahu	Mattingley & Pauling (2005); Pauling et al. (2007); Te Rūnanga o Ngāi Tahu (2003, 2007); Pauling (2010)
Wetlands	National monitoring approaches and indicators of wetlands  Wetland habitats along the Waikato west coast, e.g. Toreparu wetland assessment approach	Harmsworth (2002)  Robb (2014)

<b>Name of approach</b>	<b>Specific examples</b>	<b>Selected references</b>
Mauri assessments	The Mauri Model and 'mauri o meter' ( <a href="http://www.maurimeter.com/">http://www.maurimeter.com/</a> )  Mauri of Waterways Kete and Framework  The Mauri Compass	Morgan (2006, 2007a,b, 2011, 2015)  Jefferies & Kennedy (2009)  Ruru (2014, 2015)
Science and cultural indicators	Linking cultural and science indicators	Harmsworth et al. (2011)
Kaitiaki tools (guardianship tools)	Kaitiaki tools: an internet-based Iwi Resource Management Planning Tool  ( <a href="https://www.niwa.co.nz/freshwater/management-tools/water-quality-tools/kaitiaki-tools">https://www.niwa.co.nz/freshwater/management-tools/water-quality-tools/kaitiaki-tools</a> )	NIWA (2016)
Ngā Waihotanga Iho (estuarine assessment tools)	Ngā Waihotanga Iho: Iwi Estuarine Monitoring Toolkit	Rickard & Swales (2009a,b)

When these mātauranga Māori or culturally based tools are recognised and legitimised next to science, they are seen as complementary but different (Table 8). This example of complementarity was first developed from Harmsworth (2002) for freshwater and wetlands. The tools are used to articulate Māori values, perspectives, and knowledge from the Te Ao Māori side, which sits next to the science side – using a number of science-based tools and methods. Together, science and mātauranga Māori can give a richer picture of what is happening in and to the environment through space and time, often reflecting impacts on Māori values, and helping to assess and report on change to the environment, such as changes to the state (e.g. quantity and condition) of our resources (e.g. through indicators or tohu), which becoming valuable information for councils, communities, and iwi/hapū/whanau. Monitoring and indicators (tohu) can be used to show progress either towards, or away from, goals, ambitions, aspirations, and desired outcomes. Figure 9 shows these tools and traditional concepts are being used increasingly in modern frameworks.

**Table 8. Complementary assessment/monitoring approaches (originally from Harmsworth 2002)**

<b>Māori knowledge or culturally based – High degree of local knowledge, experience, and expertise</b>	<b>Community – low technical, local, using scientific based approaches</b>	<b>Scientific or highly technical assessments – professionally based</b>
<p>Cultural impact assessment (CIA)</p> <p>Iwi monitoring of cultural-heritage sites</p> <p>Iwi monitoring of contaminated sites</p> <p>Cultural health Index</p> <p>Māori wetland indicators</p> <p>Culturally based environmental indicators</p>	<p>SHMAK (Stream health monitoring and assessment kit)</p> <p>Waterway Self-Assessment Form</p> <p>Community based environmental performance indicators</p> <p>Amateur surveys</p>	<p>River and stream water quality monitoring methods</p> <p>Coastal survey and monitoring</p> <p>Archaeological survey</p> <p>Scientific environmental indicators</p> <p>Laboratory analysis</p>
<p>Requires in-depth Māori knowledge and understanding of particular environments and issues</p> <p>Understanding of Māori values, goals, and aspirations.</p>	<p>Requires moderate levels of technical input and skill but scientifically robust and part-value based. Cost effective, relatively simple and short duration</p>	<p>Requires higher levels of scientific and technical input and skill, robust sampling strategies, analysis and interpretation, expensive. May be time-consuming.</p>
<p>New Māori knowledge is often created</p>	<p>Community or local knowledge is generated and utilised</p>	<p>Scientific knowledge is created</p>
<p>Examples:</p> <p>Māori indicators, defining values</p> <p>Cultural sites, mahinga kai, pā, papakainga</p> <p>Cultural health assessments</p> <p>Cultural history</p> <p>Taonga lists</p> <p>Te Mauri</p> <p>Knowledge on uses and preparation of taonga</p> <p>Land management, development issues</p> <p>Cultural information systems, GIS</p> <p>Could include culturally based assessments for river and stream water quality</p> <p>Coastal survey and monitoring of marine environs.</p>	<p>Examples:</p> <p>Stream and river condition and health</p> <p>Community based indicators</p> <p>Community values</p> <p>Community coastal surveys</p> <p>Non-technical assessments</p> <p>School monitoring programmes</p>	<p>Examples:</p> <p>Chemistry, water quality nutrients</p> <p>Hydrology</p> <p>Water table modelling</p> <p>Botanical mapping, classification of plants</p> <p>pH</p> <p>Bacterial counts, pathogens</p> <p>Giardia</p> <p>Cryptosporidium</p> <p>GIS applications</p> <p>Satellite imagery</p> <p>Studies of fish, macro-invertebrates, macrophytes.</p> <p>Archaeological survey</p>



