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**Te Kete Tua-ātea, Māori modelling of the future and the
kaitiakitanga of water.**

**A thesis presented in partial fulfilment of the
requirements for the degree of**

**Doctor of Philosophy
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Te Āti Awa, Ngāti Raukawa, Ngāti Toarangatira

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*Karanga mai rā te kāhui ātua o te wai tuku kiri e,
Ko Tāwhirimātea
Ko Hine-rau-whārangī-rau-angiāngi
Ko Hine-tū-pari-mounga
Ko Hine-moana
Ko Hine-pūkōhu-rangi
Ko Hine-wai-etaeta
Ko Hine-kapua-rangi e,
Karanga mai, karanga mai, karanga mai rā,
I te mate o te wai o Aotearoa, karanga mai, tangi ana mai rā,
He aituā! He aituā!
Karanga mai rā ki tēnei uri o Te Āti Awa, Ngāti Raukawa, Ngāti Toarangatira e
E whai ake nei he oranga wai, he oranga tangata,
Karanga mai, karanga mai, karanga mai rā!*

*I dedicate this thesis to my grandmothers,
Joyce Hobbs and Lloma Woolley,
Who both left this world during the course of this work,
For teaching me the enduring power of the divine feminine to nurture and sustain life.*

Abstract

This research arose from the experience of our iwi, Te Āti Awa ki Whakarongotai, struggling to control the future trajectory of the health of our water and the health of our people. We came to recognise that our political aspiration to realise our tino rangatiratanga in relation to water was strongly dependent on our knowledge capability, in particular, our capability to identify, examine and communicate the likely effects of future scenarios on our water.

The aim of this thesis was to propose and operationalise a mātauranga Māori framework and futuring tools that iwi can apply in decision-making to assist them in realising the futures they wish to see for water systems.

Ngā Kete o te Wānanga has been presented as a complete mātauranga Māori theoretical framework, and each kete or component has informed the generation and application of specific aspects of knowledge and the tools that are required for the kaitiakitanga of water.

Te Kete Tua-uri has informed the production of a rich iwi ontology of water that provides a more in-depth understanding of what water 'is' from a Te Āti Awa perspective. Te Kete Aronui has informed the development and application of tools to facilitate observations across the broad iwi values of water. These include novel tools for monitoring the integrity of decision-making processes, and a survey tool for monitoring the well-being attributes of wairua and whakapapa connectivity in our rohe.

The research has shown how the recognition and revitalisation of Te Kete Tua-ātea knowledge and tools as a distinct field of mātauranga Māori is particularly crucial to the practice of kaitiakitanga. This has involved developing and applying futuring tools such

as quantitative models to generate knowledge about the infinite possible future scenarios for our water catchments that can be used to inform decision-making processes.

The application of Ngā Kete o te Wānanga can make a significant contribution to improving the way that water is cared for in Aotearoa. The research has demonstrated the power of returning to the enduring wisdom of mātauranga Māori, and the benefits of a kaupapa/values-based, whole-of-system, future-oriented approach to water care.

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Finally, to the people of Te Āti Awa ki Whakarongotai, who contributed the knowledge that informed this thesis; it is my humble privilege to work as a kaitiaki for our iwi, under the guidance of our tūpuna and the principles we've inherited from them:

He kororia ki ngā ātua,

He maungārongo ki te whenua,

He whakaaro pai ki ngā tāngata katoa.

Tihei mauri ora!

Contents

| | |
|---|-----|
| Abstract..... | iv |
| He mihi – Acknowledgements..... | vi |
| List of figures | xii |
| List of tables | xiv |
| List of abbreviations..... | xv |
| Glossary..... | xvi |
| Chapter 1: Ko te pūtake – Introduction..... | 1 |
| Technopolitics and the denial of Māori futuring abilities | 3 |
| Research aim | 10 |
| Te Āti Awa ki Whakarongotai and the Māori knowledge tradition | 10 |
| Ngā Kete o te Wānanga: The theoretical framework of the research..... | 15 |
| Research questions | 20 |
| Methods | 22 |
| Chapter outline..... | 23 |
| The current political context for Māori and their water: The pursuit of tino rangatiratanga. | 25 |
| Chapter 2: Grounding the research in Ngā Kete o te Wānanga | 39 |
| Te Kete Tua-uri: What are the fundamental knowledges and values that inform Māori worldviews of how freshwater systems work? | 39 |
| Key concept 1: The universe is process energised by mauri | 40 |
| Key Concept 2: Reality is constructed through the use of whakapapa..... | 41 |
| Key Concept 3: That which causes the process of the universe is divine; wairua or spirituality is ubiquitous in Māori reality | 42 |
| Key concept 4: Māori conceptualise systems and what they experience in the material world as outcomes of the underlying integrated values, or kaupapa, that human behaviour manifests..... | 44 |
| Hua Parakore as a conceptual model for natural systems..... | 46 |
| Te Kete Aronui: What approaches and technological tools are applied by Māori to facilitate observations of freshwater systems for the purpose of informing decision-making? | 50 |
| How do Māori ‘know’? Observation, experience and embodied knowledge | 50 |
| The emergence of Te Kete Aronui approaches and tools in the scientific academic discourse of Aotearoa | 52 |
| Te Kete Tua-ātea: What approaches and tools have been and can be applied by Te Āti Awa ki Whakarongotai to examine how freshwater systems will change across a range of future scenarios, to support their decision-making? | 58 |
| Emerging recognition of indigenous futuring expertise in the scientific literature..... | 58 |

| | |
|---|-----|
| The application of Te Kete Tua-ātea knowledge and tools for scenario testing..... | 61 |
| Expanding Te Kete Tua-ātea through the integration of Māori knowledge with contemporary quantitative modelling tools..... | 68 |
| Summary of Chapter 2..... | 78 |
| Chapter 3: Te Ara Poutama – Methodology..... | 81 |
| Kaupapa Māori research methodology guiding principles..... | 81 |
| The research as part of the life of Te Āti Awa ki Whakarongotai | 87 |
| Ngā Kete o te Wānanga research method | 93 |
| Te Kete Tua-uri - Research Question One: What are the fundamental knowledges and values that inform Te Āti Awa ki Whakarongotai worldview of how freshwater systems work? | 93 |
| Te Kete Aronui - Research Question Two: What approach and technological tools have been applied by Te Āti Awa ki Whakarongotai to facilitate observations of freshwater systems for the purpose of informing decision-making? | 97 |
| Te Kete Tua-ātea - Research Question Three: What approaches and tools have been and can be applied by Te Āti Awa ki Whakarongotai to examine how freshwater systems will change across a range of future scenarios, to support their decision-making? | 100 |
| Summary of Chapter 3..... | 104 |
| Chapter 4: Te Kete Tua-uri..... | 107 |
| The fundamental knowledges and values that inform Te Āti Awa ki Whakarongotai worldview of freshwater systems | 107 |
| Whakapapa..... | 108 |
| Wairua | 114 |
| Mana | 119 |
| Māramatanga | 124 |
| Te Ao Tūroa..... | 130 |
| Mauri | 134 |
| Te Kete Tua-uri - Summary | 139 |
| Chapter 5: Te Kete Aronui | 143 |
| Approaches and tools applied by Te Āti Awa to facilitate observations of freshwater systems | 143 |
| Part One: Prioritising huanga for monitoring | 144 |
| Vester’s influence matrix..... | 145 |
| Identification of case studies to apply monitoring..... | 153 |
| Applying Hua Parakore as a conceptual model in prioritising huanga..... | 154 |
| Part Two: Piloting methods for monitoring huanga | 155 |
| 1. Mauri and Te Ao Tūroa monitoring | 156 |
| 2. Mana and Māramatanga Monitoring | 163 |

| | |
|---|-----|
| 3. Māramatanga, Wairua and Whakapapa monitoring..... | 168 |
| Summary of Te Kete Aronui | 177 |
| Chapter 6: Te Kete Tua-ātea..... | 179 |
| Approaches and tools applied by Te Āti Awa to examine freshwater system futures | 179 |
| Part one: Developing Te Āti Awa ki Whakarongotai conceptual model of the system | 180 |
| Part two: Developing Te Āti Awa ki Whakarongotai BBN model of the freshwater system. | 187 |
| Part three: Applying Te Āti Awa Whakarongotai BBN model to infer water system health. | 198 |
| Applying the BBN model to test health outcomes of activities..... | 198 |
| Applying the BBN model to set objectives for huanga of water system health and prioritise restoration, care and management effort | 206 |
| Summary of Te Kete Tua-ātea | 214 |
| Chapter 7: Nā te wānanga te hauora..... | 217 |
| Discussing the implications of this research | 217 |
| Applying Ngā Kete o te Wānanga theoretical framework to water care | 219 |
| Te Kete Tua-uri: The fundamental knowledge that informs our understanding of water | 219 |
| Te Kete Aronui: The knowledge we generate through being a part of water systems | 222 |
| Te Kete Tua-ātea: The knowledge we create about the possible futures of water systems | 223 |
| The implications for Te Āti Awa ki Whakarongotai of implementing Ngā Kete o te Wānanga as a framework for water planning and care | 226 |
| Embedding Te Āti Awa ki Whakarongotai view of water systems in practice..... | 226 |
| Developing Ngā Kete o te Wānanga capability to support the rangatiratanga of Te Āti Awa ki Whakarongotai..... | 230 |
| Applying Ngā Kete o te Wānanga to support Te Āti Awa ki Whakarongotai to determine better outcomes for water systems..... | 234 |
| The implications of implementing Ngā Kete o te Wānanga as the theoretical framework for water planning and care in Aotearoa | 235 |
| Te Kete Tua-uri: Transitioning from an effects-based to a kaupapa/values-based approach to water planning, care and regulation in Aotearoa..... | 235 |
| Te Kete Aronui: Broadening our view of water systems in Aotearoa | 237 |
| Te Kete Tua-ātea: Empowering Māori futuring tools in water care | 240 |
| What are the preconditions required to implement Ngā Kete o te Wānanga in water planning and care in Aotearoa?..... | 242 |
| Appropriate power arrangements for Māori in water planning and care | 243 |
| Providing for entirely distinct mātauranga Māori planning processes | 245 |
| Chapter 8: Ki te whaiāo, ki Te Ao Mārama..... | 249 |
| Key findings of this research..... | 249 |
| Contributions of the research | 253 |

| | |
|---|-----|
| Future research | 256 |
| Future trajectories | 257 |
| References | 261 |
| Appendix A: Consent Documentation | 272 |
| Appendix B: Iwi Kaitiakitanga Plan..... | 278 |

List of figures

| | |
|---|-----|
| Figure 1.1 The rohe of Te Āti Awa ki Whakarongotai | 11 |
| Figure 1.2 Te Puna o te Aroha | 14 |
| Figure 1.3 Whakapapa from Io to the future (Royal, 1998)..... | 17 |
| Figure 1.4 Knowledge about the different layers of reality as conceptualised by Ngā Kete o te Wānanga. | 20 |
| Figure 2.1 Genealogy of the creation of the universe. | 40 |
| Figure 2.2 How Māori understand the relationship between perception, values and cultural imperatives..... | 45 |
| Figure 2.3 Conceptualising Hua Parakore as the integration of a diverse spectrum of kaupapa. | 49 |
| Figure 2.4 Micronesian star compass (Low, 2018 p. 55)..... | 65 |
| Figure 2.5 Ruamāhanga Whaitua modelling architecture | 70 |
| Figure 2.6 Example of a BBN from Carriger et al. (2016, p. 13195)..... | 75 |
| Figure 2.7 Spectrum of ability for Māori to have their worldview reflected through quantitative modelling processes | 77 |
| Figure 3.1 Tiriti House conceptual model | 84 |
| Figures 3.2 & 3.3 Early translocations in teenage years and accompanying kiwi off the island in recent years..... | 87 |
| Figure 3.4 Sitting with my grandparents at the launch of the Tuia te Kawe iwi strategy..... | 89 |
| Figure 3.5 Hui Rangatahi 2016, Waikanae River | 90 |
| Figure 3.6 Planning wānanga at Whakarongotai marae..... | 95 |
| Figure 3.7 Rangatahi wānanga | 96 |
| Figure 3.8 A factor typology of Vester’s influence matrix as presented by Cole et al. (2003) | 99 |
| Figure 3.9 Participants building flow diagrams in wānanga..... | 102 |
| Figure 4.1 Te Āti Awa ki Whakarongotai whakapapa of water | 109 |
| Figure 4.2 Kaumātua and mahinga kai expert Les Mullen, restoring wairua at Waikanae River | 115 |
| Figure 4.3 Rangatahi supporting their wairua through enjoying the Waikanae River | 116 |
| Figure 4.4 Function factor typology (Cole et al., 2003)..... | 146 |
| Figure 5.1 Wānanga test the use of the influence matrix..... | 147 |
| Figure 5.2 A portion of the influence matrix showing how a group has ranked the degree of influence each attribute has against each of the other attributes in the matrix | 149 |
| Figure 5.3 Te Āti Awa ki Whakarongotai Influence Matrix | 150 |
| Figure 5.4 Kaitiaki with their samples | 159 |
| Figure 5.5 Kaitiaki lifting fyke nets in the Whareroa | 162 |

| | |
|--|-----|
| Figure 5.6 Relationships between experiences and contact with nature and pro-environmental behaviours (Rosa et al., 2018) | 171 |
| Figure 5.7 Whakarongotai o te wā survey for monitoring Wairua and Whakapapa attributes | 175 |
| Figure 6.1 Drafting a Te Āti Awa ki Whakarongotai conceptual model of water systems. | 182 |
| Figure 6.2 Final Te Āti Awa ki Whakarongotai conceptual model of water system | 187 |
| Figure 6.3 A simple CPT showing probabilities of different combinations of ‘Intergenerational Knowledge Transfer’ and ‘Quality of Mahinga Kai’ states. | 194 |
| Figure 6.4 A complex CPT showing probabilities of different combinations of ‘Quality Mahinga Kai’, ‘Contamination’, ‘Water Temperature’, ‘Fine Sediment’ and ‘Algae’ states. | 195 |
| Figure 6.5 Te Āti Awa ki Whakarongotai Bayesian belief network: Te Kete Tua-ātea tool for predicting water system health | 197 |
| Figure 6.6 Base BBN model | 198 |
| Figure 6.7: Applying the BBN model to infer system health in disturbed contaminated site scenario | 199 |
| Figure 6.8 Applying the BBN model to infer system health in no disturbance scenario..... | 200 |
| Figure 6.9 Heavy metal results from watercress survey across three sites, including Kiwi Road | 202 |
| Figure 6.10 Applying the BBN model to predict system health in a scenario where a contaminated site is disturbed, and human health effect levels of contamination are exceeded | 203 |
| Figure 6.11 The trend of probable states when inserting new base states into the BBN model | 205 |
| Figure 6.12 The probabilities of states of different huanga in a scenario where ‘Wairua and Whakapapa’ is in a state of good health | 207 |
| Figure 7.1 How Māori understand the relationship between perception, values and cultural imperatives. (Royal, 2008, p. 64) | 219 |
| Figure 7.2 Further interpretations of Ngā Kete o te Wānanga (adapted from Royal, 1998, p. 52) | 226 |
| Figure 7.3 Steps, capabilities and resources required before beginning futuring work | 231 |
| Figure 7.4 Spectrum of ability for Māori to have their worldview reflected through quantitative modelling processes..... | 242 |

List of tables

| | |
|--|-----|
| Table 1.1 Different types of modelling referred to in this thesis. | 9 |
| Table 2.1 A summary of the three aspects of knowledge Ngā Kete o te Wānanga | 79 |
| Table 3.1 The range of methods applied across the three phases of Ngā Kete te Wānanga research process..... | 105 |
| Table 4.1 The various components of the whakapapa of wai..... | 110 |
| Table 4.2 Mahinga kai species that experts expect to see in freshwater and marine environments | 136 |
| Table 4.3 Te Āti Awa ki Whakarongotai Freshwater Health Index..... | 141 |
| Table 5.1 Identifying priority huanga..... | 155 |
| Table 5.2 ‘Ko te mana, ko te māramatanga’: Audit method to monitor the ability of Crown partners to uphold mana and provide for māramatanga | 165 |
| Table 5.3: Survey Section 1: Intergenerational transfer of mātauranga Māori me ōna tikanga and an example how a participant filled it out | 170 |
| Table 6.1 Objectives for Waikanae Catchment | 213 |
| Table 6.2 Ngā Kete o te Wānanga framework of tools developed to support Te Āti Awa tino rangatiratanga in relation to water | 216 |
| Table 7.1 Ngā Kete o te Wānanga Framework of tools developed to support Te Āti Awa tino rangatiratanga in relation to water | 220 |

List of abbreviations

| | |
|--------|--|
| ART | Te Āti Awa, Ngāti Raukawa ki te Tonga and Ngāti Toarangatira |
| BBN | Bayesian belief network |
| CLSM | Causal loop systems map |
| CNT | Connectedness to nature theory |
| CPT | Conditional probability table |
| EDS | Environmental distress scale |
| GIS | Geographic information system |
| JMA | Joint Management Agreement |
| LCSA | Life cycle sustainability assessment |
| M2PP | Mackays to Peka |
| NEG | New environmental governance |
| NIWA | National Institute of Water and Atmospheric Research |
| NOF | National Objectives Framework |
| NPS-FM | National Policy Statement for Freshwater Management |
| RMA | Resource Management Act 1991 |
| NZTA | New Zealand Land Transport Authority |
| TAKW | Te Āti Awa ki Whakarongotai |

Glossary

| | |
|---------------------|-------------------------------------|
| ahi kā | continuous occupants |
| āhua | character |
| Aotearoa | New Zealand |
| aroha | compassionate love |
| āronga | worldview |
| atua | deity |
| awa | river |
| hapū | subtribe |
| hapuka | cod (<i>Polyprion oxygeneios</i>) |
| haukāinga | home people |
| hauora | well-being |
| hihiri | energy |
| huanga | outcome or attribute |
| hui | meeting |
| hui rangatahi | youth camp |
| ira wahine | feminine nature |
| iwi | tribe |
| kaimoana | seafood |
| kāinga | village |
| kaitiaki | guardian |
| kaitiakitanga | environmental stewardship, care |
| kanae | mullet (<i>Mugil cephalus</i>) |
| kanohi ki te kanohi | face to face |
| karakia | incantations, prayer and meditation |
| karanga | ceremonial calling |
| kaumātua | elders |

| | |
|--------------------|---|
| kaunihera | council |
| kaupapa | values |
| kāwanatanga | governance |
| kete aronui | the aspect of our worldview that arises from what we can sense through our perception |
| kete tua-ātea | the aspect of our worldview that pertains to the possible reality |
| kete tua-uri | the aspect of our worldview that pertains to the real world beyond what we can see |
| kina | sea urchin (<i>Evechinus chloroticus</i>) |
| kohanga reo | Māori language preschool |
| kore | nothingness |
| kotahitanga | community unity |
| kōrero | information |
| kōura | crayfish (<i>Jasus edwardsii</i>) |
| kumukumu | red gurnard (<i>Chelidonichthys kumu</i>) |
| kura kaupapa Māori | Māori medium instruction school |
| manaakitanga | the ability to care for others |
| mahinga kai | cultural practice of food cultivation and gathering |
| mana | authority, power, status |
| mana | self-determination |
| mana whenua | group with territorial rights |
| Māoritanga | Māori identity |
| marae | communal meeting grounds |
| maramataka | lunar calendar |
| māramatanga | enlightenment |
| mātauranga Māori | Māori knowledge |
| matua | term of respect for older man |
| mauri | life principle |

| | |
|---------------------|--|
| mokopuna | grandchild |
| ngākau | heart |
| ngārara | Māori taxonomical group that include taniwha lizards and insects |
| ngā taonga tuku iho | aspect of treasured heritage that are inherited |
| noho puku | quiet reflective place |
| Pākehā | person, or pertaining to people of European descent |
| pātiki | flounder (<i>Rhombosolea patiki</i> ; <i>Rhombosolea spp</i>) |
| pepeha | tribal saying |
| piharau | lamprey (<i>Geotria australis</i>) |
| pō | night |
| pou | pillar |
| puku | gut |
| puna | spring |
| puna o te aroha | wellspring source of aroha |
| pūtake | origin |
| rāhui | temporary prohibition |
| rangatahi | youth |
| rangatira | chief |
| rangatiratanga | right to exercise authority |
| rohe | tribal territory |
| rongoā | Māori medicine |
| tāhuhu kōrero | iwi history |
| taiao | environment |
| tamariki | children |
| taniwha | powerful creature |
| taonga | things treasured, including natural resources |
| tapu | be sacred |

| | |
|----------------------|--|
| Te Aka | vine |
| Te Ao Mārama | the material world of being |
| Te Ao Tūroa | the enduring world, the natural world |
| Te Ara Poutama | pathway followed by Tānenuiarangi in the pursuit of knowledge |
| Te Moana-nui-a-Kiwa | the Pacific Ocean |
| Te Pō | the spiritual world |
| Te Pū | seed |
| Te Rea | shoot of a plant |
| te taha hinengaro | mental health |
| te taha tinana | the physical body |
| te taha wairua | the spiritual aspect |
| te taha whānau | family and social relationships |
| Te Tiriti o Waitangi | The Treaty of Waitangi |
| tukutuku | Māori lattice work |
| Te Wao-nui | The great forest |
| Te Weu | rootlet |
| Te Whare Tapa Whā | the four-walled house |
| te whare tapere | performative arts |
| tikanga | correct protocols, practices, policy and regulation |
| tikanga Māori | Māori law, regulations that enforce Māori cultural norms and values; practices |
| tino rangatiratanga | autonomy, sovereignty |
| tohu | indicator |
| tohunga | expert |
| toroa | albatross (<i>Diomedea sanfordi</i>) |
| tuna | eel (<i>Anguilla dieffenbachii</i> , <i>Anguilla australis</i>) |
| tupuna | ancestor |
| tūpuna | ancestors |

| | |
|------------------|--|
| tūturu | genuine |
| urupā | cemetery |
| waerea | protective incantation |
| wāhi tapu | sacred place |
| waiata | song |
| wairua | spirit |
| wānanga | creation of knowledge |
| whaiao | world of light |
| whaikōrero | art of making formal speeches |
| whakaaro | to think |
| whakama | embarrassed |
| whakapapa | genealogies |
| whakaterere waka | sailing |
| whānau | family |
| whanaungatanga | familial connection to one another, kinship, social cohesion |
| whare kura | traditional Māori schools |
| whare wānanga | institution of learning |
| whenua | land |

Chapter 1: Ko te pūtake – Introduction

Māori have always been future seers. Māori have always had the ability and right to realise the futures they envision. But in the postcolonial state of Aotearoa (New Zealand), Māori are still fighting to see those rights in relation to water realised (New Zealand Māori Council, 2018). The founding document of Aotearoa, Te Tiriti o Waitangi (The Treaty of Waitangi), is the basis for the recognition of rights and roles of Māori and the Crown in relation to water. While the legal implications of Te Tiriti as it relates to water continue to be examined, Ruru's (2016, pp. 434–435) analysis found that the specialist body established to investigate how the Crown should act in accordance with Te Tiriti, the Waitangi Tribunal, has consistently interpreted that, in general, the Crown's right to kāwanatanga (governance) is qualified by Māori rights to tino rangatiratanga (sovereignty) over taonga (things treasured, including natural resources).

Bargh (2007, p. 10) showed that 'tino rangatiratanga' has been defined in many different ways: mana motuhake, absolute chieftainship, full chiefly rule, self-management, self-governance and self-determination. While Māori 'sovereignty' is another often used translation of tino rangatiratanga, in more recent times, commentators have encouraged a reframing away from 'sovereignty', in favour of foregrounding the Māori political claim of 'rangatiratanga' on the basis of tikanga Māori, or Māori law, in the same way that Europeans have made claims to 'sovereignty' on the basis of Crown Law. They argue that 'sovereignty' is not a 'tūturu' (genuine) starting point for Māori discourse on their right to exercise authority over their own existence and territories, particularly given its history in being mobilised as a tool of colonisation (Maaka & Fleras, 2005, p. 37; Tomas, 2013, p. 222).

The realisation of tino rangatiratanga would include the freedom for Māori to continue their relationship with water in a self-determined way. However, to date the Crown legal framework has not been applied in a way that adequately conceptualises and provides for the relationship Māori seek to have with water. It does not have equivalent concepts to the Māori basis for tino rangatiratanga, which comes from 'having developed an intimate connection with the environment and an intricate web of relationships to regulate our place within it', or the subsequent cultural and legal imperatives this then creates to maintain balance (Mikaere, 2011, p. 126). There is also little in terms of a Crown legal framework to deal with the Māori understanding that hapū and iwi simultaneously belong to the water and the water belongs to them (Bargh, 2007, p. 11) or that our identity and sense of self are inextricably bound with the water: 'Ko au te awa, ko te awa ko au' (I am the river, and the river is me).

The inadequacies of postcolonial legal frameworks are seen internationally in the way that technical processes of water management seem to just perpetuate colonial relations and values of water. When legal and corresponding technical processes limit the way in which local indigenous communities can conceptualise their relationship with water, the communities are ultimately limited in their ability to protect all the values that relationship includes. In Australia, this has been observed through the technical water allocation processes that focus on supporting the colonial value of 'industry' while marginalising the multiple other integrated water values held by local indigenous communities in relation to water: 'Water places are places of memory and renewal, not simply of bodily needs, but of stories and connection of identity, of the past, and of future possibilities' (McFarlane, 2005, as quoted in (McLean, 2014, p. 199).

The Māori knowledge tradition understands this connection between values, regulation and knowledge explicitly. As described by Royal (2012), in the Māori worldview, kaupapa Māori, or the political platform of values held by Māori, is realised through two related

systems: tikanga Māori, or regulations that enforce cultural norms and values, and mātauranga Māori, which is the existing and created knowledge about how to be in and encounter the world in a way that gives expression to our indigenous worldview.

A knowledge system that explicitly acknowledges the subjective tendency of science to reinforce political and legal values is distinct from the traditional Western scientific approaches, which still often try to insist on the objective, value-free nature of science and technical practice. However, the term 'technopolitics' has emerged in the Western science tradition to define the strategic practice of designing or using technology to constitute or enact political goals (Hecht, 2001b, p. 256). This arose out of studies into the history of technology, which have often examined how technological systems uphold certain values, through embodying and reinforcing social and political power (Hecht, 2001a).

This chapter will highlight how the tools that have been developed to date to assist in decision-making about water in Aotearoa reflect specific values held within certain groups. This means that when these tools are applied to inform decision-making, the policy developed as a result continues to reinforce and enact those values and the political power of those who hold them. Conversely, there is a significant lack of technical tools developed and invested in relating to Māori values.

Technopolitics and the denial of Māori futuring abilities

How then is this playing out in reality in Aotearoa? I turn now to my own local experience of this issue and how it culminated in the topic of this thesis.

At a time when I was living overseas and deciding what to do next, the Waikanae River called me home. My iwi Te Āti Awa ki Whakarongotai needed some help with

environmental planning for the river, and while working on that from afar, I realised where I really wanted to be. Nearly five years later I am the Pou Takawaenga Taiao for my iwi, managing a little team of four amazing Te Āti Awa women all working in kaitiakitanga for the betterment of our land, water and people.

Since returning home, one of the key areas of my work has been investigating how to implement the National Policy Statement for Freshwater Management (NPS-FM) 2014 (New Zealand Government, 2014). A fundamental policy introduced through the NPS-FM is the mandatory requirement for regional councils to set water quality objectives and the limits to resource use that is required to achieve those objectives. The policy process followed to implement this requirement are referred to as 'objective and limit-setting'.

Objective and limit-setting is achieved through the National Objectives Framework (NOF) in NPS-FM. The NOF works as an accounting system in the management of freshwater quality and quantity in accordance with the following policy process:

- It identifies national values of freshwater of which measurable attributes of those values are identified, e.g. ecosystem health, human health for recreation
- It sets national 'bottom lines' or 'minimum acceptable states' for those attributes.
- It then devolves the authority to councils to implement the following cascade:
 - Identify freshwater objectives for each of those attributes that must be specific to 'freshwater management units' or distinct catchments.
 - Set limits on resource use that will be required to achieve those objectives.
 - Establish objectives, policies, methods and rules in plans to ensure the limits are applied to resource users.

Setting objectives requires the consideration of the health of water that communities want to see in the future, and setting limits requires identification of the steps that need to be

taken to realise that future. These processes are therefore often informed by scientific methods of future scenario testing, which in this context is described as 'making predictions, often using various types of models or analytical inference, of what the future could look like under various resource management scenarios' (Rouse & Norton, 2017, p. 13).

In order for this type of future scenario testing to be inclusive of the future scenarios that Māori may wish to see for water, this would require knowing the values they hold in connection to water, how to measure those values, and then the ability to assess how use, such as discharges to water or certain amounts of water takes, would affect those values. The potential issues with that process for us as Māori first became evident through a particular case study in our rohe.

A significant motorway project had been underway in our rohe for several years, and as construction continued, the New Zealand Land Transport Authority (NZTA) required resource consents for aspects of the construction. One such consent application proposed to disturb land with soil and groundwater that was heavily contaminated with a range of heavy metals, including arsenic, which had likely originated from previous land use as market gardens. The proposal was to remove some of the soil, but leave the remainder and inundate it with water, to provide for flood storage for the catchment of the Wharemauku Stream, because of the need created by the motorway for more flood storage. This would result in a discharge of those contaminants into the water. In my role working for the iwi, it was quite clear to me, given my kaitiaki expertise, that the disturbance and wetting of soil contaminated in this way would make the contaminants more bioavailable, and once discharged into land and water, they would be taken up by insect and plant life, bioaccumulating in the food chain of the catchment. The effects of this on our relationship to the stream would be profound and integrated across a range of different values. Beyond the obvious effects to the stream life itself, given that streams

provide a key source of food or mahinga kai, our people's health would be put at risk by consuming food harvested from this stream, and the need to cease harvesting and therefore the connection we have to that stream would have a range of economic, social, cultural, emotional and psychological effects on our people. It would limit opportunities to feed families, share recreational time together and generate feelings of connectedness and calmness from mahinga kai, and on a deeper level, the proposal was a reminder that our values as iwi were not front of mind in those planning the road being built.

I could see very clearly in my mind's eye what the future would look like for this stream and for our relationship to it if this proposal went ahead. I shared the application with our environmental committee, and based on their expertise and experience, they could see the same future scenario very clearly. Given the protection of our values in the legal framework, and the scale and severity of the likely future effects to those values, it was clear that this proposal should not be allowed to go ahead.

I followed the process of writing up an assessment, identifying the threatened native fish and traditional foods growing in the stream, and outlining the history of connection to the area of the catchment for mahinga kai. I pointed to the Regional Plan schedules (Greater Wellington Regional Council, 2015, pp. 284,285,296), which identified that the stream's values would necessitate written approval from the iwi for works such as those proposed to be consented. I set out the basis for opposing the proposal by referring to geomorphology and ecotoxicology literature that explained how disturbance of land contaminated with arsenic makes the contaminant more bioavailable and pointed out that the proposal had been developed without the benefit of any analysis to assess the levels of arsenic that may move into sediments. I explained the predictable risk to human health posed by consuming food from the stream with the support of the Ministry of Health's public health advice.

Despite this, Regional Council granted the resource consent. Little in terms of the concerns we raised was addressed in the consent application report and decision. Regarding the effects to mahinga kai, the assessment from the contaminated land specialist stated that he considered 'that sampling mahinga kai is a very difficult matter to undertake and interpret, and is not recommended'.

Over two years later, through quite simple methods, our own kaitiaki sampling of watercress now growing in the disturbed area was tested and results found that concentrations of arsenic in the plant material was nine times that of the Australia New Zealand Standards Code (Food Standards Australia New Zealand, 2017). Our iwi now have a rāhui placed on any harvesting or contact with the stream. The worst case future scenario that we had predicted as an iwi had been realised, and our relationship to that waterway severed.

At the time the consent was granted, long before generating the result that would prove our prediction had been correct, it was clear that while the legal framework recognised our rights to have our relationship to water protected, our knowledge and technical skills as kaitiaki and our ability to see and come to conclusions about probable future impacts to the values involved in that relationship were disregarded. The inclusion of Māori values and concepts in the law, policy and plans was toothless if the knowledge of what they mean, how they are measured and their potential future trajectories was not considered valid to the extent that they had any decision-making weight.

The case study had highlighted the denial on the part of regulators of the ability for Māori to conduct their own future scenario testing, that is, to come to well-informed conclusions about the effects of future scenarios on the values they hold in relation to water. This denial has implications for us as Māori more broadly as we looked to engage with the future scenario testing that would be used inform the objectives and limit-setting

processes under the NPS-FM. Already in attempting to engage in the technical quantitative modelling projects that Regional Council were developing as part of those processes, I had been told that ‘Māori seem to be uncomfortable about modelling’, and ‘Māori don’t like putting numbers to their values’.¹ Other Māori attempting to engage with quantitative modelling projects being facilitated by Regional Council at the time shared concerns that they felt that not only were Māori knowledge and future scenario testing based on this knowledge being seen as invalid, but many Western scientists seemed to have assumed that scenario testing itself was distinct to their knowledge system, as if other knowledge systems were not employed to carry this out as well.

This ignored that Māori and their ancestors have a long successful tradition as future seers. It was at odds with the experiences I had enjoyed with many different kaitiaki across the country, when I saw them apply different types of models to inform decision-making, such as maramataka to efficiently manage their farm productivity, astronomical models to assist in oceanic navigation, or models that triangulate temperature, colour, wind direction and time to make predictions about fish migration. To my own knowledge, Māori held and applied a range of tools that enabled them to model, think about and plan for the future. I came to think about these as ‘futures tools’ after engaging with literature on tools that were developed for similar purposes (Cornish, 2004; Hajer & Pelzer, 2018; Millett, 2006).

These futures tools are often referred to collectively in the literature as ‘modelling tools’. The terms ‘model’ or ‘modelling’ can create ambiguity as they can be used to refer to a wide range of different tools or processes that are applied for different purposes. In this thesis I always attempt to qualify the types of models or modelling I am referring to in order to provide as much clarity as possible. Table 1.1 also provides an overview of the

¹ These prejudiced views are reminiscent of the common assumption that Māori educational professionals encounter - ‘Māori aren’t very good at maths’ - as discussed by Te Maro (2018).

key terms used in this thesis to refer to different types of models and a definition of each based on how it is presented in the literature.

Table 1.1 Different types of modelling referred to in this thesis.

| |
|---|
| Mathematical Modelling |
| The use of mathematical equations to represent a real-world system. Such equations are used to describe various components of the systems, as well as to show how those components are interconnected and interact with each other. Such systems of equation are deterministic and contain no probabilistic element. |
| Statistical Modelling |
| The use of equations to test and describe the probability of some behaviour happening. Statistical models differ from mathematical models in that their equation structure attempts to measure probability by showing what can be explained versus what cannot be explained. |
| Quantitative Modelling |
| Although not a common term used in the literature, this is used as an umbrella term to refer to all methods that measure quantities to describe or represent reality. This includes not just mathematical and statistical modelling, but also geographic information systems (GIS) and rule-based systems that attempt to simulate spatial dynamics. |
| Conceptual Modelling |
| The use of a diagram or map to represent a system, identify its components, and sometimes the relationship between its components, to assist people to understand or examine the system. Quantitative modelling will be based on an underlying conceptual model of the system that is understood by the modeller; however, in some cases this will not have been made explicit, but just assumed. |

In order for Māori to realise the future they want to see with regards to water, they need to be well equipped with a knowledge framework and technical tools that can be used to uphold and protect the values that their relationship to water comprises. This is in order to ensure that their values are not ignored or marginalised through decision-making and other policy processes relating to freshwater use and management of human activity. The revitalisation, reaffirmation, development and use of Māori technical knowledge of water systems is critical in shifting the postcolonial power relationships that continue to privilege the colonial view of our relationship to water. In that sense, Māori technological tools might be seen as a critical agent of political and broader national cultural

transformative change and decolonisation. While there has always been much emphasis on the political tools of transformation and decolonisation, the technological tools that are vital to support this agenda appear to have been overlooked.

Research aim

The aim of this thesis was to propose and operationalise a mātauranga Māori framework and futuring tools that iwi can apply in decision-making to assist them in realising the futures they wish to see for water systems.

Te Āti Awa ki Whakarongotai and the Māori knowledge tradition

Given the aim of this research, it has been conducted within the mātauranga Māori tradition of knowledge creation. Mātauranga Māori is a modern phrase used to refer to the indigenous knowledge system that has its origins in Te Moana-nui-a-Kiwa (the Pacific) and has continued to develop here in Aotearoa (Broughton & McBreen, 2015; Royal, 2012, p. 33; Smith, Maxwell, Puke, & Temara, 2016, p. 145).

This research has been conducted as a case study under the direction and guidance of my iwi Te Āti Awa ki Whakarongotai. This is consistent with protocols of the control and protection of mātauranga Māori and its use, creations and dissemination (Waitangi Tribunal, 2011, p. 44).

The rohe of Te Āti Awa ki Whakarongotai is set out in the following pepeha ;

Mai i Kūkūtauākī ki Whareroa, tatu atu ki Paripari

Rere whakauta ngā tinitapu ko Wainui, Ko Maunganui, Pukemore,

Kapakapanui, Pukeatua

Ūngutu atu ki te pou whakararo ki Ngāwhakangutu

Ko Te Āti Awa ki Whakarongotai e

From Kūkūtauākī ki Whareroa, extending to Paripari

Up to the sacred peaks of Wainui, Maunganui, Pukemore, Kapakapanui,
Pukeatua

Down to the marker of Ngāwhakangutu

This is Te Āti Awa ki Whakarongotai

This tribal area is depicted below in Figure 1.1:

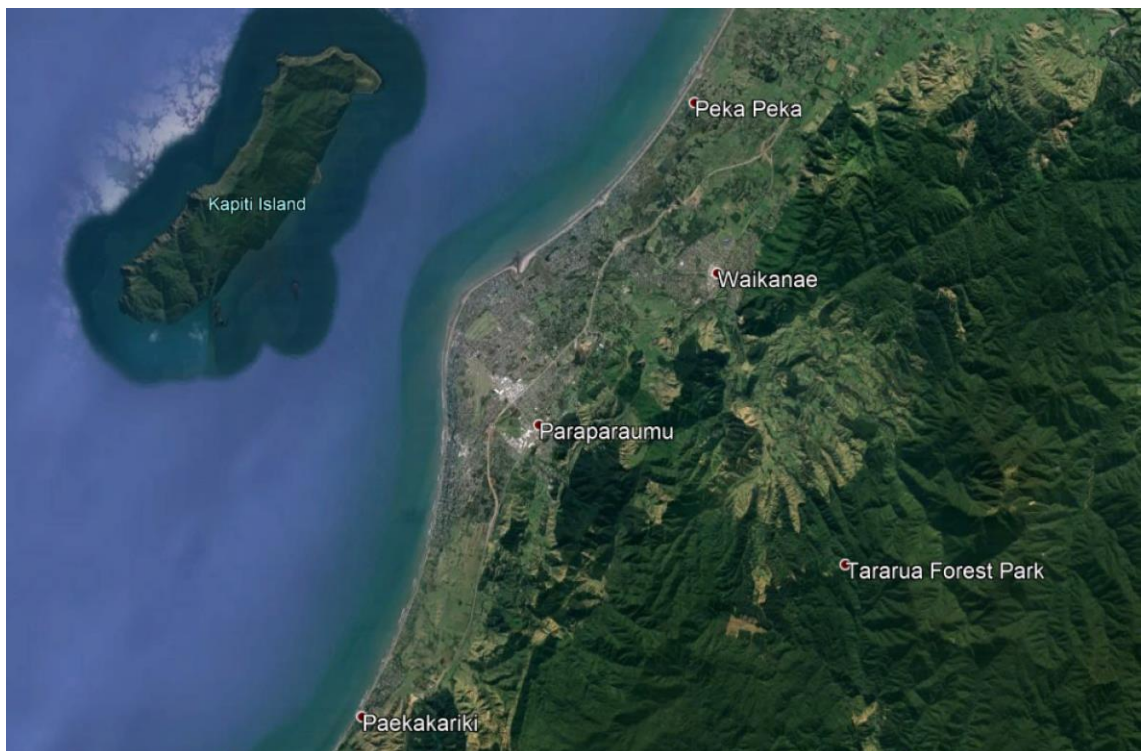


Figure 1.1 The rohe of Te Āti Awa ki Whakarongotai

While 2013 census data suggest that we are an iwi of fewer than 1,000 people, local iwi knowledge considers that this significantly underestimates the population size. That being said, we are definitely a very small iwi with a relatively unique identity. Our oral

tradition tells of our ancestors' waves of migration from Taranaki to the area where we are now mana whenua. A number of people from various iwi and hapū in Taranaki came down together and participated in the conquest of the area alongside Ngāti Toarangatira and Ngāti Raukawa. A few decades after establishing themselves as mana whenua, some of our people returned home, largely driven by the need to defend Taranaki from Crown invasion and assault in the Taranaki Land Wars. This meant that a mix of people from various Taranaki iwi and hapū remained as the ahi kā in Waikanae, Paraparaumu and Paekākāriki. The principal home of the collective was concentrated in an area of Waikanae that comprised Tukurākau kāinga and what is now Takamore urupā and wāhi tapu. Eventually, the rangatira Te Kākākura moved the marae from this location to where it stands today as Whakarongotai Marae, near the railway lines in Waikanae. Various whānau from Te Āti Awa and other Taranaki iwi and hapū collectives whakapapa to this marae, and collectively we are Te Āti Awa ki Whakarongotai.

Whereas many Māori exercise rangatiratanga and kaitiakitanga, or care, as it relates to freshwater as hapū entities, given our size and the nature of our present governance arrangements, the key authority for rangatiratanga and kaitiakitanga is held as an iwi collective, and this is the key political unit and lens through which this research was conducted. However, this rangatiratanga and kaitiakitanga is still enabled and supported through specific relationships that various hapū groups within the iwi hold with particular areas and waterbodies.

The starting point for my understanding, application and pursuit of creation of Māori knowledge comes from the knowledge tradition I have inherited through my own whakapapa. Because this research was conducted to support Te Āti Awa ki Whakarongotai, it has been guided and informed by my Te Āti Awa kaumātua and other Te Āti Awa experts. Te Āti Awa ki Whakarongotai is one of three iwi in the confederation of Te Āti Awa, Ngāti Raukawa ki te Tonga and Ngāti Toarangatira (ART), who together

in 1981 established Te Wānanga o Raukawa in Ōtaki, an institution to assist ART to revive and achieve its educational aspirations. My great grandfather Matenga Baker was heavily involved in this work, as a rangatira and knowledge holder.

Te Wānanga o Raukawa and all those who have been connected to its establishment, delivery of education and reinvigoration of iwi and hapū knowledge are central to the knowledge tradition I have inherited. Life in Ōtaki, where I grew up and to which I returned to live at the commencement of this PhD research project, is permeated with the life of Te Wānanga. My first job at the age of nine was helping my father, who was working as an administrator at Te Wānanga at the time, bind course outlines and readers late at night. Since then it has continued to connect me to the many creative and critical thinkers that have been involved with Te Wānanga, and as I complete this thesis I have taken up a teaching position there. This heavily influences the academics and practitioners who have informed my own education and whom I chose to engage with as a researcher and practitioner myself.

One such key teacher, researcher and writer with associations to Te Wānanga o Raukawa and whakapapa to Ngāti Raukawa ki te Tonga is Te Ahukaramū Charles Royal. He has written and theorised extensively on the topic of mātauranga Māori (Royal, 2005a, 2005b, 2007, 2008, 2009a, 2009b, 2009c, 2011, 2012). Some of this work has included the preparation and detailed interpretation of manuscripts from Māori Marsden, the renowned Te Aupōuri tohunga and scholar. Marsden produced some of the key seminal works on Māori philosophy, many of which are compiled in the text *The Woven Universe* (Marsden, 2003d), including an extract from his final seminar that was delivered at Te Wānanga. Both Marsden's and Royal's work has been relied on heavily to provide the initial framing of the mātauranga Māori tradition and understanding of the theoretical framework that was used for this research.

As stated earlier, a fundamental assumption of mātauranga Māori is that knowledge is not created or applied without an agenda of manifesting certain Māori kaupapa or values (Marsden, 2003c, p. 28). This agenda, political platform or ‘plan’ of Māori values is what is referred to in the literature as ‘kaupapa Māori’ (Royal, 2012), and this research has been conducted with an explicit agenda to develop the technical tools that can better enable the values of Te Āti Awa ki Whakarongotai to influence decision-making on freshwater.



Royal's (2008) book *Te Ngākau: He Wānanga i te Mātauranga* presents the view that the key value that the use, creation and advancement of mātauranga Māori should be grounded in and manifest is aroha (compassionate love). This is reinforced on the marae of Whakarongotai, where the pou Te Puna o te Aroha stands (see Figure 1.2). The carvings on the pou depict the ascent to knowledge that arises from 'the wellspring of aroha', and a tuatara named Kōpaearea, sitting near the top, in his role as Te Āti Awa kaitiaki (guardian) of knowledge.²

Figure 1.2 Te Puna o te Aroha

The principle of aroha has guided me throughout this research. Ultimately, the intention of pursuing this research project and developing technical tools is out of a deep sense of aroha for the water, for its life-giving and cleansing properties, for both the absolute joy and the calmness we all derive from

² Personal communication from Te Āti Awa ki Whakarongotai kaumatua Paora Ropata.

the Waikanae River, and for the way it connects us to one another as people of Te Āti Awa ki Whakarongotai. It is my intention that the tools created through this project will not only be useful in a political sense but also support the iwi to reinstate more loving and healthy relationships to the water, to each other and to themselves.

Ngā Kete o te Wānanga: The theoretical framework of the research

This thesis has used Ngā Kete o te Wānanga as a theoretical framework to guide the research inquiry and identify what the mātauranga Māori framework and tools for decision-making would comprise. The writings of Māori Marsden in *The Woven Universe* (2003d) as presented by Royal and also further interpreted in his other texts (1998, pp. 52–53; 2005b p. 61) have been relied on heavily to assist in understanding Ngā Kete o te Wānanga in order to apply them as a theoretical framework for this research. More in-depth discussion of mātauranga Māori as an epistemology, its application and key concepts according to a broader range of commentators is provided in the following chapters.

Royal (1998, p. 53) refers to Marsden's interpretation of Ngā Kete o te Wānanga, or the three baskets of knowledge, as mythopoetic symbols in the Māori oral tradition of the pursuit of knowledge. In the tradition, Tānenui-a-rangi ascends to the highest heaven, where he acquires the three baskets, and then returns to earth, where he establishes the institutions of higher learning. Symbolically, Ngā Kete o te Wānanga provides a framework for the Māori worldview of reality that is evident through the pursuit of knowledge. Royal (1998, pp. 52–53) presents Marsden's (2003b) interpretation of each of the three baskets as symbols of three different conceptual time-space aspects of the Māori worldview of reality:

- Te Kete Tua-uri: the aspect of our worldview that pertains to the real world beyond what we can see
- Te Kete Aronui: the aspect of our worldview that arises from what we can sense through our perception
- Te Kete Tua-ātea: the aspect of our worldview that pertains to the possible reality.³

To assist in understanding the meaning of Ngā Kete o te Wānanga, and how they relate to one another and to the broader Māori cosmological view, it should first be established that a fundamental aspect of the mātauranga Māori view is that it sees reality as a dynamic, lineal, ongoing stream of processes and events, which are usually represented through the use of whakapapa, or a genealogy, that shows the dynamic movement from one state or event to the next (Marsden, 2003a): ‘Every object is the result of a prior cause, of a chain or procession of events’ (Marsden, 2003c, p. 31).

As shown in Figure 1.3, Royal (1998) uses a traditional Māori cosmological whakapapa to show the process from the origin of the universe at Io, through to the creation of our physical world at the separation of the primordial parents of Ranginui and Papatūānuku (the sky father and earth mother), and the continuation through to today’s and future generations and worlds, and how each kete relates to these.

³ Different oral traditions may have different names for each of Ngā Kete o te Wānanga, which may be utilised to conceptualise knowledge in a different way. Other names for Ngā Kete o te Wānanga that are occasionally encountered are Te Kete Uruuru Tau, Te Kete Uruuru Rangī, and Te Kete Uruuru Matua. Other names such as these might be applied to conceptualise knowledge according to their discipline, purpose or status (Buck, 1974, p. 449). This thesis engages with the specific way of conceptualising knowledge through Tua-uri, Aronui and Tua-ātea, or the different aspects of worldview and reality, as discussed by writings of Marsden and Royal referred to in this Chapter.

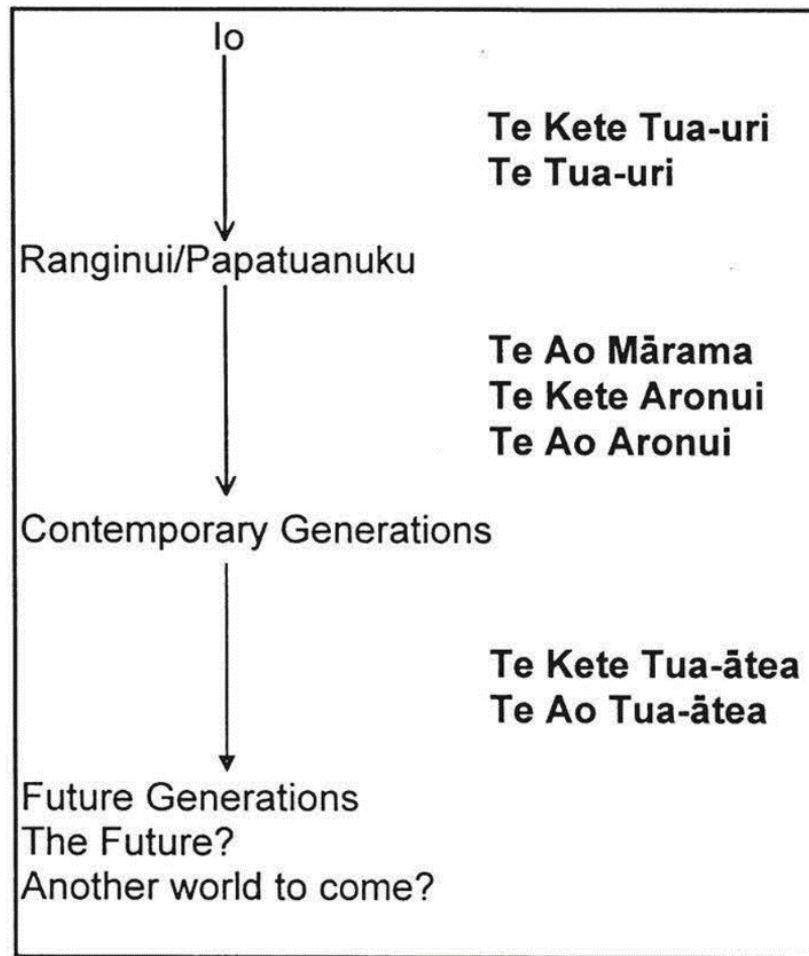


Figure 1.3 Whakapapa from Io to the future (Royal, 1998).

The first basket, Te Kete Tua-uri, is defined by Marsden (2003b) as the worldview of that which is 'beyond in the darkness' (p. 60). It pertains to the real world beyond that which is illuminated for us to see plainly.

This is the 'real world' behind the world of sense perception of the natural. It is the seed bed of creation where all things are gestated, evolve, and are refined to be manifested in the natural world. This is the world where the cosmic processes originated and continue to operate as a complex series of rhythmical patterns of energy to uphold, sustain and replenish the energies and life of the natural world (Marsden, 2003b, p. 60).

