Culturally-led, science-informed water management

Freshwater quality is one of the key concerns for New Zealanders and presents a multigenerational challenge to undo the damage wrought over the past century. Gabe Ross and Mapihi Martin-Paul of Boffa Miskell say a culturally led, science informed approach to our water projects is the solution.

Aotearoa – a land of forests, rivers and wetlands.

As an island nation, New Zealand has been in the fortunate position of having a reliable and relatively abundant supply of water. Historically, this fuelled a rich mosaic of forests, rivers, wetlands and estuaries that supported an incredible abundance of plants and animal life.

For the first Māori settlers, waterways provided key transportation corridors and access to food, medicine, and other natural resources. Water was recognised as the fundamental essence of all life and health and played a central theme in Māori creation stories. River systems became entwined with tribal identity and genealogy; they were recognised as living ancestral entities of the people.

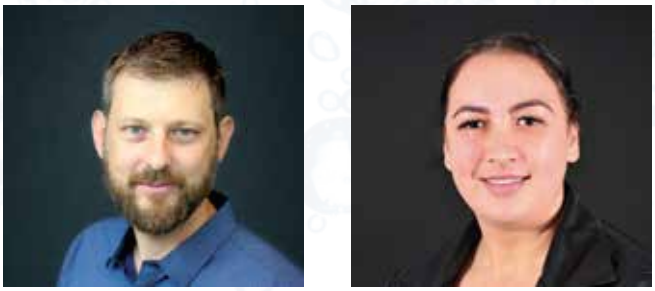
Within the mātauranga Māori belief system, all living creatures and natural resources are infused with mauri (life essence). When mauri is strong, flora and fauna are seen to flourish; when mauri is depleted, the life essence is weak and at risk of diminishing. Through kaitiakitanga (guardianship), Māori managed the natural resources within their territory to safeguard the mauri of the land and water for future generations.

A wilderness to be tamed.

With the arrival of European settlers in the mid 1800s came a very different world view. The natural landscapes were perceived as a wilderness requiring taming and water was both a liability and a resource to be owned and exploited.

Equipped with industrial age technology, wetlands were drained, and watercourses were dammed and channelised to reduce flooding, provide power and allow growth of fledgling settlements. Through the late 1800s and early 1900s the great swamps and forests gave way to the expansion of townships, farmland and other more 'productive' uses.

This transformation of water systems provided significant public health, development and economic opportunities but has proven disastrous to the freshwater ecology and the intrinsically linked mātauranga Māori cultural values.



Boffa Miskell's Gabe Ross (left) and Mapihi Martin-Paul.

Freshwater quality is now one of the key concerns for the general population and presents a multigenerational challenge to undo the damage wrought over the past century.

Water revalued – Te Mana o te Wai

The recent updates to the National Environmental Standards (NES) and National Policy Statement – Freshwater Management (NPS-FM) require and encourage stronger protection of freshwater ecosystems, engagement between tangata whenua and local authorities, and further protection of Māori values.

The Te Mana o te Wai framework imbedded within the NPS-FM recognises freshwater as a natural resource and its health as integral to the social, cultural, economic and environmental well-being of communities.

Within this supporting legislative context, and with rapidly improving technical expertise and capacity, iwi, rūnanga and hapū groups across the country are increasingly playing a key part of the planning and design process for water management and restoration projects. This can be as either treaty partners working collaboratively with the consultant team, or in many instances, as the end client.

The interweaving of traditional knowledge with engineering and other empirical science-based expertise has led to enriched multi-benefit project outcomes that achieve functional goals with

added water quality, biodiversity, recreational, educational and mahinga kai benefits.

In Canterbury, Te Waihora/Lake Ellesmere is a tragic case study of how agricultural intensification and associated drainage and development within the contributing catchments can have devastating effects on water bodies.

Te Waihora was historically an incredibly rich and productive ecosystem and while now severely degraded remains a significant treasure to local Māori. Through the Te Waihora Co-governance partnership with Environment Canterbury a long-term programme, Whakaora Te Waihora, has been developed to restore and rejuvenate the mauri of the lake and ecosystem health. This will be a multi-generational challenge but mana whenua groups are taking a leading role in starting this process.

Measuring the subjective

One of the challenges for incorporating the concept of mauri into planning and design processes is how to accurately recognise and measure what can be a very subjective definition that varies from hapū to hapū.

