

Mātauranga Māori and its role in coastal management

Dan Hikuroa



Tauranga (Cape Foulwind), Westport (Photo: Dan Hikuroa)

'Angi angi ki te wakarua, Angi angi ki te mawaki; Taku aho ka tangi wiwi nei; Taku aho ka tangi wawa; Taku aho kai iria ka mate, Tu ana he wata mano wai. Manowa mai hoki, Te watu wiwia, Te watu rawea, Te watu ko rongā ta, au ni ka wai atu ki moana, ka wainga Waka nene a Maui Waka nene a-ka-tau, He Hirihiringa mo te hutinga a te ao.'

'Blow gently from the wakarua, Blow gently from the mawaki; My line let it pull straight; My line let it pull strong; My line, it is pulled, It has caught, It has come. The land is gained, The land is in the hand, The land long waited for, The boasting of Maui, His great land, For which he went to sea, His boasting, it is caught.' (from Taylor, 1855).

This is the karakia Māui recited to haul up Te Ika a Māui, the Fish of Māui, the North Island of New Zealand, using the sacred magic jawbone he had acquired from his ancestress Muri-Ranga-Whenua as a hook and his own blood as bait. His canoe, Te Waka a Māui, is the South Island; Te Punga a Māui, the anchor stone, Stewart Island; Te Taumanu o te Waka a Māui, the seat or thwart, Kaikōura Peninsula. Hence, land was drawn out of the ocean and so at their interface we have coasts – takutai.

A brief history of Aotearoa New Zealand

Aotearoa New Zealand* has been settled in many waves of migration, with our identity and nation built around two main bodies of knowledge – mātauranga and science. Both provide an understanding of our whenua, our land and our moana, our oceans, harbours and estuaries, and where the two meet – our takutai.

After the Polynesian ancestors of Māori settled in Aotearoa New Zealand many centuries ago (Hikuroa, 2017), they

* Aotearoa is one Māori name for New Zealand's North Island, but commonly used when referring to New Zealand overall.

brought with them vast navigation, ocean, tropical ecosystem, weather and storm knowledge, and systems for testing and adding to existing knowledge, and creating new knowledge. Distinct groups emerged (today, about 40 iwi and hundreds of hapū) that built their identity from landscapes, waterscapes and coastscapes. A fundamental underpinning of the knowledge bases and knowledge systems is that change is guaranteed, is anticipated, hence the systems were structured to observe, record and codify change as it occurred. Other key and intertwined underpinning principles were that of reciprocity, responsibility and relationships. These form the foundation of what we call today kaitiakitanga – the practices we undertake to fulfill our responsibility to uphold the principle of intergenerational sustainability. Kaitiakitanga is understood as managing human relationships with the environment, not managing the environment.

Although drawing from all available knowledge is our moral and ethical responsibility, I also believe that in so doing we will reach the best decisions. While the rest of the chapters will discuss scientific understandings of how different coastal systems behave in different ways, and how these should be considered in the planning, management and engineering components, this chapter will focus on mātauranga Māori and its role. In particular, within mātauranga Māori is a rich, vast body of takutai knowledge that significantly extends the temporal range of variability and change and also different perspectives on planning and management. One of the features of mātauranga Māori is that it does not seek universality – there can be more than one version – and it embraces that variability, seeing it as a strength. What does that look like? What does that mean? The multiple names and hence explanations for the South Island – Te Wai Pounamu and Te Waka a Māui for instance is what it can look like. What this means is that the observations,

interpretations and knowledge that informs those different names is likely vast and varied, affording us the opportunity to learn from the widest range of knowledge available. Noting there are many places with more than one name, it is highly likely that much salient coastscape information can be found therein. Acknowledging that there is no one universal set of mātauranga Māori, just like there is not one Māori perspective, I will draw mainly from widely accepted versions. I further acknowledge therefore that there will be different versions I haven't included herein, not because they are wrong, or less important, but because those are for others to tell.

Mātauranga Māori

Over time Māori developed a detailed knowledge of their natural environment (King et al., 2017), including local takutai. Hitherto mostly ignored or disregarded by the science and engineering community because it seemed to be myth or legend, fantastic and implausible, mātauranga Māori is generated using techniques consistent with the scientific method, but also includes culture and values and is explained according to a Māori world view (Hikuroa, 2017). Building on mātauranga Māori – a taonga tuku iho (treasured gift handed down through generations) – through observations and local experience, the practice of mātauranga included the recording and classification of knowledge into various forms including stories, songs, place-names and narratives. It also included methods to test and, when necessary, update knowledge.