This part of a Māori worldview includes knowledge about fundamental concepts of cosmic processes such as mauri, hihiri, mauriora and hauora.

Te Kete Tua-uri is presented by Royal in whakapapa as pertaining to everything preceding the material or physical world which was created by the separation of Ranginui and Papatūānuku. As emphasised by Marsden, Te Kete Tua-uri does not necessarily relate to what precedes the material world in terms of time, in that it relates just to the past; instead, it relates to what precedes the physical world in conceptual space - to the metaphysical world behind what we see in the physical world:

Tua-uri is the real world of the complex series of rhythmical patterns of energy which operate behind the world of sense perception. Though we cannot prove its existence by logical argument, we are compelled to assume its existence behind that of the world of sense perception (Marsden, 2003b, p. 60).

This then leads to Te Kete Aronui, which pertains to the Māori worldview of what Marsden (2003b p. 61) defines as the physical world that can be apprehended by our senses. Te Kete Aronui is the worldview of the reality that we perceive, as opposed to true metaphysical reality, about which we can only theorise. Te Kete Aronui is presented by Royal in whakapapa as pertaining to everything that has been observed since the emergence of the material world, Te Ao Mārama, including the observations and associated knowledge of the present day. Marsden gives examples of knowledge from Te Kete Aronui, including observed natural cycles and patterns.

Te Kete Tua-ātea, the third basket, is the worldview of that which Marsden (2003b p. 61) defines as 'beyond space and time', of the multiple realities that can exist when time-space is infinite and eternal. He refers to Tua-āteā as the realm of Io, the deity who personifies omnipresence and omniscience who is therefore regarded as supremely

divine (Marsden, 2003b p. 62). In the whakapapa presented by Royal, Te Kete Tua-ātea proceeds from Te Kete Tua-uri and Te Kete Aronui, and relates to future generations; he questions whether it relates to knowledge about the future and worlds to come. In another text, Royal (2005b) suggests that Te Kete Tua-ātea is associated with 'the world of ultimate reality...that is located outside of space and time' (p. 61). This suggests that Te Kete Tua-ātea relates to the infinite possible realities, as opposed to the experienced reality. It may not just relate to possible future realities, but also to alternative present realities. For the purpose of applying this as a theoretical framework in this thesis, Te Kete Tua-ātea has been utilised to interpret the infinite possible futures that the absolute nature of ultimate reality comprises. It is a lens that allows us to see and examine futures scenarios of interest.

Ngā Kete o te Wānanga as a theoretical framework thus presents reality as a layered construct of three types of knowledge. The first layer is the fundamental reality of the universe that exists, but which we can never see fully, or know perfectly. We can only make assumptions about how that reality exists based on the second layer, our perceived reality, which comprises all that we observe. The last layer is the infinite realities that we believe could exist. Our knowledge of how possible future realities will look and function is informed by our knowledge of how true and perceived realities have functioned to date. This theoretical framework of knowledge in relation to different layers of reality, as represented in Ngā Kete o te Wānanga, is set out in Figure 1.4.

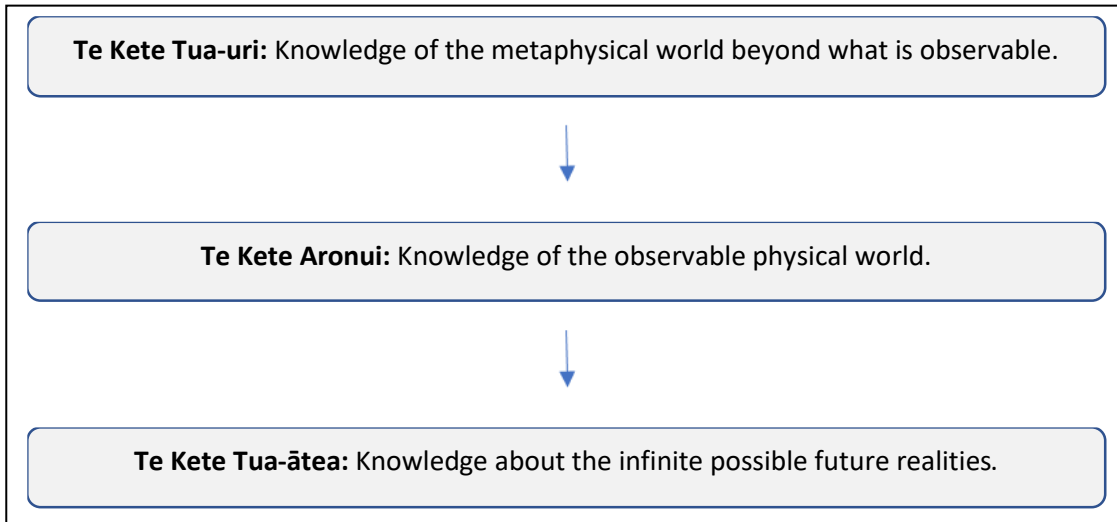


Figure 1.4 Knowledge about the different layers of reality as conceptualised by Ngā Kete o te Wānanga.

Effective decision-making involves the ability to know or infer what actions or changes are required to deliver outcomes that people wish to see in the future. Ngā Kete o te Wānanga tell us that Te Kete Tua-ātea, our knowledge of and tools to infer possible future realities and how they will function, is informed by both Te Kete Aronui and Te Kete Tua-uri, the strength of our observations and the knowledge we have been able to develop of the unobservable parts of the universe. The knowledge and tools of all three kete are required to support the realisation of the futures that Māori wish to see. Each of these three kete are explored in more detail throughout this thesis.

Research questions

To fulfil the aim of this research, Ngā Kete o te Wānanga have been applied through the development of research questions to identify the knowledge and technologies of each kete required for a mātauranga Māori framework and futuring tools that can support iwi decision-making and the realisation of their future aspirations for tino rangatiratanga in relation to water. The research questions identified through the application of Ngā Kete

o te Wānanga are all interrelated, in that the findings that arose from each kete informed one another.

The knowledge of the first kete, Te Kete Tua-uri, includes the fundamental theory and knowledge of how the universe and natural systems work, and the key values that give rise to our worldview. This leads to the first research question:

Te Kete Tua-uri - Research Question One: What are the fundamental knowledges and values that inform Te Āti Awa ki Whakarongotai worldview of how freshwater systems work?

The knowledge of the second kete, Te Kete Aronui, that would support iwi decision-making includes all the knowledge generated from observations of systems and the technologies that facilitate those observations and help us to interpret them. This leads to the second research question:

Te Kete Aronui - Research Question Two: What approach and technological tools have been and can be applied by Te Āti Awa ki Whakarongotai to facilitate observations of freshwater systems for the purpose of informing decision-making?

The knowledge of the third kete, Te Kete Tua-ātea, that would support iwi decision-making includes knowledge about the future and the tools that can be applied to examine future scenarios and change over time. This leads to the third research question:

Te Kete Tua-ātea - Research Question Three: What approaches and tools have been and can be applied by Te Āti Awa ki Whakarongotai to examine how

freshwater systems will change across a range of future scenarios, to support their decision-making?

Methods

A range of methods have been employed in this research to assist with each of the research questions. All research has been overseen by the Taiao (Environment) Committee of Te Āti Awa ki Whakarongotai, as directors of and participants in the data collection and testing of the research. They have ensured that the appropriate ethical processes have been followed in this project. Chapter 3 provides more detail on the methods that have been used in this thesis.

This research is interdisciplinary in nature; it is concerned with freshwater systems with integrated ecological, knowledge, political, economic, social and psychological values, and the technological tools that relate to them. This has required a wide-ranging review of relevant literature.

Much of the knowledge and values that inform the iwi worldview about how freshwater systems work and the knowledge of approaches and tools for observation and scenario testing are held orally by the whānau of Te Āti Awa ki Whakarongotai. The collection of this mātauranga has largely been facilitated through a range of interviews, focus group workshops and wānanga. Additionally, a full analysis of any archival information that could be found was conducted.

The exploration of approaches and tools of observation and scenario testing has been done through the participation of iwi in the following ways:

- two iwi-wide wānanga

- five focused wānanga of kaitiaki and mahinga kai experts
- the assistance of two iwi kaitiaki to test the use of specific technical tools.

Chapter outline

This first Chapter, 'Ko te pūtake', has introduced the topic, aim, research questions, and methods of this thesis. It has established Ngā Kete o te Wānanga as the theoretical framework that has been applied through the research. It will conclude by providing the current political context for Māori and their relationship to water, specifically the pursuit of tino rangatiratanga.

Chapter 2, 'Grounding the research in Ngā Kete o te Wānanga', explores the various knowledge tools of Ngā Kete o te Wānanga that are currently found in the literature which are applied to support Māori in their pursuit of tino rangatiratanga. The review presents three interrelated functions of knowledge that comprise Ngā Kete o te Wānanga: to create meaning from what we observe, to create and apply theories of how the world works, and to create knowledge about how the future will look.

Chapter 3, 'Te Ara Poutama', provides a reflexive account of the kaupapa Māori methodology applied through the iwi-led research and work presented in this thesis. It sets out the process and methods applied to develop a mātauranga Māori framework and futuring tools across three phases of research, each of which are informed by one of the three Kete o te Wānanga and address one of the three research questions. These three phases are:

1. Te Kete Tua-uri: Research to identify the fundamental knowledges and values that inform the iwi worldview of freshwater systems.

2. Te Kete Aronui: Research to identify the approaches and technological tools the iwi can apply to facilitate observations of freshwater systems.
3. Te Kete Tua-ātea: Research to identify approaches and tools the iwi can apply to examine how freshwater systems will change in different future scenarios.

Chapter 4 presents the first phase of the research, Te Kete Tua-uri, which identifies the fundamental knowledge and values that inform the worldview of Te Āti Awa ki Whakarongotai on water systems in the form of an iwi ontology of water. This phase was carried out as part of the development of an Iwi Kaitiakitanga Plan, which involved the identification of not just the values of water, but also huanga, or outcomes that would be observed if these values are upheld. An index of freshwater health huanga was then compiled to inform the following research phase.

Chapter 5 presents the second phase of the research, Te Kete Aronui, which identifies the approaches and tools that can be applied by Te Āti Awa ki Whakarongotai to facilitate observations of freshwater systems. The Chapter presents the resulting monitoring regime that was established by the iwi to monitor the huanga identified in Chapter 4, which includes biophysical and ecological methods through to methods for observing power relationships, through to more qualitative social science methods. The knowledge generated through this monitoring, when integrated, gives a whole of system understanding of freshwater health.

Chapter 6 presents the final phase of the research, Te Kete Tua-ātea. This Chapter presents the development of a conceptual model of the water system, which was informed by the knowledge created in the first research phase, and a statistical model that was informed by observational data and knowledge that was generated through the second research phase. These models are then applied by Te Āti Awa ki Whakarongotai to examine futures scenarios of water systems for the likely effects to our values. When

applied together, these three kete comprise the complete mātauranga Māori framework and complement of tools to support Te Āti Awa tino rangatiratanga in relation to water.

Chapter 7, 'Nā te wānanga te hauora', discusses the implications of this research, by examining how the generation and application of new knowledge and knowledge tools in relation to water systems can support the well-being of Māori and their water. The Chapter examines the implications of applying Ngā Kete o te Wānanga as a theoretical framework for water planning and care, both for Te Āti Awa ki Whakarongotai and more broadly from a national perspective, and the preconditions required for this to be successful.

The thesis concludes with Chapter 8, 'Ki te whaiao, ki Te Ao Mārama', by first discussing the key findings and contributions of the research, and then identifying the potential future trajectories these findings give impetus to. It identifies the type of paradigm shift required in the care of water and the environment more broadly in Aotearoa, outlines the need for fully operational technical systems to support tino rangatiratanga of iwi and hapū in Aotearoa, identifies the key areas that require further research, and discusses the fundamental need to continue building mātauranga Māori capability.

The current political context for Māori and their water: The pursuit of tino rangatiratanga.

It is also important to set out the broader political context of the research. This part overviews the various ways in which Māori have and continue to pursue tino rangatiratanga in their relationship with water in the context of the settler state of Aotearoa New Zealand. This provides the context of the different power arrangements

in which a mātauranga Māori framework might be employed by iwi to support freshwater decision-making.

Since their tino rangatiratanga was guaranteed protection in Te Tiriti o Waitangi in 1840, Māori have continued to strategically pursue recognition and realisation of their tino rangatiratanga in relation to water through the legal processes, structures, mechanisms and approaches available to them. Tino rangatiratanga in relation to water has continued to operate through the tireless efforts of iwi and hapū to reinforce their position as mana whenua and as kaitiaki of water (Bargh, 2007).

The literature presented in this part shows that the refusal of the Crown to recognise this has meant that iwi and hapū are limited in the extent to which their authority can be upheld, and this ultimately limits their ability to have their own aspirations for water realised. It has also meant that the geography of mechanisms utilised by Māori across the country to have their tino rangatiratanga recognised is varied and at different levels of maturity, reflecting a reality whereby Māori have to be somewhat opportunistic and make the most of whatever context they find themselves in, in terms of political timing and relationships with the Crown and local authorities, their own capacity and capabilities, and economic realities, in order to leverage arrangements or the effective implementation of the law that might provide for their aspirations in relation to water. This means that knowledge frameworks and technical approaches to support Māori in freshwater decision-making ideally should be adaptable to support Māori in a variety of different power arrangements. Part one of this chapter provides an overview for context of the various ways in which Māori have pursued and continue to pursue the realisation of tino rangatiratanga in relation to freshwater, and concludes with an outline of the settler state institutions of freshwater governance that Māori must interact with.

The first broad approach to pursuing this recognition has been through the development of a pluralistic legal system, whereby the statutory framework attempts to provide for the operation of Māori rights in natural resource management through the inclusion of certain Māori concepts as principles or values by which natural resource use is regulated, or through the recognition of tikanga Māori itself, as the Māori legal system of regulation and the first law of Aotearoa (Mikaere, 2007).

Gombay (2015), building on a definition by Oligiati (2007), defined legal pluralism as:

the circumstances in which multiple layers of law exist within a single state or society. These multiple legal frameworks are accorded different sources of legitimacy, and reflect the diverse normative frameworks that can exist within a given state. This is particularly the case in settings where the legal framework of the settler colonial state is coincident with pre-existing legal systems of Indigenous peoples. (p. 12)

The Resource Management Act 1991 (RMA) is the key piece of legislation for regulation relating to freshwater in Aotearoa. Its purpose is 'to promote the sustainable management of natural and physical resources'. All activities involving the use of freshwater and all plans submitted by local government on the management of freshwater are assessed in accordance with the range of specific principles and restrictions of the RMA.

Despite the pluralism of the statutory framework in Aotearoa, there has been broad criticism of its ability to enable tino rangatiratanga as it relates to water. In their analysis of the ability of Māori to influence decision-making on Lake Te Waihora, Memon and Kirk (2012) distinguished between the provisions of *exogenous* and *endogenous* regulation. Exogenous regulation relates to the establishment of mandates set by government

legislation and council planning, and endogenous regulation refers to the internal ethics, principles and values that inform water regulation and management. Regarding the recognition of Māori rights in the RMA, this is the distinction between the exogenous regulation that provides for the transfer of powers to tribal entities to develop plans and regulations for freshwater, and the endogenous regulation that identifies the following as key 'Māori principles' of the RMA that inform regulation:

- the relationship of Māori with their ancestral lands, waters and other taonga
- the practice of kaitiakitanga (Māori ethic of stewardship)
- the principles of the Treaty of Waitangi.

Memon and Kirk (2012) found that at the exogenous level, the RMA regulatory regime has been unwilling to devolve management powers to local Māori. Instead, tribal authorities rely on the emphasising of Māori principles at the endogenous level to leverage management schemes informed by their own values and worldview. Views on the ability of the pluralistic approach to support the realisation of tino rangatiratanga have varied: its successful implementation is celebrated as groundbreaking by some and a pipe dream by others (Tomas, 2013).

In other international contexts, Gombay (2015, p. 17) observed that legal pluralism does not necessarily imply that state legal systems give indigenous customary legal systems legal status; rather, they may only recognise their existence. She observed that the legal system in Canada operates in such a way that indigenous communities are often only in the position to have their values influence regulation by proxy of special provisions within the foreign colonial legal tradition.

Closer examination of this was provided by Kanwar, Kaza and Bowden (2016) in their analysis of water policy regarding the Kaipara Harbour; they showed that where attempts

are made to include Māori in water resource management, the language used in relation to those inclusions is 'gentle and implicit' (p. 39). A key example of this is the language used relating to the Māori principles within the RMA. Regulators are required to 'recognise', 'have regard to', 'take account of' and 'give effect to' those principles. Kanwar et al. recommended that instead of policy asking the regulator to give some form of consideration to how Māori or their values might be included in management or regulation, policy should focus on the delivery of 'specific outcomes from ecological, economic and indigenous perspectives that include the preservation of cultural identity and customary and ecological resources' (p. 39). They also noted that policy was more effective at integrating Māori values as their geographic scale and jurisdiction decreased.

The second key approach to having tino rangatiratanga recognised in relation to water has been through the Treaty settlement process, which has been concerned with redressing Crown breaches of the Treaty, including cultural redress of Māori relationships to waterways. These redress solutions have focused on creating management opportunities, often through co-management agreements of rivers, but they have not satisfied the more holistic reconciliation that Māori seek, which might include a range of means of redress, from providing for the restoration of the deeper ancestral connection through to commercial and proprietary redress (Ruru, 2013). More recent settlement statutes that have been negotiated between the Crown and Māori, which are addressed later in this chapter, have provided a better recognition of how Māori wish to relate to waterways (Ruru, 2018b); however, with most iwi having now settled historical grievances with the Crown, the vast majority of settlements provide a standard co-management arrangements.

The dilemma for Māori in these co-management arrangements is evident in van Meijl's (2015) examination of the evolving relationship of Waikato Māori with the Waikato River following their Joint Management Agreement (JMA) for the Waikato River with the

government. Before the agreement, the tribal groups regarded the river as an ancestor, and their key interest appeared to be protecting and enhancing the health of the river. After the agreement, tribes found that their JMA did not provide them with the authority to prevent or adequately influence the government in its moves to sell shares of power-generating energy companies located along the river. Waikato Māori were required to challenge the government's assumption that they held no property rights in connection to the river, and this drove a discourse that encouraged tribes to consider the river a property object, in the interest of benefiting from or influencing economic opportunities relating to the river.

This touches on the next key approach to recognition, which has been through the construct of ownership. Māori lodged a claim with the Waitangi Tribunal that the Crown's resource management reforms were happening without a plan to recognise and provide for Māori rights and interests in water. Partly driven by the unfolding situation with the Waikato River and the power company share sales, and the realisations that co-management agreements still did not provide for tribal authority or interests to the appropriate extent, the Tribunal granted an application to conduct an urgent hearing on the claim in 2012. A key finding of the report in Stage 1 of the inquiry, which was consistent with a history of Tribunal findings, was that Māori have a proprietary interest akin to ownership in relation to water (Waitangi Tribunal, 2012).

Having Māori rights akin to ownership recognised has been seen as a worthy strategy for some time because mana whenua have appeared limited in their authority or ability to implement tikanga Māori in connection to waterways without holding some form of property right. McCormack (2011) has observed this in the inability of Māori to enforce rāhui or bans on resource access when they do not hold any common property rights. In their case study on Lake Te Waihora, Memon and Kirk (2012, p. 954) observed how indigenous freshwater management often only becomes meaningful when specific

aspects of the waterscape are set aside for indigenous ownership, title or management. The vesting of lakebed and limited surrounding lands in tribal ownership in a Treaty settlement was identified as a critical means of ensuring a degree of control over the activities in the lake.

However, as identified by Coombes (2007, p. 70), there is also a degree of criticism and discomfort from Māori in pursuing ownership rights as a means of redressing their relationships to water, through the increasing sense that postcolonial governance, legal and management frameworks appear to be limited in their ability to value water in the more holistic and dynamic way that fits a Māori worldview. A shift from Māori viewing rivers and lakes as part of their sense of self, ancestry and identity to objects of property might be considered the perpetuation of colonial thinking, as indigenous communities have long been aware, given that the ontological separation of nature from person is one of the fundamental mechanisms that has enabled imperial colonisation of water through history (WillemsBraun, 1997).

To some degree it appears that for Māori to restore their relationship to rivers and other waterways as a part of their identity, and as something that they must care for in accordance with tikanga Māori, they have had to utilise problematic aspects of the Pākehā legal framework, such as property rights over water or riverbeds and lakebeds as a means of securing the authority and freedom to do so. For Māori relationships with and values of water to be upheld and manifested through governance and management arrangements, new ways of framing and understanding nature itself have been required of the postcolonial legal framework that better provide for fundamental indigenous understandings of nature.

Posthumanism is a movement in the mainstream that is consistent with the enduring indigenous worldview and law that recognises the rights and agency of 'non-human'

entities such as rivers and the dynamic 'co-creation' relationship between person and nature (Panelli, 2010; Young, 2016). This is the fourth approach Māori are utilising to provide for tino rangatiratanga in relation to water, but also to ensure that the way in which water is being valued and viewed is more consistent with a Māori worldview in recognising its agency and values beyond just the economic (Charpleix, 2018). Some commentators have also noted that it makes sense for the Crown to pursue this approach because it neutralises the contention by Māori of ownership of natural resources including water (Ruru, 2018a). The first example of a posthumanist approach to freshwater governance in settler state Aotearoa is the agreement between the Māori of Whanganui River and the government that recognises the Whanganui River 'in its entirety as a living being and legal entity' (Hsiao, 2012, p. 371). Legal mechanisms such as this that recognise and endorse a tikanga Māori approach and Māori visions for how people should relate to water are now being seen as the appropriate basis for any future national reforms relating to water, or resource management more generally (Ruru, 2018b). Implementing these new approaches, however, requires the right technical tools in order to appropriately define, interpret and defend the rights and values of nature (Charpleix, 2018, p. 27).

The pursuit to have tino rangatiratanga recognised will continue via these different strategies until some sense of resolution is gained for Māori. However, significant incremental progress has been made over the past decades; with each success and progressive step forward, new opportunities for Māori involvement in freshwater decision-making, management and restoration have arrived. Whether it is through the implementation of Crown Law and policy involving Māori concepts and values, the securement of increased influence in water management through Treaty settlement and co-management arrangements, the use of evidence on proprietary rights influencing the direction of water reform or the introduction of whole novel legal frameworks, each strategy is slowly but surely wedging open the political space for Māori authorities to

require that governance and management of water in Aotearoa be subject to the right of Māori to continue their ancestral relationships with water.

Given that context for the varied ways in which Māori are pursuing realisation of their tino rangatiratanga in relation to water, the last key aspect of the context within which iwi decision-making on freshwater operates is the specific settler state institutions of freshwater governance that Māori are required to interact with.

The first key institution of settler state decision-making utilised by the Crown is democracy. Māori rights, including tino rangatiratanga and democracy, have historically been seen as oppositional because of examples of the Crown actively utilising them as a tool to suppress Māori influence in Aotearoa. Metge (1989) provided the example of Ahipara, where the high influx of Pākehā into the community resulted in the transition of local Māori to a democratic minority, coinciding with a limitation of the ability of Māori to influence decisions and uphold their tino rangatiratanga in the community.

Another institution of settler state decision-making is neoliberal policies and economies. Some political commentators assert that the neoliberal reforms of the 1980s and 1990s in Aotearoa sought to limit citizens' role in economic decision-making in particular. Legislation from the reforms has ensured that a certain financial and economic ideology was not up for democratic deliberation, and that this ideology was instead determined by banks or corporates independent from political supervision (Dean, 2016).

However, perhaps the most critical institution of settler state decision-making that is relevant to the topic of this thesis is devolved collaborative decision-making, sometimes referred to as NEG (New Environmental Governance), where authority and responsibility for freshwater governance and management have been devolved to the local government and community scale. This follows the global trend in recent decades of

decentralisation of natural resource management as a result of the earlier disillusionment of stakeholders, agencies and academics with the abilities of central government to implement sustainable management of shared resources (World Commission on Environment and Development, 1987). Aotearoa has been no different in terms of broad discontent with outcomes of the central government's mismanagement of freshwater in Aotearoa (Gunningham, 2008).

Ironically, despite the localised approach to decision-making and freshwater care being more consistent with tikanga Māori approaches, this devolution to the local level has been problematic for Māori. This is due to the tendency for the Tiriti partnership to be weakened further at this level. Rather than the devolution of water governance to collaborative structures promoting the legitimacy of Māori tino rangatiratanga, the underlying agenda of collaborative structures is to promote and pressure cohesion of Māori within the wider community as 'stakeholders', and ultimately to protect the legitimacy of the nation state holding the overarching authority for governance. As Humpage (2002) has found, these devolved governance approaches, which emphasise 'community empowerment' and 'active citizenship', operate with a major assumption that Māori needs or rights can be met within the universal citizenship rights of the 'nation state'.

In addition to not being able to deal with the concept of tino rangatiratanga itself, postcolonial law and policy in Aotearoa has struggled to reconcile how Māori rights to tino rangatiratanga should relate to the Crown's right to governance. At one end of the spectrum, Māori may see Te Tiriti as cementing their overriding authority while granting permission to the Crown to govern British nationals (Mikaere, 2011, p. 128), whereas at the other end of the spectrum, the Crown continues to assume that Te Tiriti equated with a cessation of authority by Māori and the establishment of their own supreme sovereignty (New Zealand Government, 2017). This inability to reconcile the expectations of the two

sides of Te Tiriti partnership is of course part of a broader history of colonisation in Aotearoa that includes far more proactive diminishing of Māori rights through invasion, war and legislated confiscation and discrimination. It also reflects the complexity of the unresolved constitutional arrangements in Aotearoa, whereby the ethic of tino rangatiratanga among Māori seems to be in conflict with the ethic of integration of Māori and New Zealanders, promoted by the wider nation state. Put another way, the specific rights of Māori are often presented in a way in which they appear to pose a threat to the democratic rights of the citizens of Aotearoa (Durie, 2001; Kelsey, 1995; Memon & Kirk, 2012).

There is also a noticeable absence in the literature of any analysis of the effects of NEG approaches such as stakeholder collaboration and participation on Māori rights or tino rangatiratanga, or simply the ability of Māori to influence decision-making. Despite a comprehensive review of the design of water regulation and governance, Gunningham (2008) did not make any conclusions or recommendations regarding governance and the Treaty partnership. In their multiple evaluative criteria case study, Lennox et al. (2011) assumed that Māori criteria for water management can be integrated into those of the public, and did not attempt to address the inevitable scenarios where Māori objectives or values may conflict with those of the democratic majority. In other examples where effective engagement processes have been utilised to gain representation of iwi in integrated catchment management, a critical analysis or reflection from the iwi is still lacking on whether this has resulted in the actual realisation of the power they seek through involvement (Allen et al., 2011). In his review of the strengths and weaknesses of audited self-management, Holley (2016) did not even mention the existence of indigenous people in Aotearoa, let alone address issues relating to the Treaty partnership. There appears to be an inability in the literature to recognise that these structures of devolved governance are operating not only in the 'shadow of the law', but also in the shadow of the Tiriti partnership, and the obligations and rights implicit in it.

There also is little analysis in the literature on the role of Māori knowledge in NEG. However, a recent case study in the Kaipara Harbour (Makey & Awatere, 2018), has identified that the achievement of the integrated ecosystem based management approach promoted through NEG must recognise the validity of other indigenous worldviews beyond Western science instead of simply co-opting Māori knowledge into Western quantitative modelling, and further that:

the challenge facing cross-cultural integrated catchment programmes should not be so much 'how to integrate indigenous knowledge into resource management' but 'how to integrate indigenous knowledge holders into planning and decision-making'. (Hepi, Foote, Makey, Badham, & Te Huna, 2018, p. 497)

The NPS-FM provides the current framework for how devolution of water governance and care should operate in Aotearoa New Zealand, and as alluded to in Chapter 1, is therefore central to the topic of this thesis. It provides the regulatory framework for what decision-making is focused on. It sets out that councils must present objectives for freshwater in each 'freshwater management unit' or catchment in their regional plans, and also have the option of strengthening any of the national 'bottom lines' or 'minimum acceptable states' where determined appropriate.

The provision for Māori rights and interests in relation to freshwater is provided at the endogenous level in the NPS-FM, in that Māori principles, values and interests are given statutory significance throughout the NPS-FM. Most prominent is the identification of 'Te Mana o te Wai' as the key objective regional councils are required to recognise. Māori interpret Te Mana o te Wai as the integrity of water, which the policy further interprets as arising from the fundamental value of water to support the health of the environment, the health of water and the health of people in a connected way (Te Aho, 2018). The NPS-FM also includes other Māori values in the national values, and requirements to involve

iwi and hapū in freshwater management and decision-making. This thesis will examine how the findings of this research could be applied to assist our iwi to inform the implementation of the NPS-FM, specifically the setting of freshwater objectives through the Wellington Regional Council Natural Resource Plan.

The literature presents quite a challenging legal and political landscape for Māori realisation of tino rangatiratanga, or even for genuine involvement in freshwater governance and management. The Treaty partnership seems to have provided a recognised basis for meaningful involvement of Māori; however, law and policy have struggled to reconcile Māori rights in relation to water, including tino rangatiratanga, with the broader democratic and neoliberal agenda of the nation state. Moreover, while the NPS-FM, as the key freshwater regulatory tool, identifies Māori values in relation to water and even vests them with fundamental and national significance, the examples from the literature have demonstrated that technical decision-making processes under the control of the Crown, and then the broader community, are limited in their ability to uphold Māori values and views. They have a tendency to simply integrate the consideration of Māori values among various other stakeholder values as mere minority interests, or they simply do not have the epistemological framework to deal with how Māori understand and relate to water.

For Māori to have tino rangatiratanga in their relationship to water realised, they require, first, the right power arrangements that recognise their unique rights, values and role and ensure they will not be marginalised by the majority, and then, the right technical tools and approaches that are able to ensure their knowledge and values can inform decision-making processes. The following chapter will address the knowledges, tools and technical processes that are utilised to support Māori decision-making in freshwater.

Chapter 2: Grounding the research in Ngā Kete o te Wānanga

This chapter reviews the literature to identify the various knowledges and tools of Ngā Kete o te Wānanga that Māori have inherited, utilise and continue to develop to support their pursuit of tino rangatiratanga in relation to water. The chapter is in three parts. Part one focuses on Te Kete Tua-uri; what is published with regard to the fundamental knowledges and values that inform Māori worldviews of how freshwater systems work? Part two focuses on Te Kete Aronui: what approaches and technological tools can be applied by Māori to facilitate observations of freshwater systems? Part three focuses on Te Kete Tua-ātea: what approaches and technological tools can be applied by Māori to examine how freshwater systems will change in future scenarios? These three parts provide the foundation of knowledge, tools and approaches on which this thesis has been built.

Te Kete Tua-uri: What are the fundamental knowledges and values that inform Māori worldviews of how freshwater systems work?

The first aspect of knowledge used by Māori to inform their worldview of how freshwater systems work, and therefore to inform decision-making, is Te Kete Tua-uri. As described in the first chapter, this is the aspect of our worldview that pertains to the 'real' world beyond what we can see. This part of Chapter 2 provides an overview of knowledge from Te Kete Tua-uri, which includes fundamental key concepts of cosmic processes that give rise to the material or physical world that we see, and therefore provides us with a theoretical understanding of how the universe works (Marsden, 2003b; Royal, 1998, pp. 52–53).

Key concept 1: The universe is process energised by mauri

Marsden presented the Māori worldview of the universe as a dynamic, lineal, ongoing stream of processes and events (Marsden, 2003a): 'Every object is the result of a prior cause, of a chain or procession of events' (Marsden, 2003c, p. 31).

This view of the universe as process is represented within the fundamental genealogy of the creation of the universe Te Kore, Te Pō, Te Ao Mārama - the nothingness, the night, the world of light - potential, becoming and being (Marsden, 2003a) (see Figure 2.1).

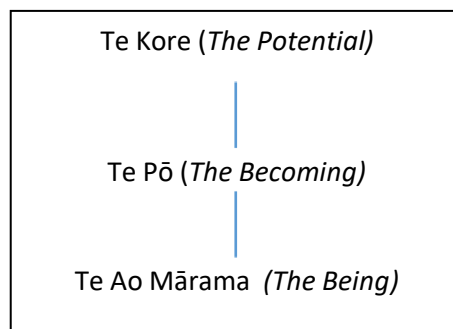


Figure 2.1 Genealogy of the creation of the universe.

The process of 'being' is central to a Māori understanding of reality. As opposed to focusing on 'knowing' the universe, Māori epistemology is focused on contemplating being through a holistic relationship with the universe (Mika, 2012): '[In a Māori worldview] there is very little room for belief in static phenomena; and objects and knowledge to be gleaned from them must avoid the tendency toward this paralysis' (Mika, 2012, p. 1082).

Te Ao Mārama - the material world of being - was created through the application of mauri to Te Kore and Te Pō. 'Mauri' is defined as 'the life-force immanent within all creating which bonds all the elements within the universal process' (Marsden, 2003c, p. 44). This mauri gives the universal process of creation its unity and diversity. Royal (2003) also describes a Māori view of the world as 'rhythmical patterns of pure energy'

(p. xiii). According to a Māori worldview, creation is not a moment or discrete event, but a constant and infinite energised process.

Key Concept 2: Reality is constructed through the use of whakapapa

Underlying the view of the universe explained above is an awareness that this reality is a constructed one. In the Māori worldview, humans create and order the universe through their description of it in whakapapa (Roberts & Wills, 1998; Royal, 2003, pp. xiv-xii). In simple terms, whakapapa is the genealogy of all things as understood and handed down through the generations.

As cited in in Mikaere (2011), Winiata and Jackson emphasise that whakapapa is not an objective or abstract description, but a deliberate technique of a constructivist approach to reality that gives meaning to existence. This process of a constructed reality has been analogised by Royal (2003) as the ‘woven universe’,⁴ where reality is rendered through the ritualistic retelling of creation traditions by carefully reciting whakapapa.

There are different types of whakapapa:

- cosmic genealogies that describe the processes of creation of the universe, for example, Te Kore, Te Pō, Te Ao Mārama
- genealogies of natural phenomena: both physical, such as those that describe the ecological relationships between living things, and abstract, such as the genealogy of knowledge (Royal, 1998, pp. 56–57)

⁴ Also the name for the collection of Māori Marsden’s writings.

- genealogies of human beings that describe people's ancestral descent, which goes back to the arrival of sea vessels to Aotearoa (Barlow, 1991, p. 174).

The reality constructed by whakapapa is not fixed, but is always changing, developing and being filled with more and more detail over time. Ranginui Walker (2013) describes whakapapa as 'a systematic layering of knowledge with a sense of progression, evolution and development' (p.37).

Winiata (2006) has described the knowledge generated through the passing down of whakapapa as a 'knowledge continuum' (p. 200), which has its origins in the Pacific or even further back in the history of the Māori, and has been added to as each generation makes sense of their experience of being. He suggests that Māori knowledge has endured because it is flexible enough to always be directly relevant to the experiences of Māori people through time.

Key Concept 3: That which causes the process of the universe is divine; wairua or spirituality is ubiquitous in Māori reality

In Māori cosmogeny, from Te Kore, Te Pō was begotten, and then the primordial parents, Ranginui and Papatūānuku, emerged clinging to each other, keeping the universe and their children, the atua or deities, in darkness. Their separation marked the beginning of Te Ao Mārama, the world of being, where the atua could flourish (Royal, 1998, p. 47). Marsden (2003c) has stated that 'ultimate reality is wairua, or spirit' (p. 31). The way I have come to interpret this and how other theorists have described Māori 'spirituality' is that which causes the process of the universe is divine. The more fundamental that causality is, the more divine. The state that existed before the beginning of the universe,

Te Kore - the nothingness, is divine in the most extreme, because it was the potential for the universe to be created.⁵

Using that interpretation, the 'spiritual realm' of Te Pō represents the cosmic causal processes of the universe, which is distinguished from the 'material realm' of Te Ao Mārama, which is largely acted upon by the wider cosmos (Henare, 2016). This highlights that the Māori view of reality is not that the material world is distinct from the spiritual world; the two interact in one integrated system. All activities and objects in the material world are under the influence of the processes of constant creation or atua, and therefore the spiritual world. As described by Marsden Marsden (2003a):

Material proceeds from the spiritual, spiritual interpenetrates the material. Natural laws can be affected or changed by higher spiritual laws. Spirituality binds the cosmic process together, sustains and replenishes the physical world (p.20).

The wairua or spirit is ubiquitous and emerges as we come to understand the cosmic drivers of process, or atua, in our universe. The Māori worldview could be called a form of deism, as spirituality or God, which is only known via reasoning and understanding the causal processes of the universe as observed manifest in nature and the physical world (Johnson, 2015).

In addition, the procession of Te Kore - Te Pō - Te Ao Mārama does not occur in one direction. Beings that existed in the material world eventually transition back to an existence in the 'spiritual realm' of Te Pō. They exist there through people's regular practices and rituals that recognise and honour their role as ancestors who produced

⁵ Note, however, that in the whakapapa of Te Āti Awa, there is a stage before Te Kore, 'Te Kūtereretanga', or the liquid state from which 'nothingness' arose.

and affected the present material world. This interaction with the spiritual world through recognising that which has come before is a key experienced aspect of the Māori worldview. Examples of this are evident in Māori funeral and welcoming rituals, in the daily reciting of karakia (incantations), or simply through the way that Māori regard one another (Mikaere, 2011, p. 319).

Key concept 4: Māori conceptualise systems and what they experience in the material world as outcomes of the underlying integrated values, or kaupapa, that human behaviour manifests

Kaupapa Māori are the values that give rise to Māori cultural imperatives: 'Ko ngā kaupapa, koinei ngā mea e ngākau nuitia ana e te iwi, e puta ia hoki ngā whakahau a te iwi' (Royal, 2008, p. 64).

The key cosmological concepts that have already been described in this chapter can also be considered values and are therefore some of the fundamental values that Māori culture work to manifest, enable and protect.

For example, mauri is not just a phenomenon of the universe but is also considered a value: '[Mauri is] the biological values which provide what is required for physical survival and a love and respect for Papatūānuku' (Marsden, 2003a, pp. 3–5; 2003c, pp. 27–45).

Henare (2016) described Māori daily ritualistic valuing of mauri and life as demonstrating 'a philosophy of vitalism' (p. 133). Vitalism is:

the idea that a divine life force inheres in the tiny particles of matter that comprise everything in the universe...When people recognise that all creatures are made

of the same eternal and divinely propelled particles, they will radically change their behaviour toward all living things. (Kirsten, 2016, p. 501)

Māori, therefore, see that the world they experience through their sensory perception (āronga) is a product of the values (kaupapa) that human cultural behaviour and imperatives (tikanga) have and continue to enact and give expression to. This has been conceptualised by Royal (2008, p. 64) as shown in Figure 2.2.

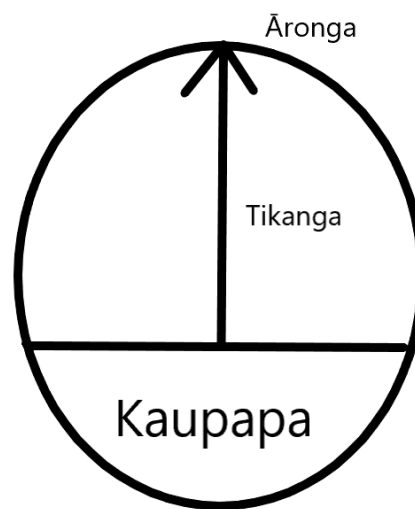


Figure 2.2 How Māori understand the relationship between perception, values and cultural imperatives.

This understanding that the world we experience is a manifestation of key values and the subsequent cultural imperatives we enact is pervasive across Māori interpretations and conceptualisations of the world, which are based on kaupapa or values. Perhaps the most well-known example of this is Durie's (1998) seminal work, *Te Whare Tapa Whā*, the four-walled house, which conceptualises Māori experience of 'health' in terms of four key values or principles: *te taha tinana*, the physical body; *te taha hinengaro*, mental health; *te taha wairua*, the spiritual aspect; and *te taha whānau*, family and social

relationships. This conceptual model then provides imperatives for maintaining and improving health across each of those integrated values.

This part has identified the following four fundamental concepts from Te Kete Tua-uri that inform Māori worldviews of how the world works:

1. The universe is process energised by mauri.
2. Reality is constructed through the use of whakapapa.
3. That which causes the processes of the universe is divine: wairua or spirituality is ubiquitous in Māori realities.
4. Māori conceptualise systems and what they experience in the material world as outcomes of the underlying integrated values, or kaupapa, that human behaviour manifests.

This thesis will continue to explore how these key conceptual tools from Te Kete Tua-uri have been used to inform our iwi understanding of how freshwater systems work.

Hua Parakore as a conceptual model for natural systems

The conceptualisation of systems in a kaupapa- or values-based way has also been applied for the purpose of understanding environmental systems. Hua Parakore is a kaupapa Māori framework used for understanding, planning and evaluating the health of socio-ecological systems, particularly where mahinga kai, or the production of food, is a key feature of that system (Hutchings et al., 2012). It was developed by Te Waka Kai Ora, the Māori organics collective of Aotearoa, and I was involved in the research and writing to develop the framework. Its development involved a comprehensive study of the diverse and rich kaupapa or values that comprise Māori food systems, as was evidenced by kaitiaki's and expert Māori food producers' practice, and then the outcomes

that tended to result from that approach. My role involved analysing all the various interview transcripts and material that had been sourced from a large number of kaitiaki and expert food producers across the country, and under the guidance of an expert panel, and the collective's leader, tohunga Percy Tipene, designing and utilising the 'kaupapa-tikanga-huanga' framework, which was applied to identify:

- kaupapa: the fundamental values and principles of food systems that are held by kaitiaki and drive their practice and the outcomes of their food production
- tikanga: the specific cultural imperatives, practices, customs and methods that fulfilled those values
- huanga: the outcomes and attributes of the system, which evidenced those values being fulfilled and tikanga being implemented (Te Waka Kai Ora, 2011b).

It was a research and personal experience that I know I will always treasure for providing me with deep insight into the richness of Māori knowledge. I recall many long phone conversations with Matua Percy, who was based in the Far North, while I pored over transcripts in Ōtaki and discussed the key themes I thought were emerging. A key part of his guidance in this iterative process of trying to essentialise aspects of growers' understanding of food systems into a selection of key values was to remember to utilise 'all of your divine senses' and to 'think in colours': in the picture of natural systems that kaitiaki presented me with, he wanted to know what the full spectrum of āhua or things that people can perceive through food they produced was, and what the values that had given rise to them were. Kaitiaki did not just attribute things such as the quality of the soil and therefore energetic or biological values to good quality food production; they also talked about how things such as the personal and inherited identification with place or the emotional well-being of growers determined the quality of food produced.

The outcome of the research (Hutchings et al., 2012) was to identify the following six key underpinning values in food systems, as described by the collective, and their associated tikanga and huanga, or practices and outcomes, that arose from them in food production systems:

- mauri: energy and life force required for growth and vitality
- Te Ao Tūroa: natural patterns of time and space, predictability
- māramatanga: practice-based insight, enlightenment
- mana: economic and social security and authority
- wairua: spiritual and emotional well-being and peace
- whakapapa: connection between all things and heritage.

Obviously, different iwi, hapū and whānau have their own set of key kaupapa that guides their practice, but the intention of the framework was to provide a means to conceptualise food systems in a way that is fully inclusive of the broad range of Māori values. For anyone working with food or ecological system analysis in Western science, it should be immediately apparent that the biological or ecological values that are often the focus of systems studies are merely one part of a broad spectrum of interrelated values that Māori see in systems. Much broader knowledge and economic, social, spiritual and psychological values are all seen in one interconnected picture of a system. We assigned a colour of the spectrum to each kaupapa, from red for mauri, through to orange, yellow, green, blue and purple for whakapapa, to reflect the unique āhua or character that each had. As depicted in Figure 2.3 the key principle of the framework was that when all those kaupapa are being upheld with integrity in a system, the result is Hua Parakore, or a 'pure product' represented by the white light (Te Waka Kai Ora, 2011a).

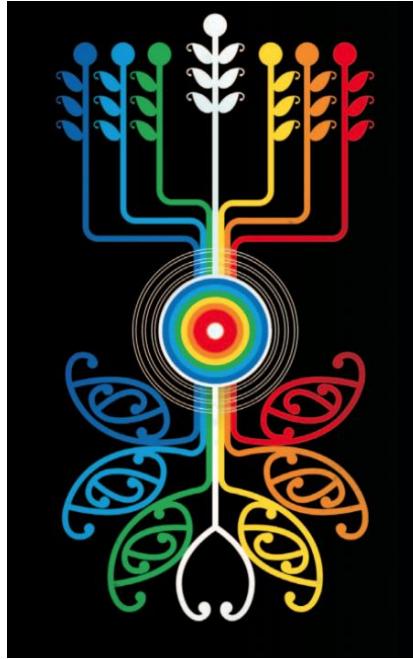


Figure 2.3 Conceptualising Hua Parakore as the integration of a diverse spectrum of kaupapa.

Sadly, Matua Percy Tipene passed away in early 2017. The last time I saw him in person was at the launch of a book on Hua Parakore at Te Wānanga o Raukawa in Ōtaki, just before I was starting my PhD. I had talked with him about how in my rohe, freshwater-based mahinga kai was the key focus of my whānau, hapū and iwi, and I had wondered whether I could discuss with him the idea of applying the Hua Parakore framework to freshwater systems, given that the framework we had developed was for all food systems, but focused mainly on land-based food systems. Rather than an in-depth kōrero with him about this, his response was to just go ahead and do it, which was a somewhat typical response of Matua Percy. He had been the type of leader who scattered seeds of inspiration and impetus freely and widely along the far-ranging global path he walked as a kaitiaki and tohunga. Following his passing, it was evident that the various ideas and projects that had sprouted in his wake were so abundant and diverse that his legacy is certain to be a rich one, and I am sure I am one of many who continue to nurture and grow his precious seeds of inspiration.

This thesis will show how our iwi have utilised Hua Parakore as a conceptual model for freshwater systems, to inform our understanding of how freshwater systems work, to support the interpretation of our observations, and to inform the development and utilisation of inference models and other futuring tools that can be applied to freshwater systems.

Te Kete Aronui: What approaches and technological tools are applied by Māori to facilitate observations of freshwater systems for the purpose of informing decision-making?

The second aspect of knowledge used by Māori to inform their worldview of how freshwater systems work and to inform decision-making is Te Kete Aronui. As described in the first chapter, this is the aspect of our worldview that arises from what we can sense through our perception of the world. This part of Chapter 2 provides an overview of the types of knowledge from Te Kete Aronui, which includes observations and the tools of observation that provide us with an understanding of how the world works.

How do Māori 'know'? Observation, experience and embodied knowledge

Māori knowledge is widely described as 'empirical' and 'practice based'; it is created as a result of being in and experiencing the universe, having practical everyday engagements and learning through doing (Meyer, 2014; Mika, 2012; Milroy & Temara, 2013; Moller, Kitson, & Downs, 2009; Pere, 1991, p. 5; Royal, 2008). There is an emphasis on the idea that to truly know something, one must experience it in its fullness beyond the explanatory; the experience of an artwork, performance, activity or certain spatial layouts is able to convey the meaning of phenomena that words cannot:

'Tapu', a word that is everywhere in Māori society, cannot be understood from an examination of a text. The word is represented and understood by the community through location, body movement interaction with objects, carving, facial expression, artwork and food gathering. Tapu is everywhere and consequently the language of tapu is represented in everything. (Tau, 1999, p. 15)

The experiences and observations that generate Māori knowledge can be facilitated by a range of aspects of a person, such as the mind, heart, soul, head and gut. This is familiar to many indigenous or ancient knowledge traditions and is described in the literature as 'embodied knowing': 'All human knowledge and language are embodied, that is, tied to bodily orientations, experiences, and interactions in and with our environment' (Goldberger, 1996, p. 353).

The literature is not particularly clear on which ways of knowing are connected to which specific aspects of a person. In discussing the term 'whakaaro' or 'to think', Smith (2000) described it as an activity of the stomach and entrails, and associated with the aspect of the body that experiences emotion and instinct. As mentioned earlier, Marsden distinguished between knowledge, which he associated with the head, and wisdom, which he saw as the outcome of integrating knowledge into the heart (Marsden, 2003d). In his view, the heart is where our values are felt, and given expression through their interaction with knowledge (Marsden, 2003b, p. 59). Other Māori and indigenous scholars have also discussed the wisdom or 'true intelligence' of the heart (Meyer, 2014; Royal, 2008). Meyer (2014) has suggested a key benefit of indigenous and other 'enduring' knowledge systems is their ability 'to be more rigorously definitive of the affective realm in facets of knowledge production and exchange' (p. 157). She presented an overview of various knowledge traditions from across the globe that attribute different knowledge types to their physical, mental and spiritual orientations. Perhaps it is not so much important to locate different ways of knowing with specific orientations in the body,

but instead to acknowledge that the range of rational, emotional, intuitive, psychic, conscious and subconscious perceptions, however they are experienced and wherever they are felt, have a role in the generation of legitimate mātauranga Māori.

This is strongly reminiscent of the teachings I received from Matua Percy to ‘use all your divine senses’ when observing or trying to understand something from a Māori perspective. When decision-making is informed by Te Kete Aronui, this opens up the realms of influence to a broad range of knowledges that are generated from what we perceive, observe and experience through all the aspects of our senses.

The emergence of Te Kete Aronui approaches and tools in the scientific academic discourse of Aotearoa

The long-standing regular practice of kaitiaki making assessments and decisions based on these broad types of observations and experiences started to attract attention in the mainstream academic and policy discourse first as a feature of what the literature dubbed ‘traditional ecological knowledge’ (Berkes, Colding, & Folke, 2000; Moller, Berkes, Lyver, & Kislalioglu, 2004) and then through the emergence of ‘cultural health indices’ and ‘cultural health monitoring’ (Tipa & Teirney, 2006).

Cultural health indices are typically a suite of indicators, which might be qualitative or quantitative, that can be systematically monitored to assess environmental state or change from a cultural perspective. They can be used in the same way scientific indicators can: to set environmental benchmarks, to provide a better understanding of health or to inform decision-making processes. They have been particularly well developed and utilised in freshwater environments (Harmsworth, 2002; Harmsworth, Awatere, & Robb, 2016; Harmsworth, Young, Walker, Clapcott, & James, 2011).

Early attempts to create frameworks for 'national use' (Tipa & Teirney, 2006) perhaps overlooked a key strength of a Māori approach to observation - its ability to focus on site-specific values and contexts of place - in addition to the exciting creativity of different iwi, hapū and whānau who continue to develop their own unique, novel and innovative methods and technologies to conduct this type of monitoring. Additionally, the slow but sure enhanced obligation on local government and land and water users at large to be consistent or compliant with Māori values under government freshwater policy has driven a real need for methods to assess compliance in terms of Māori values. In particular, the identification of mahinga kai as a national value in the NPS-FM has meant that Crown and other research funders increasingly invest in research and projects that address the need to measure mahinga kai and other aspects of 'cultural health' through the development and application of new indices or monitoring approaches. The result has been a diverse array of approaches and tools that different iwi, hapū and whānau are applying around the country to identify different indicators and apply and develop different methods to monitor and interpret them. In 2016, Harmsworth et al. provided a comprehensive overview of 19 different approaches to measuring freshwater health according to Māori values in the literature. These few approaches published in academic literature represent a small fraction of the rich variety of methods utilised by kaitiaki across all the iwi and hapū in Aotearoa. These methods include those handed down and novel methods that continue to evolve and be developed across the country.