**Table.** Links between values, objectives, monitoring, and actions to sustain or enhance the mauri

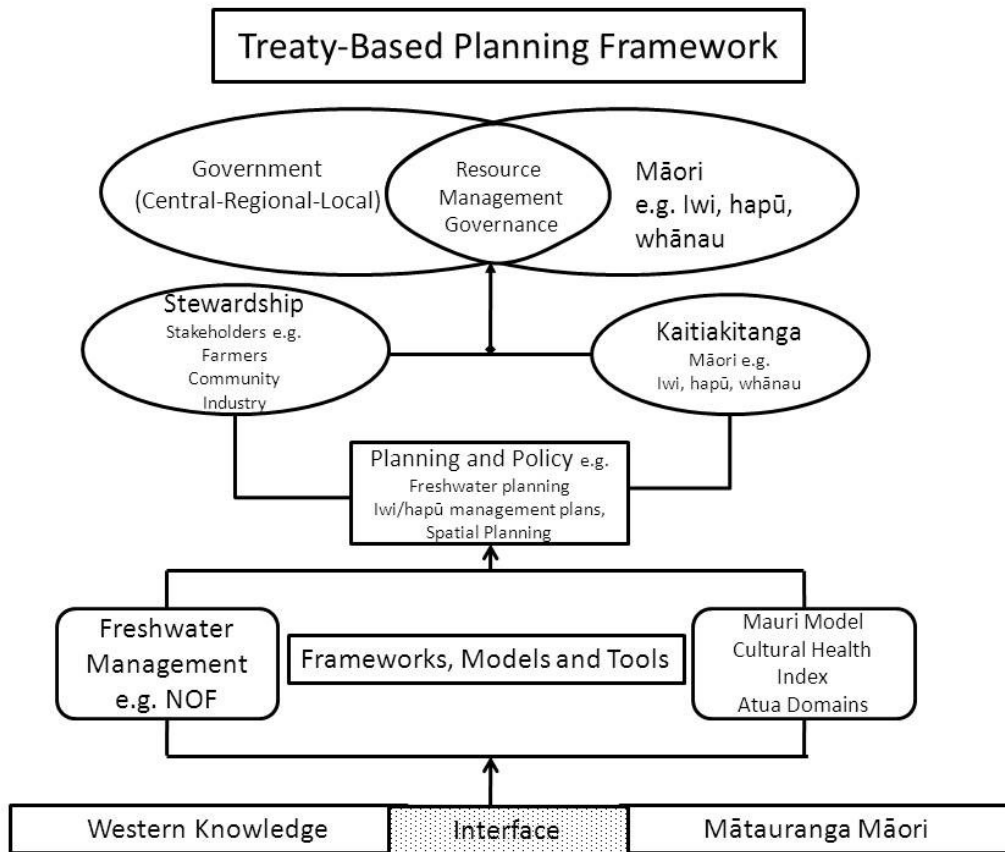


Values	Objectives	Performance measures/tools	Management variables (examples)
<b>Kaitiakitanga Mauri Mahinga kai</b>	<p>Restore the mauri of freshwater to a standard</p> <p>Sustain/enhance cultural resources, mahinga kai, taonga spp.</p> <p>Define standards/limits/above bottom lines</p> <p>to support cultural values, life supporting capacity, ecological integrity, and ensure human wellbeing</p>	<p>Monitoring such as CHI and mauri assessment –</p> <p>identify change/trends in the state or mauri, or other indicators e.g. taonga spp.</p> <p>Condition of cultural resources, taonga spp., mahinga kai</p>	<p>Minimum flows</p> <p>Catchment management, Riparian, planting, landuse, erosion,</p> <p>Nutrient management/reduction</p> <p>Water clarity &amp; sed</p> <p>Pathogens (e.g., Ecoli)</p> <p>Stock exclusion</p> <p>Connectivity</p> <p>Habitat extent and condition</p>

**Figure 9. Modern frameworks for freshwater management based on Māori values, concepts, and some of the tools such as CHI presented in Table 7. Note that Māori values are often used as underpinning to define goals and objectives.**

#### 4.1.8 Following the correct/tikanga process towards negotiation and implementation

To build bridges between mātauranga Māori (Māori science knowledge) and science it is essential to develop strong relationships and partnerships with Māori organisations, to recognise Treaty of Waitangi responsibilities, and to plan and achieve desired environmental, social, cultural, and economic outcomes for communities, iwi/hapū/whānau, and regional councils. As in waka taurua, each canoe represents the worldview and values of the people who are coming together to achieve a common purpose/whāinga. This will strengthen awareness and understanding of Te Ao Māori/ mātauranga Māori and what it actually looks like, which is pivotal to improving engagement with Māori (e.g. iwi/hapū/whānau, and Māori organisations). It will also improve the way science is accessed and understood. In recent years there has been much interest across wider society and councils for understanding Te Ao Māori/ mātauranga Māori and how it can be effectively used alongside science to better inform policy, planning, and resource management in Aotearoa-New Zealand. A Treaty based planning framework and model was given by Harmsworth et al. (2013) to guide this bicultural planning approach (Figure 10). This provides a solid foundation to guide the engagement between councils and iwi/hapū/whānau/tangata whenua, to develop collaborative projects that bridge the gap between mātauranga Māori and science and/or develop new forms (e.g. co-design, innovation) of mātauranga Māori and science.



**Figure 10. Treaty-based Planning Framework for Resource Planning and Management (Harmsworth et al. 2013).**

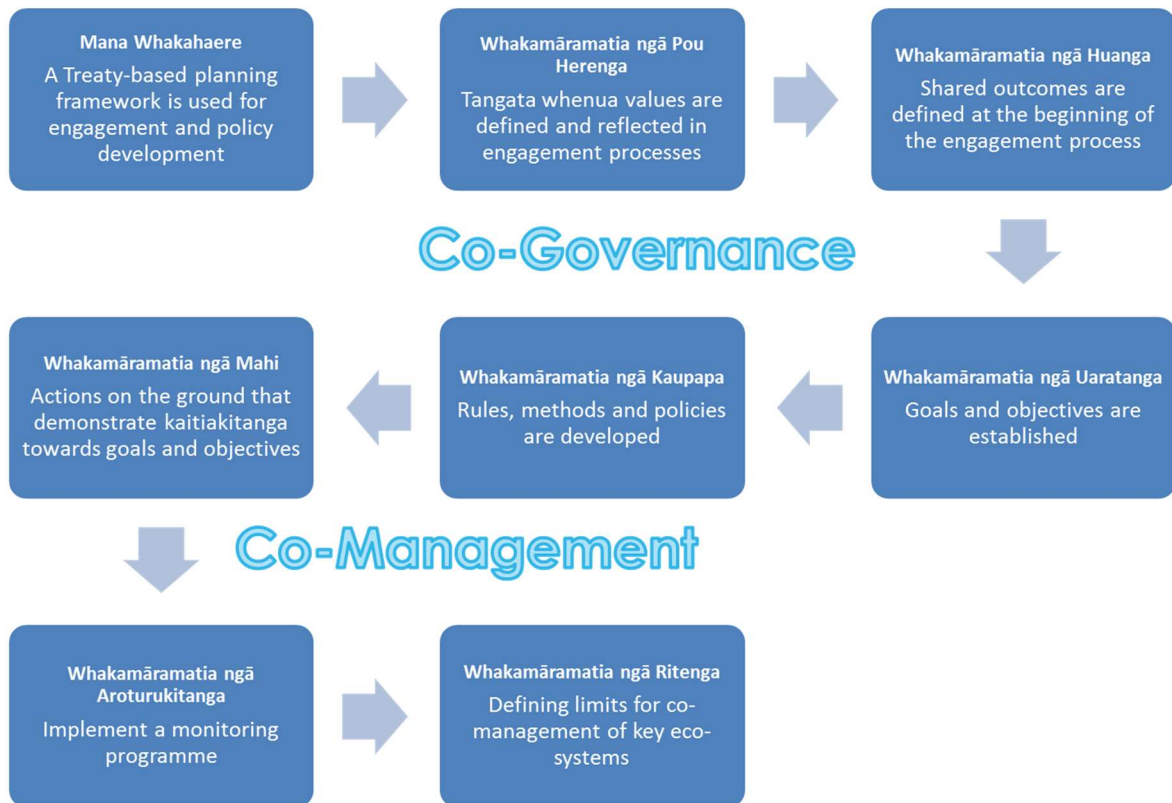
In Te Ao Māori, all processes are guided by tikanga, kawa, values and principles, and in the negotiated space or interface, the framework and model in Figures 10 and 11 are founded on the principles of the Treaty of Waitangi (i.e. participation, protection, partnership). They therefore give formal recognition from the start to specific iwi/hapū, mana whenua, or tangata whenua group(s) in the relationship. From this partnership approach and framework, a tikanga-based process model – Figure 11 (Harmsworth et al. 2013; Robb et al. 2015) – was developed in 2013 to better achieve freshwater planning and management outcomes in Aotearoa-NZ. In the model, co-governance and co-management for freshwater are progressively developed as capacity is built on both sides (i.e. primarily the Crown and iwi/hapū), through 8 main process steps (1–8). The eighth step was added in 2014 – in the context of freshwater management, national standards, and the NPS-FM – to define limits to sustain and enhance cultural values, such as mahinga kai (Figure 12; Awatere & Harmsworth 2014; Robb et al. 2015; Taura et al. 2017b; Awatere et al. 2017).