Pūrākau

Pūrākau comprise environmental knowledge codified in story form and are an integral part of mātauranga. They are deliberately constructed explanations of landscapes,

seascapes, coastscapes and associated phenomena, consistent with a Māori world-view, many record environmental change. Place names also contain valuable takutai knowledge and information. In customary Māori society, pūrākau were fundamental to understanding and making sense of the world.

In Te Ao Māori (Māori world), people are simply one strand in the relational networks known as whakapapa, linked in a kinship-based relationship with everything through their shared descent from Papatūānuku (Earth Mother) and Ranginui (Sky Father) (Salmond, 2014; Hikuroa, 2017). All mātauranga is understood within that whakapapa, relational framing. Accordingly, although there is much mātauranga of the takutai, and hence relevant to this Special Publication, it needs to be viewed first through that whakapapa lens, and then engaged with respectfully and appropriately.

A Māori worldview of Aotearoa New Zealand is demonstrated in Figure 1. This view doesn't change the shape of the takutai, doesn't change the processes that occur in the takutai, it just changes the orientation, and is another example of 'more than one version'. Neither version is wrong.

Because of the growing recognition of pūrākau as place-based repositories of accurate takutai information, the scientific community and Māori are increasingly working together to elucidate risks and anticipated coastal change. Despite this progress, there is still much more that could be done.

'Based on a long and close association with the land and its resources, Māori have developed a detailed knowledge of local natural hazards. This includes oral histories and traditions that *record past catastrophic hazard events, place names that designate areas that are high hazard risk, and environmental indicators that inform about the safety and viability of activities linked to changes in the environment.* Māori Environmental Knowledge [knowledge of local environmental features and processes] is a valuable and neglected area of information on natural hazards and provides a unique source of expertise that can contribute to contemporary natural hazards management and mitigation in New Zealand.' King et al. (2007, p. 59).

In Te Ao Māori, tangata whenua, the local people (tangata) born of the land (whenua), had a role as kaitiaki of their lands, waters, and physical and cultural environments they draw their identity from. Kaitiakitanga is a responsibility to maintain the wellbeing of people and environment. Contemporary kaitiakitanga can be understood as implementation of mātauranga-informed decisions and management (Clapcott et al., 2018; Paul-Burke et al., 2018) to achieve intergenerational sustainability.

In Aotearoa New Zealand we have novel laws that consider both scientific and indigenous worldviews, emphasising the human and non-human elements of landscapes and waterscapes and interconnectivity – Te Urewera Act 2014 and Te Awa Tupua Act 2017. Building on the latter Brierley et al. (2018) posit that rivers have rights to be rivers. In their Te Mana o te Wai Report to Hon Minister David Parker, the Kahui Wai Māori (2019) are very clear there is a hierarchy of obligations and the first obligation is to protect the health and mauri of the water. These laws acknowledge the integrity of both science and mātauranga Māori and resultant policies provide opportunities for coastal scientists, technicians,



Figure 1. Aotearoa New Zealand, aligned according to a Māori worldview, with the head of Te Ika a Maui upwards.

practitioners and Māori communities to act as advocates for the takutai. They also align with an Earth Systems Science, a trans-disciplinary, systems-based approach focused upon sustainability as an outcome, which acknowledges that changes in the environment result from interactions among the air, water and living things and that the Earth behaves as a system in which oceans, atmosphere and land, and the living and non-living parts therein, are all connected. An Earth Systems Science approach seeks to understand, predict and work with natural systems, as opposed to taking a command-and-control approach. Accordingly, Earth Systems Science has much in common with Kaitiakitanga.

One understanding of the origins and dynamic processes forming and interacting with Aotearoa New Zealand and our takutai – coasts, as introduced above, stems from the exploits of Māui. Māui's older brothers had continually refused to let him come fishing with them, so early one morning he hid in their canoe. After Māui's brothers had paddled far out to sea to start fishing, he emerged from his hiding place. Māui drew out his fishing line, which was imbued with strength through karakia and to which was attached the jawbone of Muri-Ranga-Whenua, his ancestress. He hooked the home of Tonga-nui/Tongo-nui, grandson of Tangaroa, deity of the ocean and began to pull in the huge fish. So immense was the fish that he had to recite a karakia to assist in raising it to the surface. Other versions have Māui calling the fish Ranga Whenua, Haha Whenua or Hahau Whenua, however no matter which version you prefer, once caught, the fish was called Te Ika a Māui – The Fish of Māui – the North Island.