Despite the variety of approaches across different Māori groups, there are some common themes among them. One particular tool that has been taken up by Māori at a great pace is spatial mapping. Spatial mapping tools such as geographic information systems (GIS) or Google Earth have been used by Māori to identify, record, classify and map values on sites, or to determine the scale or impact of human disturbance or modification of stream margins and habitat, combined with observed information about the ecological communities living there (Harmsworth et al., 2016; Hopkins, 2018). Some

iwi and hapū are also building and utilising mobile phone apps to engage all their community in the activities of collecting observations and values about the environment.⁶

A common focus of cultural health monitoring is to conduct assessments of the abundance and health of mahinga kai species, or to utilise other biophysical measures that relate to specific freshwater species, sites or waterbodies such as nutrient levels, contaminant profiles, habitat health or geomorphology (Paul-Burke, Burke, Bluett, & Senior, 2018; Pauling & Arnold, 2008; Robb, Shaun, Harmsworth, & Makey, 2016). The recognition of the need for tools to measure mahinga kai health has been widespread enough that progressive Western science freshwater ecologists have also worked to identify Western science tools that could be utilised to support mahinga kai monitoring and management (Collier, Death, Hamilton, & Quinn, 2014). While it has clearly been helpful to identify existing science tools that can be utilised to assist in the care and protection of mahinga kai, there has not been much critical analysis of the tendency to embed well-established biophysical measures in mahinga kai monitoring programmes, where they gain prominence and perceived legitimacy by regulators, while in reality, the broad values that mahinga kai comprises demands a much wider range of transdisciplinary measures and management tools.

Another common theme of cultural health indices is a focus on mauri as a value. This makes sense, given that, as discussed in the previous part of this chapter, mauri is an essential value of our universe, because the force gives energy and life to all things. The mauri model or 'mauri-o-meter' developed by Morgan (2006) was developed to include a 'cultural criterion' in engineering decision support tools, as a means of providing a Māori cultural measure of sustainability. A -2 to 2 scale, from poor mauri to well mauri, is used to provide an assessment of a long list of various environmental, economic, social

⁶ <http://www.ngatirangi.com/monitoring-apps.aspx>

and cultural indicators, and a single figure of 'mauri' is produced (Hikuroa, Slade, & Gravley, 2011). Providing a single score of mauri across what are a much broader range of values, such as whakapapa, wairua and mana, could be considered reductionist, and the approach also promotes the goal of 'objectivity' in the observation and scoring of indicators (Faau'i, Morgan, & Hikuroa, 2017), which is not consistent with a Māori worldview approach. Putting aside these criticisms of the approach, the method has been successfully applied by Māori in that a range of indicators that reflect integrated Māori values have been used to facilitate Māori observations and evaluations of systems for the purpose of informing decision-making processes (Hikuroa, Clark, Olsen, & Camp, 2018).

The initial focus on biophysical measures of cultural health in the literature was perhaps due to freshwater health being seen as largely part of the discipline of the biophysical sciences from a Western science perspective. However, as the field of cultural health has expanded, an understanding has emerged in the literature that the value of the environment from a Māori worldview extends well beyond the ecological and intrinsic, and into the societal values of psyche, people and communities, including the existential values of identity formation and relationship to nature. This is consistent with the way that indigenous people globally understand and relate to nature:

To our people (land) was everything; identity, connection to our ancestors, the home of our nonhuman kinfolk, our pharmacy, our library, the source of all in the world that sustained us. (Kimmerer, 2013, p. 17)

Māori ways of observing systems reflect an understanding of the value of nature, and this has started to provide guidance for others in how to better reconcile human relationships to nature (Lyver et al., 2017; Timoti, Tahi, O'B Lyver, Jones, & Matamua, 2017). A recent special edition of the *New Zealand Journal of Marine and Freshwater*

Research, published in December 2018 and edited by Clapcott et al. (2018), was titled 'Mātauranga Māori: Shaping Marine and Freshwater Futures' and included a number of articles with case studies from across the country that illustrated how approaches from Te Kete Aronui were generating positive outcomes when applied to support environmental decision-making in Aotearoa.

A typical approach from the more recent examples in the literature involves the identification of a broad range of key kaupapa, and then a number of attributes of each kaupapa, similar to the approach used in Hua Parakore. Across each key kaupapa, attributes of freshwater system health that are identified will include - in addition to the typical biophysical ones - broader attributes such as safety of food for consumption, taste, proportion of traditional food species found within an ecological community, access to sites, availability of traditional foods at marae, intergenerational knowledge transfer, connection of people to place, ability of people to practice kaitiakitanga, resilience and safety of people, and connectivity of human beings to cultural elements such as taniwha (Awatere et al., 2017; Kitson, Cain, Williams, et al., 2018). In these approaches, assessments of freshwater system health are as much concerned with the health of the people and the quality and nature of their relationships with all that is a part of the system as they are with water or aquatic species as an entity separate from people.

This then requires that social science methods and tools become as integral to freshwater health assessment as biophysical science methods and tools. Recent examples demonstrate how social science interviews with local practitioner specialists and recreation practitioners are critical to provide an in-depth understanding of the types of values associated with freshwater systems and fisheries, and to generate information on use of areas, change over time, condition and effectiveness of practice (Kainamu-Murchie, Marsden, Tau, Gaw, & Pirker, 2018; Maxwell, Ngāti Horomoana, Arnold, & Dunn, 2018). However, the process of identifying indicators of social-ecological system

health and embedding these within mainstream environmental care and management is not yet well developed (Sterling et al., 2017).

Spatial mapping by Māori of freshwater health also typically includes mapping of cultural values, including heritage values that are identified through literature analysis and oral history studies, to observe and interpret the cultural landscape connected to waterways (Kitson, Cain, Johnstone, et al., 2018) and future 'cultural opportunities'. The cultural opportunities method developed by Tipa and Nelson (2008) involves utilising qualitative and statistical analyses to determine the flow thresholds required for different cultural values, activities and opportunities, and then using a Likert scale to assess whether the flows observed at different sites can sustain cultural values and opportunities there (Crow, Tipa, Booker, & Nelson, 2018; Tipa & Nelson, 2012).

Māori appear to be highly comfortable utilising a broad range of methods and tools, including many that have been provided by Western science. This is consistent with the continuum of mātauranga Māori development, which continues to incorporate new technologies for the purpose of achieving and fulfilling Māori values and reflecting a Māori worldview (Roberts & Wills, 1998; Winiata, 2006). In that sense, it seems arbitrary that Māori approaches and tools for observing natural systems are framed as cultural health assessment, in that the specific worldview that they reflect is not any more 'cultural' than the way in which Western or mainstream New Zealand approaches to assessment have reflected a Western cultural worldview of system health. All frameworks for measuring freshwater health are cultural in that they reflect a view of what that particular society values in freshwater systems. Approaches and tools from Te Kete Aronui reflect a worldview that values the broad range of values that freshwater systems comprise, all of which required care, protection and enhancement.

Te Kete Tua-ātea: What approaches and tools have been and can be applied by Te Āti Awa ki Whakarongotai to examine how freshwater systems will change across a range of future scenarios, to support their decision-making?

The final aspect of Māori knowledge used to inform decision-making is Te Kete Tua-ātea. As described in the first chapter, this is the aspect of our worldview that pertains to the infinite multiple realities that can exist beyond time-space. This part of Chapter 2 provides an overview of Te Kete Tua-ātea knowledge and tools that are evident in the literature. Whilst they are not presented as such in the literature, I have identified Te Kete Tua-ātea knowledge and tools as those can be used for the purpose of seeing, understanding and examining multiple realities or scenarios.

Emerging recognition of indigenous futuring expertise in the scientific literature

The earliest academic publications on Māori environmental practices (Best, 1904), identified and discussed the ability of Māori to observe environmental indicators that forecast environmental change and alter their resource use accordingly. Today, the mainstream scientific literature has identified a wide range of environmental indicators that are observed by Māori to give them information about a system's current state and infer its future state changes, and therefore used to inform environmental decision-making (Berkes et al., 2000; Henare, 2016; King, Goff, & Skipper, 2007; Lyver, Jones, & Doherty, 2009; Maxwell & Penetito, 2007; McCormack, 2011; Moller et al., 2009; Roberts, Norman, Minhinnick, & Kirkwood, 1995).

However, it has only been in recent years that indigenous environmental indicators have been recognised in the scientific literature as reflecting an underlying comprehensive knowledge of the function of whole systems and associated logic tools that can then

applied for the purpose of analyses such as scenario testing in various resource management contexts.

In his work in First Nation territories in Vancouver, Mackinson (2001) identified in his work developing quantitative models of spatial dynamics of fish stocks, that the rich observation-based knowledge of local indigenous fishing experts could assist in bridging significant gaps in the scientific understanding of how the fish system functioned. He used linguistic statements about the system from the experts to identify 'IF...THEN' probabilities, for example, '[IF] the weather is bad [THEN] herrings shoals go deep to hide' (p. 537), and he then built a statistical model that reflected these rules and therefore the relationships in the system, that could be used to make predictions about herring shoal structure, dynamics and distribution.

The approach followed by Mackinson to develop the statistical model is referred to as a 'fuzzy logic' approach, which has been found to be consistent with an indigenous approach to modelling systems in two key ways:

1. Whereas conventional Western scientific logic assumes that a proposition is either true or false, fuzzy logic assumes that a proposition has a certain probability of being true or false (McBratney & Odeh, 1997, pp. 86–87). This is particularly compatible with an indigenous worldview because it recognises that it is impossible for humans to be certain, objective or precise in their experience of the world, and that models of reality need to account for this, hence the 'fuzziness'. To use the same example from Mackinson's study, the model did not need to identify with total certainty that 'IF the weather is bad, THEN the herring shoals would go deep', but rather identify what the probability of this IF...THEN statement was based on interviews with the experts and available scientific data. Potter, Doran, and Mathews (2016) showed that a fuzzy logic approach has also

proved useful in mapping indigenous cultural values across space, where sites can't be mapped as categorically valued or not valued, but rather reflecting a probability or degree of value along a continuous spectrum.

2. Both fuzzy logic and indigenous approaches use linguistic variables instead of numeric variables as these provide more meaning, are often faster and cheaper to measure, are able to reflect qualitative variables (Berkes & Berkes, 2009). For example, the variable of 'bad weather' was much more practical for experts to identify than having to take or rely on specific meteorological measures of weather. A fuzzy logic approach will start with a linguistic variable, and then if required identify a continuous range of numerical values that can be used to represent that variable.

Whereas Mackinson (2001) focused on integrating indigenous knowledge of a system into a statistical model, other commentators identified that indigenous knowledge holders have their own complete models of systems that are applied for scenario testing. Berkes and Berkes (2009), have described an indigenous knowledge approach whereby observations of the environment are continuously collected by a local knowledge experts to construct and continuously update 'collective mental models' of systems that comprise the different variables of a system and the causal relationships between them, which can then be applied to examine the probable states or changes of variables in the system in different scenarios. These collective mental models might also be referred to as 'cognitive maps' as described by Özesmi and Özesmi (2004), which are models developed to obtain and then apply people's ecological knowledge of complex systems for the purpose of testing the effects of different policy scenarios on a large number of variables in a system.

Whilst not necessarily explicitly referred to as such in the literature, indigenous fuzzy logic and collective mental mapping are also evident in the application of Te Kete Tua-ātea knowledge and tools across Māori examples of scenario testing.

The application of Te Kete Tua-ātea knowledge and tools for scenario testing

The literature presents a range of different contexts where Te Kete Tua-ātea knowledge and tools are applied for scenario testing. The general approach followed by Māori in applying these types of knowledge and tools is consistent with the approach of other indigenous peoples as described previously by Berkes and Berkes (2009); observations of a system (Te Kete Aronui) are accumulated over time and interpreted through and combined with fundamental knowledge of how the world works (Te Kete Tua-uri) to develop collective mental models of systems that can be applied for scenario testing (Te Kete Tua-ātea). These types of knowledge from each of the three Kete are used in an integrated way, as a whole system of knowledge. One context in which the connection between Te Kete Tua-uri, Te Kete Aronui and Te Kete Tua-ātea is seen clearly and is still broadly applied is the astronomical and meteorological sciences of Māori and other peoples of the Pacific. Te Kete Aronui holds generations of observations of celestial and atmospheric phenomena, indicators and patterns, and of how ecological and social phenomena and patterns coincide with them. This has led to the development of Te Kete Tua-uri knowledge and theory about how time, space and the universe work, and the relationship between the celestial scape, the atmosphere and earth. These observations from Te Kete Aronui and the theory of Te Kete Tua-uri inform the development Te Kete Tua-ātea tools such as mental models of the relationships and patterns that have been observed over time, that can be applied to generate knowledge in the form of inferences⁷ about what will be observed in the future as indicated by celestial or meteorological

⁷ 'Inferences' can be defined as 'a conclusion or opinion that is formed because of known facts or evidence' (Merriam-Webster, 2019).

indicators, patterns and events. Whakapapa, or genealogies of nature, are a tool that may be used as an initial template to inform the construction of these mental models, as they often held important information about the spatial, temporal, biophysical and use relationships between different natural phenomena (Roberts, 2012).

The most simple and well-known example of how the Kete interact in this way, is seen during the rising of Matariki, the constellation known globally as Pleiades; when this is observed during winter, one can make a number of different inferences about the environment. In general, one can infer from the rising of Matariki that the change into a warmer season has arrived, and more specifically, each of the nine stars that comprise the constellation relates to a specific aspect of the environment, and each stars' appearance can be observed closely to make inferences about the health or nature of that specific aspect of the environment for the coming year (Matamua, 2017). Generations of observations from Te Kete Aronui of what occurs following the rising of Matariki, combined with Te Kete Tua-uri theory to understand how the universe works, have been used to develop a Kete Tua-ātea mental model of the relationship between the celestial-scape, the time of the year, and the environment, that is applied to generate inferences of what will probably be observed. In the past decade, the celebration and understanding of Matariki in Aotearoa has undergone a revitalisation, which has been part of a wider revitalisation of astronomical knowledges and tools, including the recognition and continuation of traditional Māori observatories, including one in the Horowhenua called Tirotiro Whetū, and the burgeoning area of Māori-led astronomical research in various tertiary institutes in Aotearoa (Matamua & Whaanga, 2016).

There has also been an increased interest in Māori knowledge relating to climate and weather as a result of climate change and an increasing global recognition of the significant contribution that indigenous people can make to understanding climate variability and trends on the basis of the in depth knowledge they tend to hold in

connection to their ancestral homes (Nakashima, Galloway McLean, Thulstrup, Ramos Castillo, & Rubis, 2012, p. 6). Research in this area has uncovered a vast knowledge of Māori indicators that are used to accurately forecast changes in weather and climate (King, Skipper, & Tawhai, 2008). The forecasts made through observations of these indicators are useful in informing a range of different human activities, including planting and harvesting activities, and travel over land and at sea (King et al., 2007).

Another futuring tool widely used across not just Aotearoa but the Pacific is the maramataka, or lunar calendar, which infers the environmental conditions and therefore the outcomes that will be observed in gardening, fishing and society for each moon rising, roughly for each day. Maramataka are specific to place, and in Tāwhai's (2013) published version, he describes the process for maramataka development that we see across all Te Kete Tua-ātea tools: inherited and practised-gained observations and experience are integrated with a theoretical understanding of the relationship between the moon and earth, to develop a mental model of a maramataka, which could be applied to make inferences of what would occur with each moon's rising, that was subsequently trialled and tested over time, as the maramataka then started to be applied to everyday life. Tāwhai emphasised that maramataka were developed and applied with a socio-ecological system view that involved not only seeing the natural patterns of ecological systems, but also how those changes affected society (Tāwhai, 2013). This is consistent with the conceptual view of systems discussed in the Kete Tua-uri part of this chapter: systems are the integration of a range of values, including the social and cultural.

Dozens of published and unpublished maramataka have been identified across Aotearoa and are also commonly observed across the Pacific (Roberts, Weko, & Clarke, 2006). As the cultural revitalisation related to Māori environmental and food sciences continues, it is increasingly recognised by expert practitioners that each whānau, or perhaps even individuals, can have their own comprehensive and specific maramataka that captures

relevant observations from their specific context to enable them to effectively plan their own food production or other general life activities (Hutchings, 2015). This specificity of maramataka is a particular advantage not just in terms of them being developed specific to place, but they have also typically been developed with the particular human activities of interest to the local community in mind. For example, maramataka from warmer areas with rich soil include a lot of knowledge relating to horticultural activities, whereas maramataka from coastal areas might contain a lot of information about sea fishing or migrational species (Clarke & Harris, 2017, p. 133).

The comprehensiveness and accuracy of Pacific peoples' understanding of astronomy and meteorology is perhaps most powerfully evident in the way it is applied in the technologies of ocean navigation. As recounted by Low (2013) in his book 'Hawaiki Rising', the building and launching of the Hōkūle'a voyaging vessel in Hawai'i in the 1970s triggered a cultural renaissance of ocean voyaging first in Hawai'i and then more broadly across Te Moana-nui-a-Kiwa, or the Pacific, and a re-examination of the astounding navigating abilities and technologies of its peoples, which are applied without any chart, compass or sextant, but instead use a range of mental models and tools to accurately navigate the largest and most land-sparse ocean on the planet.

Turnbull's (1991) book 'Mapping the world in the mind', reviews literature on the knowledge system of Micronesian navigators from which other Pacific navigation systems are likely to have originated, including those of Māori. He discusses the methods and tools used to model natural systems for the purpose of navigation and presents the 'star compass' as a central tool of the navigator. The star compass is a spatial model that shows the rising and setting locations on the horizon of key stars. Low (2013) also presents the Micronesian star compass (see Figure 2.4) as a tool that was fundamental to the knowledge of navigation.

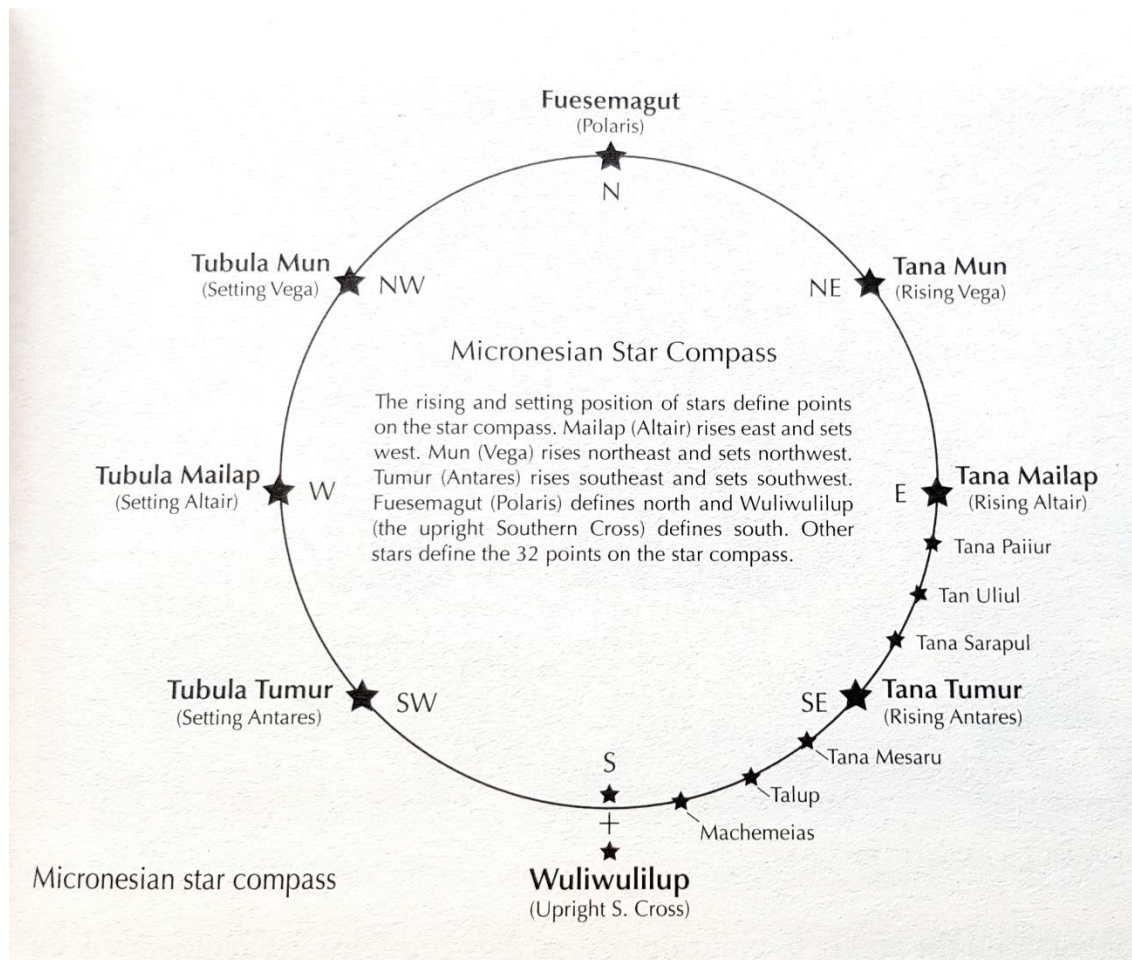


Figure 2.4 Micronesian star compass (Low, 2018 p. 55)

The literature Turnbull reviews identifies that the success of this system of navigation has relied on the ability to use experience-based observations to create mental ‘maps’ of the patterns of relationships between these star courses, and other aspects of the environment that are observed or experienced. Goodenough and Thomas (as cited in Turnbull, 1991, p. 19) explain that ‘as Micronesian navigation exemplifies, people can deal purposefully with their world only insofar as they can organise their experiences of it. To do this, they abstract from their experience patterns of relationship among things.’

As presented by Lewis (1972, pp. 82–120), the ability of Pacific navigators to mentally map the patterns of relationship between star courses and other aspects such as latitude,

time, current and wind in order to voyage towards an objective site requires a strong ability to mentally deal with significant complexity. Whilst stars rise and set at the same point on the horizon provided you remain at the same latitude, this point changes once the observer changes latitude, and the stars rise four minutes earlier every day, meaning they cannot always be observed in the same way, and are only usable for navigation in certain seasons. In addition to this, the way in which a navigator may direct their own course in accordance with star courses may have to be altered to accommodate for other factors such as ocean current or wind. Lewis also presents examples of the use of a 'wind compass', which can work as a secondary indicator of direction. A navigator is having to constantly use their mental map to calculate their direction as new information arises from their observation and experiences.

The literature on Pacific navigation all refer to a process where mental maps are constructed by navigators and refined over time, and then handed down generation to generation. Mental navigational maps or models therefore comprise generations of observations and understandings of the celestial scape, meteorological phenomena and other environmental indicators observed at sea or close to land. Low (2018, pp. 53–55) describes the process of knowledge transmission observed across the Pacific, where mental models such as star compasses were learned and memorised through chanting. These could then be readily conjured by navigators whilst at sea, to picture in their mind how the night sky should look if they were heading in the correct direction. This enabled them to accurately determine the precise course they should set in order to reach land.

Now some decades since its initiation, the revitalisation of traditional Pacific voyaging continues, including in Aotearoa. Recent commentators (Tuaupiki, 2017) have noted how the revitalisation of traditional Māori voyaging has provided a good example of the strong capability of traditional Māori knowledge and thus supports the efforts to promote the revitalisation and development of Māori knowledge more broadly. The relatively

recent recognition of the power and value of Te Kete Tua-ātea knowledge and tools pushes back at the prolonged history of Western science unreasonably dismissing and overlooking the sophistication of these Māori technical knowledges and tools that they did not understand and had a typical colonial bias against. In introducing his maramataka, Tāwhai (2013) drew a distinction between the knowledge and techniques that he holds and shares, which come from what he describes as the totally coherent memories of his people that comprise a 'tangata whenua knowledge base', in contrast to the descriptions of knowledge and tools that settler ethnographers such as Best (1922), Grey (1988), Cowan (2000) and Tregear (1999) offered. Tāwhai (2013, pp. 1–2) provided evidence of these ethnographers having documented observations of knowledge and its application in a way that could not reflect the knowledge in a full or accurate way.

This clear bias is seen in the opening statement of Best's (1959) book *The Māori Division of Time*:

The Polynesian system of division of time was crude and incomplete. It contains, however, elements of interest, for it was probably brought from the old home-land of the race in the far west. Moreover, it possesses an evolutionary interest, for we see in the primitive time-measurement of the Māori the crude system from which our accurate one has been developed (p. 5).

This view of the Māori system of time ignores its rather sophisticated functionality whereby it not only measures the passing of time but simultaneously can be used to make inferences about what one might expect to occur at any given point in time. It also ignores the high level of theoretical and applied understanding of the celestial scape, including the ability of everyday people to interpret rather complicated aspects of astrophysics such as lunar astronomy well beyond what the common knowledge of

today's society reflects. Even more remarkable to consider is that in the times of Best much of this knowledge was so intimately known that it was held completely orally and passed on with accuracy without ever having been written down.

Before colonisation, Māori mathematics, which included understanding of pattern, relationship, measurement, shape and interconnectedness, had a range of applications, including building design, navigation, weather forecasting, time, gardening and other fields. Seen without the colonial bias against Māori knowledge, Māori mathematical thinking is evidently highly capable in problem solving, lateral thinking and understanding the holistic interconnectedness of individual parts. However, the colonial education system has interrupted the passing down of Māori mathematics, amid the wider breakdown of Māori society and practices where Māori mathematics would typically be applied (Christensen, 1996; Dewes, 1993).

The assumptions by ethnographers such as Best that all they could ascertain, or were permitted to see as non-expert outsiders, constituted the full body of working knowledge of Māori expose a deep level of ignorance and hubris, and ultimately an agenda to diminish Māori knowledge and the power of Māori knowledge holders. Unfortunately, many of us who work as Māori knowledge practitioners, with Māori understandings of the world and with Māori predictive capabilities, still encounter this attitude today.

Expanding Te Kete Tua-ātea through the integration of Māori knowledge with contemporary quantitative modelling tools

There are increasingly examples of Māori entities integrating Māori knowledge and worldviews in the application of contemporary quantitative and decision-support modelling tools to simulate and examine scenarios or forecast change or trends, to support decision-making processes. These examples vary in the degree to which Māori

are able to have control over these types of modelling processes and therefore the extent to which their worldview and specific values are reflected in or the focus of quantitative modelling projects.

In some cases, Māori are involved as stakeholders in a collaborative decision-making process but have little involvement in the quantitative or even conceptual modelling itself. This type of approach has been observed in the Ruamāhanga catchment modelling project undertaken by the Greater Wellington Regional Council as part of their freshwater objectives and limit-setting process. The Ruamāhanga Whaitua Implementation Plan (Ruamāhanga Whaitua Committee, 2018) describes the involvement of Māori in the freshwater objectives and limit-setting process as being reflected through the inclusion of Māori guiding principles in the process, identification of Māori values as some of the key catchment values and the involvement of Māori in decision-making. Although the plan refers to partnership with Māori, there is no aspect of the decision-making process and structure that reflects a partnership; instead, iwi representatives hold a minority of seats in decision-making that have the same power as other stakeholder representatives. Public information disseminated about the quantitative modelling utilised to inform the objectives and limit-setting process sets out a Western science conceptual model of the catchment system (Greater Wellington Regional Council, 2016) and subsequent reports on specific quantitative modelling such as that from Allan, Hamilton, and Muraoka (2017, p. 17) include the overall Ruamāhanga modelling architecture depicted in Figure 2.5, which sets out a system comprising exclusively Western science measures and models. It notes that mātauranga Māori is 'woven in', but there is no explanation or evidence of how this is achieved in the report.

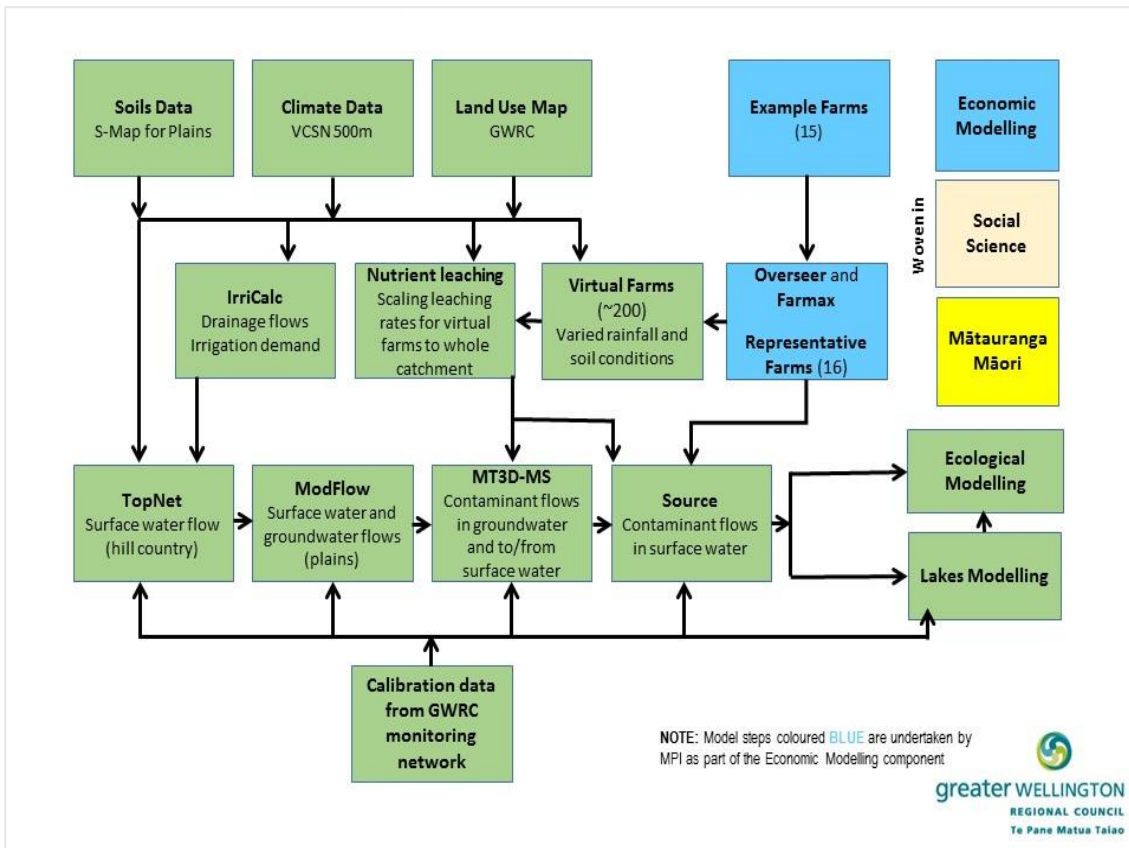


Figure 2.5 Ruamāhanga Whaitua modelling architecture

In other cases, Māori are still merely participants in collaborative community modelling projects but are at least involved directly in the development of conceptual and system models. This is the approach taken in the application of the method referred to as ‘mediated modelling’ in Aotearoa (van den Belt et al., 2012; van den Belt, Schiele, & Forgie, 2013), where stakeholders construct system dynamics models collaboratively in action research projects to support adaptive freshwater and coastal management. This type of modelling is utilised to understand cause and effect, to develop a sense of the magnitude of different problems and to simulate and examine the likely outcomes of various proposed future solutions. In these approaches, iwi and hapū are considered a stakeholder with other parts of the community, and the conceptual model of a system tends to be limited to the predominant Western science oriented view.

These approaches where Māori are positioned as stakeholder and not able to determine the conceptual model for the system is vulnerable to the tendencies examined in Chapter 1 where Māori values and interests become marginalised by default as belonging to the minority. Although these approaches do not ensure that quantitative modelling can be done within a Māori view of systems, they do have merit for Māori as a means of facilitating dialogue about their key values with other parts of the community.

There are also examples of iwi entities partnering with Western scientists to utilise their quantitative modelling tools (Smith et al., 2017; Tangatatai, Patterson, & Hardy, 2017), such as ecological economics models, cost-benefit analyses or computer simulation models, to examine the potential future impacts of various types of interventions or land uses in order to support decision-making contexts such as freshwater and coastal management or managing the climate resiliency of farm systems. The quantitative modelling tools themselves have been designed to examine the behaviour and change of specific types of values from a Western scientific lens, such as biophysical attributes of freshwater health, as opposed to the other aspects of system health that might include attributes such as connection of people to the environment or quality of knowledge. Following this Western science-based approach, Māori entities are just as likely to be susceptible to ignoring critical parts of freshwater systems that are just as important to understand, care for and manage.

Where Māori values and measures are identified, the assessments of future scenarios and outcomes are often still based on a Western scientific conceptual model of systems, utilising the 'sustainability' framework that categorises systems into environmental, social, economic and cultural values, with Māori values often being framed exclusively within the 'cultural values' subset. Montes de Oca Munguia, Harmsworth, Young, and Dymond (2009) were able to successfully incorporate cultural values into spatial futures and scenario modelling to support iwi in Motueka by developing a 'cultural production

metric' that could be used to score alternative land uses in terms of its ability to support various aspects of 'cultural health'. The cultural production metrics were then applied along with other environmental and socio-economic metrics to provide overall scores of various scenarios of interest. This tool was useful in that it supported the ability of the iwi to articulate the implications of various management scenarios for their values in their negotiations with government, industry, research agencies and other groups. However, the approach still limits the influence of Māori values to only one specific aspect of analysis, rather than to the understanding and interpretation of the system as a whole.

Pizzirani (2016) points out in her research into how to provide for Māori cultural representation in life cycle sustainability assessment (LCSA) that 'culture' is represented in participatory LCSA firstly through the use of a cultural health indicator such as that developed for the Motueka case study, but also through making the LCSA process more 'culturally focused'. She suggests that this is achieved through following an active and collaborative participatory approach to engagement that provides opportunities at each stage of the LCSA process. Notably, however, the Māori involved in the project are identified as 'participants', while those involved in the actual model development and implementation are identified as the 'LCSA practitioners'. Further to this, the adoption of a participatory approach was promoted for its ability to enhance Māori 'acceptance of the final result' (Pizzirani, 2016, p. ii). This alludes to Māori being positioned in these processes in a way that their own knowledge practitioner capabilities may be overlooked and they are being asked to accept the results of the process rather than determine the results.

There are some examples in the literature of quantitative modelling tools being applied to understand the relationship across integrated Māori values that arise from a more holistic view, rather than utilising a Western science sustainability conceptual model and limiting Māori values to a 'cultural' framing. One project that has attempted to achieve

this more integrated analysis involved four Māori farm case studies to explore how what they termed 'functional integrity' could be achieved through different land use options (Wedderburn, Kingi, Paine, & Oca, 2016). The participating groups identified different attributes or 'functions' of the land that reflected Māori objectives that spanned environmental, economic, social and cultural type objectives, in addition to the typical set of functions that farm management achieves. Then, based on information generated about the current performance of the farms, they used various computer simulation models to explore how well various land use scenarios achieved objectives across a full range of values, or functional integrity. This was achieved through iterative interaction between the researchers and the land owners, so that the assessment of outcomes was transparent, and informed by expert knowledge. Although still grounded in a Western scientific frame, this approach appears to have been useful in supporting Māori groups to explore the best future scenarios for their land in order to achieve well-being from an integrated Māori perspective.

Awatere et al. (2018) provided another example of utilising a Māori view of integrated values in future scenario testing. In their project examining the potential implications of climate change for Māori land investment, future scenarios were developed using Western science quantitative modelling, to model potential climate change implications for erosion rates and profitability of different afforestation scenarios. However, the assessment of the likely outcomes of these various scenarios was done using a kaupapa Māori, or Māori values-based, evaluation tool. Various land use scenarios were assessed for their implications for Māori communities in terms of their own view of the system, which was conceptualised in terms of kaitiakitanga, or inherited responsibilities of stewardship, across various aspects of the environment, manaakitanga, or various social, political and educational attributes that enable people to care for others, and whakatipu rawa, or how investment provides for various development goals. Conceptualising the system in terms of these three key sets of values enabled Māori to

examine and test future scenarios in terms of the full spectrum of integrated values in their view of the system, rather than in just one 'cultural' subset.

The assessment of potential future scenarios in terms of Māori values in a system can be further strengthened by mapping out the relationship between those different values, to understand how they interact, and to provide assurance that the functionality of the whole system has been considered. This can be achieved by using the causal loop systems map (CLSM) tool, which has been applied in different ways to support Māori futuring projects in both land management and human well-being contexts. In a case study in Waimarama (Kingi, Wedderburn, & Montes de Oca Munguia, 2013), a CLSM was developed to map out the factors and relationships that influenced the future of Waimarama in the context of land management. The CLSM was then used to identify aspirations that the project team could use to evaluate the potential of different scenarios. In a case study in Kaikohe (Heke, Rees, Swinburn, Waititi, & Stewart, 2019), a CLSM (referred to as a 'causal loop diagram' in this project) was used to describe the Māori language immersion school community view of their school and community system and to examine and identify key factors that would support shared community objectives.

Ultimately, most of these approaches follow a process whereby quantitative or computer simulation models that have been developed to infer the behaviour of very specific values generate scenarios that require interpretation by Māori experts in terms of how probable it is that those scenarios will affect their own values in a certain way, based on their own inherited or practice-based observations. This Māori approach to futuring, which determines the probable outcomes of different scenarios as a result of ongoing accumulated observations, is compatible with how probability is understood and applied in the approach followed in the Western science field of Bayesian statistics, where probability expresses a degree of belief or confidence in an event occurring, which can change as new information is gathered. For this reason, Hudson et al. (2016) identified

a Bayesian approach as a potentially useful technical tool for indigenous futuring. It has been applied with the Gooniyandi people of Australia by Liedloff, Woodward, Harrington, and Jackson (2013) to develop a Bayesian belief network (BBN) to model their understanding of a part of a river catchment.

A BBN is a network that can be drawn to identify key attributes of a system, how each attribute is connected through cause and effect to others and, when an attribute is changed, the probable degree to which all other attributes of that network are likely to change. Figure 2.6, taken from Carriger et al. (2016, p. 131195), shows a basic BBN structure. Each attribute of a system is represented by a node, which is connected by arrows in a direction from cause (the 'parent' node) to effect (the 'child' node). For each node, conditional probabilities are used that represent the probability of each possible state in a child node, given each possible state in the parent's nodes.

Figure 2.6 Example of a BBN from Carriger et al. (2016, p. 13195)

In that sense, it takes the process of the CLSM one step further by not just identifying the key relationships between different parts of a system, but also, by applying information about the probable degree to which change in one part of the system affects change in other parts, enabling inferences to be made about how the system as a whole may change. In the example with the Gooniyandi people, a BBN was built to show the relationship between attributes of the system they had knowledge of, including fish species' availability, condition and required habitat, with other hydrogeological factors that were understood from previous research undertaken. The BBN was then used to infer eco-hydrological changes that would result from proposed future water resource development. BBNs also appear to be a useful and simple way to represent indigenous understanding of systems, despite the narrow focus of the Australian example on the biophysical attributes of freshwater health.

Carriger et al. (2016, pp. 13196–13197) identified two key types of inferences that can be made through the application of a BBN. The first are 'predictive' or 'observational' inferences. These are inferences made by using the BBN in the forward direction to infer, for a given scenario, what happens to a child node, when one or several different parent nodes are in a particular state. This might be done to determine what future outcomes are probable when a change to the system is made. The second type are 'diagnostic' or 'interventional' inferences. These are inferences made by using the BBN in a backward direction to infer, in a given scenario, which parent nodes have the strongest causal effect on a child node being in a certain state. This might be done to diagnose the most significant causal factor of a particular issue in a system, or to determine where one should intervene in a system in order to generate a certain type of outcome.

Although the application of quantitative modelling and other futuring tools are proving to provide Māori and indigenous peoples with support to examine the future, inform decision-making processes and articulate their views across cultural boundaries, the

literature illustrates how challenging it can be for Māori as they continue to engage in the use of these tools. Figure 2.7 presents a spectrum of Māori ability to have their worldview reflected through the application of qualitative modelling processes. As the spectrum shows, in some cases they may be provided only with the opportunity to be involved in the decision-making that is informed by quantitative modelling, but not the modelling itself. Further along the spectrum, where Māori may have more involvement in the modelling itself, often the conceptual model of a system still marginalises their values into one aspect of a system, rather than reflecting the Māori view of how their values are integrated across the whole system. The strongest examples of quantitative modelling reflecting a Māori worldview are where both Māori conceptual models of a system and Māori expert knowledge or opinion on probable outcomes of scenarios are utilised. In these examples, Māori groups tend to be in control of the futuring projects or recognised as the project team itself, rather than participants in the project.

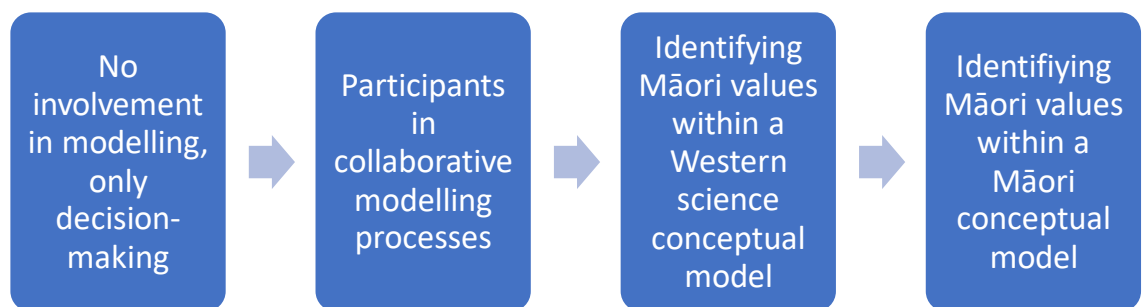


Figure 2.7 Spectrum of ability for Māori to have their worldview reflected through quantitative modelling processes

It should also be noted that although Māori involvement in quantitative modelling as apparent in the literature has been covered here, the tendency by Māori to want to protect knowledge associated with these projects means that very few projects undertaken are

actually published. Publication is not always the goal or even desirable for Māori who are working in this field. In the course of writing this thesis, I have been made aware through my own networks of kaitiaki and other professionals that there are many more Māori futuring projects occurring across the country and being applied in a range of different contexts. This indicates the need to engage at the local level directly with kaitiaki in order to really appreciate the breadth and depth of this field.

Māori knowledge is often viewed and utilised with an orientation to the past. Its value to outsiders might be in providing an insight into 'primitive' or 'ancient' knowledges. However, its value to us as Māori might be to understand better how our ancestors saw the world, to find our way back to something traditional, as a way of reclaiming authenticity - reclaiming what we have lost. Yet in exploring Te Kete Tua-ātea, we see that the Māori worldview is strongly interested in understanding and knowing the infinite possible futures beyond what we can currently see. As much as Māori observation is about understanding what can be perceived now, it is just as much about informing our mind's eye of what the future will look like, to know what is coming just over the next horizon.

Building on the process and examples described here, this thesis shows how Te Kete Tua-ātea tools have been developed and applied to assist Te Āti Awa ki Whakarongotai to create, present and interpret its own knowledge and inferences about the potential futures of freshwater systems in its rohe, to support the iwi to uphold their worldview and values in decision-making processes.

Summary of Chapter 2

This chapter has examined how each of the three aspects of knowledge in Ngā Kete o te Wānanga can be utilised together to support decision-making, with examples that

relate to freshwater where possible (see Table 2.1 below). This analysis has shown that, together, Ngā Kete o te Wānanga comprise three different but interrelated functions of knowledge: to create meaning from what we can observe, to create and apply theories of how the world works, and to create knowledge about how the future will look.

These three kete function together and so this thesis presents the development of relevant knowledge for each kete, to support the application of Te Kete Tua-ātea futuring tools to support iwi freshwater decision-making.

Table 2.1 A summary of the three aspects of knowledge Ngā Kete o te Wānanga

| Ngā Kete o te Wānanga | Type of knowledge | Created by | Purpose |
|------------------------------|--|---|--|
| <i>Te Kete Tua-uri</i> | Knowledge of the metaphysical 'real world' beyond what is observable Fundamental knowledge about how the universe works | Inherited and developed theories of what we sense is beyond what is directly observable | To make meaning of what cannot be directly observed in the world To inform our interpretation of Te Kete Aronui, or what we observe |
| <i>Te Kete Aronui</i> | Knowledge of the observable world | What we can observe using our full range of senses | To make meaning of what we see in the world To inform Te Kete Tua-ātea, our knowledge of the future |
| <i>Te Kete Tua-ātea</i> | Knowledge about the infinite possible realities | Inferences informed by Te Kete Tua-uri, our understanding of how the world works and Te Kete Aronui, accumulation of observations | To have meaningful knowledge of potential future worlds |

Chapter 3: Te Ara Poutama⁸ – Methodology

This thesis presents the research and work conducted by me and our iwi to propose and operationalise a mātauranga Māori framework and futuring tools to support us to realise our tino rangatiratanga, specifically with regard to decision-making processes connected to freshwater. I have conducted this research as a member of my iwi and in my role as Pou Takawaenga Taiao. This name was given by one of my kaumātua, Paora Ropata, and conferred by our iwi governance, and it might be translated literally as the ‘conduit supporting environmental matters’ but is used in a professional sense to mean ‘environmental manager’. This chapter provides a reflexive account of the process of this research and work, in which the development of a PhD thesis has been secondary to the fundamental and daily responsibility of carrying out this role for our people and for all the taonga under our kaitiakitanga.

Kaupapa Māori research methodology guiding principles

Research such as this, which aims to create Māori knowledge with an agenda of manifesting certain Māori kaupapa, or values, is considered ‘kaupapa Māori’ research (Royal, 2012). This approach to knowledge production is consistent with what is observed with indigenous knowledge globally; it is always linked to the fulfilment of ethical values, and to the manifesting of the cultural view of the ‘right’ way to be in the world (Smith et al., 2016, p. 138). There are several other aspects of the kaupapa Māori approach beyond it being ‘values based’, and here I will provide an overview of these and how they have informed this research.

⁸ Te Ara Poutama is a pattern sometimes depicted through tukutuku (Māori lattice work) to depict the journey taken to pursue enlightenment.

There is a significant body of literature written on how kaupapa Māori informs knowledge production and application (L. Smith, 2000; Smith, 1998; Walker, Eketone, & Gibbs, 2006). However, this is mainly in the context that the literature is most familiar with, that of course being the function of kaupapa Māori in academia. The following values are identified as central to kaupapa Māori research in academia: resistance to Western academia, decolonisation of the process of knowledge production, and transformation and liberation of Māori themselves (Pihama, 2010). Certainly, these values have directly informed this research; its key aim is to provide iwi with their own knowledge tools to uphold their own values. This has been transformative for us in that it has empowered us to resist the dominance of Western knowledge approaches, and to decolonise the thinking and implementation of decision-making about freshwater.

However, it has been evident to me in the course of this research that the values of resistance and decolonisation are specific to the current context we find ourselves in as Māori in the academic context, and secondary to the more fundamental Māori values that inform the production of knowledge when we are free from the burden of constantly resisting, such as mauri, mana and tapu: the things we value simply by being Māori. There are also many more ways of knowing and producing mātauranga Māori than those provided by the academy, and where mātauranga Māori may be produced without any agenda for decolonisation or resistance, but rather to just produce knowledge that is an expression of who we are and how we see the world. It is important to recognise that some of the most important examples of kaupapa Māori knowledge creation and application sit outside the academic context:

It is important to recognise the depth of expertise of our own community based knowledge keepers to conduct those extraordinary, metaphysical tasks, such as mediating the material and spiritual world, escorting a spirit on a physical and spiritual journey, binding ancient genealogies with contemporary realities,

sustaining relationships while healing collective grief, seeking visions and teachings from our ancestors, or cleansing people and spaces. The knowledge that sits behind these roles and responsibilities is often not recognised, understood or valued by non-indigenous colleagues or institutions, likened more - as it often is - to religion rituals, dogma and ceremonies than to forms of knowledge production. (Smith et al., 2016, p. 132)

There are examples of this across many knowledge practices, including kaitiakitanga (environmental stewardship), whakatere waka (navigation) and te whare tapere (performative arts). In this research, I have found it important to remember that its outputs are for us as an iwi, not the academy, and their fundamental purpose is to give expression to our values freely; their deployment to resist and respond to the colonial context is secondary to that.

Marsden (2003a) states that to achieve the manifestation of Māori values, and broader social justice, it is critical to pursue 'authenticity' in the generation and holding of knowledge. From a Māori perspective, authenticity requires one to follow a 'passionate, subjective approach' and to actually live and experience the 'Māori world', or 'Māoritanga'. According to Marsden (2003a), Māoritanga is a thing that is experienced and felt in the heart, not in the head:

The integration of an individual into full membership of society takes places over a long period of time. Not in formal schooling, but in his living situation. The process of learning, by which the raw material of the young is transformed into full citizenship, is inherent in the workings of each institution so that the instilling of values, norms and attitudes is effected by the apprenticeship to tribal life, that is, by existence in the cultural milieu. (p. 23)

Recent scholars have emphasised the importance of these ‘authentic’ kaupapa Māori approaches in addressing Māori issues: ‘In order to understand, explain and respond to issues for Māori there must be a theoretical foundation that has been built from Papatuanuku’ (Pihama, 2010, p. 10).

The insistence on the use of Māori-based knowledge to address ‘Māori issues’ raises the question of the role Western or other foreign knowledges can or should play. This is particularly important for this research, which has engaged with various tools and techniques from Western science spaces. Royal (1999) referred to Whatarangi Winiata’s Tiriti House conceptual model⁹ (see Figure 3.1) as a framework for conceptualising how different knowledge and cultural paradigms can interact. The framework reflects Winiata’s (1997) view that one cannot create for one culture from within the paradigm of another. The success of cross-cultural institutions or application of knowledge is predicated on the maintenance of distinct spaces dedicated to Māori cultural institutions and knowledges.

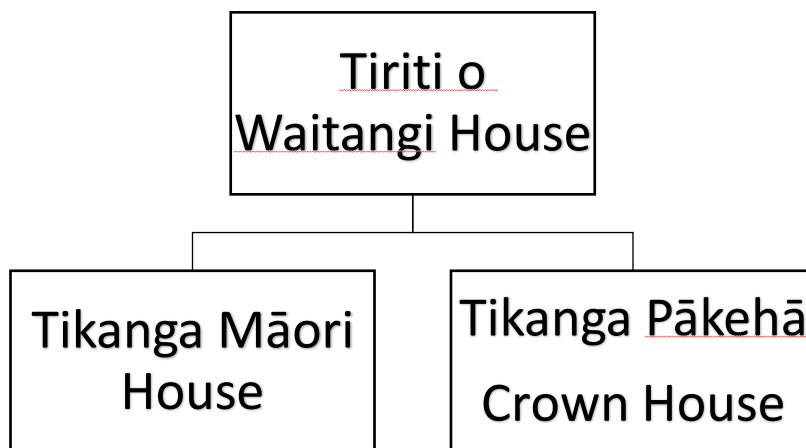


Figure 3.1 Tiriti House conceptual model

⁹ Sometimes also called the ‘Raukawa-Mihingare’ conceptual model in reference to its introduction by Ngāti Raukawa ki te tonga to the structure of the Mihingare or Anglican Church of Aotearoa.

Royal (1999) discussed the importance of authentic spaces and institutions for the manifestation of Māori values and aspirations and referred to kohanga reo, kura kaupapa Māori, whare kura, whare wānanga and iwi authorities as examples of these: 'The agenda should be orientated toward the creation of authentic mana motuhake institutions which are devoted to the paradigms of Māori knowledge' (p. 5).