The progressive steps can also be applied to setting up collaborative research or to bridge the gap between Te Ao Māori/ mātauranga Māori and science, especially to understand Māori values. At each stage, the model is guided by core Māori/tangata whenua values and principles to identify issues and priorities, to establish goals, objectives, and methods, to determine actions or interventions, and to collectively inform decision-making and management. This is continued throughout each of the phases of work (mahi), demonstrating the partnership approach and establishing guidance for the duration of the relationship,

based on, for example, principles of respect, trust, sharing, and reciprocity and generally defining the good behaviour and correct process that should be followed (Appendix 2). In all cases there is early establishment – at the onset of the relationship – of agreements, the Treaty, correct process (through each stage), generating understanding and protocols that both sides are willing to adopt and abide by. This not only provides a basis to understand Māori issues and priorities, but also allows incorporation of mātauranga Māori and Māori values into the engagement process, currently and into the future. At later stages (steps 7 and 8), effective monitoring and evaluation are used to measure progress or performance towards, or away from, agreed iwi/hapū/whānau (or agency e.g. local government) goals and objectives. Steps should not be used in isolation from each other, and all are interlinked in the overall process.

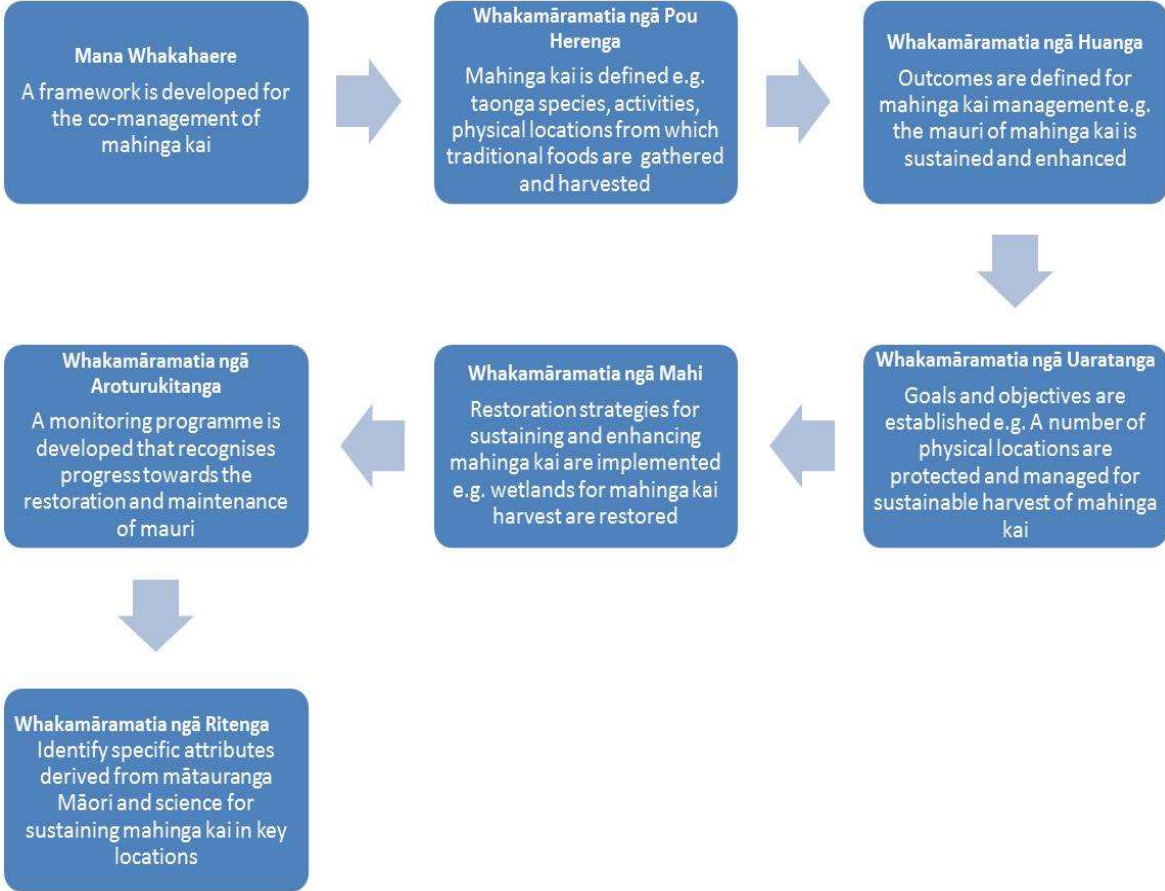
The 8 key process steps which correspond to each box in Figure 11 are:

- 1 *Mana Whakahaere*: A Treaty-based planning framework is used for engagement, based on trust and respect.
- 2 *Whakamāramatia ngā Pou Herenga*: Tangata whenua values/principles or Māori values/principles (physical to metaphysical) are defined to guide the engagement process, and reflected in the relationship from the onset, e.g. whakapapa, rangatiratanga, kaitiakitanga, manaakitanga, wairuatanga, mauri, mahinga kai, etc.
- 3 *Whakamāramatia ngā Huānga*: Shared outcomes, desired outcomes or vision, is stated at the beginning of the engagement process.
- 4 *Whakamāramatia ngā Uaratanga*: Common goals and objectives are established.
- 5 *Whakamāramatia ngā Kaupapa*: Rules, methods, and policies are developed and applied.
- 6 *Whakamāramatia ngā Mahinga*: Actions on the ground are implemented that demonstrate kaitiakitanga and progress iwi/hapū/whānau towards their goals/objectives/aspirations vision, outcomes, through tangible projects or activities.
- 7 *Whakamāramatia ngā Aroturukitanga*: Implement a monitoring programme. This could also be reflection or evaluation of projects to measure progress through time and indicate the direction they are heading.
- 8 *Whakamāramatia ngā Ritenga*: Using the generic tikanga-based framework for setting limits to sustain and enhance cultural values, such as mahinga kai. Ritenga is often used to denote rules of regulation or management of the natural and physical environment (e.g. tapu, rahui, noa).