When considered as a pūrākau (codified oral history) there is some physical evidence to support the hauling of a giant fish out of the sea – the shape is broadly that of a whai (ray) or pātiki (flounder). Te Upoko o te Ika, the head of the fish, is the southern part of the North Island, some say at Turakirae Head, with the upper jaw being Rongorongo and the lower jaw at Te Rimurapa (north and south heads of Wellington Harbour respectively), another version has Turakirae and Matakītaki a Kupe (Cape Palliser) as the jaws. The salt water eye of the fish is Whanganui-a-Tara, Wellington Harbour and the fresh water eye is Wairarapa (Lake). Te Hiku o te Ika, the tail of the fish, is Muriwhenua, the Far North, Te Tara o te Ika – the barb – is Coromandel Peninsula, Ngā Pakau o te Ika – the fins, are at East Cape and New Plymouth respectively, Te Pito o te Ika is Taupo, and the axial ranges are Ngā Tuara o te Ika – the spines or backbone. Once the fish was caught, the hook, Te Matau a Māui, instantly transformed into land now forming the coast of Hawkes Bay, and Te Kauae a Māui, Māui's jawbone, is Cape Kidnappers. There are also marine fossils found throughout Te Ika a Māui, including right in the middle of the island, indicating that at some stage what is now land was once beneath the ocean. Te Waka a Māui, the South Island, is broadly the shape of a waka, listing to the east. The northern region is Te Taihū – the prow, and the southern region Te Taurapa – the stern.

However, to truly grasp the meaning of Te Ika a Māui we must draw also from earlier Polynesian navigation knowledge. Māori used stars to navigate from the tropics to Aotearoa New Zealand. One constellation is Te Mātau a Māui – the hook of Māui, also known as Scorpius. During the optimum season for sailing to Aotearoa Te Matau a Māui is aligned vertically. As you sail toward it, the hook appears on the horizon, with more and more of it appearing,

and as you get closer and closer, first a glimpse of land, then more and more land, before finally, Te Mātau a Māui has 'pulled' Te Ika a Māui out of Te Moana Nui a Kiwa (Pacific Ocean). The Māui pūrākau is a codification framework for making sense of the many observations detailed above, consistent with a Māori worldview.

In another pūrākau that discusses the various responses of Ranginui and Papatūānuku's children after they separated their Sky father and Earth mother whom were locked together in a loving embrace, we can also see reference to processes in the takutai. The children dismissed Tū-matauenga's (guardian of humankind and war) initial suggestion to kill them, instead resolving to separate them. Tāwhiri-mātea (guardian of winds and storms) had not shared his opinion during the discussion, but after Tāne-mahuta (guardian of forests) separated his parents, his feelings were revealed – he was enraged. After wreaking havoc on Tāne-mahuta he turned his attention to Tangaroa (guardian of sea life) and Kiwa (guardian of the sea), where he heaped up waves as high as cliffs, churned the sea to whirlpools and battled the tides. Tangaroa took flight in terror from his usual home, the shores, and hid in the ocean depths, where Tāwhiri-mātea could not reach him. As Tangaroa was about to leave the shores, his grandchildren consulted together as to how they might save themselves. Ikatere, the father of fish, and Tutewanawana, the father of lizards and reptiles, could not agree where it was best to go to escape the storms. Tutewanawana and his party, shouting into the wind, followed one and some followed the other, and so they fled in two parties. Those of Tutewanawana hid themselves on land, and those of Ikatere in the sea. This is what is called, in the ancient traditions of our people, 'The Separation of Tāwhiri-mātea'. Hence Tangaroa, angered that some of his offspring deserted him and were sheltered by the forests, has ever since made war on Tāne-mahuta, so the sea is forever eating at the edges of the land.

Taniwha

Taniwha are widely known as supernatural creatures, similar to serpents and dragons in other cultures, however they are also a form of pūrākau that can have varied meanings. They could take the shape of animals such as sharks, eels, dolphins, octopuses, or even logs. In one tradition the taniwha Pane-iraira took the shape of a whale, and swam with the Tainui canoe from Hawai'ki to Aotearoa. Most usually associated with water, they reside in many places including the ocean, harbours, rivers, lakes and caves. They are seen variously as dangerous, predatory beings and as highly respected kaitiaki (protective guardians) of people and places. Exploits of taniwha include eating and killing people, kidnapping women and eating or inundating land. Pomare and Cowan (1930) record a pūrākau concerning a taniwha, Rapa-roa, that lived in a cave at the base of cliffs at Honipaka, on the Kawhia coast. A local chief, Haumia lived nearby in Taungatara pa and he made a maara kumara (kumara garden) at Honipaka. Every year Rapa-roa created large waves that inundated Haumia's gardens, ruining the entire crop. Determined to stop Rapa-roa, one day Haumia convinced Rapa-roa to go out sea, and once Rapa-roa had left he filled in his home with sand and rocks. Without a home Rapa-roa died.