To ensure authenticity in the creation of mātauranga Māori, in the context of a bicultural society, what is important is not so much the content of knowledge generated, but that its theoretical and empirical basis are distinctly Māori, as are the milieu and associated cultural protocols of the institutions within which the knowledge is generated, disseminated and used.

Others have emphasised that, given the ever growing and developing continuum of mātauranga Māori, being authentic does not imply a dogmatic adherence to traditional values but rather an ability to always be relevant to the Māori world (Smith et al., 2016, p. 145), and that it is defined by the political context of the knowledge production and use:

The same knowledge can be classified one way or the other depending on the interests it serves, the purposes for which it is harnessed, or the manner in which it is generated. (Agrawal, 1995, p. 433)

Because of the broad range of ways in which knowledge is produced within the mātauranga Māori paradigm, it is important to recognise that experts come in different forms with different qualifications, and that this does not at all mean that it is not clear who the experts are:

It is very clear when listening to indigenous people talk about knowledge that their communities know their own experts and can describe the kinds of roles, functions and responsibilities those experts perform in their communities. Knowledge is often seen to be held by grandmothers, elders, healers, medicine people, seers, artists, builders, weavers, guides, hunters and gardeners and midwives. (Smith et al., 2016, p. 144)

Finally, Māori oral tradition on the origin of knowledge and the establishment of the *whare wānanga*, or institution of learning, and wisdom frames knowledge as sacred because of its power to manifest particular agenda, and therefore there are strict *tikanga*, or ethical protocols, about who is able to access it, where, in what way and for what purpose (Marsden, 2003b; Royal, 2003, p. xiii). This means that the research process has to follow appropriate *tikanga* to guide a safe and appropriate process and degree of knowledge sharing and access.

To summarise, following are the key aspects of kaupapa Māori knowledge generation that have informed the methodology of this research:

1. manifests Māori values
2. not limited by the values, interests or approaches of the academy
3. informed by impassioned, lived experience as a member of iwi society
4. built from Papatūānuku
5. originates from distinct Māori spaces devoted to paradigms of Māori knowledge
6. produces outcomes that are relevant to Māori
7. recognises experts as identified by the iwi collective
8. follows a *tikanga* Māori ethical approach to accessing and sharing knowledge.

The research as part of the life of Te Āti Awa ki Whakarongotai

The pathway and passion for doing this work started for me as an 11-year-old, who would be taken down to Whakarongotai Marae every year by my father to ask the Marae Committee for their support and endorsement of my studies. It was reinforced in me from a young age that the pursuit of knowledge was grounded in the aroha of our people, and that its purpose was always to achieve things that served our collective aspirations. When I was 13, an uncle who was based on Kāpiti Island asked me to come over to the island during my school holidays and help with a new project catching and translocating kiwi to the Karori Wildlife Sanctuary. This experience triggered my passion for kaitiakitanga and I continued to have opportunities to stay involved in the translocations over the years (see Figures 3.2 and 3.3)



Figures 3.2 & 3.3 Early translocations in teenage years and accompanying kiwi off the island in recent years

The feeling I had the first time I held a kiwi in my arms and looked into its eyes is similar to what I still experience with other native animals in Aotearoa; sometimes when you release kokopu you have caught, it will stay looking up at you instead of darting off as you might expect. It is a profound feeling that can only be understood through experiencing it. Western scientists call our native fauna 'naïve' to predators, but I have always felt that our native fauna are not supposed to have a reason to fear us greatly, but instead should be able to trust us as kaitiaki. It is that sense of responsibility as a kaitiaki that has always driven me in the work that I do.

In my tertiary education, I focused on environmental studies, ecology and Māori resource management, and my master's thesis was also iwi-focused research, which developed a kaupapa-based framework to support iwi decision-making on genetic engineering. After some time researching and working with Māori across the country, particularly in food-related areas, and then a few years working in Copenhagen, I moved back home to take up my current role working for Te Āti Awa ki Whakarongotai, which I have now been doing for five years.

This research and the knowledge and tools created through it belong to the iwi; the research has been done for them, under their guidance, and implemented by them. So it is also important to consider their positioning as researchers and how this has informed the process and outcomes of the research. The Āti Awa ki Whakarongotai Charitable Trust (the Trust), is the 'mandated iwi organisation', the political entity responsible for the governance of the iwi, and I report to them in my role as the Pou Takawaenga Taiao. As is the case with any small pre-settlement iwi, it has been a challenging journey for our iwi to resist the influence and impacts of colonisation, and to maintain strong leadership and good governance (Ropata, 2019). When I started out in my role, the Trust was in a state of building confidence and capability, with a totally volunteer board of trustees and a part-time administrator. Its key function at the time was to oversee the management of

fisheries assets and provide political representation on various committees of local government. It had just launched its iwi strategy, Tuia te kawē, which identified six key areas of well-being for the Trust to work towards, including the development of an iwi environmental strategy (see Figure 3.4).



Figure 3.4 Sitting with my grandparents at the launch of the Tuia te Kawē iwi strategy

Initially my work was purely responsive, providing assessments or responses to various environmental and development issues that arose, and I have now built a Taiao Unit of four young Te Āti Awa women to continue this key function of work. However, building a mātauranga Māori framework to support our iwi decision-making has been our underlying core work as an iwi in these recent years, and it continues to be informed by the day-to-day context of kaitiakitanga.

Bringing in an operational unit of the Trust to manage the environmental work of the iwi, including this research, has brought a huge burden of governance to the Trust. Therefore, we have had to develop the appropriate governance mechanisms and resources for this project as we develop the research. It has been of utmost importance that this research belongs to and is accountable to the iwi collective, across all levels.

For a young woman who was not yet 30 starting out on this project, the support, direction and guidance of my kaumātua have been essential to doing the research in the right way. In addition to this, a key activity that has continued to inform this work has been the Hui Rangatahi (youth camps) run twice a year by myself and a relative. On the surface, these hui are about providing opportunities for our youth to experience whanaungatanga (familial connection to one another) and for us to teach them about who they are, but they have also played a critical role in my research and work; not only have rangatahi informed some of the data collection in the research, but they have grounded me with an experiential understanding of what the fulfilment of our values looks and sounds like (see Figure 3.5). Our rangatahi are another 'puna o te aroha': a wellspring source of aroha and hope for our people that provides inspiration in the work that we do.



Figure 3.5 Hui Rangatahi 2016, Waikanae River

In addition to my monthly reporting responsibilities to the Trust Board, and annual reporting to the iwi at large, the Trust and Kaunihera Kaumātua (Kaumātua Council) assisted me to convene a Taiao Committee to provide specialist advisory support from those who had the expertise and experience with kaitiakitanga specifically, for this research and my work in general. This started as an 'advisory group', but later through

the course of this work it was given delegated authority for specific governance responsibilities from the board, including project oversight. The committee's five members include the chair of the Kaunihera Kaumātua; experts in kaitiakitanga, including conservation and water care and protection; elders with long-reaching historical knowledge of the area; mahinga kai experts; and members with comprehensive iwi governance experience.

The committee was appointed by our Trust Board and comprised only men. Whereas the board comprises three men and three women ranging between 40 and 70 years old, the committee members were all senior experts, none younger than 60 years old. I believe that the committee and its membership therefore reflects the leadership dynamics of a particular generation of the iwi that had especially limited opportunities for Māori women to perform leadership roles, both inside and outside of Māori organisations. Consequently, when selecting for senior experts who have long-standing experience in iwi leadership, women are not as likely to be identified as men. As Mikaere (2017) has discussed, this dynamic is contrary to traditional Māori society, where women fulfilled leadership roles in a range of contexts and could be recognised as experts in a range of different fields. The dominance of male leadership and oversight of this research is in my view a limitation of this research, in that I have not had much access to Māori female knowledge and wisdom in directing the research. I have tried to address this limitation through various means: by actively seeking out female participants, successfully seeking a change to the terms of reference of the committee that future appointments should seek to appoint a woman, and as mentioned earlier, through engaging young Māori women in the Taiao Unit I manage to build Māori female capacity and capability within our iwi. The committee have been responsible for ensuring the research is done in a way that is consistent with our iwi values and tikanga, or ethical protocols, and that the outputs of the research are relevant and of benefit to the iwi. During the process of information gathering, it also co-opted members with specific expertise to function as a focus group

and inform the process. The committee set out the ethical procedures for me to follow in the research, which included my reporting requirements to the committee, the board and the iwi; a marae-based process for confirmation; a process for identifying participants and structuring information gathering; co-development of various consent forms for different types of information gathering in each project that comprised the thesis research (see Appendix A); and a process for gaining approval to disseminate and publish aspects of the research outputs. A key method utilised in the research was wānanga, which in this context is a means of creating knowledge through interaction with one another. The committee were particularly important in ensuring that tikanga (appropriate ethical protocols) were upheld in the process of wānanga to keep all participants safe. Another key area requiring ethical guidance was the way in which research outputs are disseminated, because it has been critically important to ensure that the iwi have total control over how the knowledge they generate is published. Part of the work involved in this project has been resourced through external funders and there have been multiple times when standard commercial contracts for the delivery of research work have had to be drastically changed to terms that are acceptable to the iwi from a tikanga Māori perspective. This often involved ensuring that external parties can only request a licence to use or view certain material information generated by the iwi.

My PhD confirmation was held at my marae, to ensure that the iwi had the opportunity to participate in that process, to query the proposed research approach and offer feedback or indicate interest to participate in the project itself. At this confirmation, the committee presented me with a plume of toroa (royal albatross), which are typically worn by Te Āti Awa women and sometimes men to represent the mana of Te Āti Awa and the core value of peace, as a token of support for me and the project.

Ngā Kete o te Wānanga research method

In developing and operationalising a mātauranga Māori framework and futuring tools to support decision-making on freshwater, Ngā Kete o te Wānanga has been used as a theoretical framework to identify the key components of mātauranga Māori knowledge and tools that needed to be developed in relation to freshwater systems. Ngā Kete o te Wānanga as a theoretical framework comprises three kete or aspects of Māori knowledge. The previous chapter examined this framework and found that the knowledge in each kete is created in different ways and applied for different purposes, but that all three kete function together to inform the generation of the knowledge from Te Kete Tua-ātea (see Table 2.1).

The research has thus involved addressing three key research questions to develop Māori knowledge and tools for these three distinct but interrelated kete. A series of different projects run through the iwi Trust was used to address each of these research questions. This section sets out the methods used in those projects to address each research question and to develop each kete.

Te Kete Tua-uri - Research Question One: What are the fundamental knowledges and values that inform Te Āti Awa ki Whakarongotai worldview of how freshwater systems work?

The Taiao Committee agreed that the Hua Parakore framework (Te Waka Kai Ora, 2011b), discussed in Chapter 2, could be applied as a conceptual model for freshwater systems to identify and explore in detail the fundamental knowledges and values that Te Āti Awa ki Whakarongotai hold of freshwater systems in order to develop an iwi ontology of water. This was to be done as part of a broader project to develop the Iwi Kaitiakitanga

Plan¹⁰ to guide and support the general kaitiakitanga and environmental work of our iwi. The plan would adopt the six key kaupapa or values of the Hua Parakore framework, because the group felt that these inclusively reflected the full spectrum of fundamental values associated with natural systems. The plan would be structured in the same way as the Hua Parakore plan framework, which utilises a kaupapa-tikanga-huanga structure, and it would identify in detail:

1. how Te Āti Awa ki Whakarongotai understand each key kaupapa or value
2. the specific tikanga or practices, protocols, policy and regulation required to uphold each value
3. the indicators or outcomes that would be observed if these values were upheld, which could be used as plan objectives.

As part of this project, a specific scale, the Freshwater Mahinga Kai Health Index, was developed that identifies all the different indicators of freshwater system health that would be observed if the system were healthy. Chapter 4 presents the results of the development of this plan in terms of the specific findings that relate to freshwater systems.

A rigorous method of kōrero (information) gathering and analysis was used to ensure full iwi input into the development plan. There was an emphasis on ensuring that all the various subjective perspectives of iwi members of different ages and positions in life informed the development of the plan. Gathering of kōrero for input was facilitated both through passive means, by utilising existing information and any opportunities offered when iwi members were engaging with each other, and through targeted means, by interviewing or conducting wānanga with groups to fill gaps in particular parts of the plan

¹⁰ See Appendix B

where information did not already exist. Kōrero was gathered from the following range of sources:

- full review of all historical and existing iwi environmental and planning documents that were available
- review of eight archived oral interview transcripts and recordings held by iwi where consent for such use had been provided, this included several interviews conducted for the purpose of my master's research (Baker, 2010).
- three marae-based workshops, one focused on rangatahi (see Figures 3.6 and 3.7)
- three focused wānanga with mahinga kai and kaitiakitanga experts
- structured interviews with 12 mahinga kai and kaitiakitanga experts
- an online survey of 62 participants.



Figure 3.6 Planning wānanga at Whakarongotai marae



Figure 3.7 Rangatahi wānanga

Iwi members were very familiar with the method of interview and wānanga for the purpose of gathering kōrero, given the number of oral tradition and other projects that have been conducted in recent decades with iwi members. However, the online survey was a novel method for the iwi to use, and stimulated conversation among kaumātua about whether conducting online surveys engendered disconnection because iwi members were not required to come to the marae or to connect kano ki te kano (face to face) in order to participate in planning processes. Nevertheless, given that the majority of iwi members lived outside the rohe, it was decided to trial it as a method to reach out to members who otherwise would not engage, and as a means to encourage further engagement. This was conditional upon wānanga continuing at the marae as the focal point for gathering kōrero. Ultimately, the online survey proved a useful method for gaining personal kōrero, particularly that which related to environmental distress and trauma, in that it gave anonymity to participants who provided kōrero and therefore themes that otherwise may not have been captured.

The kōrero gathering process generated a large volume of rich information, which was analysed to identify key kaupapa, hua and tikanga and how that information could be entered into the plan. The qualitative data analysis software NVivo was then used to apply a grounded theory methodology (Bazeley, 2007; Flick, 2009) to systematically read through all kōrero generated through the kōrero gathering phase, and code the information with key kaupapa themes that arose from kōrero. This allowed for key kaupapa, hua and tikanga that were widely repeated to emerge, and ensured that all kōrero gathered contributed to the final kōrero presented in the plan.

Te Kete Aronui - Research Question Two: What approach and technological tools have been applied by Te Āti Awa ki Whakarongotai to facilitate observations of freshwater systems for the purpose of informing decision-making?

With the Freshwater Mahinga Kai Health Index of 49 different hua or indicators identified as a result of Te Kete Tua-uri phase to understand the key values of freshwater systems, the research could proceed into Te Kete Aronui phase and initiate a project to identify and develop an approach and tools to facilitate observing those different āhua (aspects) of the freshwater system through the development of a monitoring program. Obviously, it was not practical to set out monitoring of all 49 different indicators; the iwi wanted to establish an ongoing regular monitoring regime and so the program had to be practical and efficient at generating knowledge. The first critical research decision for the iwi then was how to prioritise what to monitor.

Te Kete Aronui section of Chapter 2 covers a range of different approaches to monitoring, and cultural health monitoring experts Awatere and Harmsworth (2014) have provided a helpful summary review of different mātauranga Māori approaches to cultural health monitoring. However, the extensive body of literature on monitoring Māori values provides no real methodological guidance on how to prioritise what to monitor,

particularly for the purpose of an ongoing regime to support broader iwi decision-making, as opposed to monitoring specific activities on a case-by-case basis.

The first tool then for the iwi to develop was a method for prioritising attributes for monitoring. I raised some key questions for the committee to wānanga, the first being:

When we know that all things are important due to their interconnectedness, how do we prioritise only a few attributes of the system to focus on?

The committee were aided in addressing this question by recognising that a key purpose of traditional practices of monitoring was to identify when there is a need to intervene and change use or practice to improve the health of a system, as shown through the practice of rāhui. This led the committee to question:

What attributes of a system when intervened with or changed will have the greatest influence on the rest of the system?

In response to this, I proposed to them the use of Vester's influence matrix method (Cole, Allen, Kilvington, & Fenemor, 2007; Cole, Parshotam, Roth, Webby, & Botha, 2003). This method is used to categorise attributes of a system in accordance with what type of 'factor' they are, or whether they play an active, critical, buffer or passive role in the system (see Figure 3.8).

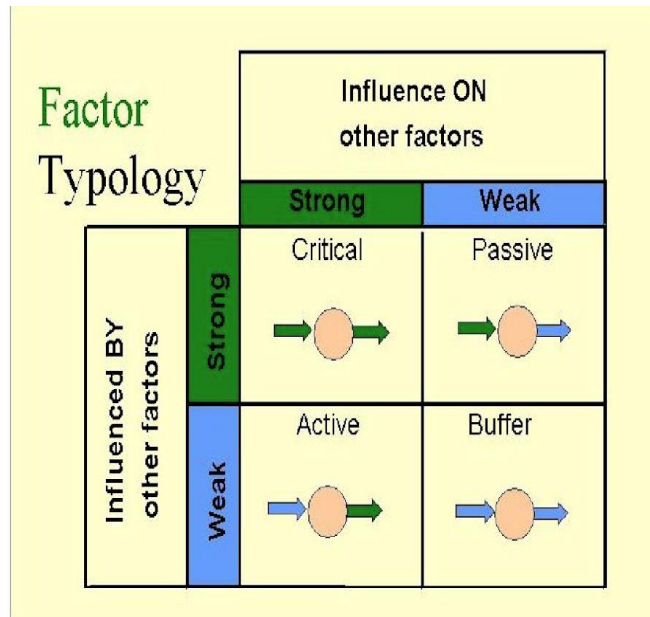


Figure 3.8 A factor typology of Vester's influence matrix as presented by Cole et al. (2003)

The method could be used to identify which parts of the system are the most 'active' and 'critical', meaning which parts of the system drive the most change. The committee agreed that this typology reflected their understanding of the different roles of its parts, but to ensure that its use identified attributes across the full spectrum of values in the system, in a way that was consistent with a Māori systems view, it should be applied to identify priority attributes across each of the six key kaupapa of the Hua Parakore framework. This method was then applied in wānanga at the marae with iwi members with particular interests and expertise in kaitiaki monitoring. The specific detail of how this method was applied and the results are presented in Chapter 5.

Once the application of this method had identified a list of 12 priority attributes for monitoring across the full spectrum of Hua Parakore values, we identified and piloted methods to monitor this suite of attributes. The methods for some of the attributes were well developed and are currently being used in existing state of the environment monitoring, but for monitoring of attributes that are not utilised within current

environmental monitoring contexts, methods had to be adjusted or developed for the purpose of implementation in our kaitiaki monitoring program.

The broad spectrum of values to be monitored emphasised the strong transdisciplinary nature of Māori approaches to and methods of observation, which required us to simultaneously carry out microbiological, ecological, meteorological, information management, geographical, political, psychological and social science methods of monitoring and analysis. The monitoring was directed by our committee and assisted by other kaitiaki in helping to carry out the field work. A GIS map was then developed by one of the kaitiaki to spatially collate all the data collected.

This phase not only generated the monitoring data; it also gave us experience in applying a range of methods for the purpose of ascertaining which methods were both practical and able to generate data that would be useful to support freshwater decision-making, and a range of real decision-making case studies were used to assist this.

Te Kete Tua-ātea - Research Question Three: What approaches and tools have been and can be applied by Te Āti Awa ki Whakarongotai to examine how freshwater systems will change across a range of future scenarios, to support their decision-making?

The priority attributes of the system that had been identified in Te Kete Aronui phase became the basis for the development of a Te Āti Awa ki Whakarongotai conceptual and then BBN model of freshwater systems in Te Kete Tua-ātea phase of the research. This phase was centred around five focused half-day wānanga with the committee, who co-opted two additional members with specific mahinga kai and kaitiaki expertise to develop the models. Each of these workshops was audio recorded with the consent of participants to ensure that none of the discussion or reflections would be lost.

As suggested in the literature discussed in Chapter 2 (Hudson et al., 2016; Liedloff et al., 2013), I proposed to the group that we build a BBN to reflect the Māori mental models of the system they have as experts, and this could then be used to predict outcomes of different scenarios. I showed them some examples of BBNs being used to model freshwater systems, which are essentially flow charts that graphically show the relationship between attributes of a system (Carriger et al., 2016; Death, Death, Joy, Stubbington, & van den Belt, 2015; Elith et al., 2006; Uusitalo, 2007). The group could see the benefit of this approach but commented that the scope of each of the BBNs was very narrow because they focused on biophysical aspects of health. They also noted that the BBNs terminated at a single attribute, which they felt did not reflect reality, because there are always flow-on effects and feedback loops in systems. Some participants were harsher in their criticism and commented that without including broader aspects of freshwater health, the models were 'meaningless'. The group agreed that we could attempt to build a BBN that included the broader attributes of the system as a Māori futuring tool.

The first stage was to develop a conceptual model of the system, which was constructed by building a flow diagram, similar to the CLSMs built in the projects discussed in Chapter 2 (Heke et al., 2019; Kingi et al., 2013), showing how all the priority attributes of the system were connected to one another. This was done simply through putting all the attributes onto Post-it notes, colour coded for the kaupapa they represented, and heuristically working together to build a flow diagram (see Figure 3.9). Narratives of how they had experienced the system working were very important in the building process. Although the flow diagram was not a whakapapa, it was obvious to us that the task of drawing relationship connections between phenomena was familiar to us as knowledge holders of whakapapa, and perhaps comes naturally.



Figure 3.9 Participants building flow diagrams in wānanga

Through this process, a few attributes were identified that were overlooked during the original process of identifying attributes in the first two phases of research. The group then tested out adding them in or whether the narrative of the system could still make sense without it. The process of building the conceptual model was iterative, allowing the group to revisit decisions they made about its construction.

It was important that participants felt that they were not expected to arrive at the wānanga with fully formed knowledge to provide, but rather that they could enter into a knowledge-creating space where knowledge would emerge from the discussions within the group. All participants shared their knowledge and understanding of how parts of the system connected together, and thus learned from one another. My role was as both a facilitator and a contributor of knowledge. When I listen to the recordings now, I can hear the important role that our whanaungatanga (kinship) played in making these wānanga safe and conducive to good knowledge creation. All the participants have life-long relationships with one another and a good degree of trust in and respect for each other, and this was important in allowing for full and frank debate at times. As participants, everyone was able to bring their full selves to the process of wānanga, and on more than

one occasion, discussion on a topic brought a participant to tears; there was also much excitement about the process.

Once the flow diagram of the conceptual model was finalised, I reconstructed it into a network of attributes using the computer software Netica version 6.05. The next task for the group was to identify the potential states for each attribute, for example, affirmative or negative, or a traffic light of poor, moderate or good. The fewer the potential states of the attributes, the easier the construction of the network, and so the group aimed to identify only two or three potential states for each. For some of the attributes, this was straightforward. For example, 'disturbance of contaminated land' could be in either the affirmative or the negative. However, for continuous variables such as temperature, thresholds of interest had to be identified; for example, 20 degrees Celsius water temperature was identified as an ecological threshold above which aquatic life was at risk, so the states were 'below 20 degrees' and 'above 20 degrees'. These thresholds were identified using a mixture of the group's knowledge, or by referring to knowledge from outside experts or literature. Many of these decisions stimulated lengthy debate, sometimes across multiple workshops.

However, the most labour-intensive aspect of the BBN development was building conditional probability tables (CPTs). CPTs are used to calculate the probability of each state of an attribute occurring, given each potential combination of conditions. These probability tables mathematically reflected the way that the experts described the relationship between each of the attributes based on their expert knowledge and some of the data we had access to or generated through monitoring. For example, to describe the relationship between the attribute of 'authority and input into decision-making' and 'disturbance of contaminated site', a matrix was completed to describe the probability that a contaminated site will be disturbed versus not disturbed when authority and input into decision-making is in a 'poor' state, the probabilities when it is in a 'moderate' state,

and the probabilities when it is in a 'good' state. This type of matrix had to be built for every relationship within the network, of which there were 19 in total. This required an iterative process of me building the CPTs based on what the group had discussed and agreed and then taking them back to the group for confirmation and changing according to their suggestions.

Once the BBN was complete it could be used in both a forward direction to make inferences about the likely outcome of system changes, and in a backwards direction to infer what parts of the system were the strongest causal factors in achieving desired outcomes, for the purpose of informing interventions in the system. The first application for this was when contamination was detected in watercress through our ongoing monitoring. The BBN could then be used to infer what the impact of this would be across all the attributes of the system. The second application was to identify which parts of the Waikanae River system should be targeted for management in order to achieve certain well-being objectives. Chapter 6 includes an account of how the BBN was used for these.

Summary of Chapter 3

This chapter has provided an account of the kaupapa Māori methodology used in this iwi-led research. It has presented a range of methods applied across each of the three phases of Ngā Kete o te Wānanga research process to develop a mātauranga Māori framework and futuring tools to support Te Āti Awa ki Whakarongotai in its freshwater decision-making (see Table 3.1).

Table 3.1 The range of methods applied across the three phases of Ngā Kete te Wānanga research process.

| Ngā Kete o te Wānanga | Purpose | Type of knowledge | Methods applied |
|-------------------------|--|--|---|
| <i>Te Kete Tua-uri</i> | To make meaning of what cannot be directly observed in the world To inform our interpretation of Te Kete Aronui, or what we observe | Knowledge of the metaphysical 'real world' beyond what is observable Fundamental knowledge about how the universe works | <ul style="list-style-type: none"> • Hua Parakore plan framework • Document analysis • Structure interview • Wānanga • Online survey |
| <i>Te Kete Aronui</i> | To make meaning of what we see in the world To inform Te Kete Tua-ātea, our knowledge of how the future will look | Knowledge of the observable world | <ul style="list-style-type: none"> • Influence matrix • Range of ecological, social science monitoring methods • Geographic information system (GIS) |
| <i>Te Kete Tua-ātea</i> | To have meaningful knowledge of how different scenarios may look | Knowledge about the infinite possible realities | <ul style="list-style-type: none"> • Mental models • Wānanga • System narratives • Flow diagram • Bayesian belief networks |

Chapter 4: Te Kete Tua-uri

The fundamental knowledges and values that inform Te Āti Awa ki Whakarongotai worldview of freshwater systems

Whakarongo ki ngā kupu o ngā kaumātua,
Kākakahutia i runga i a koe hei hoatu ki te ao hou.

Listen to the words of your elders,
Clothe yourself in them to offer to the new world.

Wi Te Kākākura Parata

Te Kete Tua-uri is the knowledge that relates to the ‘real world’ behind what is observable, and to the cosmological time before the creation of Te Ao Mārama, the material world of light we perceive. In accordance with whakapapa, or Māori genealogies of cosmogony, this includes knowledge about the many core kaupapa or values that give rise to Te Ao Mārama (Marsden, 2003b, p. 60; Royal, 1998, pp. 53–57).

This chapter presents kōrero (information) gathered for Te Kete Tua-uri: the fundamental knowledges and kaupapa (values) that inform the worldview of Te Āti Awa ki Whakarongotai on freshwater systems. It presents our iwi ontology of water - our understanding of what water ‘is’. Kōrero was gathered from written sources, interviews, wānanga and online surveys with the people of Te Āti Awa ki Whakarongotai as part of the development of the Iwi Kaitiakitanga Plan¹¹. The aspects that relate specifically to

¹¹ See Appendix B

freshwater systems are presented here. As discussed in Chapter 3, the kōrero that was gathered has been coded into the six key kaupapa (values) of the Hua Parakore framework, to identify iwi understandings of each kaupapa, and the huanga, or attributes, that would be observed if these values were being upheld. The huanga collectively comprise the Freshwater Mahinga Kai Health Index of indicators. The kōrero is presented here in a way that privileges the voices of the iwi as much as possible, with the collective iwi understandings of water that emerged from the analysis of each kaupapa being supported by direct quotes from iwi members.

Whakapapa

Ko wai au, ko wai koe, ko wai ia.

The first kaupapa of the Hua Parakore framework is whakapapa, the value of the genealogical lineage of all things: that life continues to proceed forward.

The fundamental huanga, or outcome, of the whakapapa of water is the existence and functioning of water itself in our world, which is presented in the whakapapa shown in Figure 4.1. This was shared with me by memory in a wānanga with Ben Ngaia and is shared here with his permission to put it into written form. It comes from the whare wānanga of Te Āti Awa and the teachings of the tohunga Dr. Huirangi Waikerepuru. Many significant meanings emerged through it being shared in wānanga, which gave me a much more in-depth understanding of water from a Te Āti Awa perspective. Only a few key aspects that inform this research are shared here.

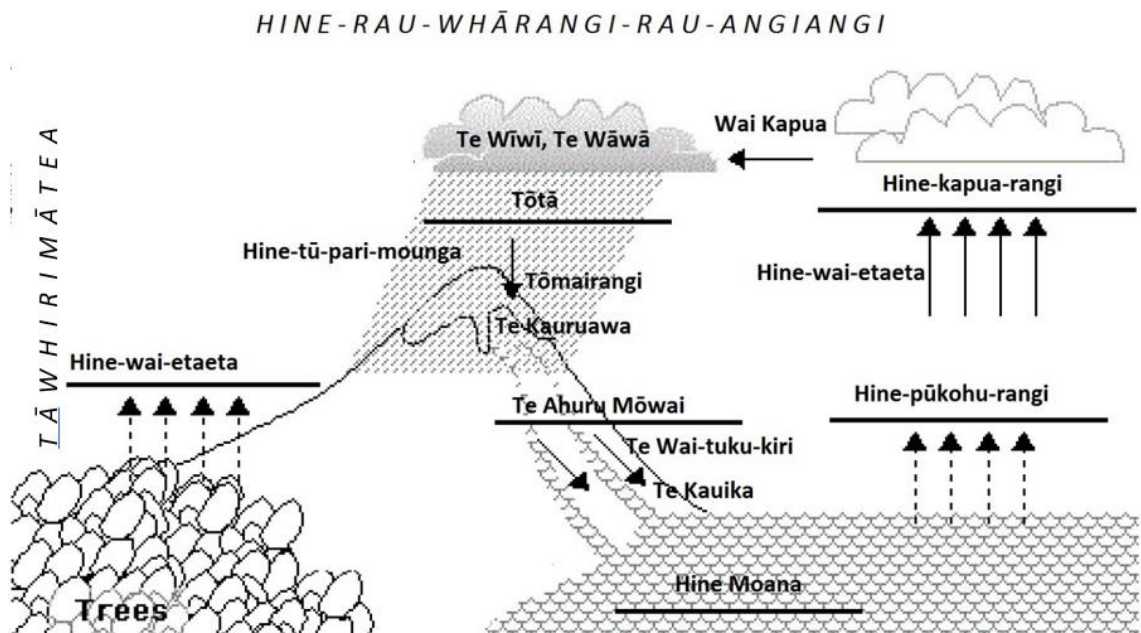


Figure 4.1 Te Āti Awa ki Whakarongotai whakapapa of water

The first thing to note in the whakapapa is that it is a cycle. This emphasises that water is seen not as a fixed outcome, but as a cycle of various diverse but interrelated processes and atua, or deities. Each deity in the whakapapa is a process personified with a female identification, including Tāwhirimātea, who according to Te Āti Awa is also seen with a female personification. This denotes a strong connection between water and the ira wahine, or the feminine nature. The different components of the whakapapa were defined as shown in Table 4.1.

Table 4.1 The various components of the whakapapa of wai.

| | Definition |
|--------------------------------|--|
| Hine-rau-whārangī-rau-angiāngi | The deity of the stratosphere, who oversees the transition of entities from Te Wāwā through the liminal space between Te Ao Mārama (the material world of being) and Te Pō (the spiritual world) |
| Tāwhirimātea | The deity of the troposphere, the lowest layer of the atmosphere, which oversees the interaction between the water in the ocean, in weather systems and within |
| Te Wīwī | The spiritual entities that reside in the upper levels of the troposphere |
| Te Wāwā | The space where Te Wīwī resides |
| Tōtā | The precipitation that condenses from the vapour of Te Wīwī and Te Wāwā |
| Hine-tū-pari-mounga | The female deity of mountains |
| Tōmairangi | The frost, dew or moisture that forms on the land |
| Te Kauruawa | The initial point of the headwaters |
| Te Ahuru Mōwai | The channels of water, much like the birth canal from which precious life emerges |
| Te Wai-tuku-kiri | The life-giving waters that flow in rivers and streams |
| Te Kauika | The runs of fish and other life that emerge from the mouths of waterways |
| Hine Moana | The deity of water in large waterbodies |
| Hine-pūkōhu-rangi | The deity of mist and fog that rises from land and water |
| Hine-wai-etaeta | The deity of water that rises in evaporation and transpiration |
| Hine-kapua-rangi | The deity of clouds that begin to form |
| Wai Kapua | The vapour in the clouds |

Along with the whakapapa, some kōrero referring to wai to mean different types of 'currents' was also offered. This suggests that implicit in the existential considerations of who we are is the knowledge that we are of water, as understood in terms of the full system of water that encompasses the atmosphere, the air, the running water, the ocean and ourselves.

- Ko wai au - the currents in water
- Ko wai koe - the currents in bodies, including the whenua
- Ko wai ia - the currents in the atmosphere.

Finally, the whakapapa also provides a framework for understanding the interactions that occur between the spiritual world of Te Pō and the material world of Te Ao Mārama.

According to Te Āti Awa tradition, water as an element has a sensitive nature; it has an ability to convey both physical and spiritual character. The water cycle in the material world is penetrated and replenished by the spiritual world. The whakapapa identifies the stratosphere as represented by Hine-rau-whārangī-rau-angiāngi as the liminal space that distinguishes between Te Pō and Te Ao Mārama. The understanding I gained from our wānanga was that this does not just refer to the physical boundary or space between the stratosphere and outer space; instead, this is a conceptual space, which distinguishes that everything below the stratosphere in our world is subject to the wider processes of the cosmos.

The analysis of texts, interviews and kōrero from other wānanga showed that the value of whakapapa informs an iwi view of water as providing fundamental existential and psychological values, in that water supports people's sense of origin, identity and place in the world. It supports the ability of people to find meaning in knowing who they are.

Participants talked about how our unique identity as indigenous mana whenua, as Te Āti Awa ki Whakarongotai, arises directly from the water. Our relationship to the Waikanae River as our principal waterway, and to other significant waterways, has fundamentally informed our collective identity as Te Āti Awa ki Whakarongotai. They shared stories that spoke to how the river as a heritage feature is layered with a history of intimate relationships between various whānau and specific parts of the river, and how the knowledge of these relationships and histories is important to the identity of the people:

[Heritage], better phrased as 'ngā taonga tuku iho'...covers knowledge, memories, language, stories, events, places, spiritual concepts, natural resources, landscapes and landforms, landing sites, places of ritual, taniwha, kaitiaki, wāhi tapu, artefacts and taonga, karakia, moemoea, whakapapa, and buildings. The common thread with all of these is the quality of attachment felt by

tangata whenua. It is not just about sacred places. It is all aspects of life both tapu and noa. It is anything that adds to our knowledge of previous and current relationships with the land (Te Rūnanga o Āti Awa ki Whakarongotai Inc, 2000, p. 3).

Through this part of the research, many historical and present-day kāinga and mahinga kai sites were identified along the length of the river and other significant waterways that have been accessed to sustain and nourish the whānau that have resided there for multiple generations. This emphasised why connection to waterways and sites were so significant to the survival and life of the people of Te Āti Awa ki Whakarongotai:

They reckon about 90% of the food sources were fish and water fowl and when you look at where the marae and kāinga were (at time of settlement), they were always situated around water.¹²

The activity of mahinga kai that is sustained by water was seen by participants as central to our way of life and our identity. Going out as a family to special places to fish renews those whakapapa connections to place, to the atua and to each other:

People went out as family groups. We used to go out with a few other couples and all the kids and haul and get flounders and we'd cook them up on the beach as well.¹³

¹² Interview participant.

¹³ Interview participant.

Participants also described a range of other cultural and social practices and activities that the waterscape is used for, and explained that it was the continuation of these practices in connection to water sites that reaffirm our identity to the area:

It's your umbilical connection to it. Whether it's doing tohi rights at the river. Whether that's where we go to do a healing. It's the place. So how do you make that the place? How do you make it an indelible memory that doesn't become something of the past? It's a lived thing.¹⁴

This long-standing intimacy of our relationships to the waterscape means that we have inherited a cultural memory and familial connection to how waterways and life growing in them should look, taste, smell, sound, feel and behave, and identify with their character. The well-being of water therefore directly informs our view of our own well-being.

Analysis of this kōrero identified that the following key huanga would be observed if the value of whakapapa were upheld:

1. We maintain our way of life as Te Āti Awa ki Whakarongotai.
2. Through water, our people are connected to their history, to the marae and to each other.
3. All our people know their whakapapa to the water and waterbodies.
4. The unique identity and role of Te Āti Awa ki Whakarongotai as mana whenua and kaitiaki of water in their rohe is recognised and respected.
5. The unique relationship that certain whānau and hapū hold in connection to certain sites and taonga is respected and protected appropriately.

¹⁴ Interview participant.

6. All sites of significance and associated names and kōrero within the rohe of Te Āti Awa ki Whakarongotai are respected and protected.
7. All generations enjoy harvesting and eating mahinga kai from the water.

Wairua

Ko tōku waikanaetanga tēnei.

This is my peace and humility.

The second kaupapa of the Hua Parakore framework is wairua, which participants defined as the aspect of well-being that reflects the connection between the human condition, in particular our mental, emotional, psychological and spiritual well-being, and that of the wider and physical and non-physical environment:

When everything is healthy, everything else is spiritually healthy. When our awa is not healthy, we're not healthy.¹⁵

Participants discussed how different parts of the waterscapes are imbued with different wairua - different spiritual and emotional characters - often as a result of events that have occurred there over time. A key aspect of keeping the wairua of the people well and safe is having knowledge or a sense of character of natural spaces, in order to interact with them in an appropriate way. Through the lens of 'wairua', iwi members see the waterscape reflecting a range of histories, characters and meanings.

Some spaces are nourishing for the wairua of people as places to visit and interact with. They may have the power to provide people with a feeling of connection to the atua, to

¹⁵ Interview participant.

the natural elements, which is important for keeping them well. Participants generally associated familiarity with water and the atua with the ability to keep themselves safe. Participants talked about calling on atua, and that feeling of connection to the natural world in different practices such as karakia (prayer and meditation) and waerea in order to clear their minds, or to feel grounded in their day-to-day lives, as a way of ensuring they are mentally, emotionally and spiritually well. Familiarity with the environment is also important for ensuring physical safety and well-being. In the modern-day context, this familiarity and connection to what is happening in the environment ensures people do not access areas that are physically dangerous or unsafe, or consume things that are unsafe.

As alluded to in the Whakapapa section, some spaces are ritualistically used for practices relating to the cleansing of wairua. Participants shared information on a range of water sites that have always had a crucial role in providing physical and spiritual cleansing of the people. Many iwi members talked about going to visit waterways when they were in need of spiritual cleansing, often from whatever might be causing stress in their life. This may be through using water, being submerged in water or the feelings of clarity that are often generated by simply visiting water sites (see Figures 4.2 and 4.3).



Figure 4.2 Kaumātua and mahinga kai expert Les Mullen, restoring wairua at Waikanae River

The river was a space where he could not worry about the stress of life. He was a hard-working man. So that was where he went with that. The life force of that river. So that you can sustain that wairua connection to it.¹⁶

A way I can look after my wairua is doing bombs at the river, it cleans me from the inside.¹⁷



Figure 4.3 Rangatahi supporting their wairua through enjoying the Waikanae River

It is not just the visitation of spaces that is good for the wairua, but also certain types of activities that water provides for, with mahinga kai in particular being recognised as good for the wairua of the people. Participants discussed the great enjoyment and stimulation they receive not just from eating mahinga kai, but from the process of gathering and preparing it, and the connection to the land and water they experience through that

¹⁶ Interview participant.

¹⁷ Rangatahi wānanga participant.

activity. It supports people's self-esteem and their sense of satisfaction to be able to continue these practices, and to be able to provide for their whānau and for others:

It would give their wairua a big kick just to do something for themselves and have it to put on a plate.¹⁸

Mahinga kai was also described as an activity that has a calming and relaxing effect on people. Many of the kaumātua who participated shared fond memories of gathering mahinga kai because it always gave them something to do as children. However, waterscapes are valued for a range of other recreational activities that connects people to their rohe, and therefore supports their wairua:

Not being able to use the environment - e.g., surf at the beach because of pollution - means a detachment from the rohe, which is bad for well-being overall. Having strong links to my rohe gives me pride and therefore a better mental and spiritual health.¹⁹

It is important to be aware that some spaces are not to be accessed but left alone, to show reverence for certain historical events that have occurred and given that site a state of tapu. This especially applies to areas where people may have been buried or fallen in battle. These types of sites are not appropriate to disturb or for gathering food. In addition to the physical spaces or artefacts whose protection is important in maintaining the well-being of our wairua, there are a range of tikanga and kōrero tuku iho that are also important to protect.

¹⁸ Interview participant.

¹⁹ Online survey participant.

The perceived connection between the state of the waterscape and the well-being and pride of people also means that when waterways, or taonga tuku iho connected to them, are degraded, people experience these effects directly to their wairua:

This mainly affects me mentally and spiritually. I experience a lot of rage at not only the actions of the Crown, but also at how our own people have failed to fight for themselves and the environment. At times I feel helpless that we don't have a unified, intelligent collective effort to respond to the impacts on the environment.

Analysis of this kōrero identified that the following key huanga would be observed if the wairua were upheld and protected:

1. Water supports healthy wairua of the people. It is clean, calm, safe and conflict free.
2. The presence of native flora and fauna can be observed and heard in the waterscapes.
3. The wairua of people is supported through their ability to practise mahinga kai.
4. The people of Te Āti Awa ki Whakarongotai have good self-esteem about the state of waterways.
5. Our people feel a sense of pride and fulfilment about the capability of our iwi as kaitiaki of water.
6. The people of Te Āti Awa ki Whakarongotai are free of stress and trauma brought about through degradation and change of waterways.
7. Wāhi tapu, tikanga and kōrero tuku iho are respected and protected.
8. Tikanga Māori and the mana motuhake of Te Āti Awa ki Whakarongotai is abided by in the active protection of wāhi tapu and kōrero tuku iho.

Mana

The third kaupapa of the Hua Parakore framework is mana, which Te Āti Awa ki Whakarongotai defined as the security, power and authority iwi, hapū and whānau have inherited through their whakapapa and gained through their actions.

Participants talked about how having mana whenua, the status inherited through whakapapa and undisturbed occupation of the land, provides certain rights and particular rights to people:

I used to fish all night, 'cause who said I couldn't. I'm there with my ancestors.²⁰

Participants talked about how having mana whenua also guarantees them tino rangatiratanga, or a supreme level of collective authority that is superior to Crown governance:

Tino rangatiratanga is really important for our iwi. That we step up so we aren't compromised by rules and regulations. We need to be unified.²¹

However, participants emphasised that mana is not about limitless power or use, but more about appropriate power and use, demonstrating that power and rights are adequately balanced by cultural imperatives to share, and to use only to an extent that is sustainable. Participants talked about manaakitanga as one such imperative that is intertwined with mana. Manaakitanga is the concept that your own mana is upheld

²⁰ Interview participant.

²¹ Interview participant.

through the acknowledgement of the mana of others by showing aroha, respect, generosity and care:

What you have and what you share, it's all to do with sharing and mana. Not going to the butchers or to the grocers and getting some stuff. You can do that anywhere.²²

Participants also talked about the ability to share resources being an important way of ensuring whanaungatanga and kotahitanga, or social cohesion and community strength, and that this reflects on the mana of the people. This applied not just to sharing across whānau, hapū and the iwi, but more broadly. Some participants talked about how travelling to participate in mahinga kai activities in neighbouring and related iwi is a way of maintaining good relationships. More broadly still, some participants talked about using mahinga kai with the wider community as a way to build unity and support for one another.

Another imperative of having mana whenua that participants identified is the responsibility for kaitiakitanga, or stewardship. They emphasised that implicit in the authority and rights of mana whenua are the responsibilities to sustainably manage human behaviour and its impact on taonga. The ability for the iwi to practise kaitiakitanga and ensure waterways are clean and supported abundant stocks is a direct reflection on the mana of the iwi.

²² Interview participant.

In this sense, the kōrero gathered presented a view that the wellness of water systems reflects directly on the integrity of those in power, the way they make decisions and their ability to ensure the well-being of all those who rely upon waterways.

To demonstrate this, participants provided much kōrero on the profound and systemic impact on water, and in turn the communities, of the removal of the authority of mana whenua in decision-making. Essentially, all participants saw the imposition of Crown rule and its agenda as having driven a scale and type of development that had failed to maintain the well-being of water and their communities:

The increase of population as a result of the land being stolen has meant that then you've got to put that infrastructure in, roading, sewage, all those utilities then have to go in, and that intensification of community growth, urbanisation has then led to the land being polluted and the water being polluted. Well, we've lost our inheritance. And then all those things attached to farming, market gardens, suburban growth, industry, business, all those things have led to pollution of our waterways. Because growth and development of communities became a more important priority than our water. You might look at it another way. Was that same level of pollution happening when we were in charge, when we were in control of our use of our land?²³

Another way that participants saw the waterscape reflecting the nature of power, and the state of their mana, was in exploring which types of interactions with water are culturally, socially and politically acceptable. They had seen that with the changes to demographics

²³ Oral history interview.

and the subsequent changed power dynamics, their values and practices had become marginalised, or in some cases not even permitted:

There's been a change of culture, and cultural values around us in our community...I remember dad telling me a story about getting told off by residents when trying to access our mahinga kai. The attitude from the increased population impacted, and they felt whakama [embarrassed] about being able to do these practices.²⁴

Others explained how the foreign culture and regulatory system has then worked to sever people from their food systems, which has systemic impacts on their health:

There's less delicacies to choose from. Most of the kai you now have to buy due to permits and other legislation on specific species. Physically, I don't gather food like in the past. Mentally, my mind's lazy because the body is not doing what it used to. Socio-economic, I have to travel further for some of the kai as it no longer exists in the area. I'm well, but not being like I should.²⁵

Participants also talked about the significant changes to the local sharing economies, where the value of water and mahinga kai, which lay in their ability to support whānau and encourage cohesion, had changed to being valued in financial terms, for profit, and had led to exploitation of water and fisheries, or had stopped being valued at all. The iwi also had a well-developed position that ignoring the value of clean waterways, and the resulting pollution, had eroded the ability for the iwi to uphold their mana through manaakitanga:

²⁴ Oral history interview.

²⁵ Online survey participant.

The provision of manaakitanga from Te Ati Awa ki Whakarongotai has been seriously eroded by pollution of important foods such as eels, shellfish and watercress (Te Rūnanga o Āti Awa ki Whakarongotai Inc, 2000, p. 4).

In considering how they might go about maintaining and reclaiming mana, a few participants reflected on how they felt practicing and advocating sustainability is an important strategy:

Our whānau have purchased whenua so we can create and share our space with whānau, native birds, will plant more trees and will try to use sustainable practices in our developments. Our whānau will actively respond to Council's proposals if they are not favourable to our people or our environment. Some of the whānau are involved in community groups supporting awa health. Father and brother protect kaimoana sustainability. We model sustainable and environmentally friendly practices to our tamariki and mokopuna, e.g., organic gardening, walking and biking when you don't need to use a car and many other small everyday practices that impact less on the environment.²⁶

The iwi presented a strong view that the nature of how power is held and exercised is reflected in water systems, through the way that society is permitted to interact with them, and the outcomes of those interactions. Analysis of this kōrero identified a comprehensive list of the following key huanga that would be observed if mana were upheld:

1. People are able to live their lives in the rohe of Te Āti Awa ki Whakarongotai in harmony with the water.

²⁶ Online survey participant.

2. Our relationship with the waterscape supports our economic and social security, and all abundance is shared.
3. People of Te Āti Awa ki Whakarongotai have access to mahinga kai sites.
4. There is intergenerational participation in mahinga kai.
5. The mana of our marae Whakarongotai is supported by the abundance of the waterscape.
6. Traditional economies of mahinga kai and other resources create and strengthen relationships with others.
7. Te Āti Awa ki Whakarongotai have tino rangatiratanga, authority over use that affects water.
8. Te Āti Awa ki Whakarongotai have positive working relationships with Treaty partners.
9. The implementation of tikanga in relationship to the water is upheld by the iwi and supported by Treaty partners.
10. The iwi collective feel that they can influence decision-making on water.

Māramatanga

Ka mehameha e hine, ko Waimeha

Ka ngahae ngā pī, ko Waikanae.

The fourth kaupapa of the Hua Parakore framework is māramatanga, which participants defined as the enlightenment that arises from being in the world. The process for achieving māramatanga, as discussed by participants, involves the development and attainment of mātauranga Māori, and then our ability to integrate this in our ngākau in a way that inspires us and brings enlightenment and true understanding.

As discussed in Chapter 1, the pou that stands on the marae of Whakarongotai, Te Puna o te Aroha, signifies Te Āti Awa ki Whakarongotai interpretation of how māramatanga is generated. It shows that the fundamental source and purpose of all pathways to enlightenment is aroha. It then shows the ascent to the heavens made by Tānenui-arangi in the pursuit of knowledge. It depicts the kaitiaki of knowledge, a tuatara named Kōpaeara, sitting towards the top of this ascent, where Tāne had to overcome him to attain Ngā Kete o te Wānanga. Archived interviews from previous research on the role of ngārara, the Māori taxonomical group that include lizards and insects, provided more interpretation of how ngārara act as guardians of knowledge. This interpretation alludes to the process of māramatanga coming from a holistic and heartfelt interpretation of what is observed physically:

What struck me about ngārara was, they talk to you...What you are supposed to do, and this is the understanding I took when I was a boy, was so that when they appeared they caused you to pause, and to think about why they've appeared and why they've come to you. And that you can think about anything you like thereafter, but it must be to do with the planet, it must be to do with the environment, it must be to do with all things being in equilibrium...and that was the first understanding I had of ngārara, creatures that come to you.²⁷

From a Māori perspective, participants saw that, rather than knowledge being about the environment, about natural systems, knowledge is a part of natural systems. They saw that just like other aspects of natural systems, knowledge can have different characters and quality. Kaitiaki would explore whether the knowledge that informs behaviour and

²⁷ Oral history interview.

decision-making is of good or poor quality, and look to manage and care for the quality of knowledge, as much as they care for the other parts of natural systems.

The kōrero gathered from the iwi provided a view on what was meant by good quality knowledge. The iwi characterised good quality knowledge as reflecting a deeper consciousness and broader awareness of systems dynamics:

The sacred relationship of people and land must be restored in order to turn the trends of loss to ones of recovery. This realisation must include knowledge about how the effects of an action in one component of an ecosystem can affect many other components and also the realisation that we are not separate to nature but part of a connected single, sacred thread (Te Rūnanga o Āti Awa ki Whakarongotai Inc, 2000, p. 4).