**Figure 11. A generic tikanga-based process model and framework for freshwater planning and management (Harmsworth et al. 2013; Robb et al. 2015).**

This tikanga process model was applied specifically to mahinga kai projects (Figure 12) in 2016– 2018 (Awatere et al. 2017; Taura et al. 2017).

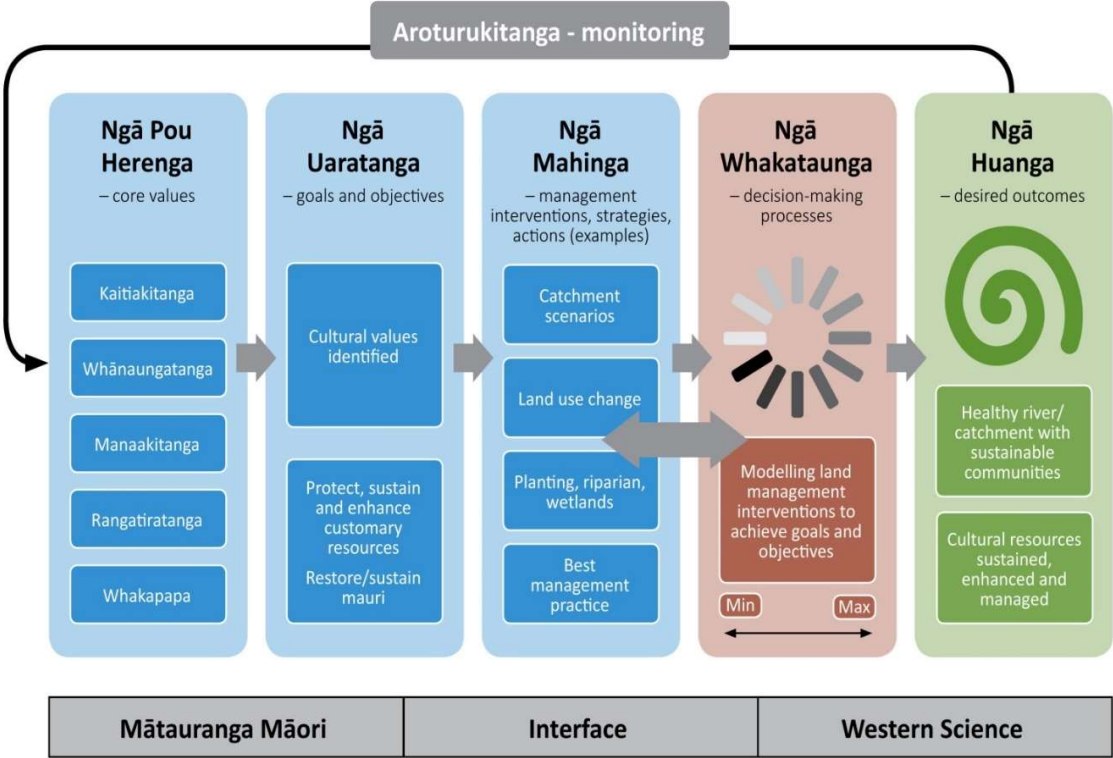


**Figure 12. A generic tikanga-based process model for mahinga kai assessment, monitoring and reporting (Awatere et al. 2017; Taura et al. 2017).**

Mātauranga Māori and science have also been linked in various decision-making models. They can be linked and used similarly to that in tikanga-based frameworks (Awatere & Harmsworth 2014). Awatere and Harcourt (2021) presented the He Waka Taurua model and the report (BOPRC 2019a, b) outlined the He Korowai Mātauranga framework. Both approaches give important steps that used values to guide the whole process and provide a space for mātauranga Māori to be used alongside science or non-indigenous approaches. In Figure 13 below, mātauranga Māori often forms the context or framework for a non-indigenous model or science approach to be included and used (e.g. a science model, a decision-support model, a science method). In these types of models, indigenous values are determined (left hand side) to drive and guide the whole process, e.g. by iwi/hapū/whānau and mana whenua groups, responding to specific issues and priorities, then setting goals (ngā pou Herenga, ngā uaratanga) and stating expected outcomes (on the right-hand side of the model). On the far right the Māori aspirations or desired outcomes are given, and typically established at the beginning of a tikanga-based planning process (these could be indigenous Māori aspirations only, or shared goals /stated outcomes, e.g. by regional council and iwi/hapū working together). Generally, this links the goals to a decision-making process (e.g. co-management) under ngā whakataunga (Figure 13). The model is then used to identify

and agree on the right interventions and strategies to take, such as implementing the right management practices/actions (ngā mahinga) most likely to achieve the stated outcomes (ngā huanga). More detailed science and economic models can be accommodated and used in this negotiated space (ngā mahinga) by all groups and to generate various scenarios that best test and can meet expected or desired outcomes. Aroturukitanga or monitoring is used throughout the entire process as a feedback loop, often using specific indicators to measure or assess whether outcomes are being met and establishes a link between values, priorities and goals and the actual aspirations/outcomes that are expected.

### Mātauranga Māori and Modelling Interface



**Figure 13. Modelling towards Māori aspirations and outcomes (Harmsworth et al. 2014, 2016).**

Already change is occurring with moves towards co-governance and co-management of our natural resources, and this can be regarded as transformative change (e.g. Ruru et al. 2017; Lyver et al. 2018b; Ruru 2018; Maxwell et al. 2020). Within these resource management paradigms is a bicultural framework using a wider set of knowledges, where Te Ao Māori and indigenous knowledge and values are central. Indigenous beliefs, knowledge, and concepts have elevated the status of the natural resource environment in our decision-making, and terms such as mana and mauri are being used more often and more consistently, even in legislative reforms and policy. This has been supported through various Treaty settlements grounded in indigenous Māori concepts, terms, and explanations, which are now entering the mainstream. For example, our legal system has recognised the personhood of Te Urewera National Park and Te Awa Tupua (Whanganui River), placing the environment as a legal entity with elevated status (mana), to be served by human beings (e.g. Ruru et al. 2017; Ruru 2018).