Boffa Miskell Ecologists and Meihana Pauling gathering data on tuna (eel) and ika (fish) species within the Huritini/Halswell River as part of the cultural health assessments.

Above: Feasibility Study Concept Design: Te Repo o Papatahora – Boffa Miskell & WGA courtesy of Te Taumutu Rūnanga. Right: Pūkānohi Discussion Concept – Boffa Miskell & Craig Pauling.

Emerging assessment methodologies and tools such as the Cultural Health Index for freshwater bodies, and the State of the Takiwā database originally developed by Te Rūnanga o Ngāi Tahu are helping to standardise this. This empowers iwi to tangibly express and measure the mauri of a waterbody in a way that can be recognised within existing RMA processes with the same stature as western science.

To allow widespread adoption this assessment methodology needs to be easily accessible and understandable for iwi, consultants, clients and regulators. Boffa Miskell's te hīhiri and ecology teams have been collaborating with a number of Ngāi Tahu Papatipu Rūnanga across the South Island to develop a user friendly digital based input system.

This allows rūnanga representitives to easily record their findings in the field on devices such as iPads using preset assessment parameters. Ecological surveys are conducted in parallel and provide science based insight into the current health of the water system that can be correlated against the cultural heath assessment findings and together allows repeated measurements to track changes in cultural and ecological heath over time.

This strategy has been applied to the recently-constructed five hectare Whakaora Te Ahuriri wetland project on the Huritini/Halswell River that drains into the Te Waihora. The cultural heath assessment, along with water quality and ecological monitoring datasets, will help to measure the long-term performance of the wetland.

This knowledge base will help the Te Waihora Co-Governance Group to inform and improve future wetland design projects.

New Zealand's annual volume of freshwater falling on each square kilometre has been calculated at 1.3 million cubic metres. This is approximately twice the relative density of the United Kingdom and approximately four times the density of the more continental climates of China and the US.

Leading by example

Te Taumutu Rūnanga, together with the Whakaora Te Waihora team and supported by a Freshwater Improvement Fund grant, are undertaking a catchment wide restoration project on the Te Waikēkēwai/Waikēkēwai Stream on the south-western edge of Te Waihora. The vision is to improve water quality, mahinga kai and biodiversity values of both the stream and the receiving lake.

This will serve as an exemplar for how other Te Waihora catchments can be rejuvenated and includes a constructed wetland adjacent to the Ngāti Moki marae. This is designed to provide ideal habitat for waikēkēwai (freshwater crayfish) for which the local stream is named after and will demonstrate how mahinga kai and water quality treatment goals can be successfully integrated to provide additional educational, ecological, recreational and amenity benefits.

Future aspirations

The marginal flood prone areas around Te Waihora were originally part of the extensive wetland system that historically extended as much as nine kilometres inland from the present-

Waikirikiri Delta / Selwyn Huts Pūkānohi Concept - April 2019

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Alfred Sharpe, Golden evening, New Zealand (1889), Auckland Art Gallery Toi o Tāmaki, purchased 1987

day shoreline. Maintaining these areas as productive pasture is becoming increasingly challenging given the need to reduce nutrient runoff to the lake and future sea level rise-induced rising groundwater water levels.

Boffa Miskell kaiarataki – te hīhiri/strategic advisor Māori, Craig Pauling, led an exploration of alternate productive land use options and developed a concept for 'Pūkānohi'. They are small ponds fed by the nutrient rich inflows into the lake and natural springs to support cultivation of highly valued mahinga kai species such as eel, freshwater crayfish, and whitebait species, as well as plants. The system is structured to filter the water through a series of wetland cells before discharging the cleansed water into Te Waihora.

The vision is to provide a short term productive use for these edges of the lake and provide current generations with the ability to experience and harvest mahinga kai from clean, clear waters while contributing to the long term vision of restoring the health of Te Waihora.

If we can continue to foster this culturally led, science informed approach to our water projects we will have an ideal vehicle to develop solutions that go beyond sustainability and provide regenerative outcomes that rebuild the mauri of our water systems. This will allow the next generations to once again enjoy healthy waterways and resilient ecosystems to explore, play and gather from.

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Mātauranga Māori monitoring programme for the Whakaora Te Ahuriri project