As discussed in Chapter 2, knowledge from Te Kete Aronui, or knowledge through observation, is holistic; it has to integrate all the different things that our senses detect:

You know it's not only about the kai in the river, it's all about when you get down there, how you feel? Kei te rere pai te awa, nē [Does the river flow well]? Is it clean? Where are all the birds?²⁸

The more senior participants, in particular, commented on the importance of the right expertise coming from the right people:

I've lived in a time where there was specialised jobs for all different people. Not everyone did everything. And if you did, someone would nudge you and say, what

²⁸ Interview participant.

are you doing? What would you do if someone walked into your office tomorrow and sat down? Everyone had their place and they did it well.²⁹

They emphasised that some types of knowledge are not for common knowledge but are entrusted to those who will be able to apply it in an appropriate way. This may include sacred knowledge, or highly localised knowledge that might relate to the best sites for mahinga kai or for other private uses. This highly localised knowledge supports a close and beneficial relationship with waterways:

Just compare my grandfather's experience. He used to catch a lot of fish back in the day. His way of using GPS is using landmarks and stuff.³⁰

Participants therefore saw that the state of waterways reflects not only the integrity of the decision-makers in power, but also the collective state of māramatanga of the people - essentially how enlightened the community and decision-makers are. In the development of the Iwi Kaitiakitanga Plan, and identifying means of ensuring mahinga kai in waterways are protected, iwi members identified the degree of input from iwi knowledge into decision-making as the most influential factor, and identified this as a top priority for the Trust to work on. Participants asserted that mana whenua have critical knowledge to input into decision-making because it is integrated, highly localised and accumulated over generations of intimate relationship to waterways:

You cannot act well in a place until you have understood what nature intended for it (Te Rūnanga o Āti Awa ki Whakarongotai Inc, 2000, p. 9).

²⁹ Interview participant.

³⁰ Interview participant.

Previous cultural assessments conducted by the iwi in relation to waterways also presented an understanding of the connection between the well-being of knowledge and of water:

The health and knowledge of the waterbodies and whenua are interconnected. If certain areas of the waterbodies are destroyed, then māramatanga related to those sites will be lost to the next generation. Equally, when knowledge of sites and species are lost, our ability to effectively manage and protect other sites and those species is eroded, and therefore the sites and species themselves are put at greater risk. Thus the retention and practice of our māramatanga is critical to the health of the waterbodies.³¹

Participants also identified that the quality of water systems reflects the success of intergenerational knowledge transfer about waterways: how to care for them and all that lived in them. They saw that facilitating education around how to care, nurture, protect and restore waterways is another priority for the iwi leadership. Participants were concerned that the undervaluing of iwi knowledge has seen a breakdown in knowledge relating to the environment, and to mahinga kai in particular, which then limits our ability to be good kaitiaki and protect waterways and ourselves from further degradation.

Participants also gave many examples of how kaitiaki have always developed new technologies to support their kaitiakitanga and mahinga kai, which presented an image of kaitiaki as highly innovative and fast adapting. This emphasised that māramatanga also comes from applying and developing new technologies that enable a new understanding or broadened capabilities.

³¹ Te Āti Awa ki Whakarongotai Cultural Impact Assessment on resource consent application.

Overall, participants presented a worldview of water as being a valuable source of inspiration and enlightenment. This role of water to inspire originates with the Taranaki tupuna, Haunui-a-naia, and his arrival to our rohe. He was pursuing his wife south, and when he came to each waterway on his journey, it would evoke an emotion in him, for which he would name the waterway. As he arrived in what is now our rohe he stated:

Ka mehameha, e hine, ko Waimeha

Ka ngahae ngā pī, ko Waikanae

I am lonesome for you, hence the Waimeha

The eyes of the mullet glistened like stars, hence the Waikanae

This value of water to reflect our thoughts and emotions continues today. Analysis of kōrero on māramatanga identified a list of the following key huanga that would be observed if the value of māramatanga were upheld:

1. Decision-making is informed by iwi knowledge.
2. A diverse array of mātauranga Māori is created and handed down: rongoā, astrology, horticulture, fishing.
3. All generations know where to source mahinga kai.
4. All generations can identify and recognise traditional kai species.
5. Knowledge on harvest and preparing is held intergenerationally.
6. Our people have access to new knowledge and technologies.
7. Knowledge is protected and applied in a safe and respectful way.
8. Local specialist knowledges are respected and empowered to inform decision-making.

Te Ao Tūroa

Te Ao Tūroa, literally ‘the enduring world’, is understood to be the world of natural order, balance and pattern that is fundamental to the world we live in. As discussed by participants, Te Ao Tūroa comprises the characteristics of living systems that ensure balance in what would otherwise be a chaotic world.

Kōrero with participants about the value of Te Ao Tūroa typically evoked conversation about divinity; the natural order and balance of the world is seen as reflecting a divine wisdom of how the world should be, and this is recognised and protected through having a relationship with and respect for the atua, the deified natural processes of the world. In accordance with a Māori worldview, the atua are all closely related, and this in turn informs a strongly holistic worldview of the natural world as a system of highly integrated parts, where each part is valued in terms of playing a larger system function, and where the health of one component of the environment cannot be understood in isolation from the whole:

So all those gods have gotta be connected to make the mauri of the river operate. Because I think if they don't...people only look at one aspect of the river and I don't think that the mauri is alive until you connect them.³²

I've come to the conclusion that every moving part has some part to play or they wouldn't be with us.³³

You can't separate water, the river, from the environment. It's all part of the one thing. You see the birds, native trees, us - we're all part of it. When we're talking

³² Interview participant.

³³ Interview participant.

about the river, we're talking about ensuring that the banks of the river, the trees are cared for so the birds can feed off them. It's the whole thing - not just the river alone.³⁴

This view supports an understanding that change in one aspect of the water system can have systemic effects that are felt across a broad range of aspects. This has been particularly important in the present day; as the population increases, mana whenua have anticipated that demographic changes and the change of use that comes with them will inevitably create further change and stresses on other parts of the environment. The kōrero gathered covered different examples of human activities creating the most significant imbalance in water systems:

Well, they take stones out of the river, aye? And that changes the river. Well, it made a difference to the mouth of the river even out at the beach. Not as wide as the mouth of the river when we were kids.³⁵

90% of wetlands have been lost or damaged in New Zealand in the last 150 years or so and the loss in the Kāpiti area has been significant on a national scale. This once-wet place is now facing problems such as water shortages and flooding (Te Rūnanga o Āti Awa ki Whakarongotai Inc, 2000, p. 9).

The protection of order and balance and the prevention of these types of negative systems changes require the adaptive management of human behaviour and expectations of how resources from the environment can be used. The protection of Te

³⁴ Interview participant.

³⁵ Oral history interview.

Ao Tūroa and the adaptive management of human activity were described as fundamental responsibilities of kaitiakitanga.

The valuing of balance in systems means ensuring that all the critical components of systems are protected, are well-functioning and are connected. Participants provided much kōrero that emphasised this in terms of how aquatic habitats are highly valued. Wetlands were identified as a particularly important habitat to the people of Te Āti Awa ki Whakarongotai. Connectivity between diverse aquatic habitats was also commonly identified as important for system health:

We say Tangaroa ki uta, Tangaroa ki tai. Tangaroa resides in the department of the sea, and then he's got to click with Tangaroa ā uta, which is the god of freshwater. And then from those two you're connected to Tāne Mahuta [forest deity]. It is important human activities do not disrupt the patterns and balance of nature.³⁶

Tributaries and other small watercourses were identified as important in terms of the specific role they play in the health of the larger river and stream channels, and water networks as a whole. Native aquatic species and communities were also valued over exotic invasive aquatic species because of the important role they play in maintaining the natural structure and order of ecological communities. Valuing Te Ao Tūroa is also seen to be about valuing the natural āhua or natural character of the environment. Participants provided examples of this, such as ensuring that there is the appropriate flow in the river for the types of activities people want to enjoy and ensuring that waterways have the right bed morphology for mahinga kai species to live in.

³⁶ Interview participant.

Kōrero gathered on the practice of kaitiakitanga to maintain natural order emphasised the importance of a tikanga Māori approach, and its contrast to Western approaches to environmental regulation. The regulatory approach of tikanga Māori as presented by Te Āti Awa ki Whakarongotai promotes people abiding by their sense and collective understanding and consciousness of the 'right way' to live. When participants talked about how tikanga Māori regulates human behaviour, they used terms such as 'having consistency', 'living honestly', 'having respect' and 'being guided by principles'. This approach that relies on the 'bottom-up' contextual enacting of collective morals and ethics was seen as in contrast to Western approaches to regulation, which rely upon top-down enforcement. This is particularly important in informing and regulating the practice of harvesting mahinga kai; harvest should always occur in a way that ensures the sustainability of stocks, and difficulty in being able to efficiently harvest enough food indicates the need to make a change to how the wider system is being used or managed.

The natural patterns of Te Ao Tūroa were seen as highly valuable in supporting communities and people to self-regulate their behaviour, use and interaction with the environment. Participants gave a range of examples of patterns they observed and relied upon to predict changes of state in the environment. The observation of tohu, or environmental indicators, is used to indicate when it is the best time to harvest, or to indicate imbalance. This often led to discussions about changes observed in the climate caused by global warming creating an unprecedented threat to the natural order, balance and patterns of the environment. Climate change is seen as setting in place new system dynamics that are working to re-establish balance and order.

Ultimately, clean and abundant waterways are seen by Te Āti Awa as a reflection of respecting and protecting Te Ao Tūroa, the value of balance and natural order, through the practice of kaitiakitanga. Analysis of kōrero on Te Ao Tūroa identified the following key huanga that would be observed if the value of Te Ao Tūroa were upheld:

1. The regular patterns of nature are observed and can be relied upon to provide abundance and safety.
2. People's behaviour, use and interaction with the environment is regulated by the collective respect for Te Ao Tūroa, for all the atua and for natural order and balance.
3. Habitat that is required to support mahinga kai and other native species is available.
4. The natural character of the environment waterbodies is protected and enhanced.
5. Diverse mahinga kai can be sourced efficiently in all seasons and harvest methods should not allow for exploitation.
6. There is good presence and cover of native vegetation.
7. Native fauna are able to complete their full life cycle.
8. Ecological communities are well structured and stable.

Mauri

Me pupuritia te mauri o te wai.

Mauri is understood to be the fundamental and essential energy required for all life. It is a systemic quality, and speaks to the vitality of processes and systems. Protection, nurturing and enhancement of mauri is our fundamental role as kaitiaki.

As mentioned in the Whakapapa section of this chapter, water is seen to be sensitive in that it conveys character. It has a vibrational quality that reverberates through systems. Participants emphasised that when the mauri of our waterways is well, the mauri of all that live in it is well. Our well-being is supported through waterways with good mauri through the quality of the food we source from them, and water we consume, or the

healing we receive from the environment. The health of water in particular is therefore understood to be fundamental to all well-being in that the mauri of water influences the mauri of all life. This understanding of water is evident across the various planning and assessment documents produced by Te Āti Awa ki Whakarongotai over the years, where the fundamental value of the mauri of water is repeatedly restated. Following are the fundamental principles set down in an assessment produced by the iwi on different water supply options:

He taonga te wai - water as a foundation for well-being

Me pupuritia te mauri o te wai - the vitality of water ways should be protected.³⁷

The following is a way of describing our waterways put forward by a group in a planning wānanga:

Our waterways are the arteries and veins that carry the mauri of Papatuanuku.³⁸

In this sense, water is seen as fundamental as it carries the essential life force and vitality of Papatūānuku.

Much of the interviewing with kaitiaki and mahinga kai experts focused on what the value of mauri is, and how it is seen reflected in the things that are valued in waterways. Participants talked about how it is mauri that gives rise to the diversity and abundance of life in waterways on which our own survival relies. Our kaumātua spoke proudly about the great abundance and diversity of mahinga kai they enjoyed in their childhood in our

³⁷ Cultural Impact Assessment for Te Āti Awa ki Whakarongotai on River Recharge Project.

³⁸ Wānanga participants.

rohe, and how accounts of our tūpuna speak of our rohe as a place that thrived with life and vitality.

Kaitiaki emphasised that mauri is as much about diversity as it is about abundance, and that waterways with good mauri will have a full suite of mahinga kai species thriving if catchment systems have good mauri. Mahinga kai experts also saw little real distinction between the health of freshwater systems and that of marine environments. There was an acute awareness that the marine environment, in particular the shellfish beds, is the receiving environment for freshwater ways, and that therefore the mauri of freshwater catchments is an important value and factor in the protection of marine waterways. This led to the compilation of a list of all mahinga kai species that experts sought to see in freshwater and marine environments if mauri is well (see Table 4.2).

Table 4.2 Mahinga kai species that experts expect to see in freshwater and marine environments

| | | | |
|--------------------|--------------------|-------------------|--------------|
| tuna (eel) | giant kokopu | banded kokopu | pipi, tuatua |
| short-jawed kokopu | kōaro | inanga | paua |
| kanae (mullet) | pātiki (flounder) | oyster | watercress |
| kōura (crayfish) | kumukumu (gurnard) | common bully | kahawai |
| red fin bully | blue fin bully | herring | kākahi |
| piharau (lamprey) | karengo (seaweed) | kina (sea urchin) | snapper |
| tarakihi | butterfish | kingfish | cod |
| trevally | hapuka (cod) | puha | kererū |

It is worth noting that despite being a bird, kererū was identified in this list, because kaitiaki saw that the wider health and abundance of broader ecological communities connected to waterways are a reflection of their mauri too. Many mahinga kai experts noted that they looked at birdlife as an indicator of the mauri of waterways, in that if there were good riparian habitat for fruit-eating birds and ample fish stocks in the waterways

for fish-eating birds, this would support good bird populations. Certainly, kererū are still seen today on the banks of the Waikanae River, where there are still small clusters of native bush. Some participants also identified specific taniwha or kaitiaki they would observe as indicators of abundance and therefore good mauri.

Participants talked about how protecting mauri involves protecting the vital and life-giving character of ecosystems, particularly relating to mahinga kai, ensuring that food has integrity in that its quality has not been compromised by contaminants. They saw a connection between mauri and Te Ao Tūroa, in that if there is imbalance in Te Ao Tūroa, for example, through the dominance of invasive species or tipping of chemical equilibria, this will typically lead to impacts on mauri, on the vitality and abundance of ecological communities. Kaitiaki talked about how they are therefore always looking for indication of the state of mauri in the whole system through a range of specific water quality indicators such as flow, algae, turbidity and temperature. The health of the Waikanae River in particular was seen as indicative of the mauri of the whole rohe:

The awa is hugely important - it's our life, our blood, it sustains us in every field.³⁹

There are also various puna, or springs, in our rohe from which pristine and special waters still flow, and these are looked to as having particularly special mauri to protect.

Essentially, all participants reflected on the excessive inputs of nutrients and other contaminants into waterways that have created imbalance in their lifetime and had devastating effects on the mauri of waterways, beaches, mahinga kai and our people.

³⁹ Interview participant.

They described reflections of this that they had personally observed in waterways and catchments:

I look for movement of that river, is it really slow, slime everywhere.⁴⁰

In 1963 I could get flounder plentifully at South Raumati, my children and I could get all the shellfish we wanted just north of Paraparaumu Boating Club, and you go there today and all you see today is the green tinge all through the sand. It's no longer a viable sand that shellfish live in. It's matted, and holds together like a cement almost. It's amazing that that degree of loss has occurred in such a short time... The kai is not there now, and you would need your head read to eat it now, because of all the pollution.⁴¹

The wānanga identified heavy metal contamination in particular as a serious threat to mauri in our rohe and a critical issue for Te Āti Awa ki Whakarongotai, because the type and scale of the effects of this are still not well understood. Participants were hopeful, though, and talked a great deal about a future of restoring and enhancing mauri within our rohe, through activities such as removing invasive species, planting and restoring the right native plants on the land and waterscape, and stopping the input of contaminants into waterways. They saw this work as critical to the future survival of the future generations and the wider community at large.

Analysis of kōrero on mauri identified the following eight key huanga that would be observed if the value of mauri were upheld; however, in developing the freshwater

⁴⁰ Interview participant.

⁴¹ Interview participant.

mahinga kai index, many of these huanga were refined down into further multiple specific indicators of health, which are discussed in Chapter 5:

1. Waterways and mahinga kai are healthy, clean and free of pollutants.
2. The temperature and oxygen in waterways support stable ecological communities.
3. Species are lively and in good condition.
4. Mahinga kai is abundant.
5. Mahinga kai tastes delicious.
6. Biodiversity is strong in that the full suite of mahinga kai species can be found in our catchments.
7. Waterways are safe for people to access.
8. The vitality and health of people is strong.

Te Kete Tua-uri - Summary

This chapter has presented the kōrero gathered for Te Kete Tua-uri, the fundamental knowledges and kaupapa (values) that inform the worldview of Te Āti Awa ki Whakarongotai on freshwater systems. Kōrero was gathered across six key kaupapa of the Hua Parakore framework as part of the development of the Iwi Kaitiakitanga Plan.

The kōrero presents an iwi ontology of water. It is an understanding of water that comprises a broad spectrum of interrelated values, and sees water as a process of interrelated phenomena. Water is valued as providing fundamental existential values, in terms of it being fundamental to the physical survival and balance of life, but also in having deep psychological values in supporting people's sense of identity and place in the world, and their emotional and spiritual well-being. At times, the value of water extends to it being a divine source of inspiration. Water also holds fundamental societal

value in terms of supporting the development and wealth of societies through the ways in which it can be used and the economies it supports. Water is seen to reflect the consciousness of societies in that its quality reflects how enlightened society is and the integrity of their decision-making. This ontology of water reflects a deeply holistic view of the world, in which those psychological, spiritual, social and knowledge values are just as integral to systems as the physical and energetic values. This was a critical underlying understanding in the following phases of the research, which involved observing and modelling systems, because all those values needed to be incorporated in those processes.

The Iwi Kaitiakitanga Plan has a broader whole-of-environment scope, but the key aspects relating to freshwater are presented here. The plan sets out:

- narrative kōrero on each key kaupapa and how they are understood by Te Āti Awa ki Whakarongotai
- huanga, the outcomes that will be seen if each kaupapa is upheld, which function as objectives of the plan
- tikanga, or the policies or practices that need to be implemented or abided by to uphold the kaupapa.

The huanga as they relate to freshwater were then identified and compiled into a freshwater health index: an index of indicators of freshwater systems' well-being. Throughout the successive phases of the research, the huanga might have been refined, or disaggregated into more specific measures where this was deemed necessary by the committee. Their final version of the huanga is set out in Table 4.3. The Iwi Kaitiakitanga Plan and the index in particular became a useful tool in the day-to-day work of the Taiao Unit of the iwi, particularly in responding to resource consent applications in the rohe.

The index could be used as measures against which to assess proposals for resource consent.

Te Āti Awa ki Whakarongotai's ontology of water, and this index of huanga became the first set of tools to support the iwi in realising their future aspirations in relation to freshwater. Chapters 5 and 6 will show how these were used to develop Te Kete Aronui, knowledge generated through observations, and Te Kete Tua-ātea, knowledge generated through inference modelling.

Table 4.3 Te Āti Awa ki Whakarongotai Freshwater Health Index

| |
|---|
| WHAKAPAPA |
| We maintain our way of life as Te Āti Awa ki Whakarongotai. |
| Through water, our people are connected to their history, to the marae and to each other. |
| All our people know their whakapapa to the water and waterbodies. |
| The unique identity and role of Te Āti Awa ki Whakarongotai as mana whenua and kaitiaki of water in their rohe is recognised and respected. |
| The unique relationship that certain whānau and hapū hold in connection to certain sites and taonga is respected and protected appropriately. |
| All sites of significance and associated names and kōrero within the rohe of Te Āti Awa ki Whakarongotai are respected and protected. |
| All generations enjoy harvesting and eating mahinga kai from the water. |
| WAIRUA |
| Water supports healthy wairua of the people. It is clean, calm, safe and conflict free. |
| The presence of native flora and fauna can be observed and heard in the waterscapes. |
| The wairua of people is supported through their ability to practise mahinga kai. |
| The people of Te Āti Awa ki Whakarongotai have good self-esteem about the state of waterways. |
| Our people feel a sense of pride and fulfilment about the capability of our iwi as kaitiaki of water. |
| The people of Te Āti Awa ki Whakarongotai are free of stress and trauma brought about through degradation and change of waterways. |
| Wāhi tapu, tikanga and kōrero tuku iho are respected and protected. |
| Tikanga Māori and the mana motuhake of Te Āti Awa ki Whakarongotai is abided by in the active protection of wāhi tapu and kōrero tuku iho. |
| MANA |
| People are able to live their lives in the rohe of Te Āti Awa ki Whakarongotai in harmony with the water. |
| Our relationship with the waterscape supports our economic and social security, and all abundance is shared. |
| People of Te Āti Awa ki Whakarongotai have access to mahinga kai sites. |
| There is intergenerational participation in mahinga kai. |
| The mana of our marae Whakarongotai is supported by the abundance of the waterscape. |

| |
|--|
| Traditional economies of mahinga kai and other resources create and strengthen relationships with others. |
| Te Āti Awa ki Whakarongotai have tino rangatiratanga, authority over use that affects water. |
| Te Āti Awa ki Whakarongotai have positive working relationships with Treaty partners. |
| The implementation of tikanga in relationship to the water is upheld by the iwi and supported by Treaty partners. |
| The iwi collective feel that they can influence decision-making on water. |
| MĀRAMATANGA |
| Decision-making is informed by iwi knowledge. |
| A diverse array of mātauranga Māori is created and handed down: rongoa, astrology, horticulture, fishing. |
| All generations know where to source mahinga kai. |
| All generations can identify and recognise traditional kai species. |
| Knowledge on harvest and preparing is held intergenerationally. |
| Our people have access to new knowledge and technologies. |
| Knowledge is protected and applied in a safe and respectful way. |
| Local specialist knowledges are respected and empowered to inform decision-making. |
| TE AO TŪROA |
| The regular patterns of nature are observed and can be relied upon to provide abundance and safety. |
| People's behaviour, use and interaction with the environment is regulated by the collective respect for Te Ao Tūroa, for all the atua and for natural order and balance. |
| Habitat that is required to support mahinga kai and other native species is available. |
| The natural character of the environment waterbodies is protected and enhanced. |
| Diverse mahinga kai can be sourced efficiently in all seasons and harvest methods should not allow for exploitation. |
| There is good presence and cover of native vegetation. |
| Native fauna are able to complete their full life cycle. |
| Ecological communities are well structured and stable. |
| MAURI |
| Waterways and mahinga kai are healthy, clean and free of pollutants. |
| The temperature and oxygen in waterways support stable ecological communities. |
| Species are lively and in good condition. |
| Mahinga kai is abundant. |
| Mahinga kai tastes delicious. |
| Biodiversity is strong in that the full suite of mahinga kai species can be found in our catchments. |
| Waterways are safe for people to access. |
| The vitality and health of people is strong. |

Chapter 5: Te Kete Aronui

Approaches and tools applied by Te Āti Awa to facilitate observations of freshwater systems

Whakarongo atu ki ngā tai o Raukawa moana e pāpaki mai ra, ia rā, ia rā.

Mutungā kore, pāpaki tū ana ngā tai ki uta.

I tēnei rā kua pāpaki mai ngā tai o te ao ki a Te Āti Awa.

Pī kē pea te piki atu, rere haere ai ki runga i te kaha o te ao hurihuri;

Me kore pea te kitea he māramatanga ki ngā whakaritenga o te wā e tika ai tātou te iwi.

Nō reira, whakarongotai o te moana, whakarongotai o te wā.

Wi Te Kākākura Parata⁴²

The knowledge we create from what we can observe in the world comes from Te Kete Aronui. This is the aspect of our worldview that relates to the reality that we perceive, as opposed to true metaphysical or ultimate reality. It pertains to everything that has been

⁴² This quote comes from a speech our ancestor Wi Te Kākākura made at the time he made a decision to move our meeting house, Pukumahi Tamariki in response to development in the community at the time. It is said that this part of the speech was based on the following passage of Shakespeare's Julius Caesar:

There is a tide in the affairs of men,
which taken at the flood, leads on to fortune.
Omitted, all the voyage of their life
is bound in the shallows and in miseries.
On such a full sea we are now afloat.
And we must take the current when it serves,
or lose our ventures (Maclean & Maclean, 2010, p. 50).

In his statement, Te Kākākura adapts this in his opening to say, listen to the tide of the local ocean, Raukawa moana, now the tides of the world are striking upon Te Āti Awa. He then concludes with 'whakarongotai o te moana, whakarongotai o te wā', meaning as you listen to the tides of the ocean, so should you listen to the tides of the time. Whakarongotai became the name of the new marae where the meeting house was repositioned.

observed since the emergence of the material world, Te Ao Mārama (Marsden, 2003b). The knowledge from this kete that supports decision-making includes all the knowledge generated from observations, and the technologies that facilitate those observations and help us to interpret them.

This chapter presents the approach and technological tools that were applied and developed by Te Āti Awa ki Whakarongotai to create knowledge from Te Kete Aronui. The outcome of this phase of the research was the development of a monitoring regime for the iwi that will facilitate observations of freshwater systems for the purpose of informing decision-making. This is presented in two parts. Part one presents the results of developing and applying a method to prioritise the 49 different huanga identified through Te Kete Tua-uri phase of the research to be monitored as part of a monitoring regime. Part two presents how the iwi identified and piloted different methods to monitor this suite of priority attributes. The piloting of each set of methods is reviewed, in terms of both how practical the methods were to implement and their ability to create knowledge that was valuable across a range of different decision-making contexts.

Part One: Prioritising huanga for monitoring

A key outcome of the first Te Kete Tua-uri phase of the research was identification of the values that inform Te Āti Awa ki Whakarongotai worldview of freshwater systems, and development of an index of 49 huanga or attributes that would be observed if these values were being upheld. The index comprises a broad range of attributes that could be monitored to create knowledge about the state of freshwater systems and how it changes over time. However, it is not practical or necessary to monitor all these attributes, particularly for the purpose of a regular monitoring regime to support iwi in their decision-making and other aspects of kaitiakitanga. While each of these 49 huanga might be monitored in a specific context, the iwi required a practical monitoring regime through

which priority huanga are regularly monitored across their rohe, in order to generate Te Kete Aronui knowledge about the state and trend of freshwater system health that can support a wide variety of kaitiakitanga and decision-making purposes.

This part sets out how the identification of those priority huanga was achieved by our committee applying Vester's influence matrix in combination with the Hua Parakore framework, to identify the most 'active' and 'critical' attributes of the freshwater system, that is, the attributes that when changed have the greatest degree of influence over the whole system. An iterative wānanga process was used to test and refine over time which huanga should be prioritised for monitoring.

Vester's influence matrix

A key feature of Vester's influence matrix that makes it particularly compatible with a Māori worldview is that it has been developed to interpret the function systems that involve the complexity of sociopolitical factors, such as the nature of human decision-making or social well-being, rather than just focusing on the ecological or economic attributes of systems. It is therefore able to represent the influence that these types of factors have on the system as a whole. This was demonstrated in trials in Aotearoa in which stakeholders were involved in whole-system mathematical model-building processes to identify the attributes across the whole socio-ecological system that were having the greatest influence on the system (Cole et al., 2007; Cole et al., 2003).

The application of the matrix on all attributes of a system results in each attribute, or 'factor', being categorised into one of four factor types, telling us what function each attribute plays in the system. The functional factor typology characterises each factor in terms of both its influence on other factors and how its influenced by other factors (see Figure 4.4).

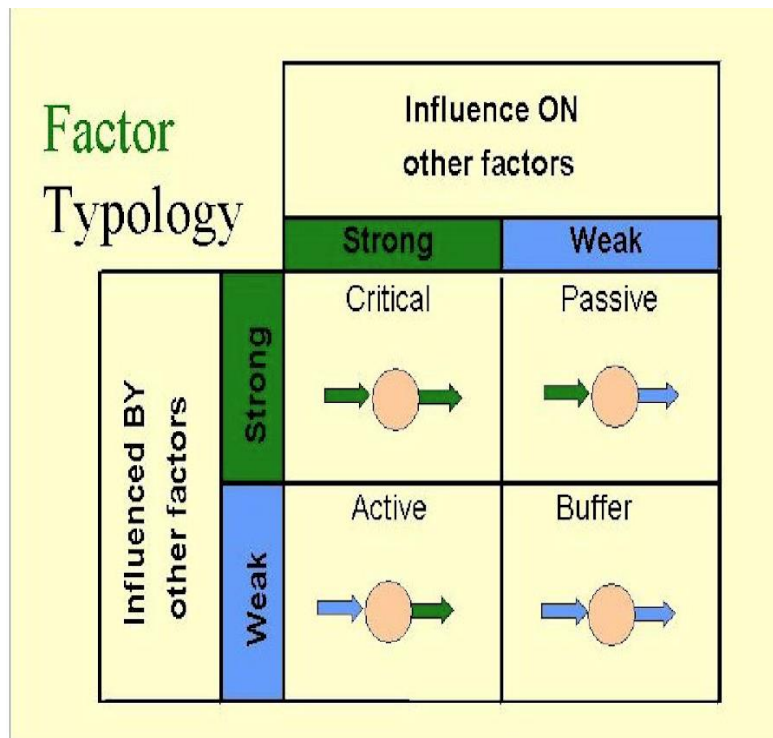


Figure 4.4 Function factor typology (Cole et al., 2003)

The typology is described by Cole as follows:

- ‘Active’ factors: The attributes that drive the system and have the greatest influence, without being strongly influenced by other attributes.
- ‘Critical factors’: The attributes that not only have a strong influence on other attributes of the system, but are also strongly influenced by others, meaning they can trigger feedback loops in the system.
- ‘Passive factors’: The attributes that perform important feedback-dampening functions in that they are strongly influenced by other factors, but weakly affect others. They might be described in systems terminology as ‘stocks’.
- ‘Buffer factors’: The attributes that are weakly affected by other facts and weakly affect others. They support system resiliency in that they provide the capacity in the system needed to slow down and ease the approach of the system towards thresholds or limiting values.

The 'function factor typology' therefore also complements a Māori worldview in that its purpose is not to try to identify which attributes are more significant than others; it simply acknowledges that different attributes have different functions in a system, and these can become more or less significant in different resource management contexts. In the context of identifying which attributes to prioritise for monitoring, the committee were interested in utilising it to identify the most active and critical attributes.

A wānanga was held to apply the influence matrix to the index of huanga in order to categorise them in accordance with Vester's typology. The approach was informed by Cole's participatory approach; however, a larger number of experts were used. It was important that the experts were able to participate to both apply the method and to provide useful insight and reflection on its merit. Participants in the wānanga included the five committee members, another five kaitiaki experts from the iwi selected by the committee, me and a research assistant (see Figure 5.1).



Figure 5.1 Wānanga test the use of the influence matrix

The method used to apply the influence matrix was as follows:

1. A matrix table was developed listing each huanga along both its x and y axis, and these were colour coded in accordance with the kaupapa they arose from.
2. Because of the large number of huanga, it needed to be practical for the whole group to complete the matrix table together, and so the wānanga were split into pairs or groups of three to each complete a portion of the table. The table was filled in using 'influence scores'. The influence of each attribute on each of the other attributes was given a score from 0 to 5, 0 being no influence and 5 being strong influence. The participants gave their ranking based on what they had observed in their lifetimes. Sometimes this would create debate between group members, who would resolve their final rank using examples from their experience as kaitiaki, until they could agree on a ranking. Figure 5.2 provides an example of a portion of the influence matrix that was completed by a group.
3. All the portions of the matrix table were then combined to give a complete table.
4. For each attribute, the row scores were summed to give their active scores, that is, to show how great an influence the attribute has, and the column scores were summed to give their passive scores, that is, to show how great an influence other attributes have on them. The attributes were then ranked in accordance with their active scores.
5. As per the method set out by Cole et al. (2003), a range of algorithms including 'absolute numerical difference', 'quotient score' and 'multiplier score' were then applied to the active and passive scores of the matrix to categorise the attributes into one of the four function factor types. The attributes were sorted again according to their typology, from descending degrees of influence, from being active, to critical, to buffer, to passive attributes.

6. The outcome was the Whakarongotai Freshwater Influence Matrix (see Figure 5.2). This matrix shows the categorisation of each of the attributes into one of the four typologies.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | | |
|---|----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|
| 2 Number | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 Pollution | 1 | 4 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 4 | 3 | 5 | 3 | 4 | 4 | 5 | 4 | 3 | 4 | 3 | 5 | 1 | 4 | 0 | 3 | 3 | 0 | |
| 4 Heavy metal contamination | 2 | 5 | 5 | 0 | 4 | 2 | 5 | 5 | 4 | 2 | 4 | 3 | 5 | 0 | 0 | 4 | 0 | 4 | 3 | 1 | 3 | 0 | 1 | 3 | 0 | 3 | 1 | 0 | |
| 5 Temperature and dissolved O2 | 3 | 3 | 3 | 4 | 4 | 2 | 5 | 3 | 4 | 2 | 4 | 3 | 3 | 0 | 5 | 1 | 3 | 3 | 5 | 4 | 3 | 1 | 5 | 4 | 0 | 2 | 2 | 0 | |
| 6 Birdlife | 5 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 7 Liveliness of fish | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 Contaminant levels in flesh | 7 | 0 | 0 | 0 | 2 | 0 | 4 | 0 | 0 | 0 | 4 | 2 | 5 | 0 | 0 | 4 | 0 | 4 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 |
| 9 Algae | 8 | 4 | 3 | 5 | 4 | 2 | 5 | 1 | 4 | 3 | 3 | 3 | 5 | 4 | 5 | 1 | 4 | 2 | 5 | 3 | 3 | 2 | 4 | 3 | 0 | 1 | 1 | 0 | 0 |
| 10 Turbidity | 9 | 2 | 0 | 1 | 1 | 0 | 4 | 3 | 3 | 2 | 2 | 4 | 2 | 0 | 0 | 2 | 0 | 0 | 4 | 1 | 0 | 0 | 3 | 1 | 0 | 3 | 3 | 0 | 0 |
| 11 Abundance of mahinga kai available for consumption | 10 | 2 | 2 | 3 | 1 | 3 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 3 | 5 | 0 | 0 | 2 | 5 | 0 | 2 | 2 | 0 | 0 |

Figure 5.2 A portion of the influence matrix showing how a group has ranked the degree of influence each attribute has against each of the other attributes in the matrix

After the initial wānanga, the matrix was reviewed several times and changed slightly to reflect these reviews. The final version is shown in Figure 5.3. The wānanga included a discussion of the theoretical framework of the influence matrix, and after the completion of the tables, a discussion about the groups' sense of usefulness of the matrix. The participants indicated that they placed significant weight on my suggestion that this tool was helpful in showing the underlying logic of how from a Māori perspective we might prioritise where to focus our attention, but they could see its merit and were happy to proceed on that basis. It did take some time to become familiar with the scoring system relating, not necessarily to the importance of the attribute itself, but to its ability to influence other factors, and we discussed how common it is in the resource management context that as Māori we are asked about what our most 'significant' values are, as opposed to being asked for our interpretations of what the key drivers or influential aspects of systems are.

Other useful feedback on the application of this method included:

- Particularly given the number of huanga, the participants identified that the ranking was sensitive to 'creep', whereby as the group moved further through the rankings they had to make, and became more confident and agreeable with each other, they might be more likely to not think through their rankings or start to repeat ranks. We dealt with this during the wānanga by reviewing the rankings to ensure consistency across the matrix in terms of how rankings were applied
- Review of the rankings was also needed to ensure consistency across the matrix in terms of how rankings were applied. In our case, this was provided first by me as the project leader doing a deep review and checking each response to test for issues with creep or consistency, and then the committee doing a general review to check that nothing seemed particularly unusual. However, in other cases, if there was already comfort with the approach, then a small collective of tohunga, or experts, or even one, could complete the table. The group felt that this really depended on the collective's comfort with the knowledge of experts.
- The pairings or group personalities influenced how long the process took. Some were highly agreeable, and some had different views to debate, or were just more likely to try to be contrary to others.
- The group felt that 49 (later increased to 56) was a high number of attributes because there were around 2,500 relationships to rank and this created much work. The group felt that it might be possible to aggregate the huanga somewhat for the purpose of ranking, but that it was helpful once the work was complete to have that many fine attributes categorised.

There was recognition that there are always going to be relationships within the system that are not well understood and thus it was important that those using the matrix were cognisant that like anything in Te Kete Aronui, the matrix reflected the experts' view

based on what they had observed through their life but it was not a perfect reflection of reality.

The first result of interest from using the influence matrix was that it identified that the active factors were exclusively from the Māramatanga and Mana huanga. This suggested that the attributes that have the most influence in driving the dynamics of the system relate to the degree to which iwi knowledge is healthy and is influencing decision-making, and the way in which power is utilised. This was considered obvious from an iwi perspective, because, as discussed in Chapter 4, they see the health of water as directly reflecting the enlightenment of society and their integrity in decision-making. However, this is a significant finding when considering that the matrix is being applied to identify priority attributes of systems for monitoring, and that in typical state of environment monitoring, effectively no attention is paid to monitoring the 'health' of knowledge and political factors, which based on the expertise of Te Āti Awa ki Whakarongotai was having the most influence on freshwater system health. This highlighted the importance of integrating an understanding of how these factors influence change into the understanding of the ecological attributes, and of system health as a whole.

The group concluded that the influence matrix was a useful tool for the iwi, but acknowledged that other iwi may have different or more straightforward methods to prioritise attributes. This may be as simple as convening a group of experts to prioritise them through discussion. However, the group were satisfied that this method provided a great deal of rigour that could be used to justify or insist upon types of monitoring to be conducted that otherwise may not be.

Identification of case studies to apply monitoring

It was apparent that different contexts may require the monitoring of different priority huanga. To inform the prioritisation of huanga, three current scenarios in which there is a need to develop a kaitiaki monitoring regime were identified as case studies to consider when prioritising huanga for monitoring:

1. Rohe-wide kaitiaki monitoring: This would involve regular monitoring in the rohe that could be used to inform iwi state of the environment reporting, to measure the success of the implementation of the Iwi Kaitiakitanga Plan, and to inform the assessment of effects on mahinga kai and customary use for resource consenting by ensuring significant baseline data are being generated in the rohe.
2. Post-construction monitoring for the Mackays to Peka Peka (M2PP) Expressway: As discussed in Chapter 1, there were potential significant effects of the 18 km expressway following construction, and the iwi had gained agreement with the New Zealand Transport Authority for them to monitor effects to mahinga kai across the footprint of the project.
3. Flood Protection Environmental Monitoring Plan: The iwi are currently working with the Flood Protection department of the Greater Wellington Regional Council to ensure that there is monitoring of iwi values to inform ongoing adaptive management of Flood Protection works.

The iwi had also conducted an online mahinga kai survey that included a range of questions, but for the purpose of this project, surveyed 64 participants regarding their most widely consumed mahinga kai species, in order to inform which specific mahinga kai species should be prioritised in monitoring. Watercress was identified as the most widely consumed mahinga kai species in the rohe, and whitebait the second most widely consumed.

Applying Hua Parakore as a conceptual model in prioritising huanga

The last stage of the prioritisation of huanga utilised the Hua Parakore framework. This conceptual model for the freshwater system was based on a fundamental principle that all six kaupapa, or values, of the system had to be well for the system to be well. This principle was then implemented by taking the influence matrix rankings and the two huanga from each kaupapa that were ranked highest in terms of their influence. Where huanga were significantly broad, for example, 'pollution', they were adapted to be as specific as possible, and the case studies and survey results were used to identify which contexts of the huanga, in this case which contexts of pollution, should be targeted. The process also avoided prioritising attributes that were already monitored in state of environment monitoring. This resulted in identification of the priority huanga for each case study (see Table 5.1).

It quickly became apparent that most of the huanga could be monitored for application across all three case studies. The only huanga that needed to be adapted to fit the case studies at this stage was 'pollution' and this was refined by adding specific types of pollution to the matrix, and calculating their ranks to further identify which type of pollution ranked highly in influence. The highest-ranking pollution factor was heavy metal contamination and so this was selected both for rohe wide and for monitoring the effects of the M2PP construction. It was noted that heavy metal contamination was not really an issue in relation to Flood Protection works in the river, however, and so the next highest-ranking pollution factor was selected, which was fine sediment. It became apparent that this process of refining attributes required participants to have a good working knowledge of the types of activities that were going to be monitored and their likely impacts, to ensure that the huanga were as relevant as possible.

Table 5.1 Identifying priority huanga

| KAUPAPA (Values) | Rohe-wide monitoring | M2PP monitoring | Flood Protection |
|-------------------------|--|--|--|
| Mauri | Pollution: Heavy metal contaminants | Pollution: Heavy metal contaminants in watercress | Pollution: Fine sediment |
| | Biodiversity | Biodiversity | Biodiversity |
| Te Ao Tūroa | Extreme weather events | Extreme weather events | Extreme weather events |
| | Presence and abundance of mahinga kai species | Presence and abundance of mahinga kai species | Presence and abundance of mahinga kai species |
| Māramatanga | Decision-making is informed by TAKW knowledge | Decision-making is informed by TAKW knowledge | Decision-making is informed by TAKW knowledge |
| | Knowledge of harvest and preparing | Knowledge of harvest and preparing | Knowledge of harvest and preparing |
| Mana | Development: Density on the floodplain | Development: Catchment attenuation | Development: Density on the floodplain |
| | TAKW are part of the governance of resource management | TAKW are part of the governance of resource management | TAKW are part of the governance of resource management |
| Wairua | The environment is calm, safe and conflict free | The environment is calm, safe and conflict free | The environment is calm, safe and conflict free |
| | People are able to practise tikanga | People are able to practise tikanga | People are able to practise tikanga |
| Whakapapa | Maintaining our way of life | Maintaining our way of life | Maintaining our way of life |
| | All people are connected to the environment | All people are connected to the environment | All people are connected to the environment |

Note: TAKW = Te Āti Awa ki Whakarongotai

With our priority huanga identified, we were then able to trial methods to monitor them.

Part Two: Piloting methods for monitoring huanga

This part presents the methods that were piloted to monitor the priority huanga. In some cases, this involved applying methods that were well developed and currently being used in existing environmental monitoring contexts; in other cases, it involved adapting

methods or developing our own. Reflections are then provided on their feasibility for use in an ongoing monitoring regime, both in terms of their practicality and the value of the knowledge that they are able to generate about freshwater system health.

In identifying methods for monitoring the priority huanga, three types of monitoring approaches emerged:

1. ecological methods to monitor Mauri and Te Ao Tūroa huanga
2. organisational auditing to monitor Mana and some Māramatanga huanga
3. social science methods to monitor Wairua, Whakapapa and some Māramatanga huanga.

1. *Mauri and Te Ao Tūroa monitoring*

The huanga that require monitoring across the Mauri and Te Ao Tūroa values are:

- Pollution: Fine sediment in rivers
- Pollution: Heavy metal and microbiological contaminants in watercress
- Extreme weather events
- Biodiversity
- Presence and abundance of native species.

Mauri monitoring of fine sediment

The committee had identified that fine sediment is a priority huanga of Mauri to monitor for the purpose of Flood Protection works. We adopted the bankside visual assessment method as described in Cawthron's 2011 *Sediment Assessment Methods* (Clapcott et al., 2011) whereby monitors visually assess the area cover of the relative surface area of the streambed with deposited sediment.

This was used to conduct pre- and post-construction monitoring of Flood Protection works and enabled monitors to detect increases in fine sediment downstream of Flood Protection works. It was also combined with fish surveys, which are discussed later in the section, to draw an association between the works, the sediment and the fish life observed. This type of data would be useful in that it could inform adaptive management of Flood Protection works. This is a fast and simple method of assessment that can easily be included in state of environment type monitoring, and the iwi are now looking to have it conditioned to the Flood Protection consent as part of the Environmental Management Plan required for the Waikanae River.

Mauri monitoring through watercress surveys

According to the survey conducted, watercress is the most widely consumed mahinga kai by Te Āti Awa ki Whakarongotai. This was therefore selected as a focal species for mauri monitoring.

1. The first step in this method involved developing a map of watercress sites for sampling across the rohe. This was done by consulting with mahinga kai experts who most frequently source watercress for use at the marae. A GIS map was then developed identifying watercress gathering sites and making annotations with any useful information regarding the nature of the site⁴³.
2. Heavy metal and microbiological testing is relatively expensive, and therefore, testing all known sites was not feasible. Instead, the samples were targeted to identify where certain activities in the rohe, including the disruption of contaminated land or discharges to land and water, were creating a contamination effect. Two sites at the bottom of each catchment were then

⁴³ The information in this map is kept confidential to the iwi as it contains information regarding highly valuable mahinga kai sites.

identified, with the assumption that this would capture information on the areas that were most polluted and therefore of most critical interest. An upstream control site and downstream test site were identified for each of the five key catchments in the rohe, namely:

- Whareroa Stream
- Wharemauku Stream (with an additional site in a tributary of interest)
- Mazengarb and other tributaries to the Waikanae River
- Waimeha Stream
- Paetawa Stream.

3. The methods used for sampling itself were informed directly by Edmonds and Hawke (2004), who conducted microbiological and metal contamination testing on watercress in the Wellington region, including the Kāpiti District, in 2000. Both watercress plant material and the water they were growing in was sampled. The following tests were to be conducted on the samples:

- heavy metal tests for arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc in plant material
- E. coli tests of plant material and water
- Campylobacter tests of plant material.

4. On site, two kaitiaki took the appropriate watercress and water samples (see Figure 5.4) and completed a form that included information on access, fine sediment, current site condition, expert memory of condition, flow, fish life and any other observations, and took photos of the site. Samples were then sent to Hills Laboratories.



Figure 5.4 Kaitiaki with their samples

The GIS map is relatively easy for the iwi to use and interpret, and it has also proven useful to support the iwi in their work reviewing and assessing the effects of non-notified and notified resource consents in their rohe. Many of the resource consents applied for in the rohe relate to effects on streams, including those for in-stream works or earthworks that will have erosion and sediment effects. These have potential effects, not only on the presence and abundance of watercress, but also on the potential for contamination of the watercress and water that it grows in. The map, therefore, can be utilised to identify where activities proposed for consent may have specific effects on mahinga kai in terms of watercress. This can then be used to inform the outcomes of consent applications, or the drafting of conditions that can include sediment and erosion controls, mitigation of effects to watercress or avoid any effects whatsoever.

The watercress sampling was relatively easy for kaitiaki to undertake, provided we were able to collect samples that met the standards required for laboratory testing, and the data they generated were extremely powerful. As is discussed further in the next chapter, the data generated some highly concerning results regarding the contamination of watercress, which led to their publication in the media. This type of monitoring that focuses directly on the values associated with water, including mahinga kai and contact recreation, appear to be much more effective at drawing attention to the plight of poor water quality. The results were also able to provide us with data to challenge the compliance of a significant consented construction project in the area.

Te Ao Tūroa monitoring of extreme weather events

Live data on extreme weather events can be accessed through existing monitoring in rohe that is provided by the National Institute of Water and Atmospheric Research (NIWA) National Climate Database, including the Daily New Zealand Drought Monitor and Daily Standardised Precipitation Index.⁴⁴ The Kāpiti Coast is identified as a distinct area where precipitation and drought is monitored by NIWA. The data can be accessed relatively easily online by creating an online account; however, clarity is lacking from the Regional and District Council on what they categorise as an ‘extreme weather event’, particularly in terms of the level or type of extreme weather events that is likely to create public health risks relating to the flushing of contaminants in freshwater. Councils have not yet developed consistent triggers for such events, and have indicated in my communication with them that, in the past, when they have issued public health warnings following heavy rainfall events, they have received negative feedback and pressure to limit these effects, but they currently do not have the ability to address that response

⁴⁴ <https://cliflo.niwa.co.nz/>
<https://www.niwa.co.nz/climate/information-and-resources/drought-monitor>

from the public. It is unclear whether they will continue to issue such public health warnings in the future.

Mauri and Te Ao Tūroa monitoring of fish presence, abundance and biodiversity

Monitoring data on presence, abundance and biodiversity of mahinga kai fish species is also pre-existing in the rohe. The New Zealand Freshwater Fish Database⁴⁵ contains data from fish observed in the rohe. There is also a range of fish monitoring that may occur as conditions of consented activities such as large-scale construction projects or water infrastructure management, and a more recent commitment by Regional Council to conduct fish monitoring as part of state of the environment monitoring.

Kaitiaki trialled a range of fish monitoring methods informed by *New Zealand Freshwater Fish Sampling Protocols, Wadeable Rivers and Streams* (Joy, David, & Lake, 2013).

These methods included:

- spotlighting in the Waikanae River during pre- and post-construction monitoring required for a Flood Protection consent
- relative abundance surveys using fyke nets (see Figure 5.5) and Gee's minnow fish traps
- electric fishing, which involved two kaitiaki gaining certificates to use electric fishing.

⁴⁵ <https://nzffdms.niwa.co.nz/search>



Figure 5.5 Kaitiaki lifting fyke nets in the Whareroa

As mentioned previously, the spotlighting method was successfully used in combination with sediment monitoring to provide evidence to support the assessment of future flood protection resource consent works. The relative abundance survey conducted in the Whareroa Stream also provided important results. The Stream is currently ranked by Regional Council as having the second worst water quality in the rohe, however the results of the survey showed that there were in fact more than 20 giant kokopu, a highly valuable and at risk fish species, as well as a high diversity of many other species. This highlights how existing methods of monitoring often overlook significant values in that they focus on chemical measures of water quality and fails to identify valuable fish communities. This data was then used to support the iwi response to both resource consent applications for instreams works; in order to highlight the high values fish life at risk from the works, and in the development of the Park Plan for the park in which the stream is located. This ensures that the Park will be developed in a way that continues to support the ecological value of the stream instead of overlooking this and further supporting land use which puts this value at risk. On being trained to conduct electric

fishing, the participating kaitiaki agreed that whilst it was a useful tool to be applied when there was a need to completely empty a water body, e.g. for a stream diversion, the potential risks to the fish life, and expense and personnel required meant that it was limited in how practical and acceptable it was as a method. It was decided that it was unlikely this method would be used in any type of ongoing monitoring.

2. *Mana and Māramatanga Monitoring*

The huanga that require monitoring across the Mana and Māramatanga values are:

- Decision-making is informed by iwi knowledge
- Intergenerational knowledge of harvest and preparing mahinga kai
- Development: Density of development on floodplain
- Development: Catchment attenuation
- The iwi are part of the governance of resource management

Mana and Māramatanga monitoring of Treaty partnerships

'Decision-making is informed by iwi knowledge' was the huanga that was identified as having the highest rank in the influence matrix, meaning that factor had the greatest degree of influence of catchment system health. It indicates that in Te Āti Awa ki Whakarongotai worldview, the ability for tribal knowledge and observations to be used as information and evidence in decision-making processes is a key determinant in ensuring that decision-making generates positive system health. However, there was no existing formal or established method to monitor the degree to which iwi knowledge was informing decision-making, which meant that we would have to develop one.

The method required to monitor this huanga would be some form of reporting that audited the ability of decision-making bodies and organisations to provide for the meaningful inclusion of Te Āti Awa ki Whakarongotai knowledge in decision-making. The committee also saw that this huanga related closely to the mana huanga ‘Te Āti Awa ki Whakarongotai are part of the governance of natural resource management’. It was then decided that an organisational and decision-making audit method could be developed to monitor these two priority huanga together. The only example of an audit of input from iwi into decision-making that we could find was Te Tiriti o Waitangi Audit on Auckland Council, which is conducted by the Independent Māori Statutory Board (2018). The scale of this type of audit was much more comprehensive than what we could realistically implement with our resources, and we also identified the need for the auditing to be simple in that it could generate information about this huanga across a range of agencies in a straightforward way. However, this example provided some guidance on the key areas the audit could focus on.

An auditing and reporting tool, ‘Ko te mana, Ko te māramatanga’, was developed to monitor the four key partner organisations that had responsibilities relating to freshwater system health, in terms of their ability to achieve the two huanga ‘Decision-making is informed by iwi knowledge’ and ‘Te Āti Awa ki Whakarongotai are part of the governance of resource management’ (see Table 5.2). Monitoring is carried out across four key decision-making functions of the organisations - governance and leadership, regulation, infrastructure and asset management, and financial planning - and the specific aspects of each of those functions are identified for each organisation. A full review of the legal Te Tiriti obligations of these organisations was conducted to inform the identification of the functions of each organisation. This was also compiled as a separate report for the iwi’s future use.