In the case of the Whanganui, it has also given a wholeness back to the river, recognising all the parts of the catchment as an interconnected and interdependent system. The research, science, and innovation sector are increasingly taking on its Te Tiriti o Waitangi obligations to partner, participate in, and protect Māori interests and values (NZAS 2019, 2020). All over Aotearoa-New Zealand, the rapid growth of te reo Māori education is increasing people's understanding of the way Māori see and make sense of the world (Black 2014; Mercier 2018; NZAS 2019, 2020).

## **5 Conclusion and recommendations**

There is considerable interest within councils to understand Te Ao Māori/ mātauranga Māori, particularly at the regional and local community level, and know how it can be used alongside science to develop successful collaborative science-mātauranga Māori based projects. A broader and rich knowledge base can then be used to inform policy, planning, and resource management in Aotearoa-New Zealand. The development of collaborative projects alongside enduring partnerships and joint planning (e.g. co-governance, co-planning) is essential to improve local engagement with Māori communities and organisations. All the council special interest groups (SIGs) we worked with in this project had a strong doctrine and ethos to work with Māori to better improve their understanding of Te Ao Māori/ mātauranga Māori (i.e. by council staff) and to use it appropriately. This was specified as a high priority in all the strategies, objectives, goals, and stated outcomes of the different SIGs we collated and read as part of this project (section 1.3 onwards). We provided a number of presentations and workshops in this project to strengthen awareness and understanding of Te Ao Māori/ mātauranga Māori demonstrating this through actual projects and case studies of what it essentially looks like. This learning and understanding is pivotal to improving engagement with Māori (iwi/hapū/whānau) while establishing projects that demonstrate implementation.

The Māori world view (Te Ao Māori) acknowledges the interconnectedness and interrelationship of all living and non-living things across all aspects of the environment and its ecosystems at various scales (mountains to the sea – ki uta ki tai). People are an integral part of these ecosystems i.e. not separate. Māori values are centred on increasing and guiding good behaviours and responsibilities consistent with enduring relationships and partnerships amongst people, and to foster reciprocal relationships with the environment (taiao) in order to sustain a healthy environment (oranga taiao) and healthy people (oranga tangata). The (w)holistic approach, seeks to understand the total system, not just parts of it. This approach is becoming increasingly necessary to minimise negative repercussions in other parts of the system, and to break down silos and bridge disciplines when tackling complex problems and finding solutions to them. The inclusion of Te Ao Māori in scientific research can deepen our collective understanding of connections, interdependencies, and long-term intergenerational perspectives. Opening up science research to include Māori values and mātauranga Māori (Māori knowledge) is part of a transformative evolution in Aotearoa - New Zealand's science sector and society as a whole (Taura et al. 2021).

Within mātauranga Māori we have identified seven main areas (e whitu wāhanga o mātauranga) that should be explored between councils and iwi/hapū/whānau, to create successful collaborative projects within regions, with local communities (iwi/hapū/whānau/tangata whenua) and Māori organisations. Some of these areas align with the process steps described in Figures 11 & 12. These learnings are derived from many previous mātauranga Māori-centred projects and examples were given in presentations during this envirolink:

- 1. Tikanga-led process (customary process and steps).** Developing a framework for dialogue and collaboration with Māori groups is generally guided by the principles of the Treaty, local customary process, rules, protocols and regulation (e.g. Figures 10 & 11). This is to make sure it is soundly based on trust, understanding, and respect from the beginning to the end. It also makes sure the relationship is following sound and diligent process (ka tika) in order for the relationship to be enduring. Tikanga is a very important value and principle drawn from mātauranga Māori which guides the development of most Māori frameworks, their project design and method, and the activities which proceed to achieve an outcome. In Figure 11 it commences with mana whakahaere and then proceeds through a series of steps depending on the purpose or goal of the project. Once a framework is developed through customary protocols, it guides behaviour, actions, and responsibilities of all those involved. Any framework development for collaboration needs to be cognisant of any agreements already in place, e.g. Treaty settlements, council-iwi/hapū agreements, Memorandum of understanding (MOUs), Memorandum of Partnership (MOPs), legislation, statutes, national and iwi/hapū policy (i.e. should follow tikanga-based frameworks such as the waka taurua model, setting up the negotiated space). Appendix 2 provides a guide to help with engagement and learning about process and protocols.
- 2. In-depth understanding of mātauranga Māori** as a deep and wide knowledge system in its own right, reflecting a profound history and kōrero (set of narratives), particularly about the environment and ecosystems. Working locally to explore important kupu (terms/words) and kōrero te reo Māori (language) related to different environmental systems (e.g. water, groundwater, wetlands, marine, coastal, whenua/soils, biodiversity atmosphere/climate). Using, for example, a range of Māori practices to acquire knowledge and explore deeper understandings of local Māori knowledge, including: kōrero/kōreroreo (conveying knowledge, converse, dialogue, speaking, memory, translation), tikanga pūnaha maumahara, pūnaha kōreroreo (systems for recalling, recollecting, knowledge), lists and inventories (tātai, rārangi taputapu, whakarārangi, whakarōpū), whakapapa (ancestral lineage/layers, connections), pūrakau (whakapapa and traditional stories), pakiwaitara (legends, stories, folklore), whakataukī/whakataukāki (proverbs), and mōteatea (chants), waiata (songs) and karakia (prayers). Māori knowledge can be aligned with non-Māori/ western scientific knowledge to find complementarity in understanding, for example, a whole catchment or ecological system and restoring it back to a desired state in order to find equilibrium or balance (e.g. restore te mauri of the system). Building capability and capacity to strengthen council understanding of mātauranga will be an important underlying foundation on which to form meaningful Māori relationships and to develop collaborative projects. An understanding of Māori resource



management practices, principles, models, and frameworks, both traditional (e.g. tapu, noa, rahui) and contemporary can be discussed and shared between Māori groups and councils.