In Matatā, Bay of Plenty, a taniwha in the form of a ngārara (lizard) resides in the Waitepuru Stream. Debris-flow and

flood events cause the lower part of the stream to overrun its banks and carve new channels, moving back and forth over centuries – just like a flicking tail. In 2005 during extreme weather, the debris flows wiped out several roads, damaged nearly a hundred homes, many of which were completely destroyed, and caused tens of millions in damage. However it was noticeable that marae in the area were unaffected. This is because of a pūrākau of the Waitepuru Stream, that presents the ngārara, its tributaries in the form of the body (tinana), limbs (waewae) and flicking tail (hiku) and warns ‘beware the flicking tail of the ngārara’. The Waitepuru ngārara pūrākau is simultaneously metaphorical and literal incorporating local Māori knowledge of geomorphology with disaster risk reduction – it is both the evidence and policy, and decisions about where to build and where not to build marae were made based on it (Hikuroa, 2017).

Another less well-known understanding is that taniwha are our kaitiaki – our guardians. When taniwha are acknowledged and accorded appropriate respect, they keep you safe. One example is Tuhirangi, whom Kupe the legendary explorer left in Te Moana a Raukawa (Cook Strait), to guide and protect canoes in the area (Keane, 2007). Another example is Karu-tahi. Ngāti Naho voiced concerns that a section of the Waikato expressway being constructed near Meremere in 2002 would encroach upon the lair of Karu-tahi. After consultation the route was slightly altered. Just over a year after construction, a flood engulfed the lair of Karu-tahi, but the re-design ensured the expressway was not threatened (Jones et al., 2020). Practically, if you know about a taniwha and how it manifests and behaves, if you take precautionary action based on that knowledge, the taniwha serves to reduce disaster risk, its presence acting simultaneously as a warning sign and hence as a guardian.

Maramataka

The maramataka is the Māori stellar, lunar and environmental calendar used to mark time, seasons and as a guide for activities such as fishing, planting and harvesting. Each lunar month was represented by a star or stars, and the nights within each month had general guides for activities, that varied in specificity through the months and seasons. The maramataka is not fixed and static, it is dynamic, and when it was taught to the next generations, the method was a combination of authority teaching and experiential learning – the maramataka was lived and practiced (Hikuroa, 2017). Importantly, a critical component of the teaching and learning process was to continually test the knowledge, to ensure that it was still valid. This continuous testing derives from an understanding that in natural cycles, change is the only constant. Accordingly, practised maramataka are both accurate and precise. By interacting closely with local environments and processes over time, Māori developed a detailed knowledge of biophysical indicators or tohu (King et al., 2005). Through these layers of the past, tohu provide access to the memories of Māori ancestors and the state of the environment in their time. They can therefore be used to signal, monitor and forecast changes in the natural environment. Due to the regular, detailed observations that form a key aspect of maramataka, it is likely that maramataka practitioners will be some of the first to notice environmental change in our takutai.

Pūrākau and maramataka are frameworks by which Māori understand and comprehend the takutai – add to and test

that knowledge, share it within generations, and pass it down through the generations. Pūrākau and maramataka comprise knowledge critically verified and updated through time and therefore can be both accurate and precise.

Working with Māori communities

Mātauranga Māori is taonga tuku iho, it is not freely available to be accessed by anyone. Māori communities are the kaitiaki of the mātauranga, so it is imperative that coastal scientists and practitioners work with them in respectful, reciprocal and responsible ways. Excellent examples are works led by Darren King (King and Skipper, 2006; King et al., 2007; King and Goff, 2010). Further guidance can be found in Wilkinson (2020). One approach documented therein is the IBRLA – Initiation, Benefits, Representation, Legitimation and Accountability framework (Bishop, 1996). In this framework, mātauranga Māori is respected and upheld, collaboration is facilitated, security for the researcher is provided when including mātauranga Māori, while maintaining the integrity of the scientific method. Another is the He Awa Whiria (Braided rivers) framework (MacFarlane and MacFarlane, 2018) that recognises two streams of knowledge – science and mātauranga Māori, allowing the two knowledge streams to operate both independently and collaboratively, and like a braided river, the streams may diverge, converge, and meander, but ultimately, they both flow in the same direction and towards the same goal (Wilkinson et al., 2020).