Table 5.2 'Ko te mana, ko te māramatanga': Audit method to monitor the ability of Crown partners to uphold mana and provide for māramatanga

| ORGANISATION | Kāpiti Coast District Council | Greater Wellington Regional | Department of Conservation | Heritage Pouhere Taonga |
|--|---|------------------------------------|---|--|
| Governance and Leadership | <i>Council decision-making</i> | <i>Council decision-making</i> | <i>New Zealand Conservation Authority</i> | <i>Heritage New Zealand Pouhere Taonga Board</i> |
| | <i>Committees</i> | <i>Committees</i> | <i>Wellington Conservation Board</i> | <i>Māori Heritage Council</i> |
| Regulation | <i>District plans</i> | <i>Regional plans</i> | <i>Supporting iwi rāhui</i> | <i>Statements of general policy</i> |
| | <i>Resource consent assessment</i> | <i>Resource consent assessment</i> | <i>Wildlife authority and permits</i> | <i>Archaeological authorities</i> |
| Infrastructure and Asset Management | <i>Infrastructure strategy</i> | <i>Infrastructure strategy</i> | <i>Conservation management strategy</i> | <i>List and landmark list</i> |
| | <i>Park Management</i> | <i>Park management</i> | <i>Conservation management plans</i> | |
| Financial Planning | <i>Long term plan</i> | <i>Long term plan</i> | | |
| | <i>Annual plan</i> | <i>Annual plan</i> | | |
| OVERALL | | | | |
| KEY | TIKA: Decision-making is informed by mana whenua knowledge. Mana whenua have authority over natural resource management to the extent that they are part of its governance, can determine decision-making and are resourced to do so. | | | |
| | KIA WHAKAPAI: Decision-making is informed by mana whenua knowledge. However, mana whenua do not have adequate authority over natural resource management in that they are not part of its governance, cannot determine decision-making and are not adequately resourced. | | | |
| | KĀORE I TE TIKA: Decision-making is not informed by mana whenua knowledge. Mana whenua do not have adequate authority over natural resource management in that they are not part of its governance, cannot determine decision-making and are not adequately resourced. | | | |

A 'traffic light' assessment is used to assess each aspect of the organisations' decision-making:

- 'Tika' (green light): Decision-making is informed by mana whenua knowledge. Mana whenua also have authority over natural resource management to the extent that they are part of its governance, can determine decision-making and are adequately resourced to do so.
- 'Kia Whakapai' (orange light): Decision-making is informed by mana whenua knowledge. However, mana whenua do not have adequate authority over natural resource management in that they are not part of its governance, cannot determine decision-making and are not adequately resourced.
- 'Kāore i te Tika' (red light): Decision-making is not informed by mana whenua knowledge. Mana whenua do not have adequate authority over natural resource management in that they are not part of its governance, cannot determine decision-making and are not adequately resourced.

This is then used to determine an overall assessment of each organisation.

The environmental manager or any other staff member who is familiar with the functions of the partner organisation can use the tool to do an annual audit, utilising examples from the year to provide evidence of how each function of the organisation performed. This can then be provided to the Taiao Committee or governance entity for their review, before it is provided to the board as a report for the year. The audit can also be distributed externally, to provide organisations with a report of their performance from the iwi, and to provide context as to how other organisations perform.

The audit tool can also be used for specific relationships with key parts of an organisation or for specific projects. For example, Te Āti Awa ki Whakarongotai is currently developing

a version of the audit tool for use in partnership with the M2PP Expressway, as part of their memorandum of understanding for post-construction monitoring, and with the Flood Protection Department of Regional Council, in developing a partnership agreement for the management of the catchment and Flood Protection works.

This monitoring tool has been useful because the iwi have seen a significant lack in monitoring and reporting on Tiriti partners in terms of upholding their legal obligations to Māori. This was particularly evident in recent attempts to engage in special consultative processes of Regional Council, who failed to uphold their obligations. Instead, Councils tend to set performance indicators in relation to Māori that are inconsequential; for example, Regional Council measure their performance in terms of the Tiriti relationship with the performance indicator '13% staff do an induction into Māori values and te reo Māori'. However, our monitoring tool ensures that Tiriti partners will have their performance monitored in terms of measures that have much more meaning. It has also been a helpful planning and reporting tool for the Taiao Unit of the iwi because it creates the ability to focus effort on and support to the relationships that are not performing well.

Mana monitoring of development

Mana monitoring of development is focused on the scale and nature of societal development in relation to land and water, specifically:

- Development: Density on the floodplain
- Development: Catchment attenuation.

Data on these attributes already exist in the form of urban, rural and forest land use and hydrology data held by councils and accessible via GIS. It appears that these data will be particularly useful to develop associations between areas of high development or poor attenuation and the health of other huanga.

Of the remaining priority huanga in this section, the method to monitor the huanga 'Knowledge of harvest and preparing mahinga kai' fits more closely with the method presented in the following section on Wairua and Whakapapa monitoring.

3. *Māramatanga, Wairua and Whakapapa monitoring*

The huanga that require monitoring across the Wairua and Whakapapa values are:

- Maintaining our way of life
- All people are connected to the environment
- The environment is calm, safe and conflict free
- All people are able to practise tikanga.

The committee saw that these attributes would all require some form of social science method to monitor, and that the monitoring of the māramatanga huanga 'Intergenerational knowledge of harvest and preparing mahinga kai' could also be measured using this type of method. The method identified to monitor these social-psychological-cultural huanga was a social science survey. The survey is in two parts. The first part of the survey:

1. Intergenerational transfer of mātauranga Māori and tikanga

addresses the following two Wairua and Whakapapa huanga:

- Maintaining our way of life
- All people are able to practise tikanga

and the following Māramatanga huanga:

- Knowledge of harvest and preparing mahinga kai.

The survey asks participants to identify how far along they are on the journey of intergenerational knowledge transfer for a range of specific tikanga and mātauranga Māori (see Table 5.3).

The next part of the survey explores the nature of iwi members' relationship with the environment:


2. Relationship with the environment

The first component of this arises from the huanga:

- All people are connected to the environment.

The aspect of 'connectedness' that was of critical interest in the iwi's conceptual model of the catchment was the actual contact that iwi members had with nature. In workshops, examples they provided of positive connectedness to the environment included going to the beach, river or bush; hunting, gathering or consuming wild kai; planting; practising whakapapa of the environment, stargazing and observing tohu. It was these acts of contact that they felt facilitated connectedness to the environment.

Table 5.3: Survey Section 1: Intergenerational transfer of mātauranga Māori me ōna tikanga and an example how a participant filled it out

|  | | | | | |
|---|---|--|---|--|--|
| INTERGENERATIONAL TRANSFER OF MĀTAURANGA AND TIKANGA MĀORI | Te Pū | Te Weu | Te Aka | Te Rea | Te Wao-nui |
| | 'I know this knowledge exists within iwi members or records.' | 'I know that this knowledge is being shared within the iwi.' | 'I know how to access this knowledge if I need or decide to.' | 'I am learning and practising this knowledge.' | 'I have taught or created this type of knowledge.' |
| Whakapapa | | | | ✓ | |
| Tāhuhu Kōrero - Iwi history | | | | | ✓ |
| Te Reo Māori | | | | | ✓ |
| Tikanga o te Marae - Whaikōrero/Karanga | | | | | ✓ |
| Karakia | | | | ✓ | |
| Waiata | | | | ✓ | |
| Mahinga kai - Harvest, preparation | | | | ✓ | |
| Toi Māori | | | ✓ | | |
| Rongoā Māori | | | | | ✓ |
| Instructions: For each type of knowledge, tick each box along the continuum that applies to you | | | | | |

There is significant research in the literature on connectedness to nature theory (CNT) that includes the development of measurement tools for assessing the degree of connectedness a population has to nature. However, the study of CNT as presented in the literature is primarily concerned with understanding how people psychologically identify themselves with the natural environment, particularly in terms of seeing the self as part of nature, and despite being widely applied in different countries globally, there are essentially no examples of this being applied with indigenous nations or communities (Restall & Conrad, 2015). This is perhaps because the psychological conceptualisation of the self as part of nature is such a fundamental aspect of the indigenous worldview that, if applied, the survey would not identify any significant degree of variability within the population; most or even all indigenous people would respond to the survey with high degrees of connectedness according to this conceptualisation.

The relationship of experiences and direct contact with nature to ‘connectedness with nature’ has been conceptualised by Rosa, Profice, and Collado (2018). Their application of this conceptual model through survey data also provides evidence in support of the iwi view that contact and connectedness with nature has a positive influence on the likelihood of pro-environmental behaviour (see Figure 5.6).

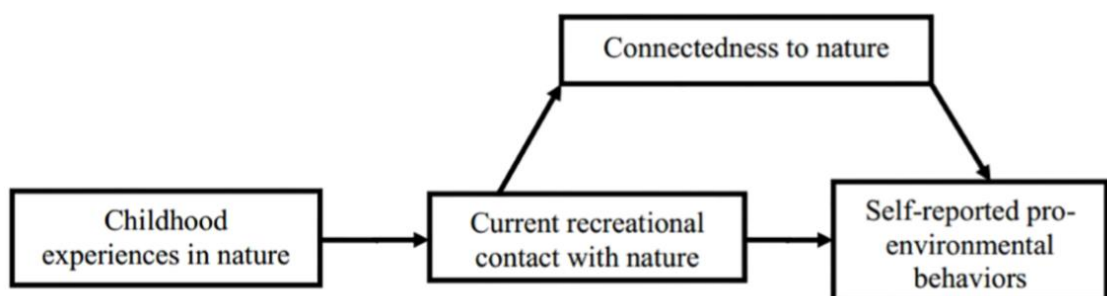


Figure 5.6 Relationships between experiences and contact with nature and pro-environmental behaviours (Rosa et al., 2018)

The measure used to determine 'current positive contact with nature' in Rosa et al.'s work was taken from Larson, Whiting, and Green (2011), which is to survey the population with the question 'How frequently do you participate in leisure activities in contact with nature?' and listed examples of leisure activities. Participants could respond using a scale from 1 = never to 5 = most days. This method was thus adapted to provide the first question in the 'Relationship to the environment' part of the survey.

The remaining questions in this part of the survey address the huanga:

- The environment is calm, safe and conflict free

This huanga reflects the connection between the state of the environment and the wairua, or spiritual, emotional and psychological well-being of the people.

The Environmental Distress Scale (EDS) is a method found in the literature that has been developed and successfully applied to measure the bio-psycho-social cost or 'environmental distress' that people experience when environments are negatively transformed. Typically, it involves a survey that asks dozens of either yes or no or 5-point rating scale questions across as many as six elements, including:

- place attachment
- frequency of hazard events
- observations of type of hazards
- perceived threat to self/family of hazards
- felt impact of environmental change
- feelings of 'solastalgia' loss of solace
- performance of environmental actions

- trustworthiness of information about the environment. (Higginbotham, Freeman, Connor, Albrecht, & Agho, 2006)

The EDS was developed in Australia to assess the emotional impacts of environmental change brought about through human modification and natural disaster, using open-cast mining and drought respectively, as examples. However, it can be successfully translated and culturally adapted for application in scenarios that are different both in type of environmental change and cultural context, as was demonstrated when it was applied after a volcanic eruption in Indonesia (Warsini, Buettner, Mills, West, & Usher, 2014). The iwi are also aware that it is currently being modified for application with indigenous communities where fracking is occurring in the southern United States.

As part of the project, a pilot survey was developed and tested online with 64 participants to determine whether a survey such as the EDS could be developed for general monitoring of environmental distress within the iwi. Unlike the application of the survey for specific environmental incidents, the survey would have to be able to collect evidence on a full range of potential environmental changes and impacts within the rohe. The pilot survey included 24 questions, but by the final questions of the survey, only 27% of participants were still responding. This was despite having random prizes for participants in the survey. It was evident that the survey was too long, and in particular had too many open questions. It is, however, worth noting the following observations of the data that were generated:

- Those who responded indicated a strong sense of mass environmental destruction within their rohe that continues to escalate, and many responses focused on impacts to freshwater.
- Overwhelmingly, participants identified that the effects were related to mental health and spirituality, as opposed to economic or recreational matters, often

describing the change as negatively affecting their sense of identity as Māori and iwi members.

- Participants commonly saw role modelling of positive environmental behaviours and other forms of intergenerational education as being key strategies in responding to the environmental distress that was experienced.

While there is a strong analytical and statistical benefit in surveying with a large number of questions, the purpose of the development of a kaitiaki monitoring tool to monitor the well-being of wairua in the rohe is to ensure that information can be readily generated, and quickly and easily interpreted in order to inform future decision-making and activities of the iwi as they relate to the environment. It was decided it was more important to develop a survey that would realistically gain full participation, rather than be challenged in achieving full participation in an attempt to create rich data sets.

This part of the survey was therefore drastically altered to comprise, in addition to the frequency of contact with nature question, the following three key two-part questions:

1. Describe the changes to the environment or loss of ecosystem health you have observed in your lifetime.
 - How severe have these changes been? (1 - Not at all, 5 - Extreme)
2. Describe the impact that these changes have had on your hauora - on the physical, mental, spiritual, social and economic well-being of you and your whānau.
 - How severe have these impacts been? (1 - Not at all, 5 - Extreme)
3. Describe any actions taken or responses you and your whānau have had as a result of the impacts you describe.
 - How strong a reaction have you had to these changes? (1 - Not at all, 5 - Extreme)

This part of the survey could also be adapted for the purpose of specific environmental changes or incidents and would be applied for both post-construction monitoring of the expressway and Flood Protection works on the Waikanae River.

The overall survey that combined the questions on intergenerational knowledge, contact with the environment and environmental distress was developed into a Google form (see Figure 5.7), which enabled the survey to be distributed easily online. However, a written survey was also distributed to focus on participation of those who do not access the internet as readily, such as kaumātua.

Whakarongotai o te wā: Monitoring Form

*Required

Questions

Intergenerational transfer of mātauranga Māori me ōna tikanga:
For each type of knowledge, tick the box of how far along the knowledge continuum you are *

| | Te Pū: 'I know this knowledge exists within iwi members or records' | Te Wēu: 'I know that this knowledge is being shared within the iwi' | Te Aka: 'I know how to access this knowledge if I need or decide to' | Te Rea: 'I am learning and practicing this knowledge' | Te Wao-nui: 'I am practicing and have taught this knowledge' |
|---|---|---|--|---|--|
| Whakapapa | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tāhuhu Kōrero - Iwi History | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Te Reo Māori | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tikanga o te Marae - Whaikōrero/Karangā | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Karakia | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Figure 5.7 Whakarongotai o te wā survey for monitoring Wairua and Whakapapa attributes

The data generated through the surveying have been highly valuable because they have presented a snapshot of the social and educational issues within the iwi to better understand the phenomena of environmental stress and the needs of the iwi. The data have already been applied as evidence for the iwi Waitangi Tribunal inquiry and proved an effective way to substantiate aspects of claims that address the social and psychological effects of colonisation on the iwi. They also provided the ability to engage the value of public observation to report on environmental changes, enabling the iwi to be more responsive as these incidents arise, particularly for the large-scale construction and infrastructure activities in the rohe.

One limitation of this method is that, inherently, those who are less connected or under more significant stress are less likely to engage in surveys such as this. Therefore, strategies are required that may involve collaborating with iwi health services in the future to gain assistance to reach those potential participants who could otherwise be overlooked. The data generated also provided critical insight into a socio-psychological dynamic in relation to environmental changes and degradation that I believe does not exist elsewhere. It enabled us to uncover a type of 'environmental effect' that is currently not well understood or addressed through environmental management and care, but data generated about this effect support the need to develop better understandings about the way that freshwater governance, management and care can respond to and protect the social and mental health needs of communities, such as recreation, solace and safety of contact. We envisage that monitoring of social and psychological well-being of communities will be increasingly recognised as a useful tool to support the management of catchment health from a systemic perspective.

Summary of Te Kete Aronui

This chapter has presented the approach and technological tools that were applied to create knowledge from Te Kete Aronui: the knowledge we can create about freshwater systems from observing the world.

The approach to observation has been consistent with the Hua Parakore framework, in that it has required kaitiaki to apply all their divine senses to observe and understand what is happening in their rohe. Monitoring has ranged from the more precise, biophysical and ecological methods that generate quantitative data about the state of mauri and Te Ao Tūroa, through to observing and assessing the nature of power between iwi and Tiriti partners, through to the more qualitative social science methods that require kaitiaki to observe the well-being of the freshwater system from a human psychological and emotional perspective.

Through this phase of the research, the iwi were able to implement a permanent ongoing kaitiaki monitoring regime based on selecting and adapting the methods that were feasible and generated useful information. This monitoring regime is now generating knowledge that, when integrated, gives a whole of system understanding of freshwater health. The next chapter shows how the fundamental understanding of the system as set out in Te Kete Tua-uri phase, and the knowledge generated through this Te Kete Aronui phase of the research, was applied to create Te Kete Tua-ātea knowledge: inferences about future scenarios of water systems.

Chapter 6: Te Kete Tua-ātea

Approaches and tools applied by Te Āti Awa to examine freshwater system futures

The knowledge we create about the future comes from Te Kete Tua-ātea. This is the aspect of our worldview that relates to the infinite possible future realities we can see but that are yet to occur. Knowledge from Te Kete Tua-ātea emerges from applying our fundamental understanding of systems from Te Kete Tua-uri, and the observations of them from Te Kete Aronui, which then inform our inferences about how the system may look and behave in the future. Te Kete Tua-ātea enables us to infer and see the different possible worlds that may become our future reality. The knowledge of reality that emerges from all three Kete o te Wānanga together comprise the Māori view of 'ultimate reality': the absolute nature of reality in all its possibilities.

Chapter 2 provided examples of Māori futuring tools from Te Kete Tua-ātea that are used to see beyond present space and time. These include navigational tools used to infer where land would be found; maramataka, or lunar calendars, to infer good times for productivity; and models that kaitiaki use to infer the observation of certain environmental events such as fish migrations or environmental outcomes such as loss in fish stocks. These tools are typically mental models in that they were handed down through generations, with each generation enhancing and refining the mental models based on their own evidence in the form of experiences and observations. Chapter 2 also set out how, since the introduction of Western science to Aotearoa, Māori have started to work with a selection of Western scientists who have quantitative modelling tools that may be applied to conduct analyses or simulations and model and make inferences about systems to support Māori decision-making. However, these tools are still largely based

on Western scientific conceptual models of systems, which tend to focus on certain types of values, and are not built to deal with some of the broader values of interest to Māori that comprise the conceptual models that underlie Māori mental models. Yet one particular tool, the BBN, has been proposed as a way of building an inference model that is able to reflect an underlying indigenous conceptual model of a system.

This chapter presents the approach and technological tools that were applied and developed by Te Āti Awa ki Whakarongotai to create knowledge from Te Kete Tua-ātea. It sets out the three key outcomes of this phase of the research, which were informed through five focused half-day wānanga with our committee and co-opted experts. First, it presents the development of an iwi conceptual model of the freshwater system. Second, it shows how the conceptual model was then developed into a BBN model that could be used as a model to infer water system health. Third, it shows how this inference model could be applied for two key purposes:

- to infer future changes and trends that would be observed throughout water systems across a range of different scenarios and in different decision-making contexts
- to infer the objectives and limits that could be set for different huanga of the system in order to achieve certain water health future outcomes.

Part one: Developing Te Āti Awa ki Whakarongotai conceptual model of the system

The iwi conceptual model of the freshwater system needed to show the iwi view of how the huanga in the system are connected to one another. The participants heuristically built a number of iterations of a flow chart that modelled how the system functions

according to their view. We were able to refer back to knowledge generated from Te Kete Tua-uri, which provided fundamental understandings of how key kaupapa and aspects of the system work, and from Te Kete Aronui, where observations were being generated about the water system. Participants recounted and shared narratives of their own observations of the system's behaviour as they discussed with each other how the flow chart should look and tested it out by walking through specific examples of system dynamics for different mahinga kai species, for example, how the system functions in relation to watercress and how it functions in relation to whitebait.

The structure of the flow chart was informed by several key principles they identified together:

- They saw the system as being a cycle; it does not follow the structure of other examples of BBNs they were shown, which were hierarchical flow charts. Instead, the system comprises feedback loops, where the drivers of the systems are always somewhat subject to being influenced by outcomes of change through the system.
- They would start by focusing on the priority huanga and how they fit together in the system and add any other huanga that they felt needed to be included for the system to make sense.
- Despite the apparent cyclical nature of the system, it made sense to start building with the key drivers of the system, which they had identified through the use of the influence matrix, and investigate what they directly influenced, and so on as they added each huanga to the system.

As they started to build the flow chart with the priority huanga, it became apparent that they wanted to add a few huanga to the flow chart so that the processes connecting priority huanga were clear. Most of these additional huanga were from the long list of 49

that had already been identified, but two had not been previously identified and therefore could be added to the list of huanga. Figure 6.1 illustrates the first draft of the flow chart the group developed. The colours of the Post-it notes reflect the various kaupapa of the huanga: red = Mauri, dark yellow = Te Ao Tūroa, light yellow = Māramatanga, green = Mana, blue = Wairua, purple = Whakapapa.

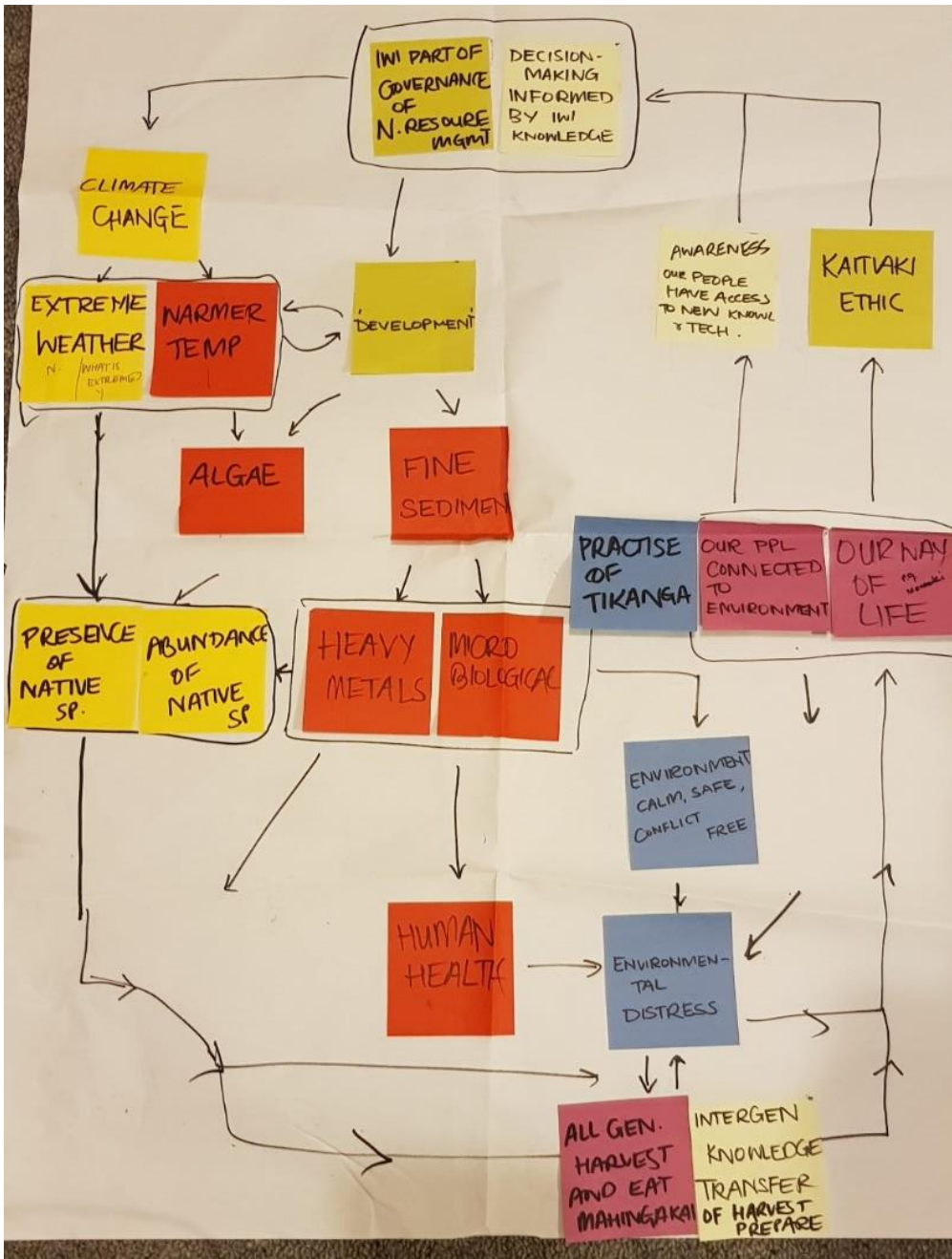


Figure 6.1 Drafting a Te Āti Awa ki Whakarongotai conceptual model of water systems.

The flow chart presents an iwi narrative of the whole system, as follows. 'Iwi involvement in governance and decision-making' was grouped together with 'Decision-making informed by iwi knowledge' as the top-tier drivers of the system. The ability for iwi to influence decision-making in these ways then influences how 'Development' occurs, but it was also identified that it influences the rate and impacts of 'Climate change'. This had not previously been identified as a huanga, but was identified as a long-term outcome of human decision-making that has significant influence on both the huanga of 'Extreme weather effects' and 'Water temperature'. 'Climate change' was identified as a huanga of Te Ao Tūroa, because it is an attribute of the balance of natural systems.

The second-tier huanga of 'Development' and 'Water temperature' were then both seen as key determinants for a range of third-tier Mauri huanga. First, for the amount and type of 'Algae' that is observed in waterways. Then 'Development' was also seen as being a key driver in the amount of fine sediment that makes its way into waterways, through both construction earthworks and the removal of vegetation from the landscape and replacement with impermeable surfaces. 'Fine sediment' in waterways was then identified as the key determinant of 'Heavy metal' and 'Microbiological' contamination of waterways, which in turn influences 'Human health'. However, 'Fine sediment' was also identified as having an impact on the 'Presence and abundance of native species' in aquatic systems, a Te Ao Tūroa huanga. This is also affected by 'Extreme weather events', 'Warmer temperatures' and 'Algae'.

The third-tier 'Presence and abundance of native species' in aquatic systems huanga in turn influences whether there is any mahinga kai to fish, influencing a range of more social huanga, such as whether 'All generations harvest and eat mahinga kai' and then the 'Intergenerational transfer of knowledge on harvest and preparation'. The degree to which people are harvesting, eating and learning about mahinga kai, in addition to public health risks created through both heavy metal and microbiological contamination then all

culminates in the degree of 'Environmental distress' felt by people, including their sense of whether 'The environment is calm, safe and conflict free'. These aspects have flow-on effects to three interrelated huanga: 'The practice of tikanga', the extent to which 'Our people are connected to the environment' and the ability to 'Maintain our way of life'. The narrative and flow chart highlight how the health of mauri and Te Ao Tūroa of waterways has flow-on effects both for the Wairua of people, in terms of the ability for water to either continue to support their psychological and emotional well-being, or to become a source of stress or trauma because of its poor health, and for the Whakapapa huanga of water, in that people will become disconnected from waterways that become unsafe for them to have contact with, or stop producing food for harvest.

Finally, the state of these fourth-tier Wairua and Whakapapa huanga then served as the feedback loop, in the way they influence the top-tier Māramatanga and Mana huanga that are driving the system. First, the flow chart illustrates how the degree to which people are connected to waterways and the environment influences their level of awareness or 'Our people's access to new knowledge', which in turn influences how well decision-making can be informed by iwi knowledge. Second, the group identified a new huanga, 'Kaitiaki ethic', to describe a feedback loop whereby the well-being of people's Wairua and Whakapapa connection to water is a key determinant of whether they will develop kaitiakitanga ethics, and therefore become engaged in decision-making; the group saw that if waterways are clean with plenty of mahinga kai, people will be psychologically well, they will be well connected to their waterways and, ultimately, they will continue to practise our way of life in relation to water, meaning they will have a high level of ethics around kaitiakitanga and be strongly engaged in decision-making about water. However, if people become disconnected and stop practising our way of life in relation to water because of its poor health, they will be less likely to develop kaitiakitanga practices, and therefore less likely to engage in, or be effective at, decision-making in relation to water. The cycle will then continue, with the positive input from iwi into decision-making either

further improving the health of the system, or the reduction of input from iwi into decision-making allowing for further degradation of the health of the system. The flow chart effectively shows the iwi view of the whole system as a cycle, and how the various types of huanga from a broad range of values relate to one another.

With the flow chart drafted, and a clear shared understanding of the narrative it told, we then worked to refine it into a final conceptual model. For the conceptual model to be used to build a BBN, it would ideally use as few boxes as necessary to convey the complexity of the system. To achieve this, we looked at where we could aggregate some of the boxes and decided this was aided by referring back both to our priority huanga to monitor and the methods of monitoring to be applied to generate information on more than one huanga at the same time.

For example, Te Kete Aronui phase of the research had identified that the huanga of 'Iwi input into water governance' and 'Decision-making is informed by iwi knowledge' could be monitored and therefore measured together, so these were aggregated in one box. The group also decided that the measure of 'Environmental distress' was a useful broad measure in that the method used to monitor this huanga, the social science survey, not only adequately measured the impacts of environmental changes to various Wairua huanga, but also captured measurements of impacts of environmental changes to other huanga that relate to people, including the impacts of public health risk and the ability to harvest or consume mahinga kai, and that this could then be aggregated with the additional Whakapapa huanga measured in the survey 'Our people are connected to the natural environment', into one Wairua and Whakapapa box, to capture this feedback loop aspect of the system. The group also decided to remove the 'Extreme weather events' huanga as they felt that 'Temperature' changes would capture the effects of climate change, and that the impact of 'Extreme weather events' would also be captured by the changes observed in 'Fine sediment'. Finally, they combined the 'Presence' and

'Abundance' of measures into a 'Quality of mahinga kai' box, which they felt could integrate a range of different huanga with regard to mahinga kai, including condition.

The group were then satisfied with the final conceptual model (see Figure 6.2). It reflects their worldview of the water system in that it shows the relationship between the full range of diverse kaupapa or values through which Māori view and understand systems, rather than just focusing on the biophysical aspects. By integrating broader values into the conceptual model, we can see that these often play important system functions that would otherwise be overlooked. This conceptual model depicts how the Wairua and Whakapapa huanga (attributes) of a system function as a feedback loop, in that the state of the iwi's psychological and emotional well-being and connection to the environment as a result of changes in aquatic health then influence the degree to which they are able to positively influence decision-making. These attributes will continue to drive either negative or positive systemic health trends. In the words of one of the participants, if these other values are not included in conceptual models of water systems, they are 'meaningless'. With the conceptual model finalised, the group could now move into the phase of turning it into a BBN, for the purpose of creating an inference predictive model.

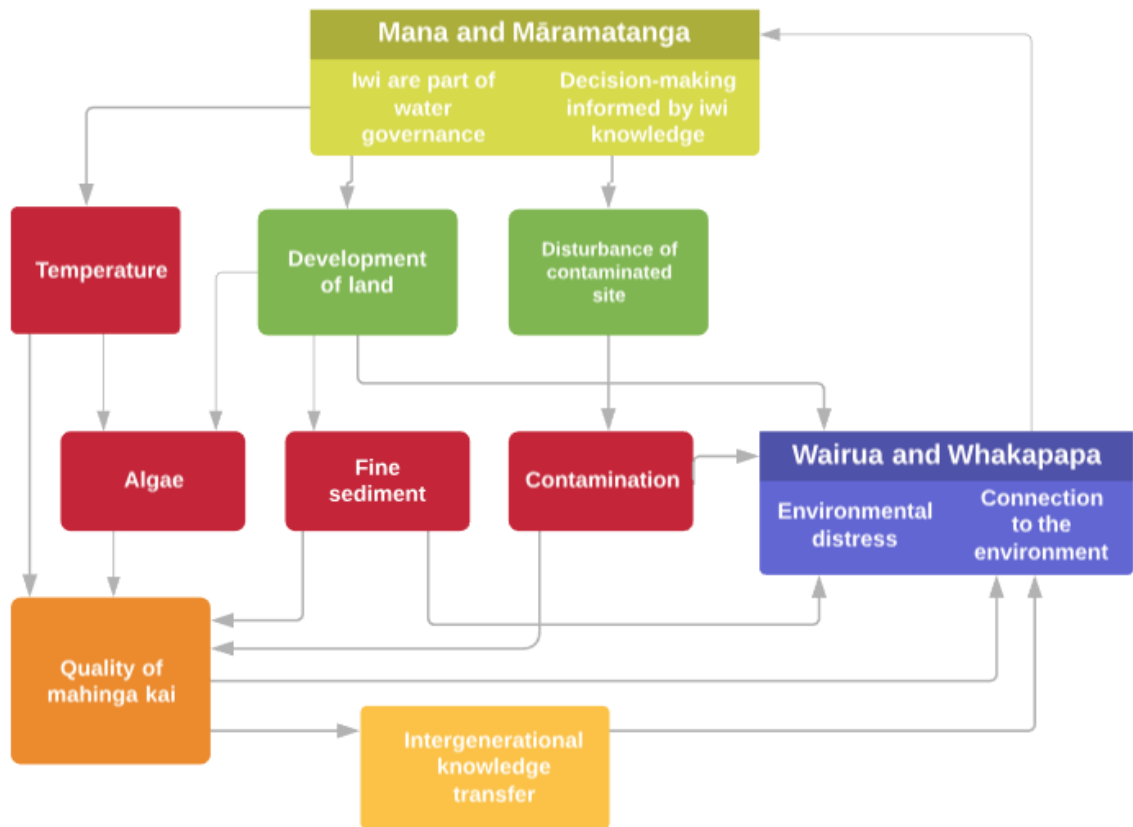


Figure 6.2 Final Te Āti Awa ki Whakarongotai conceptual model of water system

Part two: Developing Te Āti Awa ki Whakarongotai BBN model of the freshwater system

The first task to develop the BBN was for the group to identify two or three potential states of each box in the conceptual model. In some cases, it was quite straightforward to identify the states for each huanga, particularly where the states were either 'affirmative or negative'. In other cases, it involved discussions to identify the objective state or the state limit. Following is a presentation of the states identified for each box, and the basis for this.

Mana and Māramatanga

Iwi are part of water governance

Decision-making informed by iwi knowledge

The identification of the states for the Mana and Māramatanga box was quite straightforward, in that we could use the states in the ‘Ko te mana,

Ko te māramatanga’ monitoring tool that had been developed to monitor this huanga. The tool is used to audit partner organisations and gives a final score within a traffic light scale of:

- ‘Kāore i te Tika’ (Red): Decision-making is not informed by mana whenua knowledge. Mana whenua do not have adequate authority over natural resource management in that they are not part of its governance, cannot determine decision-making and are not adequately resourced.
- ‘Kia Whakapai’ (Orange): Decision-making is informed by mana whenua knowledge. However, mana whenua do not have adequate authority over natural resource management, in that they are not part of its governance, cannot determine decision-making and are not adequately resourced.
- ‘Tika’ (Green): Decision-making is informed by mana whenua knowledge. Mana whenua have authority over natural resource management to the extent that they are part of its governance, can determine decision-making and are resourced to do so.

Development of land

The states identified for the huanga ‘Development of land’ were ‘Yes’ for developed land in an urban zone, and ‘No’ for undeveloped land in an urban zone, or land in any rural, reserve or forested zone.

Information on this could be sourced from District Council GIS maps.

Disturbance of contaminated site

The states for the huanga ‘Disturbance of contaminated land’ were a simple ‘Yes’ or ‘No’.

Temperature

For the huanga 'Temperature', the group wanted to identify two states: one at which aquatic life stress and deaths were likely, and one at which aquatic life would not be likely to die or undergo significant stress. The group had in mind an incident on the Waikanae River in late January 2018, when fish deaths were observed the length of the Waikanae River, and a test of water temperature had shown it to be 27 degrees Celsius. The group discussed what in their expertise constitutes water that poses risks to aquatic life and agreed that once water temperature starts to exceed 20 degrees Celsius, particularly if it remains this way for an extended period, this can start to pose threats to aquatic life, and also saw it associated with other aspects of poor water quality, including low levels of dissolved oxygen. The group decided to also consult scientific studies that had been done to recommend water quality limits, including limits for water temperature (Ausseil, 2013, p. 17; Davies-Colley, Franklin, Wilcock, Clearwater, & Hickey, 2013, p. 28), which found that certain macroinvertebrate species require a 'long-term maximum temperature' as low as 21.4 degrees Celsius, and certain native fish species, namely banded kokopu, require a long-term maximum temperature of 21.2 degrees Celsius. Research found that native fish species, including inanga, smelt and banded kokopu, all have 'preferred temperatures' of lower than 19 degrees Celsius, and that in water that exceeded 20 degrees Celsius one would observe 'some thermal stress on occasion, with elimination of certain sensitive insects and absence of certain sensitive fish'. The group were therefore satisfied to set the objective state at below 20 degrees Celsius and the adverse state at 20 degrees Celsius and above.

Algae

For the huanga 'Algae', the group also wanted to identify two states: one objective state of algae at which mahinga kai could be carried out in waterways, and one state of algae cover at which point mahinga kai was likely to be avoided by people and therefore adversely affected. The group first had to discuss exactly what they meant by algae, in terms of how it was presented in the conceptual

model in affecting whole of system health. They agreed that in their experience, the brown and green filamentous algae sometimes observed in waterways creates a slime on the beds of waterways and sometimes within the channel itself, which is an indication to kaitiaki that the waterway is in a poorer state of health, as a result of perhaps enrichment through nutrient inputs, low flow and warm water temperature, or any combination of those factors, and therefore is not an appropriate place to attempt to fish or gather food from. Attempting to carry out mahinga kai amid the slime is also undesirable from a recreational perspective. The group then had to identify how they would measure the state of algae in a waterway, and all agreed that a simple bankside observation of cover is typically an accurate and practical method for measuring the amount of algae in a waterway for the purpose of determining its suitability for mahinga kai. They agreed that setting an objective state of 0% algae is probably not a good reflection of reality, given that many kaitiaki would tolerate at least some amount of algae in a waterway when carrying out mahinga kai, but that setting an objective of 30% cover or below is appropriate, as this is an easy proportion of cover to estimate, and there was agreement that any amount higher than this would become intolerable for people to conduct mahinga kai. The group also consulted with published advice on this and found that while algae limits are often recommended in terms of biomass, a NIWA report for the Ministry for the Environment also recommended a limit of 30% algae cover for the purpose of protecting aesthetic or contact recreation values (Biggs, 2000, p. 91).

Fine sediment

The group also wanted to identify an objective state and a below objective state for the 'Fine sediment' huanga. The reason for including fine sediment in the conceptual model was to identify the relationship between fine sediment and both the health of mahinga kai and the health of wairua and whakapapa of people. In the case of the relationship between fine sediment and mahinga kai, kaitiaki were interested in the effect of fine deposited sediment on the benthic habitat, and the available habitat for fish such as inanga and bullies in particular. Fine sediment also

affected the ability of people to maintain connection to waterways and heightened the distress people feel when they observe waterways clogged with fine sediment that make them unpleasant or difficult to have contact recreation with. Therefore, the group focused on fine deposited sediment, as opposed to suspended sediment. The group applied the same approach as they did to identifying an objective for algae: they recognised that some degree of fine deposited sediment is normal for certain waterways, but felt that once this amount approaches 30% cover, benthic aquatic life is adversely affected, and people will be less likely to maintain a connection to that waterway, and will thus experience distress. Therefore, the group set the objective state at 30% or below for fine deposited sediment cover and the adverse state at above 30% cover.

Contamination

The group identified three different states for the huanga of 'Contamination': the state of a contaminant at which human health is adversely affected, the state of a contaminant at which environmental health is adversely affected and the objective state at which there are no adverse effects of contaminants. This would be easy enough to apply, because for many of the contaminants that the conceptual model was intended to be applied for, such as heavy metals and *E. coli*, there are relatively clear standards for both environmental and human health.

Quality of mahinga kai

'Quality of mahinga kai' was perhaps the most difficult huanga to identify states for because there are many different aspects to consider when determining 'quality' mahinga kai. After several wānanga discussions and reviewing catch data from different surveys to identify the types of catches that they felt reflected 'good' quality as opposed to 'poor', the group decided to focus the states specifically on how our mahinga kai gatherers for the marae determine what a good quality catch is. The key mahinga kai that are gathered for the marae are watercress and tuna. The group agreed on two simple states: 'good' and 'poor'. For watercress, mahinga kai would be considered 'good'

if it was plentiful enough that the visit to that site provided enough watercress for a hui at the marae, and if it was safe to consume. For fishing, mahinga kai was considered 'good' if there were at least four or more good eating size tuna caught in each net, and no signs of any disease issues with any tuna caught. If catches or gathering did not meet these criteria, the quality would be considered 'poor'. The group recognised that ultimately the judgement on what constituted good quality mahinga kai rests with those experts who are responsible for gathering food for our marae.

Intergenerational knowledge transfer

The group was able to utilise the survey tool that had been developed to monitor 'Intergenerational knowledge transfer' to assist in identifying the states for this huanga. In the survey, five states of knowledge acquirement were identified, ranging from the state of 'Te Pū: I know this knowledge exists within iwi members or records' through to the state of 'Te Wao-nui-a Tane: I have taught or created this type of knowledge'. These states were scored from 1 through to 5. The group identified that to determine whether intergenerational knowledge transfer is occurring within the iwi, an average score of at least 4 - 'Te Rea: I am learning and practising this knowledge' - is needed across all knowledge types. They therefore set the states at 'Yes' for an average score of 4 and above or 'No' for an average score of below 4.

Wairua and Whakapapa

Environmental distress

Connection to the environment

The last box combined two huanga, 'Environmental distress' and 'Connection to the environment', into one box. Each huanga could be measured through the social science survey, which included questions that asked participants to score the severity of impact they experienced as the result of environmental changes they observed, and score how frequently they have contact with nature on a Likert scale from 1 to 5. An average of responses across the iwi for each huanga could be taken, where an average score of below 3 for severity of distress would be considered a positive well-

being score for this huanga, and an average score of 3 or above for connection to the environment would be considered a positive score for this huanga.

Three potential states of this box could then be identified, similar to the traffic light approach used for the 'Mana and Māramatanga' box:

- 'Pai' (Green): The iwi was generating positive well-being scores for both huanga.
- 'Kia Whakapai' (Orange): The iwi was only generating positive well-being scores for one of the two huanga.
- 'Kāore i te Pai' (Red): The iwi was not generating positive well-being scores for either of the two huanga.

With all the potential states of each box of the conceptual model identified, the next step to build the inference model was to build CPTs using the software Netica 6.05. This involved the following iterative process:

- Participants wānanga to identify and describe the nature of the relationships between different attributes of the system. This was either supported through data that had been collected or was based on the expert knowledge and experience of participants. In some cases participants would refer to western science research and data that provided evidence on the nature of these relationships.
- I then took the recordings of these wānanga and completed the CPTs to reflect how I thought the participants were describing these relationships.
- I then presented this back to the participants to confirm whether I had accurately captured what they had discussed and make any changes necessary.

In some cases, this was relatively easy, but for other cases that involved describing the complex relationship between one part of the system and a number of other parts, it might have involved months of iterative wānanga to refine the tables. Figure 6.3 shows an example CPT - perhaps the simplest within the BBN. It describes the relationship between the huanga of 'Intergenerational knowledge transfer' and 'Quality of mahinga kai'. It shows that when 'Quality of mahinga kai' is in a positive state, it is likely that 'Intergenerational knowledge transfer' will be in a positive state as well, with a probability of 75% ascribed to this positive outcome. When 'Quality of mahinga kai' is in a negative state, it is likely that 'Intergenerational knowledge transfer' will be in a negative state, with only a 20% probability score ascribed to a positive outcome.

The screenshot shows a software interface for editing a Conditional Probability Table (CPT). At the top, the node is set to 'IntergenKnowTransfer'. Below this, there are two dropdown menus: 'Chance' and '% Probability'. To the right are buttons for 'Apply', 'OK', 'Reset', and 'Close'. The main part of the interface is a table with the following data:

| QualityMahingaKai | Yes | No |
|-------------------|-----|----|
| Yes | 75 | 25 |
| No | 20 | 80 |

Figure 6.3 A simple CPT showing probabilities of different combinations of 'Intergenerational Knowledge Transfer' and 'Quality of Mahinga Kai' states.

Figure 6.4 shows an example of a more complex CPT that describes the relationship between a higher number of interrelated huanga; in this case the probability that 'Quality of Mahinga Kai' is in a positive or negative state across a range of different scenarios with huanga in various states.

Node: **QualityMahingaKai** Apply OK

Chance % Probability Reset Close

| Contamination | WaterTemperature | FineSediment | Algae | Yes | No |
|--------------------|------------------|--------------|-------|-----|-----|
| HumanHealthEffects | Over20deg | Yes | Yes | 0 | 100 |
| HumanHealthEffects | Over20deg | Yes | No | 0 | 100 |
| HumanHealthEffects | Over20deg | No | Yes | 0 | 100 |
| HumanHealthEffects | Over20deg | No | No | 0 | 100 |
| HumanHealthEffects | Below20 | Yes | Yes | 0 | 100 |
| HumanHealthEffects | Below20 | Yes | No | 0 | 100 |
| HumanHealthEffects | Below20 | No | Yes | 0 | 100 |
| HumanHealthEffects | Below20 | No | No | 0 | 100 |
| EnviEffects | Over20deg | Yes | Yes | 5 | 95 |
| EnviEffects | Over20deg | Yes | No | 5 | 95 |
| EnviEffects | Over20deg | No | Yes | 5 | 95 |
| EnviEffects | Over20deg | No | No | 5 | 95 |
| EnviEffects | Below20 | Yes | Yes | 40 | 60 |
| EnviEffects | Below20 | Yes | No | 50 | 50 |
| EnviEffects | Below20 | No | Yes | 50 | 50 |
| EnviEffects | Below20 | No | No | 80 | 20 |
| No | Over20deg | Yes | Yes | 5 | 95 |
| No | Over20deg | Yes | No | 5 | 95 |
| No | Over20deg | No | Yes | 5 | 95 |
| No | Over20deg | No | No | 5 | 95 |
| No | Below20 | Yes | Yes | 50 | 50 |
| No | Below20 | Yes | No | 80 | 20 |
| No | Below20 | No | Yes | 80 | 20 |
| No | Below20 | No | No | 95 | 5 |

Figure 6.4 A complex CPT showing probabilities of different combinations of 'Quality Mahinga Kai', 'Contamination', 'Water Temperature', 'Fine Sediment' and 'Algae' states.

One of the key realisations that emerged through the development of the CPTs was that the time scale for states of the different huanga was an important factor to consider. Typically, BBNs had been constructed to model biophysical attributes of catchment systems, where the states were determined through measures at an immediate point in time. That is, on a given day, what was the percentage coverage of algae in a waterway? However, for the social attributes of the catchment systems, it was not practical to conduct measures of a specific point in time. Rather, the social measures of the quality of decision-making processes - the state of 'Intergenerational knowledge transfer' or the 'Environmental distress' and 'Connection to the environment' across the iwi - were used

as measures of phenomena that were taking place over longer periods of time, and where it was only practical to measure this at the most annually, to reflect perhaps the state for the current year, as opposed to the current day. Change of state for these social attributes was unlikely to occur within days, hours or minutes as it might for biophysical attributes. It is important then to consider how in an integrated BBN model such as this, which deals with a spectrum of types of attributes, changes within certain types of social or political attributes as a result of changes in biophysical states may not be evident for some time.

The architecture of the final Te Āti Awa ki Whakarongotai BBN for making inferences about water system health is presented in Figure 6.5. It sets out all the priority attributes from the conceptual model and shows the probabilities in percentages of each stage occurring. One limitation of using BBNs to describe systems is that they terminate at one node or attribute. A key feature of the conceptual model according to Te Āti Awa ki Whakarongotai, however, is that it depicts the water system as a cycle, with a feedback loop from the Wairua and Whakapapa huanga to the Mana and Māramatanga attributes that are driving the system at the top. This has been depicted for clarity in Figure 6.4 with an arrow to show this relationship; however, the BBN model has had to be built to terminate at the Wairua and Whakapapa attribute due to the standard structure of a BBN.

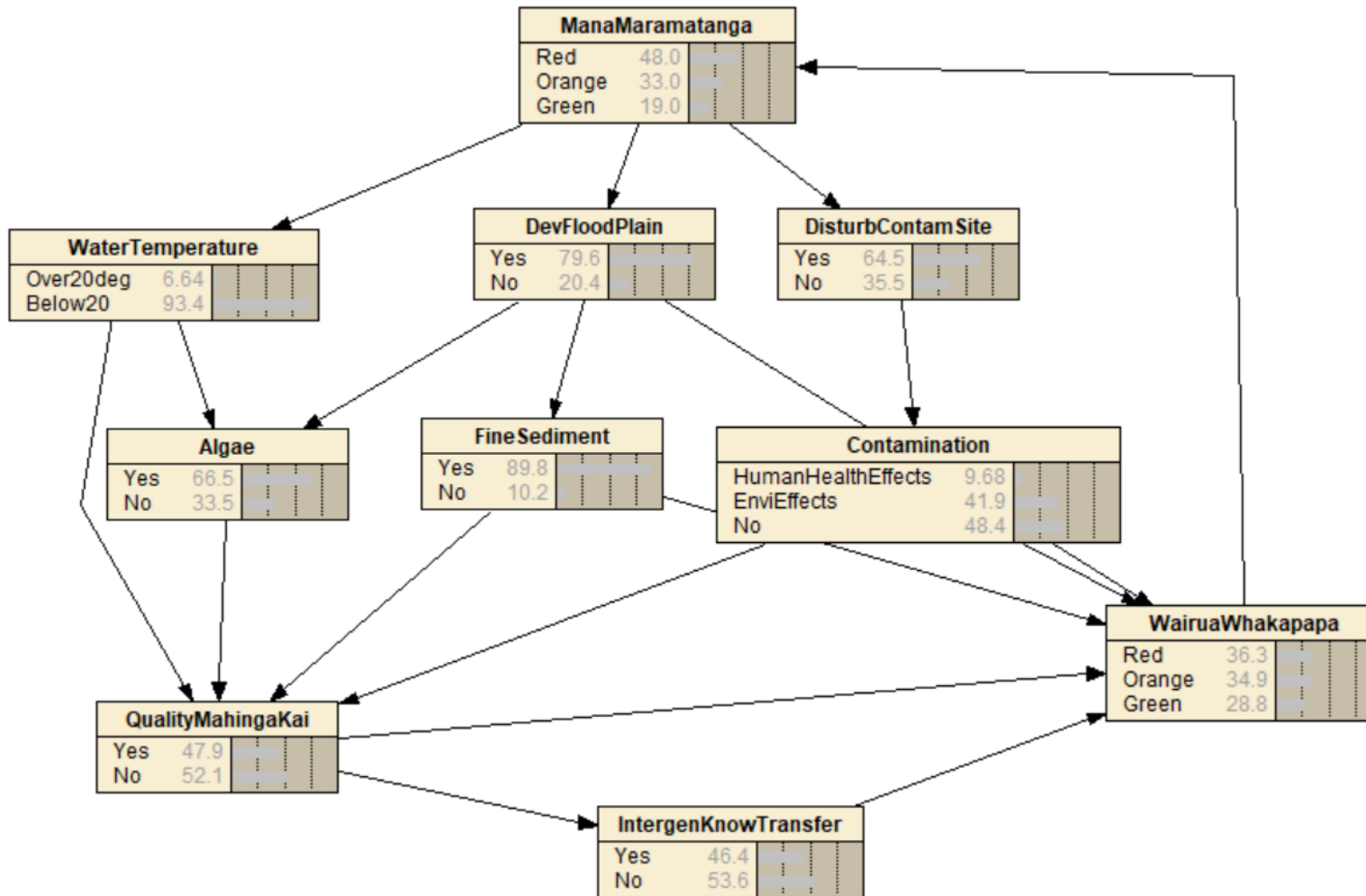


Figure 6.5 Te Āti Awa ki Whakarongotai Bayesian belief network: Te Kete Tua-ātea tool for predicting water system health

Part three: Applying Te Āti Awa Whakarongotai BBN model to infer water system health

This part provides case studies across different decision-making contexts that show the two key applications of the completed iwi BBN model of water system health.