- 3. Understanding Māori values (whanonga pono, matapono, whakamāramatia ngā pou herenga).** Firstly, it is very important for councils to learn about and understand important Māori values (e.g. whakapapa, kaitiakitanga, manaakitanga, whanaungatanga, tūmanako, wairuatanga), especially those that can guide council – iwi/hapū/whānau Māori relationships, and help establish and maintain collaborative projects. Values can be tangible and intangible. Understanding Māori values gives validity and legitimacy to Māori issues, and help Māori articulate their preferences and priorities based on their aspirations and goals. Secondly for councils to understand those values that are manifest, expressed, or articulated geographically or physically in the environment (e.g. tangible), for example at a site or location. Māori values inform and strengthen iwi/hapū/whānau and tangata whenua connection and relationship with environment through traditional mātauranga Māori and customary practice, such as whakapapa (ancestral lineage), pepeha (local tribal connections to place), cultural (heritage) sites, Māori terms, and kupu used for the local environment/landscape/flora and fauna. Māori led or collaborative projects can be used to identify cultural sites of significance and interest, providing knowledge on the link between the value, its cultural use(s), interests, and associated activities. Values and interests that have specific locations include: customary practices and activities (e.g. mahinga kai, maara kai, kaukau, waitohi), taonga species (e.g. kākahi, tuna, īnanga, kōura, kanakana/pihirau, kōkopu, kōrao, ti kouka, harakeke, raupō, kuta, māmuka, totara, kauri), sacred and important cultural sites (traditional and contemporary), including pā, marae, wāhi taonga, wāhi tapu within an area (e.g. tribal rohe). This area of work can be used to identify location-oriented Māori values reflecting cultural sites, taonga species, uses, activities, etc. and can be used to develop policy, protection and management plans, methods and rules, limits and standards, establish regulation and management, through to participatory co-planning to inform, sustain and enhance local Māori values.
- 4. Using mātauranga Māori to develop shared understandings, co-learning, and common goals and objectives.** In this area of learning it is recommended to revisit iwi and hapū management plans to see what is articulated in terms of goals, objectives, and priorities. This aligns with Figures 11& 12 process step e.g. whakamāramatia ngā uaratanga. Constructive dialogue and planning processes can be used to identify common areas for dialogue between council, local Māori communities (e.g. iwi/hapū/whānau/tangata whenua) and Māori organisations (e.g. trusts, incorporations, networks, kaitiaki, kairangahau/researchers) and will help determine what each local group is trying to achieve. There will be several areas of overlap, interest, and synergies where groups are trying to achieve similar goals and objectives (e.g. water quality, sustaining te mauri, indigenous biodiversity goals). These synergies can provide a basis for dialogue, engagement, knowledge sharing, expertise, and planning. They become a catalyst and an opportunity to build a bridge between science and mātauranga Māori.

**5. Using mātauranga Māori and science to achieve desired outcomes/aspirations**

Understanding Māori aspirations or a vision for the future (e.g., moemoea, wawata, te ao turoa, whakapūmāutanga, sustainability, healthy environment, healthy people) is essential within any framework and is a key area of learning and understanding. This future visioning aligns with Figures 11& 12 process step e.g. whakamāramatia ngā huanga. This helps establish the types of mātauranga Māori and science required to inform planning towards goals and desired outcomes. This could include collaborative projects towards restoring a river, a lake, or what does the term “prosperous communities” mean locally? It will generally result in a number of shared or cooperative activities being developed. This area of learning and understanding brings into discussion the prospects of co-governance and co-management to help achieve the aspirations/outcomes and goals, and what these arrangements might look like? It is essential to improve the understanding of both mātauranga Māori and science to inform decision-making in areas such as resource management, Māori values, indigenous rights and interests, freshwater planning, water allocation, ownership of resources, etc.

**6. The interventions and actions needed to improve the environment/taiao**

(whakamahitanga, whakatinanatanga,). It is important to gain shared knowledge, agreement, and understanding (e.g. between various Māori groups, communities and/or councils) of the specific management practices or interventions required to achieve agreed or shared goals, objectives, and aspirations/outcomes. This aligns with Figures 11& 12 process step e.g. whakamāramatia ngā mahi. These interventions will be the specific activities and actions that can achieve desirable outcomes (e.g. changes in land management, land use, limiting point source pollution, diffuse pollution, setting environmental standards, riparian planting wetland restoration projects). Collaboration and dialogue can be used to develop a collective set of actions, or a joint management plan, to achieve goals and objectives together, within a specified timeframe. This often leads to the development of suitable evaluation and monitoring approaches (e.g. cultural monitoring, community monitoring, science monitoring) that can be used to measure or assess progress towards goals. For example, a range of kaupapa Māori monitoring tools (Rainforth and Harmsworth 2019) have been developed to measure or assess progress towards goals and desired outcomes for freshwater health and cultural values. This would align with the process step in Figures 11& 12 (e.g. whakamāramatia ngā aroturukitanga and whakamāramatia ngā ritenga).

**7. Information, knowledge systems, and sovereignty.** It is essential when working with mātauranga Māori to discuss how this information/knowledge will be recorded, learnt, interpreted, transferred, understood, stored, and retrieved, and in what form. Traditionally, mātauranga Māori has been under the distinct control of local customary process and protocols (tikanga, kawa) for iwi/hapū/whānau. Each iwi/hapū/whānau group has comprehensive systems and regulations in place, including through hui, oral systems of kōrero and uiui, and wānanga for the exchange and storage of knowledge (mātauranga Māori, mohiotanga Māori) and expertise (pūkenga, kaimātanga, tohungatanga). Some groups have lists and inventories of knowledge (tātai, rārangi taputapu, whakarāangi). The sovereignty of

data/information/knowledge needs to be discussed and understood in this area of knowledge learning, as does any transfer, interpretation, or holding/storage of indigenous? information/knowledge. The corollary of this is from the science side (e.g. regional council databases, knowledge experts/staff, GIS, CRIs, universities). This aspect from the science end will ask 'how do iwi/hapū/whānau gain access and make sense of science data/information/knowledge'? 'What models can we use to bridge the gap between mātauranga Māori and science'? 'How can iwi/hapū/whānau develop useable and meaningful science information/knowledge (that makes sense to them) for their own planning and decision-making'?

## **5.1 Benefits of the Envirolink project**

We believe following tikanga process, working in a negotiated space, and using the themes on Te Ao Māori/mātauranga Māori provided through this project will help councils deliver many specific benefits, such as:

- A greater understanding of Te Ao Māori/mātauranga Māori at the interface, and how this knowledge can be used alongside mainstream science to achieve multi-dimensional aspirations (e.g. cultural, social, environmental, economic, political) and desired outcomes across regions. Outcomes may include activities that empower kaitiakitanga, shifts towards environmental sustainability (e.g. te ao Māori concepts of te ao turoa, whanake taiao, whakapūmāutanga), and approaches towards co-governance, co-planning and co-management across land, water, biodiversity, climate change, etc.
- Finding common goals, values and outcomes between councils and iwi/ hapū/ whānau for developing work programmes and collaborative projects, to achieve desired and agreed goals, objectives, outcomes
- A more (w)holistic view of cultural and environmental indicators and approaches that bridge the gap between mātauranga Māori and science across land, water, biodiversity, climate change, etc
- Providing the co-learning basis for improved engagement and collaboration with Māori organisations, such as iwi/hapū, and realising opportunities together for shared monitoring, planning, and implementation activities
- Building council staff capability and capacity to engage with Māori, e.g. iwi/hapū
- Building iwi/hapū capability and capacity in the regions and tribal rohe
- Alignment with national policy and reporting directions in relation to Te Ao Māori and science.