Conclusions

This chapter has shown the origins, nature, breadth and depth of mātauranga Māori and hence its value as a repository of takutai information. Pūrākau and maramataka are a key source of takutai knowledge, showing broad understandings in those of Māui, Tawhirimatea, Tangaroa, and Tāne-mahuta, and specificity in maramataka and taniwha. In cases where taniwha are known we can anticipate the effects of sea-level rise and increased storm intensity to be acutely seen and experienced, and even utilise warning systems and implement disaster risk reduction. Many Māori place names will hold salient takutai information. Kaitiakitanga is a mātauranga Māori informed approach relevant to the takutai and the challenges we face. Similar to an Earth Systems view, kaitiakitanga seeks to work with the environment, not command and control it, by managing our relationships with the environment and what we do in the takutai.

As we explore how different coastal systems behave in different ways, and how these should be considered in the planning, management and engineering components, weaving mātauranga Māori with science will yield significant mutual benefits to Aotearoa New Zealand.

References

- Bishop, R (1996). *Collaborative research stories whakawhanaungatanga*. The Dunmore Press, Palmerston North, New Zealand, 273 pp.
- Brierley, G, et al. (2018). A geomorphic perspective on the rights of the river in Aotearoa New Zealand. *River Research Applications* 35, 1640-1651
- Clapcott, J, et al. (2018). Mātauranga Māori: Shaping marine and freshwater futures. *New Zealand Journal of Marine and Freshwater Research* 52, 457-466.

- Hikuroa, D (2017). Mātauranga Māori the ūkaipō of knowledge in New Zealand. *Journal of the Royal Society of New Zealand* 47(1), 5-10.
- Jones, D, et al. (2020). Weaving mātauranga into environmental decision-making. *New Zealand Science Review, Mātauranga and Science Special Issue Part 2* 76(2), 49-53.
- Kahui Wai Māori (2019). *Te Mana o te Wai*. Report to Minister Parker.
- King, D, et al. (2005). *Anticipating local weather and climate outcomes using Māori environmental indicators*. NIWA Client Report: AKL-2005-129. Auckland, New Zealand: National Institute of Water and Atmospheric Research Ltd (NIWA).
- King, D, and Skipper, A (2006). Understanding local weather and climate using Māori environmental knowledge. *Water & Atmosphere* 14(2), 22-23.
- King, D, et al. (2007). Māori environmental knowledge and natural hazards in Aotearoa-New Zealand. *Journal of the Royal Society of New Zealand* 37(2), 59-73.
- King, D, and Goff, J (2010). Benefitting from differences in knowledge, practice and belief: Māori oral traditions and natural hazards science. *Natural Hazards and Earth Systems Sciences* 10, 1927-1940.
- King, D, et al. (2017). Reciting the layers: Evidence for past tsunamis at Mataora-Wairau Lagoon, Aotearoa-New Zealand. *Marine Geology* 389, 1-16.
- Macfarlane, S, and Macfarlane, A (2018). *Toitū Te Mātauranga: Valuing culturally inclusive research in contemporary times*. A position paper prepared under the auspices of the Māori Research Laboratory, Te Rū Rangahau, in conjunction with the Child Wellbeing Institute at the University of Canterbury, University of Canterbury, Canterbury, 8 pp.
- Paul-Burke, K, et al. (2018). Using Māori knowledge to assist understandings and management of shellfish populations in Ohiwa harbour, Aotearoa New Zealand. *New Zealand Journal of Marine and Freshwater Research* 52, 542-556.
- Pomare, M, and Cowan, J (1930). *Legends of the Māori*. Wellington: Whitcombe and Tombs/Harry H Tombs, Vol 2.
- Salmond, A (2014). Tears of Rangi: Water, power, and people in New Zealand. *HAU: Journal of Ethnographic Theory* 4(3), 285-309.
- Taylor, R (1855). *Te Ika a Maui*. Werthem and MacIntosh, London.
- Wilkinson, C, et al. (2020). Mātauranga Māori in geomorphology: Existing frameworks, case studies, and recommendations for incorporating indigenous knowledge in earth science. *Earth Surface Dynamics* 8, 595-618.