Applying the BBN model to test health outcomes of activities

The original decision-making issue that was discussed in Chapter 1 of this thesis identified the need to apply iwi knowledge and tools to test the outcomes of future scenarios for water system health. We can look at how the BBN model developed through this research could have been used to inform the decision on whether to permit the construction of an offset storage area for the M2PP expressway, which required the disturbance of contaminated land at Kiwi Rd, Paraparaumu. Starting with the base BBN model shown in Figure 6.6, we can see the probabilities for the condition of each huanga.

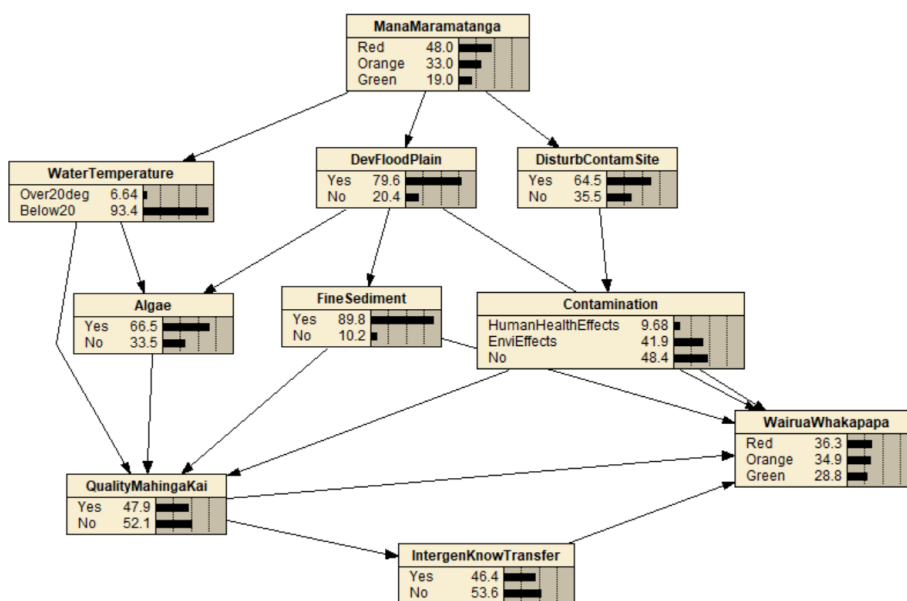


Figure 6.6 Base BBN model

We can then apply a scenario to the BBN model; in this case, we can select 'Yes' for the 'Disturbance of a contaminated site' huanga, as was proposed at Kiwi Rd. Figure 6.7 shows that when this scenario is applied, the BBN model infers the conditions of all the other huanga in the system. These inferences include both the probable outcomes in terms of the conditions of the other huanga that flow on from the 'Disturbance' huanga, and the probable conditions that would give rise to this scenario. For example, the BBN model shows a change in the 'Contamination' huanga: where previously the most likely state was no contamination, the most likely state in this scenario is contamination that has environmental effects. Other huanga, such as 'Abundance of mahinga kai', 'Intergenerational knowledge transfer' and 'Wairua and Whakapapa', show a stronger probability for adverse states than previously. The BBN model also shows the probable conditions that give rise to a scenario whereby a contaminated site has been disturbed: it shows that it is very likely to occur where decision-making processes, as measured by the 'Mana and Māramatanga' huanga, are in a poor, 'red' state, meaning that involvement of iwi and input of their knowledge was not occurring.

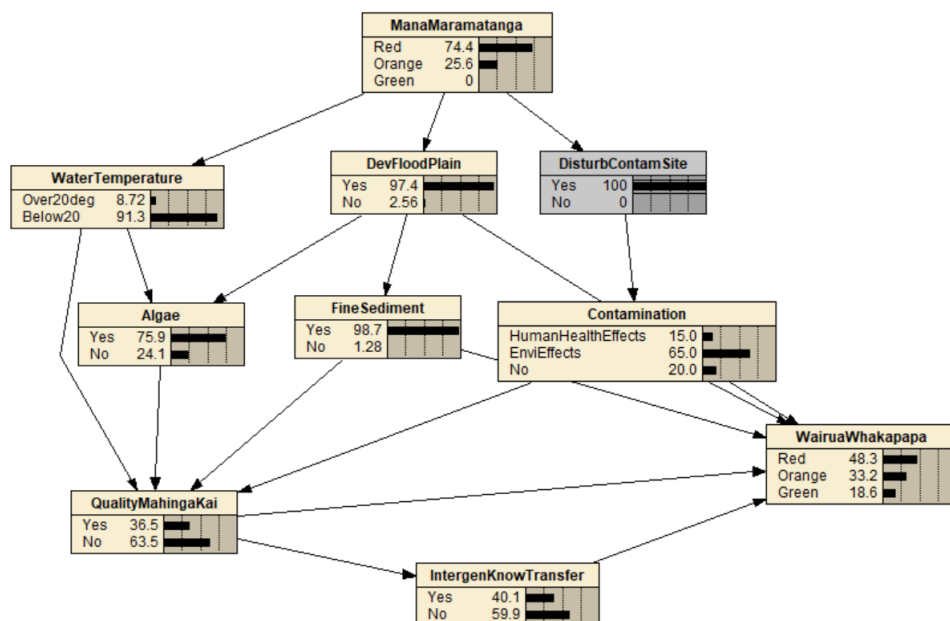


Figure 6.7: Applying the BBN model to infer system health in disturbed contaminated site scenario

We can then compare that scenario to the alternative scenario where the contaminated site was not disturbed (Figure 6.8). In this scenario, we can see very different outcomes for each of the huanga. These include no contamination effects, higher probability of positive health conditions for 'Abundance of mahinga kai', 'Intergenerational knowledge transfer' and good health of 'Wairua and Whakapapa'. It also shows that these scenarios are more probable to occur when decision-making processes are measured as by 'Mana and Māramatanga' are in a good, 'green' state, meaning that both iwi and their knowledge are having input into decision-making.

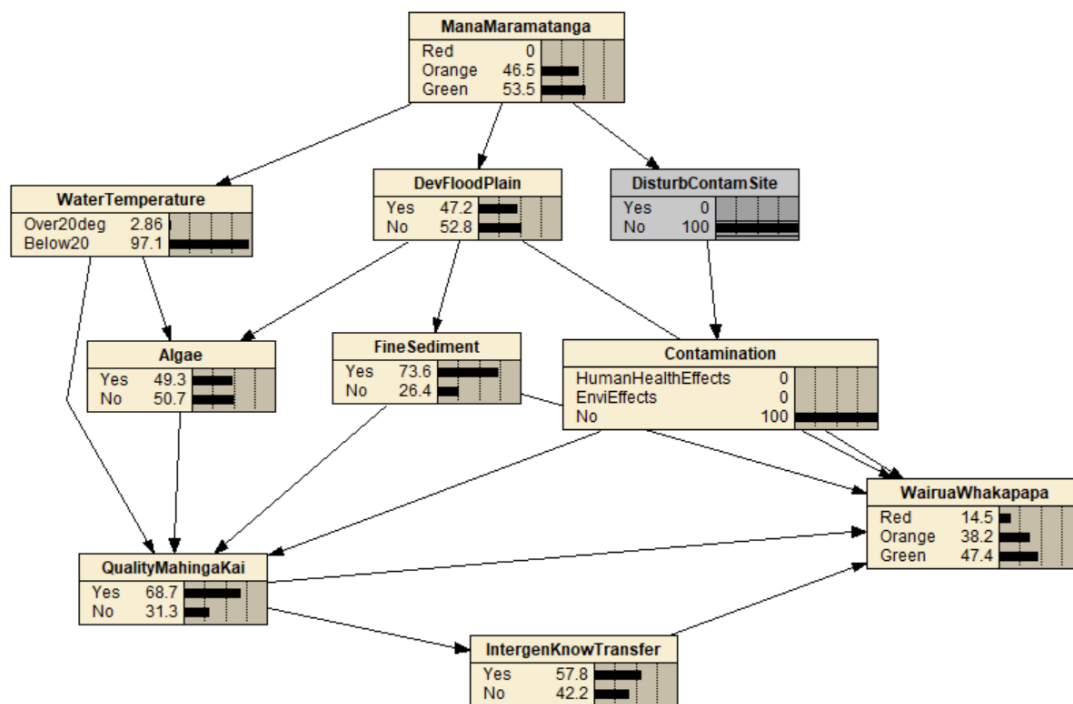


Figure 6.8 Applying the BBN model to infer system health in no disturbance scenario

This example shows the effectiveness of applying the iwi BBN model in its forward direction in a decision-making context. When applied, the BBN model is able to clearly communicate the probable outcomes of a decision across the full range of integrated values that Māori see as part of water systems. Importantly for Māori, it shows the likely outcomes of the decision in terms of potential social values that are otherwise overlooked

or not well understood, and therefore typically not fully considered in resource management decision-making. The BBN model shows explicitly how these social effects are likely to come about, through illustrating the relationships between the biophysical and social attributes of the water system. The BBN model is also effective in that it has a strong evidence base because it has been informed by observations generated by experts and further data collection. When the iwi initially responded to this proposal, we essentially provided the same inferences the BBN model makes, in accordance with the 'mental model' we had of the system and its likely reaction to disturbing contaminated sites, and provided this by way of a written submission. However, had this iwi BBN model been applied in this way during the decision-making process about the disturbance of the site, whereby decision-makers could clearly see evidence-based inferences and the systemic health outcomes that were likely if the works were permitted, they might have been compelled to not grant permission.

However, the works were completed in 2016, and as part of our monitoring for Te Kete Aronui phase of the research, we have generated further information on the outcomes of the disturbance of the site. Our monitoring of watercress at the Kiwi Rd site detected levels of two contaminants in the plant material that are even worse than inferred, in that they have exceeded 'Human health effect' levels: levels of arsenic were detected at more than nine times the food health safety standard, with levels of arsenic being found in the plant material of watercress at a level of 9.3 mg/kg. Figure 6.9 presents these results, and how the Kiwi Road arsenic results, where the contaminant land was disturbed, compares in orders of magnitude to other arsenic results from other sites. This has obviously been distressing for the iwi, but we can now utilise the iwi BBN model again to infer and communicate further likely outcomes.



Certificate of Analysis Page 1 of 1

| | | | | |
|-----------------|---|--------------------------|--------------|------|
| Client: | The Fletcher Construction Company Limited | Lab No: | 1954015 | SPV1 |
| Contact: | Alice Naylor | Date Received: | 29-Mar-2018 | |
| | C/- The Fletcher Construction Company Limited | Date Reported: | 20-Apr-2018 | |
| | PO Box 723 | Quote No: | 91212 | |
| | Paraparaumu 5254 | Order No: | M121273 | |
| | | Client Reference: | | |
| | | Submitted By: | Alice Naylor | |

| Sample Type: Plant Material | | | | | | |
|-----------------------------|---------------|--|---|--|---|---|
| | Sample Name: | Wharemauku Control 8 [Watercress] 28-Mar-2018 12:00 pm | Wharemauku Test 9 [Watercress] 28-Mar-2018 11:00 am | Kiwi Road 10 [Watercress] 28-Mar-2018 11:15 am | | |
| | Lab Number: | 1954015.1 | 1954015.2 | 1954015.3 | | |
| Arsenic | mg/kg as rcvd | 0.07 | 0.17 | 9.3 | - | - |
| Cadmium | mg/kg as rcvd | 0.0033 | 0.0063 | 0.0061 | - | - |
| Chromium | mg/kg as rcvd | 0.23 | 0.22 | 0.27 | - | - |
| Copper | mg/kg as rcvd | 0.84 | 0.85 | 0.93 | - | - |
| Lead | mg/kg as rcvd | 0.23 | 0.20 | 0.47 | - | - |
| Mercury | mg/kg as rcvd | < 0.002 | < 0.002 | < 0.002 | - | - |
| Nickel | mg/kg as rcvd | 0.17 | 0.16 | 0.20 | - | - |
| Zinc | mg/kg as rcvd | 6.4 | 12.4 | 13.3 | - | - |

Figure 6.9 Heavy metal results from watercress survey across three sites, including Kiwi Road

Figure 6.10 shows the probable outcomes when selecting for both 'Disturbance of contaminated site' and 'Human health effect' in a scenario.

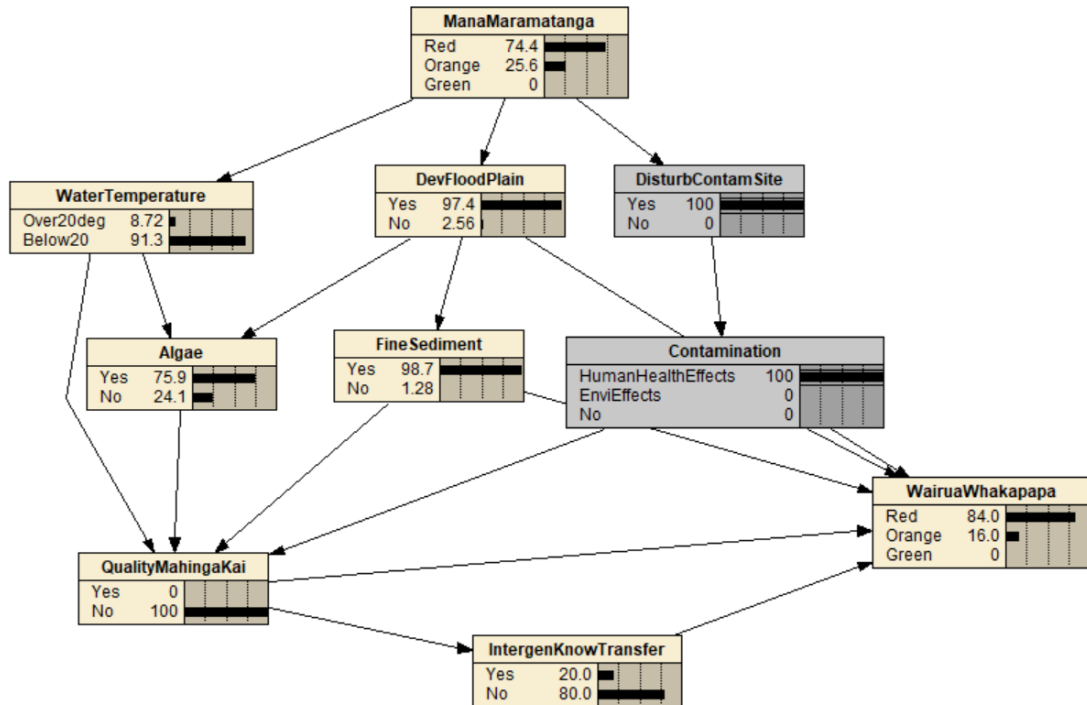


Figure 6.10 Applying the BBN model to predict system health in a scenario where a contaminated site is disturbed, and human health effect levels of contamination are exceeded

The BBN model shows that in this scenario, besides the obvious outcome of no mahinga kai being available because it is unsafe to consume, there is a strong likelihood that 'Intergenerational knowledge transfer' will not be occurring, and an even stronger likelihood that 'Wairua and Whakapapa' will be in a poor state of well-being, meaning that people will become disconnected to the waterway, and be experiencing high levels of environmental distress as a consequence of this change to system health. It also shows that there is no possibility at all in this scenario of 'Wairua and Whakapapa' being in a good state of well-being.

A limitation of the BBN is that it does not depict the feedback loop from the 'Wairua and Whakapapa' huanga back to the drivers of 'Mana and Māramatanga' because its structure requires that it terminate at one point. However, we can still visually present the feedback effect by showing successive BBNs that depict that way that the system trends as a consequence of having either poor or good states of 'Wairua and Whakapapa'. In Figure 6.10, which shows the scenario where contamination has caused human health effects, we can look at the 'Mana and Māramatanga' huanga box to see the probabilities of the states that can give rise to this scenario: a 74.4% chance that it arises from a poor state and 25.6% chance that it arises from a medium state. We can then create a new base BBN model with these as the new probable base states of this huanga. Figure 6.11 shows the original base BBN model and how the probable state of each huanga in the system changes when new probable base states are entered into the 'Mana and Māramatanga' huanga.

This shows the trend direction that all attributes are likely to follow as a result of the feedback from a poor state of 'Wairua and Whakapapa'. The relationships between all the huanga in the system is the same, in that they respond to change in the same way, but the starting point of the BBN model is different, to reflect the conditions that are likely when 'Wairua and Whakapapa' are in a state of poor health. We could construct the same to show the trend direction of 'Wairua and Whakapapa' being in a positive state, which would show the feedback from this would drive the system as a whole in a positive trend. However, the BBN cannot tell us the amount of time it might take for the system to trend in this direction, and as has been raised earlier in this chapter, the BBN does not deal with the factor of time in that changes of different types of attributes might be taking place across quite different scales of time.

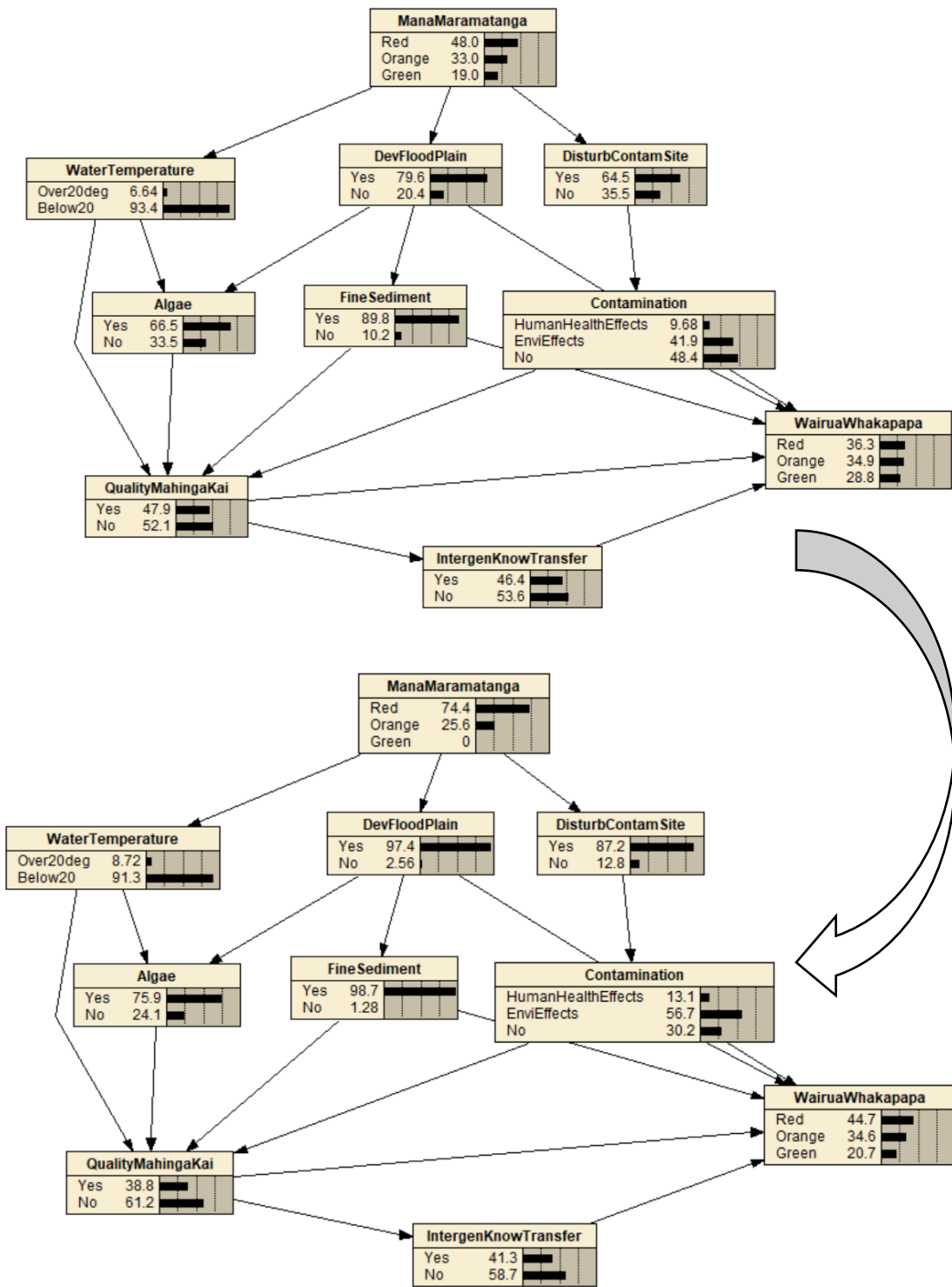


Figure 6.11 The trend of probable states when inserting new base states into the BBN model

Applying the BBN model to set objectives for huanga of water system health and prioritise restoration, care and management effort

The second example of how the BBN model can be applied (see Figure 6.11) shows how, instead of inferring the probable outcomes of an activity, we can use the BBN model in a backward direction to:

- select for the outcomes we want to achieve as objectives
- infer the objective states we need to set for other huanga in the system in order to achieve those outcomes
- prioritise interventions of restoration and care, and manage intervention efforts in a way that maximises the likelihood that we will achieve these outcomes.

This has first been applied in the context of managing Flood Protection works in the Waikanae River. As discussed in Chapter 5, the iwi are working with Greater Wellington Regional Council to develop an approach to managing Flood Protection works that ensures iwi values in connection to the river are protected and, where possible, enhanced. This is to be facilitated through the development of an environmental monitoring plan for the river that will identify objectives for different iwi values in connection to the river and direct iwi monitoring of these values. Where these objectives are not being met, this will trigger a management response that might involve changing, limiting or ceasing a particular type of Flood Protection works, or employing a mitigation strategy to ensure these river objectives are achieved.

Figure 6.12 shows what happens to the BBN model when selecting for the positive 'green' state of 'Wairua and Whakapapa', or for the outcomes of a river system to ultimately have positive social outcomes. The BBN model shows the probabilities of different states generating a scenario when that outcome is achieved.

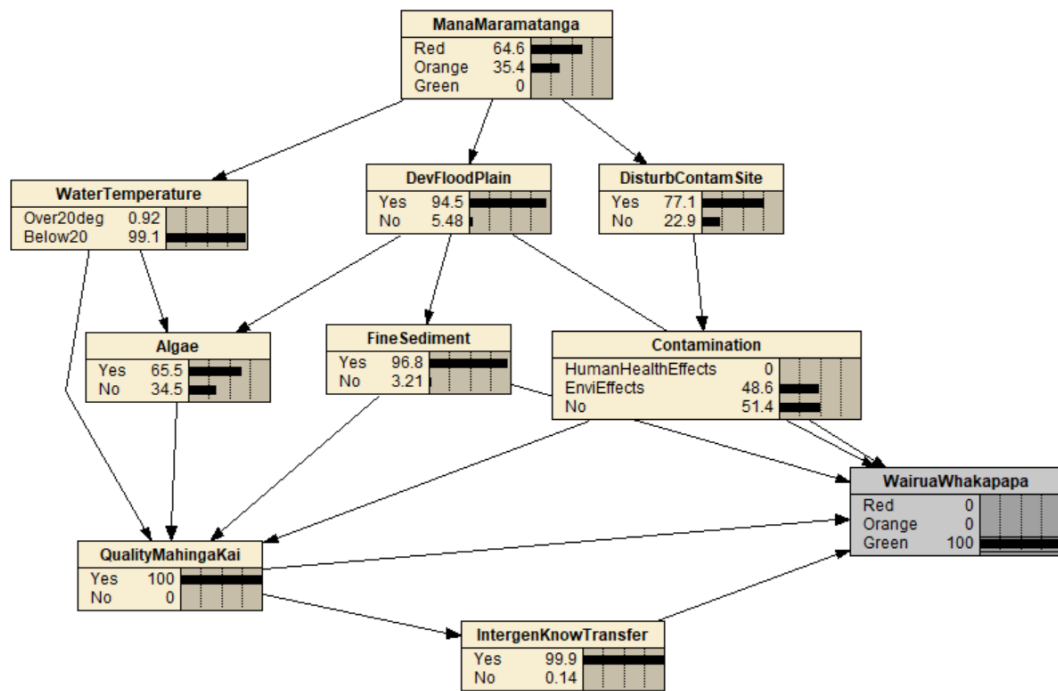


Figure 6.12 The probabilities of states of different huanga in a scenario where 'Wairua and Whakapapa' is in a state of good health

The probabilities shown when the BBN model is applied like this can then be used to infer:

- the objectives for each of the huanga in the system to achieve the well-being of 'Wairua and Whakapapa'
- the strongest determinants for well-being of 'Wairua and Whakapapa'
- the priority management and care responses that will maximise the likelihood of achieving those outcomes. This has been supported through the Iwi Kaitiakitanga Plan⁴⁶, which identified the tikanga or practices, policies and protocols required to achieve each huanga.

⁴⁶ See Appendix B

Following is a list of the huanga according to the degree to which the BBN model suggests they determine positive social outcomes in connection to the river:

1. The BBN model infers that when 'Wairua and Whakapapa' are in a positive state, there is 100% probability that 'Quality of mahinga kai' is in a positive state as well. This means that according to the BBN model, mahinga kai is the strongest determinant of social well-being, in that positive social outcomes cannot occur when it is in a negative state. This informs setting an objective for mahinga kai that all mahinga kai surveys conducted in monitoring must generate a positive measure; otherwise, a management response is triggered. Management responses might include limiting activities such as gravel extraction or channel widening that pose threats to mahinga kai species, or restoring lost habitat that mahinga kai rely on to thrive, such as spawning habitat or diversity in bed geomorphology.

2. Closely following mahinga kai as the second strongest determinant is 'Water temperature'. The BBN model shows that there is only a 0.5% chance that water temperature will be above 20 degrees Celsius when 'Wairua and Whakapapa' are in a positive state. This could inform setting an objective that water temperature is less than 20 degrees Celsius more than 99% of the time, and this probability could then also be applied to set a trigger level so that when water temperature exceeds 20 degrees more than one day a year, a management response is required. Management responses to address this huanga might include addressing aspects that affect the flow of the river, such as by preventing or reviewing the conditions of permitted water takes, recharging the river to increase its volume, avoiding the engineering of channels that reduce the volume of the wet channel or simply restoring and enhancing shade of the water channel to keep it cool.

3. According to the BBN model, the third strongest determinant for social well-being is positive 'Intergenerational knowledge transfer'. The BBN model states that the probability that this huanga is in a negative state when 'Wairua and Whakapapa' values are positive is 1.34%. This could inform an objective that 'Intergenerational knowledge transfer' is always scored positively across the iwi (i.e., the average score across the iwi is over 3). If this objective is not reached, the iwi could take steps to support 'Intergenerational knowledge transfer' through tikanga or practices identified in the Iwi Kaitiakitanga Plan, for example, running Hui Rangatahi to provide opportunities for rangatahi to learn about the river, to identify species and to learn traditional harvest and preparation techniques, or running wānanga to learn rongoā, karakia and tikanga connected to the river (Ātiawa ki Whakarongotai Charitable Trust, 2019, p. 34).

4. At this point, the huanga start to slightly weaken in how strong a determinant they are; however, they still present probabilities that show they are good determinants of well-being of 'Wairua and Whakapapa'. The BBN model shows that the huanga of 'Fine sediment' is in a negative state only 22.8% of the time that 'Wairua and Whakapapa' are in a good state. This probability could be used to inform an objective that 80% of fine deposited sediment samples score positively; for example, if when fine deposited sediment surveys are conducted, through the bankside visual assessment technique described in Chapter 5, a management response is triggered if more than 20% of these return a negative result. Management responses to this might include reviewing the works schedule and minimising or ceasing works that are known to generate fine sediment, or to investigate activities such as development or other earth works within the catchment that may be generating large amounts of fine sediment.

5. The BBN model shows that the huanga of 'Contamination' is in an adverse state only 26.2% of the time, and in a state that triggers human health effects 0% of the time that 'Wairua and Whakapapa' are in a good state. A range

of testing for human health contaminants such as *E. coli* and others such as nitrogen and phosphorus are regularly done at the Waikanae River for the purpose of state of the environment monitoring for both water quality and recreational health purposes. The probabilities from the BBN models could be used to inform contaminant limits that when breached trigger management responses. For example, when any state of the environment monitoring returns a result for *E. coli* that indicates likely human health effects, this could trigger a requirement to investigate potential *E. coli* sources, especially from areas of stagnant water or discharges of waste into waterways. Regarding the environmental effects of contaminants, once results exceed 'Environment effect' 30% of the time or more, this could trigger a similar management response to investigate the source of contaminants into the river.

Beyond these five huanga, the determining strength of other huanga become less significant. However, these five provide good guidance for how river care, protection and management can be structured in a way to maximise the likelihood that there will be certain positive outcomes, in this case positive social outcomes. The deployment of the BBN model in this way provides assurance that setting objectives, and implementing management responses in reaction to them, has a strong evidence base that integrates the consideration of the broad range of interacting values that influence the overarching health of the awa.

The application of the BBN model in this way also makes it apparent that often the management reaction required to achieve certain objectives may sit outside the scope of the authority typically vested in water managers. In the example of how Flood Protection management might respond to poor mahinga kai results, this may require addressing activities that sit outside the typical scope of Flood Protection management,

for example, addressing poor spawning habitat that has been damaged through sediment deposited by other activities, or in the example of how Flood Protection management might respond to high temperature levels, this might require addressing the water takes that are occurring or being permitted out of the river. This highlights how the separation of water management into very narrow and specific interests often limits the ability to respond to issues in waterways in the required integrated and systemic way. The conceptual model developed by the iwi presents a view of the water system as involving complex relationships and feedback loops between different components, and therefore makes the case for water management to require the ability to first understand the way a range of different values and activities interrelate and create different types of outcomes, and to respond with a whole of system perspective. This is a different approach to the way in which water management is currently structured, where different entities or departments have a narrow scope that allows them to address only one part of the system, which ultimately might not be a strong determinant on the outcomes that people wish to see in waterways.

However, Te Āti Awa ki Whakarongotai have been able to use the BBN model in the work to identify objectives and management responses for the care of the Waikanae River as part of Flood Protection management. Prior to the development of this approach and the accompanying tools that support it, including the Iwi Kaitiakitanga Plan, Te Kete Aronui monitoring and the BBN model, most of the iwi values in connection to the river were being overlooked. Utilising the approach that has now been developed will ensure that the full suite of values that the iwi hold in relation to the river will be considered in how Flood Protection works are managed, and the management framework will be vested with the power to respond when these values are affected. These technical tools can now be applied to provide the iwi political involvement in river management with more weight to influence the outcomes that the iwi want to see.

Finally, the knowledge generated through the development and application of the BBN model can also be applied in the broader regional plan processes to set catchment objectives. The implementation of the NOF as part of the NPS-FM requires that regional plans set catchment objectives to guide freshwater management, in particular, to inform the setting of limits on resource use that impacts water, such as nutrient discharges and water takes. Currently, the NPS-FM only requires that objectives be set for the compulsory values of 'ecosystem health' and 'human health for recreation'; however, it has provisions for regional plans to set objectives for other national values or 'any other values that regional councils consider appropriate'.

In preparation for the regional plan process-setting catchment objectives in our rohe, the iwi has been able to utilise the knowledge generated through the application of the BBN to identify catchment objectives to be included in the Natural Resource Plan, the regional plan for the Wellington region.

Objectives for each of the six kaupapa were identified (see Table 6.1). These objectives were informed directly by the objectives that were identified for each of the huanga in the BBN. In some cases there were more than one huanga and therefore objectives that could potentially be identified. In the case of 'mauri', water temperature was identified as the key huanga given its strength to determine well-being as shown by the BBN. For the kaupapa of 'Te Ao Tūroa', although there was only one huanga, the 'Quality of mahinga kai', it was important to provide more than one objective for this huanga to ensure there was a relevant objective for different types of waterways where different types of mahinga kai were prevalent, and to address the factors of both availability of mahinga and safety to consume, which are critical to the quality of mahinga kai. In the case of the kaupapa of 'mana', the huanga of 'Iwi are part of water governance' was selected, in light of both the strong determining function apparent through the BBN and the strong system-driving function evident through the use of the influence matrix.

Table 6.1 Objectives for Waikanae Catchment

| Kaupapa | Huanga | Objective |
|----------------|--------------------------------------|---|
| Mauri | Water temperature | ≤20° C |
| Te Ao Tūroa | Quality of mahinga kai | Catch 4 eating tuna at one site when using standard mahinga kai practice. |
| Te Ao Tūroa | Quality of mahinga kai | Mahinga kai species are safe for human consumption in accordance with the Australia New Zealand Food Standards Code. |
| Māramatanga | Intergenerational knowledge transfer | An average score across the iwi of 4 'Te Rea: I am learning and practising this knowledge' across all knowledge types. |
| Mana | Iwi are part of water governance | 'Tika': Decision-making is informed by mana whenua knowledge. Mana whenua have authority over natural resource management to the extent that they are part of its governance, can determine decision-making and are resourced to do so. |
| Wairua | Environmental distress | An average score across the iwi of below 3 for severity of distress. |
| Whakapapa | Connection | An average score across the iwi of 3 or above for connection to the environment. |

The process followed by the iwi to identify these objectives for the Waikanae catchment is compatible with that required by the NOF. The huanga function just as attributes in the NOF do in that they are a measurable characteristic of fresh water that supports the relevant kaupapa or values of the catchment, and a relevant objective for the health of the catchment can be formulated for each of them, in addition to plan provisions such as policies, methods and rules to achieve those objectives.

This has now positioned Te Āti Awa ki Whakarongotai as prepared with objectives and supporting technical evidence for the NOF process once it commences in its rohe. The use of Ngā Kete o te Wānanga, including the scenario testing tools from Te Kete Tua-ātea, ensures that scenario testing includes consideration of all broad values of water, incorporates data generated by Māori observation and expert knowledge, and examines scenarios based on a Māori conceptual understanding of the function of water systems and Māori knowledge about the probability of certain dynamics and outcomes within

systems. Without the use of Ngā Kete o te Wānanga, the process of objective setting would likely result in the identification of objectives for only the limited set of biophysical attributes of freshwater quality that are identified within the NPS-FM, rather than the broader objectives for the full range of attributes that comprise water system health.

Summary of Te Kete Tua-ātea

This chapter has presented the approach that Te Āti Awa ki Whakarongotai has applied from Te Kete Tua-ātea to develop and apply conceptual and BBN models of the water system that can be used to generate knowledge about future scenarios.

The has shown how the BBN model was developed from a conceptual model through to an inference model, and how it can be applied for two key functions, across a range of different decision-making contexts. First, it showed how it can be applied to infer the outcomes of water system health across different scenarios, highlighting a key use of the BBN model to inform decisions such as the granting of resource consents. Second, it showed how it can be applied to infer the conditions necessary to achieve specific water system objectives, and therefore to inform planning and management of waterways, such as regional plan processes, or management of activities that affect water system health, such as Flood Protection works.

Finally, Table 6.1 shows how the development and application of the BBN model is the culmination of all three phases of the research, as informed by Ngā Kete o te Wānanga framework. Ngā Kete o te Wānanga has been applied through the research to identify, develop and apply tools from each kete to generate the three types of knowledge that are required to support and inform iwi decision-making in relation to water:

1. The first phase, Te Kete Tua-uri, involved identifying and applying tools utilised to identify knowledge about the world that informs our understanding of what we might observe in water systems. This involved applying fundamental theoretical frameworks that help us to structure our understanding of the world, through simple methods of data collection and analysis. The outcome of this phase of the research was to develop an iwi kaitiakitanga plan and an ontology of water according to the iwi.
2. The second phase of the research, Te Kete Aronui, involved identifying, developing and applying tools used to facilitate observations about the world, which supports us to generate observations about the function of water systems. This involved applying and developing tools of observation that allow us to generate observations across a broad range of different values.
3. The final phase of the research, Te Kete Tua-ātea, involved developing and applying methods to create a BBN model that can then be used to examine future scenarios of water systems for the likely effects to our values. The development of the underlying conceptual model drew on the fundamental understanding of water as a system as created by Te Kete Tua-uri phase, and then the building of the inferencing ability of the BBN model was informed by the observational data about the water system generated by Te Kete Aronui phase.

The development and implementation of Ngā Kete o te Wānanga approach and tools is now supporting the iwi in their pursuit to achieve tino rangatiratanga in that the iwi are now able to ensure that technical processes such as planning, monitoring and decision-making are informed by the full spectrum of values and aspirations that the iwi hold in connection to water.

Table 6.2 Ngā Kete o te Wānanga framework of tools developed to support Te Āti Awa tino rangatiratanga in relation to water

| NGĀ KETE O TE WĀNANGA | Purpose | Type of knowledge | Tools | Knowledge created in research |
|-------------------------|---|--|--|---|
| Te Kete Tua-uri | To make meaning of what cannot be directly observed in the world To inform our interpretation of knowledge from Te Kete Aronui, or what we observe | Knowledge of the metaphysical 'real world' beyond what is observable | <ul style="list-style-type: none"> • Kaupapa-tikanga-huanga framework • Hua Parakore framework • Document analysis • Structured interview • Wānanga • Online survey | <ul style="list-style-type: none"> • Iwi Kaitiakitanga Plan • Te Āti Awa ki Whakarongotai ontology of water • Te Āti Awa ki Whakarongotai Freshwater Health Index |
| Te Kete Aronui | To make meaning of what we see in the world To inform the creation of knowledge from Te Kete Tua-ātea, our knowledge of how the future will look | Knowledge of the observable world | <ul style="list-style-type: none"> • Influence matrix • Contaminant testing • Fish surveys • Meteorological monitoring • 'Ko te mana, Ko te māramatanga' auditing • Social science survey • GIS | <ul style="list-style-type: none"> • GIS map of mahinga kai and other sites of significance • Ecotoxicology data • Fish abundance and diversity data • Data on quality of decision-making • Data on intergenerational knowledge transfer • Social survey data |
| Te Kete Tua-ātea | To have meaningful knowledge of how different future scenarios may look | Knowledge about infinite possible realities | <ul style="list-style-type: none"> • Mental models • System narratives • Wānanga • Flow diagram • BBNs | <ul style="list-style-type: none"> • Conceptual model of water system • BBN model and inferences about water system health • Complete Ngā Kete o te Wānanga method for developing mātauranga Māori inference models |

Note: GIS = geographic information system, BBN = Bayesian belief network

Chapter 7: Nā te wānanga te hauora⁴⁷

Discussing the implications of this research

Mātauranga Māori is the enduring indigenous knowledge system that has successfully been applied in the kaitiakitanga or care of water for as long as Māori have lived in Aotearoa. Since the colonisation of Aotearoa roughly 200 years ago, mātauranga Māori has been marginalised, and at times deliberately undermined, to the extent that Māori now struggle to see it inform decision-making and other aspects of care for water. This has occurred as a result of the introduction and dominance of the Western scientific approach to water care and management, which has coincided with the usurping of Māori political authority and severing of their relationships with water systems. The way that the colonial agenda has targeted the dismantling of both the Māori knowledge system and the Māori political system highlights an understanding that the survival of each is linked to that of the other. This understanding must equally inform the decolonisation agenda such that the revitalisation of Māori power and the revitalisation of Māori knowledges must be linked with one another; neither can function successfully again without the other.

There are therefore interconnected political and knowledge processes involved in achieving and enacting tino rangatiratanga in relation to water. Much of the work and research on Māori and water as covered in Chapters 1 and 2 of this thesis has focused either on the development of Māori knowledge about water or on how policy and legislation can provide for political input from Māori. Much less specifically examines the technopolitics of Māori water care, that is, how Māori knowledge and technologies can be developed and implemented to further Māori political agendas. Research to develop

⁴⁷ Refers to the Māori whakapapa or genealogy of the cosmos which identifies hauora (well-being) as emerging from wānanga (knowledge creation).

Māori knowledge in relation to water often occurs in the absence of any critical analysis of the political arrangements required at various scales to effectively implement this knowledge. Equally, commentary and policy to develop improved power arrangements for Māori with regard to water often do not identify the types of knowledge and knowledge tools that will be required to support Māori political positions and aspirations.

This research has investigated the mātauranga Māori knowledge and tools that are required to support Māori tino rangatiratanga in relation to water. This has involved exploring the knowledges and tools that are required to articulate, and support, Māori worldviews, and that when applied, will also help to shift the dominance of the Western scientific colonial view. This research emerged from a need to reaffirm and develop Māori futuring tools to support our iwi in decision-making that has implications for the well-being of waterways. The aim of the research was to propose and operationalise a mātauranga Māori framework and futuring tools that iwi can apply in decision-making. Ngā Kete o te Wānanga, the mātauranga Māori theoretical framework for the pursuit of knowledge, was applied in the research, and it identifies knowledge pertaining to the future, such as inferences developed through futuring tools such as modelling, as one of three interconnected aspects of the Māori worldview of reality. It therefore emerged that Māori futuring tools needed to be developed and applied as part of the implementation of the whole cohesive knowledge framework of Ngā Kete o te Wānanga.

This chapter reflects on the application of Ngā Kete o te Wānanga as a theoretical framework in this research and discusses the technopolitical implications of the findings that emerged, both specifically for our iwi, Te Āti Awa ki Whakarongotai, and at the broader national scale, where reform of freshwater care and management is currently occurring.

Applying Ngā Kete o te Wānanga theoretical framework to water care

As outlined in Table 7.1, Ngā Kete o te Wānanga has provided a mātauranga Māori framework for the development and implementation of the complete system of knowledge required to support iwi in their role as kaitiaki of water.

Te Kete Tua-uri: The fundamental knowledge that informs our understanding of water

Te Kete Tua-uri has provided a framework for making meaning of how water systems work from a perspective based on kaupapa Māori, or Māori values. As conceptualised in Figure 7.1 from Royal (2008, p. 64), and discussed in Chapter 2, the world we observe (āronga) emerges from the kaupapa or values that are enacted or given expression. The knowledge of those fundamental kaupapa or values that give rise to the world we experience comes from Te Kete Tua-uri.

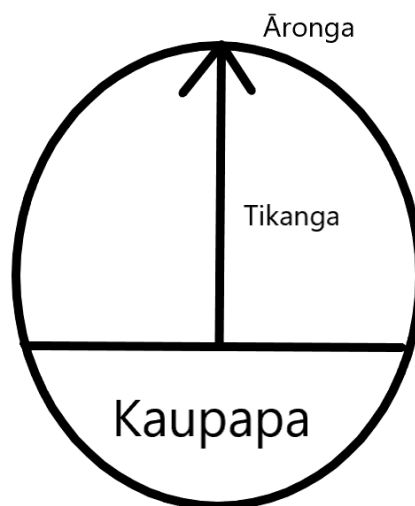


Figure 7.1 How Māori understand the relationship between perception, values and cultural imperatives. (Royal, 2008, p. 64)

Table 7.1 Ngā Kete o te Wānanga Framework of tools developed to support Te Āti Awa tino rangatiratanga in relation to water

| NGĀ KETE O TE WĀNANGA | Purpose | Type of knowledge | Tools | Knowledge created in this research |
|--------------------------------------|---|--|--|---|
| Te Kete Tua-uri | To make meaning of what cannot be directly observed in the world To inform our interpretation of knowledge from Te Kete Aronui, or what we observe | Knowledge of the metaphysical 'real world' beyond what is observable | <ul style="list-style-type: none"> • Kaupapa-tikanga-huanga framework • Hua Parakore framework • Document analysis • Structured interview • Wānanga • Online survey | <ul style="list-style-type: none"> • Iwi Kaitiakitanga Plan • Te Āti Awa ki Whakarongotai ontology of water • Te Āti Awa ki Whakarongotai Freshwater Health Index |
| Te Kete Aronui | To make meaning of what we see in the world To inform the creation of knowledge from Te Kete Tua-ātea, our knowledge of how the future will look | Knowledge of the observable world | <ul style="list-style-type: none"> • Influence matrix • Contaminant testing • Fish surveys • Meteorological monitoring • 'Ko te mana, Ko te māramatanga' auditing • Social science survey • GIS | <ul style="list-style-type: none"> • GIS map of mahinga kai and other sites of significance • Ecotoxicology data • Fish abundance and diversity data • Data on quality of decision-making • Data on intergenerational knowledge transfer • Social survey data |
| Te Kete Tua-ātea | To have meaningful knowledge of how different scenarios may look | Knowledge about infinite possible realities | <ul style="list-style-type: none"> • Mental models • System narratives • Wānanga • Flow diagram • BBNs | <ul style="list-style-type: none"> • Conceptual model of water system • BBN model and inferences of water system health • Complete Ngā Kete o te Wānanga method for developing mātauranga Māori inference models |

Note: GIS = geographic information system, BBN = Bayesian belief network

In this research, the Hua Parakore framework has been applied as a tool to generate Te Kete Tua-uri knowledge about water systems; it has been used to examine and develop knowledge about the key values that inform Te Āti Awa ki Whakarongotai worldviews about how water systems work. It was applied to a rich source of information gathered through various means from various types of knowledge holders within the iwi. There were three key outcomes of this Te Kete Tua-uri phase. The first was a broader iwi kaitiakitanga plan for Te Āti Awa ki Whakarongotai, which set out:

- an explanation of the iwi understanding of each key kaupapa
- the huanga or attributes that could be seen when these kaupapa were being upheld and expressed
- the tikanga, or policies, practices and actions required to achieve these huanga.

The knowledge generated through applying the Hua Parakore framework and creating the Iwi Kaitiakitanga Plan, was then focused specifically on water systems. The outcome of this was the iwi ontology of water as presented in Chapter 4. It presents the iwi view of what water 'is' in terms of six key kaupapa. Finally, Te Āti Awa ki Whakarongotai Freshwater Health Index was created by identifying huanga of well-being of water across each of the six kaupapa.

The iwi ontology of water and the index of huanga provides the fundamental knowledge required to inform all other technical work relating to water care, in that it provides a complete picture of the iwi understanding of water and how it should be. This chapter provides further discussion on the implications of this fundamental understanding of water as provided by Te Kete Tua-uri, both for the iwi in their work and more broadly in the national context of water care and management.

Te Kete Aronui: The knowledge we generate through being a part of water systems

Te Kete Aronui has provided a framework for making meaning of water systems through our broad sensory perception and observation. The understanding of water we gain as a result of being a part of the water system, as opposed to a theoretical or objective understanding, comes from Te Kete Aronui.

As denoted through the term 'aronui', not only is the āronga or worldview that Māori hold of water informed by a broad spectrum of different kaupapa, or values, the field of sensory perception through which Māori can generate knowledge about water systems is broad and all-encompassing. As discussed in Chapter 2, Māori observations and therefore knowledge can be generated through various aspects of the 'mind' (Marsden, 2003d; Meyer, 2014; Royal, 2008; Smith, 2000) - not just the cerebral functions of the brain, but through the visceral perceptions of the puku (gut), and the ability of the heart to integrate both the brain's thoughts and the body's senses and feelings into conscious understanding. The application of Te Kete Aronui is premised on the legitimacy of creating knowledge through the full range of sensory perception abilities that our being comprises. It has also meant that knowledge-generating processes are inclusive to a broad range of people who come to water care work with different abilities to sense, observe and create knowledge about a variety of aspects of water system well-being.

However, in the practical context of addressing the research question of this thesis and developing an approach for the iwi to conduct observations of water systems, there was a need to prioritise what could be routinely observed through a regime that monitored water systems across a broad range of values. Vester's influence matrix was successfully applied as a tool to prioritise what should be monitored so that limited resources could be focused on monitoring attributes that have the greatest degree of influence over the well-being of the whole water system. With the priority attributes

identified, a variety of tools were applied, and where necessary developed, from Te Kete Aronui to facilitate observations of water systems.

Applying Te Kete Aronui as a theoretical framework for water care has ensured that the knowledge created about water reflects the full spectrum of values that water systems comprise, through using a broader range of observation and knowledge creation methods. This in turn has ensured that this broader understanding of water informs both the technical and the political decision-making processes, and the implications of this are discussed further in this chapter.

Te Kete Tua-ātea: The knowledge we create about the possible futures of water systems

Te Kete Tua-ātea has provided a framework for taking our fundamental knowledge of water systems from Te Kete Tua-uri and the knowledge we generate through observing water systems from Te Kete Aronui to make meaningful inferences of how water systems will change across different future scenarios. The understanding we have of likely future trajectories of water system health come from Te Kete Tua-ātea.

Te Kete Tua-ātea has been a theoretical platform for us as an iwi from which we have been able to reassert our expertise in inference and futuring. We have been able to engage and further develop our ability to create highly integrated conceptual and inference models of systems, and through accumulated, inherited and refined observations, make inferences about how water systems will change in different given scenarios. This has been achieved through collectively building a conceptual model of water systems based on mental models and narratives, and then utilising BBNs to illustrate and communicate how kaitiaki experts understand the relationships between

different aspects of the systems, including the probable outcomes of changing the state of different parts of the system.

As discussed in Chapter 2, the colonial education system has interrupted the development of Māori mathematics, including the application of Māori understandings of pattern, relationship and probability (Christensen, 1996; Dewes, 1993). In our current context, we require tools to visually illustrate and communicate Māori mathematical understandings of systems and their relationships. The BBN was selected as a tool to do this because the Bayesian mathematical approach to inference appears to best reflect the Māori mathematical approach that is evident in Ngā Kete o te Wānanga. Rather than the classical statistics approach, which requires repeated sampling of populations before a 'correct' probability can be generated, the Bayesian approach follows a similar approach to that of Te Kete Tua-ātea, which is that we can never have an absolutely correct prediction; we can only infer probabilities based on prior observations and knowledge of the system. As we generate more observations and information about the behaviour of the system, we refine and improve our ability to make more accurate inferences (Carriger et al., 2016). The inference model built by the iwi is currently informed heavily by the opinions and observations of kaitiaki experts, but over time as monitoring data continue to be generated, the accuracy of inferences generated from the model will become stronger.

It is important to keep this in mind with regard to the way that these tools are used in decision-making contexts; there should always be transparency about the fact that they are never intended to reflect reality precisely, but to model it and how it may change over time, in order to generate knowledge to inform decision-making. This also perhaps speaks to why Te Kete Tua-ātea has been regarded with particular sacredness and associated with the power to be all-knowing (Marsden, 2003b p.62); those who utilise futuring tools can become quite powerful in determining outcomes of decision-making,

particularly where these tools are heavily relied upon to make decisions, and there should be care in how these tools are used, and by whom. There is also the risk that those who use futuring tools may exaggerate their accuracy or come to rely on their inferences over what can be easily observed. Our iwi experienced this during an outbreak of *Campylobacter* in our rohe that was detected through our monitoring. When these data were presented to the District Council, they refused to issue any public health warnings, and their explanation for this was that they relied on a statistical model that indicated public health risk based on data from rainfall and temperature, which were currently showing that there was no risk. In this case, the statistical model was being used as an excuse to deny observable reality. In our experience, these types of modelling tools are best used to communicate how people see a system behaving, as a starting point for conversation and debate when making decisions. They should inform but not necessarily determine decisions.