## 5.2 Recommendations

Several recommendations are made in this section to help improve the understanding and use of mātauranga Māori by councils, and to link mātauranga Māori with science. The concepts, process, and examples given in this report provide new ways of working and thinking across various forms of knowledge, and hopefully will lead to better outcomes across multi-dimensional and multi-faceted work programmes. Recommendations from this Envirolink project include:

- Use some of the existing frameworks, models and steps being developed within councils such (e.g. BOPRC 2019a,b; BOPRC He Korowai Mātauranga, weaving collaborative actions: He Whatunga Muka) or those led by the special Māori interest group across councils “Ngā Kairapu”. These frameworks can help recognise and implement mātauranga Māori and to give council staff the tools and capability to understand and incorporate mātauranga Māori in work programmes within, and across councils
- The findings and examples of this Envirolink project should be used in conjunction with recommended collaborative actions prescribed by Ngā Kairapu (e.g. HKM Ngā Kaupapa Matua) and others
- Use some of the concepts, frameworks and examples given in this report to increase understanding and use of mātauranga Māori, especially with council staff and in RC strategies, to address priorities within SIGs
- Create negotiated spaces (he pūtahitanga) as a safe place to discuss and understand mātauranga Māori and Te Ao Māori alongside science, and develop better models for bridging the gap between mātauranga Māori and Te Ao Māori and science
- Use some of the tikanga process methods and steps given in this report, to improve and guide engagement and effective collaboration with iwi/ hapū/ whānau and tangata whenua in regions
- Allocate resources for building council staff capability and capacity (e.g. workshops, training courses) to improve understanding and the use of mātauranga Māori by staff, members of SIGs, and extended networks (e.g. land management, SWIM, groundwater forum)
- Allocate resources for building iwi/hapū/whānau capability and capacity to engage with council and extended science networks
- Develop specific projects that show mātauranga Māori alongside science (i.e. linking mātauranga Māori and science). These projects can be used as exemplars within regions by councils.

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## **Appendix 1 – Key contacts**

### **Science planning and strategy**

Grant Cooper, Land and Partnerships Manager, Horizons Regional Council

Haydon Jones, Team leader, Soil and Land, Waikato Regional Council

Jean-Charles Perquin, Natural Resources Science Manager, Northland Regional Council

Susan Moore-Lavo, Kaiwhakarite Mahitahi, Project Mahitahi – Project Manager, Nelson City Council (NCC)

Asita Langi, Nelson City Council (NCC)

Iain Maxwell, Hawkes Bay Regional Council

Jon Roygard, Horizons Regional Council

Natasha Muir, Horizons Regional Council

Bill Dyck, Regional Council Envirolink Coordinator

### **Land Management Forum**

Haydon Jones, Team leader, Soil and Land, science strategy, Waikato Regional Council

Grant Cooper, Land and Partnerships Manager, Horizons Regional Council

Barry Lynch, Hawkes Bay Regional Council

Don Shearman, Taranaki Regional Council

Dougall Gordon, Senior land Scientist, Greater Wellington Regional Council

### **Nelson City Council**

Susan Moore-Lavo, Nelson City Council

Asita Langi, Nelson City Council

### **SWIM SIG**

Meeting Convenors: SWIM Steering Group

Jean-Charles Perquin (Northland RC, SWIM Convenor), Coral Grant (Auckland Council), Bevan Jenkins (Waikato RC), Elaine Moriarty (Environment Southland RC), Rochelle Carter (Bay of Plenty RC), Stefan Beaumont (Nelson City Council), Lucy Baker (Greater Wellington RC), Graeme Clarke (Environment Canterbury RC).

Facilitator: Margaret Kilvington – Independent social research, evaluation & facilitation (ISREF)

Purpose of hui: To reconnect, shape SWIM actions for 2021, share knowledge and experience, identify and prioritise research projects, progress selected issues identified by SWIM members, and learn how to get the most out of SWIM.

### **Ngā Kairapu SIG**

Kataraina O'Brien BOPRC, Kaiwhakahaere – Te Kotahitanga, Bay of Plenty Regional Council  
Toi Moana

Anaru Vercoe, Pou Whāinga (principal advisor) Policy and Planning BOPRC

Gina Mohi, BOPRC

David Perenara O'Connell, Canterbury Regional Council

### **Groundwater Forum**

Rebecca Morris, Senior groundwater scientist, Greater Wellington Regional Council

## Appendix 2 – Māori collaboration principles and guidelines for engagement

Principle	Why does this matter	Putting this into practice	Principle applied? <input checked="" type="checkbox"/>
1 Kanohi ki te kanohi – face to face	<ul style="list-style-type: none"> <li>• It is a cultural preference for Māori to meet face to face</li> <li>• This reflects the oral and often local tradition</li> <li>• Trust is built by personal contact</li> </ul>	<ul style="list-style-type: none"> <li>• Meet in person, wherever possible. This does not mean you should never use the phone or email, but significant issues are best discussed face to face</li> <li>• Discuss and seek agreement on where to meet</li> <li>• Be prepared to go out to Māori communities – meet people on their own ground, place</li> </ul>	
2 Rangatira ki te rangatira – chief to chief	<ul style="list-style-type: none"> <li>• Māori have confidence in the people with whom they are dealing /collaborating/consulting</li> <li>• People should have the mana (status) at the other side of the table at the beginning (this is largely to do with tikanga process) and starts with '<i>Chief to Chief</i>' and then progresses down to more junior staff or membership.</li> </ul>	<ul style="list-style-type: none"> <li>• Involve the right people</li> <li>• Involve people at an equal level</li> <li>• Involve the decision-makers/those who can answer the questions then and there</li> <li>• Then progress to wider collaboration/engagement</li> </ul>	
3 Nā te kākano – from the seed	<ul style="list-style-type: none"> <li>• This reflects the Māori life cycle: from seed to plant to flower</li> <li>• Early involvement shapes the final result</li> <li>• Māori have a different world view and different view of time, issues, and priorities. Your priority and timelines may not be the same as those of the Māori community</li> <li>• Your issue or research agenda may also be new to Māori, who need time to absorb the issue, seek knowledge, form their opinion, and identify and develop their position and response (e.g. water quality, NPS limits, resource allocation, genetic modification)</li> </ul>	<ul style="list-style-type: none"> <li>• Involve Māori from the start</li> <li>• Be genuine, honest, and respectful</li> <li>• Be prepared for a slow process based on tikanga and consensus</li> <li>• Clarify the kaupapa and objectives from the start - what do you want to achieve?</li> <li>• Don't expect Māori to slot into your agenda or within limited time frames</li> <li>• Many Māori have jobs in addition to their community responsibilities</li> <li>• Māori representatives are likely to need time to consult with their communities too: many Māori organisations only meet once a month</li> <li>• Be guided by Memoranda of Understanding or other agreements, if these exist</li> </ul>	

Principle	Why does this matter	Putting this into practice	Principle applied? <input checked="" type="checkbox"/>
4 Kei moumou taima – open and meaningful	<ul style="list-style-type: none"> <li>• This phrase literally means ‘waste of time’</li> <li>• It’s important not to waste people’s time – Māori are seeking meaningful engagement and desired goals and outcomes from collaboration</li> <li>• What meaningful things will come out of the collaborative exercise?</li> </ul>	<ul style="list-style-type: none"> <li>• Collaborate/consult with a clear purpose</li> <li>• Create a caring and trusting environment</li> <li>• Don’t use collaboration just to tell Māori what is happening – think about what you can get from their involvement and what its value could be</li> <li>• Don’t waste the Māori community’s time – explain why you are there and what collectively you hope to achieve (clarify the kaupapa) Sometimes Māori are not interested in collaborating with you</li> <li>• Don’t have a predetermined outcome</li> <li>• Ask Māori if they wish to discuss a specific issue, rather than assuming or expecting they do</li> </ul>	
5 Ki tai wiwī, ki tai wāwā – flexible	<ul style="list-style-type: none"> <li>• This phrase refers to moving from side to side to change direction in your waka when you become stuck or are heading the wrong way and need to change direction. You need to be open to different pathways or prepared to achieve different objectives on your way to the bigger objective or outcome</li> <li>• The Māori community has its own processes and structures, which need to be taken into account.</li> <li>• They also have to juggle lots of issues and responsibilities.</li> </ul>	<ul style="list-style-type: none"> <li>• During collaboration, be prepared to discuss several times, as many times as required, often at different levels</li> <li>• Allow for an organic or iterative process to emerge and proceed</li> <li>• There is a need for balance and a two-way relationship and trust to develop</li> <li>• Involve Māori and seek agreement on key topics/ discussion areas, decisions, etc., e.g. when, where, what, how, who’s involved, etc.</li> </ul>	
6 Tikanga Māori – the correct Māori way of doing things	<ul style="list-style-type: none"> <li>• Māori have their own protocols, customs and ways of doing things</li> <li>• Recognising these is a sign of respect towards and acknowledgement of the people you are meeting – they are willing to go with your process, and this is a two-way relationship</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise, respect, and use Māori protocols, customs, and ways of doing things (tikanga)</li> <li>• Use the language (terms) and te reo Māori in the right way</li> <li>• Respect and understand mātauranga Māori and other Te Ao Māori views</li> <li>• Within a collaborative environment sharing and co-learning is important</li> <li>• Tikanga or customary Māori hui/training sessions may be useful</li> </ul>	



Principle	Why does this matter	Putting this into practice	Principle applied? <input checked="" type="checkbox"/>
7 Ko te tūmanako – transparent	<ul style="list-style-type: none"> <li>Literally means ‘good faith’, ‘good will’ or ‘good heart’, i.e. not hiding anything</li> <li>It is important for Māori to know who is involved</li> <li>They need to know they have been invited in good faith</li> <li>Also, if they are unable to attend an event, they will know who else can represent their views</li> </ul>	<ul style="list-style-type: none"> <li>Be open and honest about: <ul style="list-style-type: none"> <li>who’s been invited to participate, who the participants/audience are, and how they all fit in</li> </ul> </li> <li>Explain at the start what the agenda, purpose, or kaupapa is</li> <li>Determine early what the right or appropriate membership should be. Who should be at the table?</li> <li>Determine the right process to be used for the collaboration (e.g. number of hui, time-frame, speakers)</li> <li>how information will be used, and IP considered</li> <li>who’s leading discussions, making decisions, and their level of authority in the process</li> <li>Don’t have a hidden agenda – be upfront</li> <li>Explain your collaborative process well to others, include regard/recognition for mātauranga Māori. Te Ao Māori?</li> <li>How will you collaboratively achieve collective desired outcomes and decisions?</li> </ul>	
8 Mahia te whare – foster capacity	<ul style="list-style-type: none"> <li>Literally ‘build the house’</li> <li>Good consultation should help foster Māori capacity and capability, rather than building from scratch every time</li> </ul>	<ul style="list-style-type: none"> <li>Ensure Māori have the capacity, resource, interest, and desire to participate</li> <li>You may not necessarily remunerate individuals, but it shouldn’t cost people anything to participate, so you should at least cover costs (e.g. venue, food, key individuals) and include a koha</li> <li>Most Māori organisations don’t have paid staff – and some don’t have any staff</li> <li>Budget/resourcing for Māori participation in the collaborative practice should be considered</li> </ul>	

Principle	Why does this matter	Putting this into practice	Principle applied? <input checked="" type="checkbox"/>
9 Whakatika te he – accountability	<ul style="list-style-type: none"> <li>Literally ‘right the wrongs’, or ‘find the right way through the confusion’</li> <li>Māori believe we should learn from the past and look to the future</li> <li>This means not continuing past mistakes and injustices, taking responsibility for our actions, keeping our promises, and listening to and valuing what Māori say</li> </ul>	<ul style="list-style-type: none"> <li>Whoever is leading the hui or kaupapa, be accountable and take responsibility</li> <li>Feed-back what Māori have told you before (e.g. provide and be generous with previous collaboration hui results)</li> <li>Feed-back what was decided and why – close the loop and show what the outcome was</li> <li>Do some research – you may be able to get a sense of Māori perspectives/views of an issue from Māori or other priorities they wish to discuss – be prepared to go off tangent sometimes</li> </ul>	
10 Kia tika te reo – use appropriate language	<ul style="list-style-type: none"> <li>Use clear and appropriate communication and language to ensure Māori understand and can engage with the consultation issue and process</li> </ul>	<ul style="list-style-type: none"> <li>Be aware of language and terminology</li> <li>Think about communication</li> <li>Basic lessons/understanding of te reo Māori may be useful within collaborative environments</li> <li>Learn Māori pronunciation</li> <li>Change the language and terms you use depending on the situation and audience – make it easy and embracing to understand</li> <li>Don’t use terms of words people don’t understand such as highly technical or too many science terms – try to retain a balance of terminology</li> <li>Explain terminology and technical language in plain language</li> <li>Try not to use unexplained acronyms</li> </ul>	