Applying Te Kete Tua-ātea as a theoretical framework for water care has been extremely useful in that it has enabled the iwi to make meaningful, evidence-based inferences about the likely implications of different scenarios of water care from an integrated whole of system perspective. These inferences have been useful in informing decision-making about water in a range of different contexts.

Figure 7.2 presents a further development on Royal's (1998, p. 52) interpretation of Marsden's Ngā Kete o te Wānanga, based on the understanding of Ngā Kete o te Wānanga that has emerged through this research.

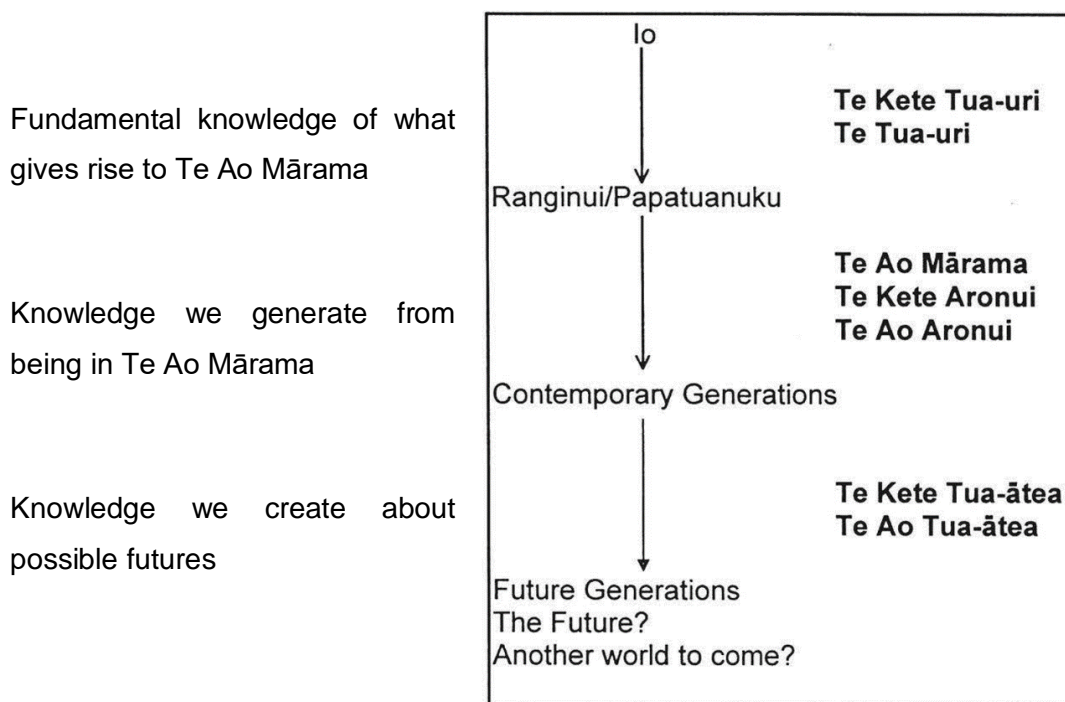


Figure 7.2 Further interpretations of Ngā Kete o te Wānanga (adapted from Royal, 1998, p. 52)

The implications for Te Āti Awa ki Whakarongotai of implementing Ngā Kete o te Wānanga as a framework for water planning and care

Embedding Te Āti Awa ki Whakarongotai view of water systems in practice

The development of our ontology of water, based on our own understanding of our values, has deepened our own appreciation about what water is from a Te Āti Awa perspective. Developing and presenting our ontology of water enables further examination and insight into critical values of water that are otherwise overlooked by Western scientific and colonial ontologies. This provides a resource to then share both internally as an iwi, to ensure that the understanding is passed on and reinforced among our people, and externally, to allow for Treaty partners and the broader community to

better understand our knowledge and perspective of water. The broader Iwi Kaitiakitanga Plan from which this work arose has also been lodged with local government authorities and local planning agencies to provide in-depth information on our understanding of the environment, including water systems.

One of the critical perspectives that is uniquely reflected through our Māori ontology of water is the way in which economies of water are understood. Typically, Māori interests in protecting aquatic habitat and species are framed as 'ecological' interests and aligned with conservation or even preservationist interests. These are then often positioned as oppositional to economic interests in water, which in Aotearoa tend to be about the ability, particularly for the agricultural and horticultural industries, to either take water or discharge pollutants to water. However, this framing and positioning of interests in this way does not hold within the Māori values framework that has been applied. Within the Hua Parakore framework, the ability for communities to thrive, develop and have wealth is an attribute of their mana. The productivity of industry is just one of many aspects of having and growing mana and must be appropriately balanced with others. Another particularly important aspect of mana is the abundance and productivity of mahinga kai, not necessarily in its financial value, but in the food security value it provides communities, and the cultural importance of being able to provide mahinga kai at our marae. The interests in having productive mahinga kai rely directly on the well-being of mauri and the balance of Te Ao Tūroa values in water systems. From this perspective, economic interests are dependent upon ecological interests, and are not at all oppositional. Taking a Māori values-based view supports the view that there are in fact many 'hidden economies' whose interests align with maximising the ecological values of water rather than degrading them (Gibson-Graham & Miller, 2015). The current economic versus ecological framing is in fact a very narrow view of a specific type of industry that has an interest in externalising ecological interests in water and locating them with others.

This insight has meant that our iwi can work to better highlight just how critical mahinga kai and therefore ecological health of waterways is from an economic perspective. This has been initiated through surveying our people to better understand the type of mahinga kai that is sourced and for what uses. Being able to frame mahinga kai as an important socio-economic interest for the community also changes the way in which we are positioned by others as having only conservationist interests that can be easily marginalised. Turning conversations about water quality into conversations about community livelihood equips us with a more powerful political discourse to more effectively influence decision-making.

Another critical perspective provided by our ontology of water, and reinforced by the conceptual model built to show how water systems work, is how crucial the well-being of peoples' wairua and their whakapapa connection to water is to whole of system health. This understanding has provided insight into the relationship between the trauma that has been created for our people by the degradation of water and severing of our connections to it, and the difficulty for us as an iwi to continue to be effectively engaged in political processes such as decision-making. It has provided insight that traumatised people who have been disconnected from their identity are unlikely to be able to participate in decision-making to the extent that they influence good outcomes for water systems. This is a critical insight to have working in the iwi context, because the sad reality is that many of our iwi members operating in decision-making processes are traumatised emotionally and psychologically from the legacy of colonisation and what has been perpetrated on our land, water and people. To an extent, as Māori we are all affected by this. Smith (2007) has highlighted through her research how the restoration of fragmented ecological systems was interdependently related to the healing of her hapū and community, in particular their reconnection to the landscape. Making these types of insights explicit creates the impetus for us to consider that kaitiakitanga and the

care of natural systems is just as much about the care for the wairua of our people, and ourselves.

In a practical sense, this has been a paradigm shift for our Taiao Unit that carries out the kaitiaki work for the iwi - a shift back to a kaupapa Māori approach to kaitiakitanga through which our regular work such as monitoring, assessment and restoration efforts include attention to wairua and the whakapapa connection of people to water. Just as we must restore healthy mauri to our waterways, we must restore healthy wairua to our people. We do this by including surveys of emotional well-being in our monitoring, developing and teaching strategies for supporting and protecting our wairua through hui rangatahi, and in resource consenting we have been able to get applicants to agree to mitigations for effects to wairua, in the form of resourcing us to construct noho puku, or quiet reflective places, along the river, where our people can go and carry out practices that reconnect them to water and keep their wairua well.

The reaffirmation of this broader integrated systems view of waterways, where caring for waterways means engaging with the socio-psychological well-being of communities, or is seen as an imperative of protecting community economies, has also informed the changes we are now advocating for in government approaches to water management in our rohe. Through our engagement with local government in particular, we are involved in the redesign of how Regional Council will deliver their services and responsibilities, and utilising our perspective on water systems to emphasise why siloed approaches to catchment management are not effective, and that people working in water management need to be able to understand the integrated values connected to waterways.

Developing Ngā Kete o te Wānanga capability to support the rangatiratanga of Te Āti Awa ki Whakarongotai

The process to apply Ngā Kete o te Wānanga to our work as kaitiaki of water has required us to identify the capacities and capabilities that are needed and to work to develop these as needed.

Significant funding was needed by the iwi before we were able to start Te Kete Tua-ātea futuring phase of the research, to resource the significant amount of work conducted through the course of this research project. As repeatedly emphasised through this research, the research has been a collective effort. There has been a deliberate intention through this work to move our iwi out of the 'one-man-band' approach to kaitiakitanga that we see repeated throughout Aotearoa. This typically looks like one kaitiaki alone carrying much of the responsibilities for iwi kaitiakitanga, usually to the point of being burned out, with no succession plan in place. This project has aimed to increase our capacity, not just in terms of bringing in more operational personnel, but also to engage the different aspects of iwi organisation in the work involved in kaitiakitanga. The resources required to achieve all of this obviously could not just be from my time as a PhD student, and given that the iwi have not yet received any settlement from the Crown and are therefore still without any significant asset base, this required us to actively seek funding from various external sources. Because these issues of resourcing are typically crucial to iwi implementing these new approaches, I have provided details in Figure 7.3 on the resources we were able to source to support the successive steps of the project. It was still challenging to deliver this work within these levels of funding, and delivery ultimately relied on volunteer time and Māori expert staff working at reduced rates. The most challenging aspect for the iwi is to ensure that they have the resources they require annually to continue monitoring works.

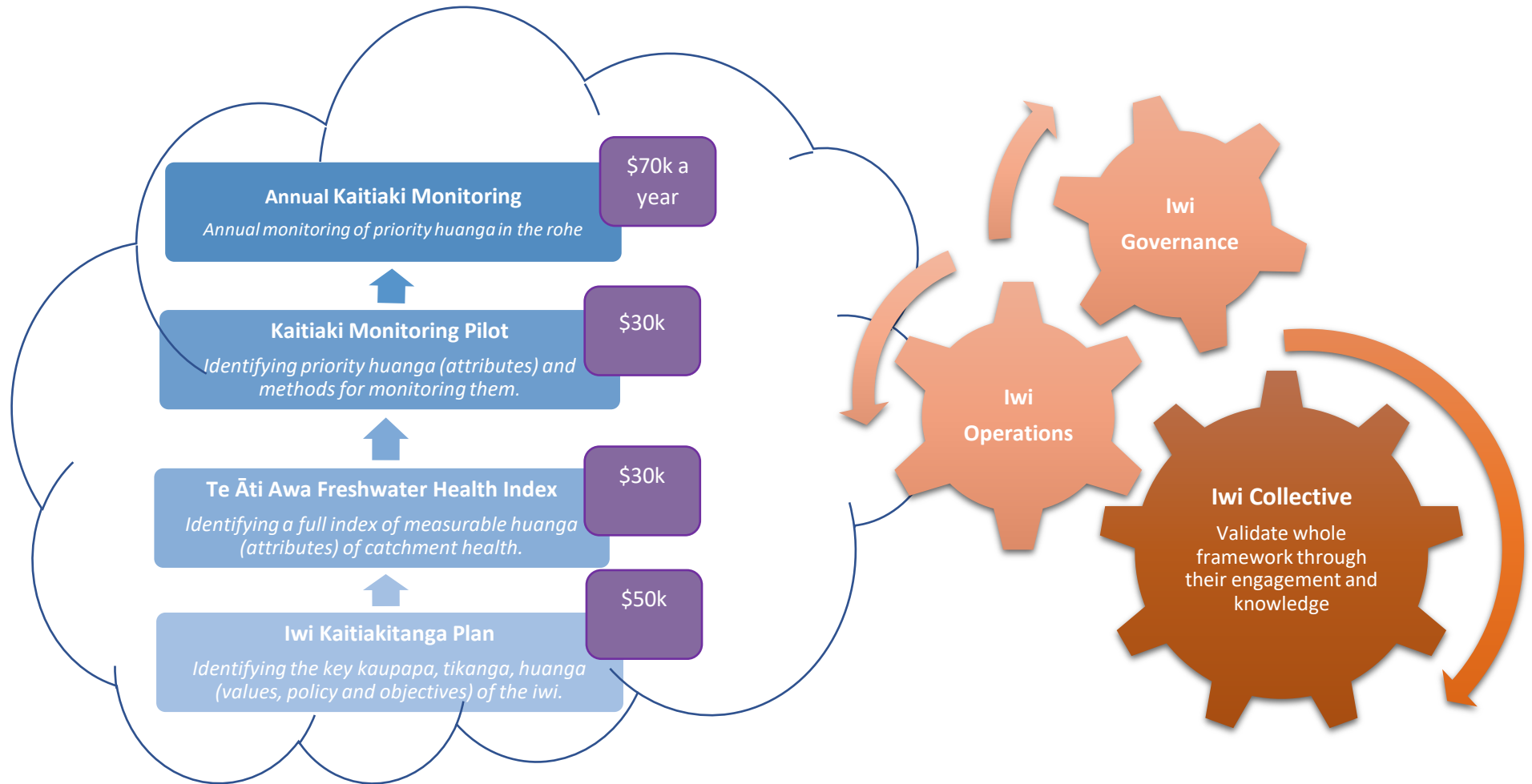


Figure 7.3 Steps, capabilities and resources required before beginning futuring work

Currently, the resource for this comes to the iwi through a post-construction monitoring agreement with a large consent project, but eventually local government authorities will have to recognise that this type of monitoring is critical to the implementation of freshwater policy in Aotearoa and that they should ensure this is funded.

The right-hand side of Figure 7.3 shows three key areas of capability that have been required to apply Ngā Kete o te Wānanga successfully. The diagram shows each area as a cog in the system working together and highlights the need for each of the following different types of capability to be developed and strengthened together:

1. **The Iwi Collective:** This is the basis of the knowledge generated through the application of Ngā Kete. They inform its application through providing their knowledge and information generated through observation, and through endorsing the validity of what is produced. Building capability in this area involves ensuring that different parts of the collective, rangatahi, kaumātua, hau kāinga, or those who live outside our rohe, all have the ability to engage through being provided with opportunity and resources.
2. **The Iwi Governance:** This is the kaitiaki of the framework that is implemented. They ensure that the iwi have what is required to implement the framework with financial, ethical and intellectual integrity. Developing capability in this area has involved ensuring we have the right governance structures and resourcing and that the introduction of a new approach does not overburden existing governance structures. In this project, the establishment, development and resourcing of the Taiao Committee have been crucial to the success of this project.
3. **Iwi Operations:** The iwi operational team have developed and implemented the framework through the application of technical skills and expertise. The application of Ngā Kete o te Wānanga has required collaboration between people with skills across different fields of environmental planning, mahinga kai, ecology,

policy, social science, tikanga Māori and law, and the development of our capability to work in an increasingly transdisciplinary way.

When seeking resourcing and support for the development and implementation of the framework, we have found that partner agencies, particularly councils, have usually assumed that they would maintain some form of control. For example, partner agencies have assumed they will own material information generated through work they fund, or they have supported the development of a monitoring framework but then attempted to employ their own non-iwi or even non-Māori staff to carry out our kaitiaki monitoring, or they have agreed to resource work, but only if the funding is held by Regional Council. This reflects a cultural norm of the colonial state that entities that exercise authority of the Crown should always ensure control, particularly over technical processes. As reflected in the work of Agrawal (1995, p. 431), 'how knowledge is generated, organised, stored and disseminated presupposes certain relationships of power and control'.

Resisting this and requiring that Crown agents relinquish their assumption of control over how this work is resourced, held and delivered has been a critical technopolitical shift in our partnerships. It has reinforced our tino rangatiratanga over how our knowledge is generated and used, and that our knowledge can no longer be separated from us and our control. This shift has involved demanding new types of funding contracts that guarantee the iwi total control over information generated, requiring councils to cease appointment processes for roles to conduct monitoring of our values in our rohe, and insisting on iwi holding and managing funding for the delivery of work.

Applying Ngā Kete o te Wānanga to support Te Āti Awa ki Whakarongotai to determine better outcomes for water systems

The most significant outcome for Te Āti Awa ki Whakarongotai in applying this knowledge framework has been our significantly increased ability to influence decision-making and determine better outcomes for water systems in our rohe. This was evident not just at the completion of the framework; at the development of every phase of the framework we have been equipped with new knowledge and technical tools to apply in decision-making.

The Iwi Kaitiakitanga Plan, ontology of water and Freshwater Health Index that were produced through Te Kete Tua-uri phase of the research are now applied on a day-to-day basis in our work responding to resource consent applications. We are regularly able to influence the outcome or even determine decisions on whether to grant non-notified and notified consents and conditions of consent through utilising these tools to assess proposed activities.

The kaitiaki monitoring regime produced and implemented through Te Kete Aronui phase has started to generate data that allow us to respond to issues that are affecting water health in a more proactive way. As mentioned earlier, the data generated through our watercross surveys have highlighted serious public health risks that currently exist in our waterways, and they are now being used to inform investigations into the compliance of various consent holders and to initiate new approaches to public health awareness in our rohe. The development of baseline data will also prove increasingly useful in the assessment and monitoring of future consents. The monitoring data are also being used in more high-level inquiries, including most recently as evidence to support Treaty of Waitangi claims as part of the Waitangi Tribunal inquiry in our rohe.

Finally, as shown in Chapter 6, the BBN model developed in Te Kete Tua-ātea phase of the research has become a powerful tool that can be used in decision-making processes to test outcomes of different resource management scenarios, to inform decisions on the objectives and limits that should be set for waterways, and to assist with decisions on the mitigation or restoration efforts that should be targeted to best achieve system health.

The implications of implementing Ngā Kete o te Wānanga as the theoretical framework for water planning and care in Aotearoa

The Ministry for the Environment's 'Environment Aotearoa 2019' (Ministry for the Environment and Stats NZ, 2019) has reported that 76% of freshwater fish are currently threatened or at risk of extinction, 82% of river length in pastoral farming areas was not suitable for activities such as swimming and 94% of river length in urban areas has nitrogen levels that may affect the growth of sensitive aquatic species. Aotearoa is in the midst of a water crisis, and it seems timely to examine how water is being cared for and what needs to change in order to halt and reverse the decline of its well-being.

Te Kete Tua-uri: Transitioning from an effects-based to a kaupapa/values-based approach to water planning, care and regulation in Aotearoa

One of the most significant contributions that Ngā Kete o te Wānanga and Māori technical approaches can make to water care in Aotearoa, and more broadly to environmental protection and regulation, is the utilisation of a kaupapa-based, or values-based, approach. The transformative effect of applying this type of approach was already demonstrated broadly through the health sector with the introduction of Te Whare Tapa Whā (Durie, 1998). This framework identifies four key values of well-being and requires that health practitioners work to optimise each of these.

Currently in Aotearoa, the RMA follows an 'effects-based' approach to regulation, whereby each proposed activity is assessed singularly in terms of its effect on the environment (Horton & Memon, 1997, p. 168). As many of the case studies referred to through this research have demonstrated, typically the onus to prove an adverse effect of a proposed activity rests with the community and Māori, and if adverse effects of the proposed activity cannot be proven, it will be given consent. As highlighted through the expressway case study discussed at the beginning of this thesis, proving an effect can be challenging without sufficient resources and the technical capability to provide evidence of it.

The transition to a kaupapa/values-based approach, described by Durie (2005) as a 'paradigm of potential', would instead require those applying for consent for activities to provide an assessment of the activities in terms of their potential to uphold values. I have tested this approach in previous research on environmental risk analysis of genetic engineering, which demonstrated how a kaupapa-based approach could be applied and how the approach ensures that decision-making is more oriented towards outcomes that fulfil societal values (Baker, 2012). Applying Ngā Kete o te Wānanga as a theoretical framework for water care and regulation in Aotearoa would require first the identification of key kaupapa or values of water and then technical regulatory processes that are oriented towards ensuring these values are upheld and fulfilled. Rather than only triggering regulatory responses when effects are detected, or limits are breached, regulation would proactively work to ensure that the values of water are enhanced and maximised.

Following a values-based approach to water care would lead Aotearoa to examine what its values truly are in relation to water. It would require the nation joining the growing global discourse that poses ontological questions about what water really 'is' (Yates, Harris, & Wilson, 2017). It would require a more conscious national dialogue about the

nature of society's relationship to water, in the same way that Māori technical approaches require that these values be examined and understood in explicit terms. Communities would have to reflectively examine how their beliefs and actions reflect the values that are dominating decisions about water and expose where different types of values may be privileged or ignored. It would also inevitably lead the nation to confront the reality that is particularly clear in colonial states: that there are multiple ontologies of water, diverse and conflicting values, and that decision-making has to involve technical and political processes that recognise, respect and provide for the diversity of values and worldviews.

Te Kete Aronui: Broadening our view of water systems in Aotearoa

Notable in this and in all other state of the environment reporting in Aotearoa is that well-being of freshwater is still largely thought about, reported on and cared for in terms of biophysical aspects of health. The view of water systems presented by Ngā Kete o te Wānanga poses the question of whether as a nation we are focusing on the right aspects of well-being, particularly given that the system is in a state of crisis. If we were to adopt the much broader view of Ngā Kete, we would be able to understand the function of the system better, including the different roles played by different types of values in the system, and as shown in Te Kete Aronui phase through the application of the influence matrix, we would be able to take a more informed and strategic view as to where to intervene in the system to improve its health.

A critical finding from this research has been that attributes of mana and māramatanga, specifically the integrity of decision-making and quality of knowledge used to inform decision-making, are the strongest determinants of overall well-being of water systems. If we were to apply those findings to how water is cared for in Aotearoa, and to the current government initiatives to restore the well-being of freshwater, there would be a heavy

focus on the technopolitics of water; the Crown would be prioritising issues with decision-making processes that affect water. Instead of analysis, monitoring and reporting being dominated by toxicology and microbiological data, we would see analysis, monitoring and reporting on the quality of local government decision-making processes. However, in comparison with the field of freshwater ecology, there is very little academic or policy discourse about how to measure the quality of decision-making, let alone regulatory mechanisms in place to ensure that this fundamentally critical aspect of water system health is functioning well. Issues of well-being are seen as exclusively located within the waterways themselves. Instead, there should be an understanding of the need to look more broadly and consider the well-being of the whole system, in particular the well-being at the locus of power.

The regulatory framework in Aotearoa is failing to ensure the sustainability of water as required by the RMA, and is failing to uphold Te Mana o te Wai, the fundamental objective of the NPS-FM 2017, which requires recognition of the connection between the health of water, the health of the environment and the health of the people. Despite the way in which the law reflects an understanding of the need to care for and manage the integrated well-being of the environment and water across a range of different values, this is not evident in practice.

The regulatory tools introduced by the NPS-FM, specifically the establishment of freshwater objectives and limits, are almost all focused on attributes of biophysical health, with the exception of contact recreation standards, which are measured in terms of what *E. coli* numbers should be limited to. This means that only the ecological aspects of system well-being are directly regulated, while the critical political and knowledge aspects, or other social aspects of well-being of the people, are not directly regulated.

The narrow focus of the Crown is also evidenced through the way that they are currently seeking 'scientific and technical' advice as part of the freshwater reform work they are undertaking. As a member of the Freshwater Science and Technical Advisory Group convened to support the Ministry for the Environment taskforce working on this, it was noticeable to me that of the 19 members all but three were freshwater ecologists. The expertise and advice of freshwater ecologists is clearly very important as part of this work; however, looking at this from a mātauranga Māori perspective, the scope of technical advice that the reform is being guided by is limited to understanding and interpreting the symptoms of system degradation, being poor ecological health, rather than being informed by technical advice on the actual drivers of the degradation, from fields such as political science or the social studies of science. If this approach continues, it appears that we are destined to continue to study and report on the ecological degradation while failing to develop an analytical and informed approach to addressing and rectifying the technopolitical factors that have led to this degradation.

An implication of applying Ngā Kete o te Wānanga as a theoretical framework for water care in Aotearoa would be a transition of the technical field of water studies to one that is far more diverse, transdisciplinary and able to more readily address the systemic issues that are driving water degradation. In the academic discourses about water, such as in publications and conferences, or in the technical working groups convened to address these issues, we would see analysis and debate about what determines good decision-making, what types of knowledges are needed in decision-making, or how to restore social connection to waterways. However, currently, these topics are limited to 'special interest papers' or seen as being on the periphery of water science, if they are engaged with at all.

Addressing the freshwater crisis in Aotearoa will require political science experts, philosophers of science, educational experts, creatives, activists and social scientists to

work in an increasingly transdisciplinary way with ecologists and other science experts to lift us as a nation out of this crisis. In this light, returning to the view and understanding of water systems that is indigenous to Aotearoa seems critical to restoring the well-being of water.

Te Kete Tua-ātea: Empowering Māori futuring tools in water care

At the beginning of this thesis, I referred to a prejudiced belief I had encountered: that Māori were uncomfortable with the application of quantitative models and other futuring tools. I hope that it has been made apparent through the examination of Te Kete Tua-ātea aspect of Māori knowledge, both as presented in literature and through this research process, that the application of futuring tools such as quantitative models and their inferencing abilities, and the reliance on knowledge generated by these tools, is in fact a key aspect of Māori knowledge. I imagine that the discomfort detected is likely to arise from quantitative models being applied outside of the control of Māori, and out of context of the wider Ngā Kete o te Wānanga framework, which requires that tools be grounded in Māori values, and informed by Māori observations.

Our iwi has demonstrated that when under their control and applied in the right way, Māori are ready to apply knowledge generated by futuring tools such as inference models in a more proactive way than their Western science oriented partners. In the case of the contaminated site disturbed by the expressway construction, the iwi quickly inferred the full range of likely outcomes and demanded action on the basis of this knowledge. Meanwhile, local government technical experts determined that there was no evidence of these effects yet and that without significant evidence they would not act to prevent the effects foreseen by the iwi.

Reflecting on this, it seems that the Western scientific approach is less confident and proficient in the correct use of futuring tools such as inference models. Provided that they are utilised in an appropriate way, the application of Te Kete Tua-ātea approaches, through building and applying inference models built from a values-based, whole of system perspective, would put communities in a stronger position to prevent future foreseeable outcomes, rather than waiting to act once the effect has been detected, at which point it is often too late to prevent broad-scale impact.

Te Kete Tua-ātea tools would be critical in a transition from an effects-based approach to a kaupapa/values-based approach, to provide for a more proactive approach to water care. As evidenced in our experience of detecting *Campylobacter* and high rates of *E. coli* in our waterways, if you cannot prove a specific source or party responsible for changes seen in waterways, or if the source responsible does not require a resource consent, there are no regulatory tools and no resourced response mechanism to address the issue. Environmental management is often bogged down in an inertia of technical debates over the degree of responsibility water users have for accumulated poor well-being of waterways, rather than collectively and proactively responding to issues with the necessary integrated solutions. In a kaupapa/values-based approach, the detection of an issue with the well-being of waterways involves utilising tools such as inference models, vested with regulatory weight, to assist in identifying the types of interventions that would be most likely to determine positive outcomes for the well-being of water.

The key environmental issues of our time such as climate change, water scarcity and pollution, and rapid species extinction all highlight the need to empower Te Kete Tua-ātea tools and capabilities and to act on the best knowledge we currently have, rather than wait for the proof that we should have acted when we still had the option. Much like the time of mass migration across the Pacific, the state of our environment requires that

we empower Te Kete Tua-ātea, and those who can use it to see beyond the horizon, to navigate us towards a safe and prosperous future.

What are the preconditions required to implement Ngā Kete o te Wānanga in water planning and care in Aotearoa?

Given the potential for the implementation of Ngā Kete o te Wānanga to be transformative for water planning and care in Aotearoa, this part will address the institutional and regulatory preconditions that are required to implement Ngā Kete o te Wānanga, in particular, Māori futuring tools such as their own quantitative models. As was discussed in Chapter 2, examples in the literature of Māori engaging in processes in which quantitative modelling tools are being applied to inform decision-making about water reveal how challenging it can be to ensure that the application of the tools are able to genuinely reflect the Māori worldview. The illustration in Figure 7.4 was presented to show the spectrum of Māori ability to have their worldview reflected through the application of qualitative modelling processes, as was evident in existing examples in the literature.

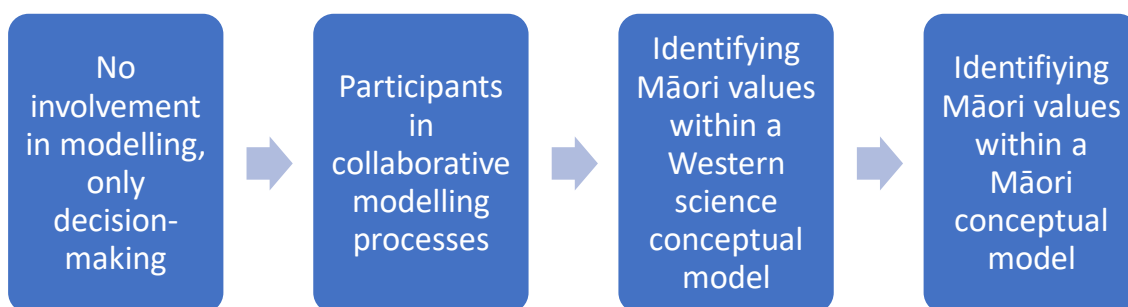


Figure 7.4 Spectrum of ability for Māori to have their worldview reflected through quantitative modelling processes

At the lower end of the spectrum, Māori were only provided with the opportunity to be involved in decision-making that was informed by quantitative modelling rather than the quantitative modelling itself. There were very few examples at the higher end of the spectrum, where quantitative models were built through utilising Māori conceptual models of systems in addition to other aspects of Māori knowledge.

This research has successfully developed and implemented a process and the tools that can be applied to ensure that quantitative modelling genuinely reflects a Māori worldview. However, consideration of the factors contributing to the success of this research has aided in identifying that certain institutional and regulatory preconditions are required for the types of processes and tools such as those presented in this thesis to be effectively implemented as a matter of standard practice in water planning and care.

Appropriate power arrangements for Māori in water planning and care

As was the case in the few examples in the literature where quantitative modelling processes were able to reflect a Māori worldview, a critical factor of the success of this research has been the ability to control the process completely, including the ability to manage and conduct the research, rather than be merely participants. Appropriate power arrangements are therefore crucial to ensuring that Māori can control the knowledge processes involved in water planning and care and provide for opportunities for approaches consistent with Ngā Kete o te Wānanga to be implemented.

Māori groups participating in the active Waitangi Tribunal inquiry into Māori rights and interests in water referred to in Chapter 1 of this thesis have identified the importance of enabling stronger government partnership with Māori in the governance of water across all levels and proposed various mechanisms for achieving this. The Iwi Leaders' Group (2018) submitted that relatively new requirements of local government to enter into iwi

partnership arrangements if requested by iwi, referred to as Mana Whakahono ā Rohe, reflect a positive step forward in engagement, but still do not directly address Māori rights and interests in water. Rather, they see that they should be addressed through providing for participation in governance and decision-making at national and regional levels, including the setting of robust limits on activities that affect the well-being of water, and recognising iwi values in decision-making frameworks.

The New Zealand Māori Council (2019) have proposed the idea of a National Water Commission as a high-level platform for Treaty partnership that would ensure that local government and catchment groups consult with relevant Māori groups when decisions are being made about freshwater bodies that are relevant to them. They also propose that local catchment groups comprise 50% Māori representation and be required to enter into properly resourced joint management agreements with Māori over their water bodies. With regard to resource consenting, they propose that gaining resource consents for commercial use in relation to a water body that Māori have a right in would require a 'super consultation' model that involves particularly strict requirements for consent applicants to consult with Māori.

These key Māori leadership groups place great emphasis on both the importance of ensuring Māori power and control of decision-making structures and processes, but do not seem to place much emphasis in terms of detailed analysis on power and control over what might be referred to as technical or knowledge processes, in particular, the processes to identify values, generate data on well-being of catchments, and conduct qualitative modelling or other types of futuring that are, in practice, central to the development and implementation of policy at the catchment scale. Relying on consultative mechanisms to have input into decision-making, or even sitting within decision-making groups that are informed by quantitative modelling, does not address the fact that the underlying conceptual models used to understand and analyse

catchment systems and inform decision-making are incapable of considering and dealing with the full range of Māori values that the Māori ontologies and worldviews of water comprise. This is consistent with a literature review conducted by Gooder (2018, p. 73) on the application of indigenous knowledge input into non-indigenous decision-making processes globally. She found that ‘international case studies of indigenous involvement in government-led impact assessment processes show that trying to fit indigenous ways of knowing into non-indigenous forums to be heard by people often unfamiliar with indigenous worldviews is undermining and ineffective’ (Gooder, 2018, p. 73).

Providing for entirely distinct mātauranga Māori planning processes

Māori require appropriate power arrangements, not just in terms of the various aspects of decision-making as set out above, but in terms of the knowledge processes involved in water planning and care. Chapter 3 of this thesis set out the key principles that guided the methodology of this research and were crucial to its success and legitimacy from a mātauranga Māori perspective. Some of them have particular relevance in terms of identifying how water planning more broadly across Aotearoa can provide for approaches consistent with Ngā Kete o te Wānanga to be implemented.

A key feature of this research has been the creation of a distinct mātauranga Māori planning process as informed by Winiata’s (1997) Tiriti House conceptual model (see Figure 3.1). The Tiriti House conceptual model reflects an understanding that the creation of knowledge and policy for one culture cannot occur within the paradigm of the other, and that for Tiriti-based co-creation to occur in the ‘Tiriti o Waitangi House’, there is a need to first ensure that there are distinct Māori cultural spaces, that is, the ‘Tikanga Māori House’, functioning to create and develop Māori knowledge.

This approach of ensuring there are distinct processes of Māori knowledge generation is increasingly reflected across various Māori planning initiatives in Aotearoa. In response to the wide range of research and planning processes that have implications for Ngāi Tahu ki Murihiku people's waterways, a project by Kitson, Cain, Johnstone, et al. (2018) has focused on reconstructing and revitalising mātauranga Māori about certain land and waterscapes to ensure the quality of knowledge is available to effectively inform future research and planning processes in relation to those waterways where engagement with Crown will be required. Ensuring that the iwi both directed and carried out the research was critical to the success and authenticity of the project.

Ensuring a distinct Māori knowledge creation process is also a feature of a research project by Crow et al. (2018) that aimed to develop tools for incorporating Māori values into the setting of appropriate streamflow levels. This was achieved through a group of mandated iwi representatives first identifying values and attributes of waterways from a Māori cultural perspective, then identifying the flow dependencies of those attributes, and then directly assessing in the field whether various observed flow regimes provide for those attributes. The importance of providing for the development of distinct Māori measures of health and flow was evident when the project found that the type of relationship between Māori assessments of health and flow was unique to each site. Mātauranga Māori knowledge creation processes ensure that place-based values and understandings of well-being are generated and not approximated by measures that have been generalised across different locations.

It is not just Māori who are increasingly seeing the benefit of providing more power to Māori governance and knowledge processes to inform freshwater policy development and management. Research by Parsons et al. (2019) has demonstrated that the system

of managing rivers in Aotearoa is profoundly 'path dependent' meaning that decision-making processes and outcomes are directed by historical institutional patterns that have been embedded over time and are underpinned by a certain set of hegemonic social values. Decision-making and management therefore tend to follow the same approaches as those employed in the past, even when more appropriate alternative options are available to decision-makers. The research identified that the translation of Māori governance and values into river policy and management approaches is critical to breaking the 'path dependency' of the Western approach to river management and changing governance, policy and knowledge processes in order to see better outcomes for catchment well-being.

It has not been within the scope of this thesis to determine the ability of knowledge and tools generated through the implementation of Ngā Kete o te Wānanga to influence Western approaches to water planning or care. However, it is worth noting that the restoration of political power, resource and capability to Māori that is observed through Treaty settlements has been reported in research by Livesey (2019) to 'unsettle' the institution of planning in Aotearoa. Livesey reported that the implementation of iwi-developed policy in planning tends to assert discourses that counter the settler colonial logics that underlie planning processes. It would seem then that a precondition of successfully implementing Māori knowledge approaches and tools such as those from Ngā Kete o te Wānanga when engaging with broader planning processes in Aotearoa is the decolonisation of the institution of planning, which Livesey suggests may be possible through initiatives to transform settler consciousness and undertake the emotional, cultural and constitutional work that is typically required in decolonising.

In this thesis, an entirely distinct mātauranga Māori process has been utilised, in which not only have the values, attributes, measures, conceptual models and modelling itself been generated within a tikanga Māori paradigm, but this process has also led to the development of our own iwi policy directly informed by this knowledge, as reflected through the identification of freshwater planning objectives and the completion of an Iwi Katiakitanga Plan. This research and other recent examples from the literature highlight that Tiriti partnership in planning requires not just our own distinct political representation in planning processes, but also provision for own distinct knowledge creation spaces and processes.

Chapter 8: Ki te whaiao, ki Te Ao Mārama⁴⁸

Key findings of this research

Five key findings have emerged from this research into how mātauranga Māori approaches and tools can support Te Āti Awa ki Whakarongotai in realising the futures they wish to see for water systems.

First, a fuller understanding of what tino rangatiratanga means in relation to water has emerged from this research. Our iwi have found that asserting our tino rangatiratanga in relation to water means we have the authority, ability and freedom to implement our values and realise our aspirations for the future through kaitiakitanga of water.

It has been evident through the research that Māori cannot rely on purely Western scientific tools to implement their values, or to articulate their view of the world and their aspirations for it. We cannot utilise the same knowledge paradigm that has been used to obscure, suppress or discount our knowledge system and our values to emancipate ourselves (Royal, 1999). We must return to our own knowledge paradigm and be careful when applying Western scientific tools to do so in accordance with Māori knowledge protocols. The implementation of Māori values can only be properly achieved through the application of mātauranga Māori approaches and technical tools, in processes controlled by us as Māori. Achieving tino rangatiratanga is therefore just as reliant on the ability to apply Māori knowledge as it is on implementing Māori political power. In a future in which Māori will increasingly find themselves around the decision-making table in relation to water, the ability to apply mātauranga Māori approaches and tools will be crucial in ensuring that this increased power results in genuinely actualising Māori

⁴⁸ An expression used to refer to arriving at a place of enlightenment.

aspirations, rather than reinforcing the limited set of values that tend to be privileged through the application of a Western scientific view.

The second key finding from the research has been the presentation of Ngā Kete o te Wānanga as a complete mātauranga Māori theoretical framework. The framework can be applied by iwi in their role as kaitiaki of water to support their tino rangatiratanga through the implementation of the three kete:

1. Te Kete Tua-uri: The application of tools from this kete provide the fundamental knowledge and values that inform our understanding of how water systems work.
2. Te Kete Aronui: The application of tools from this kete facilitates the observations and generation of knowledge we gain as a result of being a part of water systems.
3. Te Kete Tua-ātea: The application of tools from this kete generates meaningful inferences about the likely future states and trajectories of water systems.

Ngā Kete o te Wānanga functions as a complete system of knowledge and tools from each specific kete; that is, theory, monitoring and different types of modelling cannot be applied without being informed by the each other.

This research originally emerged from a need to reaffirm and develop Māori futuring tools, which come from Te Kete Tua-ātea. The third key finding of the thesis has been the recognition and revitalisation of Te Kete Tua-ātea as a distinct and critical field of mātauranga Māori that is crucial to supporting kaitiakitanga, including the care of water. Whereas the application of the other two kete appear to be more prevalent in modern kaitiakitanga practice through the examination of values that inform our worldview of water, and the increasing field of kaitiaki monitoring, the tools of Te Kete Tua-ātea are not as well retained or developed by kaitiaki and are not as actively implemented.

This research has included the development of new futuring tools that can be applied to generate knowledge from Te Kete Tua-ātea in the form of evidence-based inferences. This has involved exploring and theorising the basic aspects of the underlying Māori mathematics that is applied through Te Kete Tua-ātea, and the recognition that this aligns with Bayesian statistical theory and approaches. Developing Te Kete Tua-ātea tools and applying them to practical examples has reaffirmed the value of this field and the need to further develop expertise in this area.

Beyond the development of Ngā Kete o te Wānanga as a framework and its associated tools, the fourth key finding has been the specific knowledge their application has generated to support the tino rangatiratanga of Te Āti Awa ki Whakarongotai.

A rich iwi ontology of water has been produced to provide a more in-depth understanding of water from a Te Āti Awa perspective. This presents a view that water comprises a broad spectrum of interrelated values. It shows that water is valued as providing fundamental existential values, in both supporting physical survival and supporting a psychological sense of identity, that it holds fundamental societal values, and that it is seen to reflect the consciousness of societies.

Novel tools to facilitate observations across these broad values were developed and applied. These include tools for monitoring and measuring the integrity of decision-making processes, and a survey tool for measuring the well-being of attributes of wairua and whakapapa connectivity in our rohe. The implementation of these monitoring tools has generated rich data of broad interest on many aspects of water system health that have been overlooked for some time.

A more complex shared understanding of how water systems in our rohe function has also been developed. The conceptual model of water systems that was developed

provides insight into the way in which different types of values are related to one another in the system. This included identifying attributes of mana and māramatanga, particularly as they apply to decision-making processes, as the key drivers of well-being of water systems. Modelling also identified that attributes of wairua and whakapapa values, particularly the levels of distress and disconnection experienced as a result of the degradation of water, function as a negative feedback loop in the system, in that individuals who suffer from this are less likely to be able to effectively influence decision-making, thus making adverse outcomes more likely.

The BBN model was also able to generate useful inferences about the likely systemic outcomes of various resource management scenarios, including effects on the health of aquatic life, the quality of mahinga kai available and the ability to ensure the continuation of intergenerational knowledge transmission. The models were used to identify the key determinants of different types of well-being and show how in complex systems the attributes that are critical may be unexpected. For example, when identifying key determinants of social well-being, it was foreseeable that the quality of mahinga kai available would be identified; however, the stable temperature of waterways was also identified as a strong determinant. These types of complex relationships are crucial to understand in caring for water systems, but are only evident when taking a whole of system view. The application of these models has provided a more advanced understanding of how water systems in our rohe function.

Through applying the knowledge created in this research, the iwi have improved their ability to implement their values through decision-making processes, and generate more outcomes that align with their aspirations as an iwi.

The final key finding of this research has been the identification of the contribution that Ngā Kete o te Wānanga can make to improving the way that water is cared for in

Aotearoa. The research has demonstrated the benefits of a kaupapa/values-based, whole of system, future-oriented approach to water care.

Contributions of the research

This research makes contributions in five key areas of practice and literature discourse.

The primary contribution this research makes is the actual implementation of mātauranga Māori tools that have successfully supported my iwi of Te Āti Awa ki Whakarongotai in their exercise of kaitiakitanga, and ultimately in the opportunities they have to assert their tino rangatiratanga in relation to water. Each phase of the research has contributed to a specific aspect of the work of our iwi. Te Kete Tua-uri phase supported the development of an Iwi Kaitiakitanga Plan, and the iwi ontology of water presented in Chapter 4 was able to be filed as evidence in support of Treaty of Waitangi Claims being heard by the Waitangi Tribunal inquiry currently being carried out in the district. Te Kete Aronui phase supported the establishment of a monitoring regime that is not only ongoing in the rohe of Te Āti Awa ki Whakarongotai, but has become a model for other iwi in the region to learn from in order to support the development of their own. Finally, Te Kete Tua-ātea phase has provided the iwi with a technical tool they can apply in a range of catchment planning and restoration contexts.

The outputs and findings of this research also contribute to the published and unpublished academic discourse on mātauranga Māori tools that support the rangatiratanga and kaitiakitanga of iwi and hapū nationally. In particular, the thesis proposes the idea of the discipline of Te Kete Tua-ātea within mātauranga Māori, or what may be described as Māori future studies, as a means of revitalising, reclaiming and creating the mātauranga Māori that relate to the future, including the development and

utilisation of different types of inference models. It demonstrates the falseness of the idea that Māori do not like or are intimidated by this type of modelling.

More broadly, the thesis adds to the literature on tools to assist in the 'new environmental governance' (NEG) regimes for freshwater management that are characterised by devolution to the local level and collaborative processes (Holley, 2016, p. 24), whereby the state provides the essential steer, incentives, enforcement capability and resources while the local level provides local knowledge, ownership and legitimacy (Gunningham, 2008, pp. 5–6). This thesis provides solutions in response to the failings the literature has identified for those devolved NEG regimes to enable indigenous or other local participation in the provision of local knowledge and legitimacy or provide for indigenous authority and control over outcomes.

It also contributes to the growing discourse about the need for NEG regimes and planning processes to recognise and design for multiple ontologies of water (Yates et al., 2017). The approach developed through this research provides for an indigenous community to utilise their own understanding and observations of freshwater systems to enhance both the capability of their futuring tools and the likely impact and effectiveness of decisions they make about water and land use over time.

The research also contributes to the public and academic discourse by providing an analysis of the technopolitical connection between the development of effective technical knowledge tools, the ability of Māori to exercise rangatiratanga, and the success of devolved water care and restoration initiatives. This has been previously identified by Coombes (2007) in a case study of devolved water management in Lake Whakakāi in which he attributed the ineffectiveness of a Māori community's attempt to restore the lake to the ambivalence of state agencies towards the Māori community's broader agenda for self-determination, which included the development of their own distinct

knowledge capability. Coombes highlighted that for decentralised freshwater management to be effective, the state should ensure there is adequate resource that can be applied, not just in support of Māori organisations as a political presence at the catchment level, but in support of Māori technical input. Several of the key pieces of NEG of freshwater literature referred to in this thesis (Gunningham, 2008; Holley, 2016; Lennox et al., 2011) have lacked an understanding that the strength of Māori in terms of both their ability to exercise rangatiratanga and their knowledge capability can be critical determinants of the success of devolved freshwater management in Aotearoa.

Finally, this research makes a significant contribution by proposing an approach to implementing a key aspect of devolved water planning and management in Aotearoa: the NPS-FM. The approach developed in this research of applying Ngā Kete o te Wānanga provides the technical guidance that is currently lacking on methods for ensuring that Māori values connected to water are able to inform the implementation of the national objectives framework and the setting of freshwater objectives and limits to use, in a way that achieves the purpose of the NPS-FM to reflect Te Mana o te Wai, or the connection between the health of freshwater, the health of the environment and the health of people. This contribution has been actualised through my appointment to the Kāhui Wai Māori: a Māori expert advisory forum that was appointed by the Minister for the Environment to provide advice on freshwater reform in Aotearoa. Through that forum I have been able to directly contribute the findings of this research to the process of policy development that is currently being undertaken. At the time of completing this thesis, the New Zealand Government had agreed to consult nationally on a new policy that includes an amendment to the NPS-FM to make mahinga kai a compulsory national value and require councils to resource a planning process for iwi and hapū to identify attributes of this value that would directly inform the setting of freshwater objectives and limits at the catchment scale. This policy was directly informed by the methods, research and findings presented in this thesis.

Future research

Through its examination of the function of water systems, this project has identified a significant area of potential future research that would help us to better care for water systems.

First, while it is not of direct relation to the topic of this thesis or the specific interests of the iwi, there is a clear need for research into the values that New Zealanders hold in connection to water. For a kaupapa/values-based approach to water care to be implemented in Aotearoa, there will need to be more in-depth examination of Pākehā values of water. Additionally, there is further research needed into the roles that different values play in freshwater systems. The conceptual model developed in this research shows merely the understanding of Te Āti Awa ki Whakarongotai, and cannot be assumed to apply to all water systems. It would be of interest to see whether different Māori and different non-Māori communities understand the function of water systems in the same way, and what might be learned by comparing differing views on this.

The research identified the well-being of decision-making processes, in terms of how power is shared and the quality of knowledge inputs, as the key driver of well-being in water systems. Further research is therefore required into what constitutes 'quality decision-making'. Further knowledge is required on how this is defined, how it can be measured, what determines it, and so on. This will have to be sensitive to the fact that notions of good decision-making are culturally bound. There may be stark contrasts between what Māori communities see as constituting a good decision-making process and how Pākehā might see this. Examining this may further highlight the cultural norms that are dominating the function of decision-making processes and why, beyond the tendency to be a democratic minority, Māori find decision-making processes challenging

to engage with. However, there are also significant benefits for the community at large to develop understanding, measures and accountability for good decision-making.

There is also the scope for further research into the way that environmental distress, psychological trauma within communities, and social and identity connection to water influences overall water system health. This includes the need to research and identify effective methods to restore these aspects of well-being to the community and to people. These dynamics have particular contexts for Māori as indigenous people and as survivors of the degradation of water and their disconnection from ancestral waterways; however, there would also be merit in examining how mental health and social well-being of non-Māori communities are affected by degradation of water or the inability to connect with water, and to further examine whether the relationship between these factors and decreased likelihood of effectively influencing or informing decision-making applies to non-Māori as well.

Future trajectories

Given the crisis the country faces in terms of the well-being of water, and the maturation of the country as it continues nation-building and coming to terms with being bicultural and pluralistic, the time to create a paradigm shift in how water is cared for has arrived for Aotearoa. Fundamental reform of the RMA is required, and as a result of the findings of this research I recommend the following:

1. The explicit legal recognition of water as providing fundamental existential value to all living things.
2. The transition to a kaupapa/values-based approach to environmental care and protection through a new piece of legislation that replaces the RMA and the effects-based regime.

3. The legal recognition of a rangatiratanga-kāwanatanga framework as the constitutionally appropriate approach to caring for the environment, including water.
4. The genuine and comprehensive application of an integrated view of water into law and the NPS-FM, through the definition of the well-being of water systems in terms of a broad range of existential, psychological, spiritual, economic, social and ecological values.
5. The introduction of compulsory requirements for iwi to be resourced by the state to:
 - identify their own key kaupapa or values of waterways in their rohe and attributes for these values
 - identify specific measurable objectives for each of these kaupapa
 - conduct monitoring of these attributes.
6. Legal powers for the rangatiratanga-kāwanatanga framework to respond and intervene when monitoring identifies that water systems are not achieving set objectives.
7. Monitoring, auditing and accountability mechanisms for decision-making processes.

My thinking throughout this thesis has been heavily informed by my experience working as a kaitiaki and technical expert in support of the political leadership of our iwi. When I attend hui, or meetings, with local government or other Crown agencies, and see representatives sitting around the decision-making table, I often envisage in my mind's eye what the technical and bureaucratic support system behind each individual looks like. In the case of councillors, for example, I can see the whole staff of the council employed to provide advice to elected members, the specialised technical experts that they can sometimes contract in and the revenue that is gained through public funds such as tax or the commercialisation of public assets to fund their bureaucratic and technical

support. I also see the system of Western science with all its resourcing, functionality and power. When I look at our iwi representatives, I can often see one or two support personnel working behind them, maybe a relative that has particular expertise in the topic. I see the iwi members who meet and send email correspondence in their evenings and weekends to try to engage with consultation material. I see no revenue to resource their support, or the use of revenue that was not meant to fund the exercise of Crown processes but was provided as reparation for the effects of historic Crown processes. I see attempts to apply our system of knowledge, and the repeated ways in which it is disregarded, or undervalued.

It is no surprise then that often even with political representation, it is still challenging for Māori to determine the outcomes of decision-making. I see that positions of political representation provide only a superficial appearance of rangatiratanga; tino rangatiratanga requires fully operational bureaucratic and technical systems to support our political leadership. In accordance with the founding document of New Zealand, the exercise of kāwanatanga is subject to the tino rangatiratanga of iwi and hapū. Yet the resources held by the state are only applied to support the bureaucracies of kāwanatanga. The building of capacity and capability of the bureaucracies of rangatiratanga, particularly the technical knowledge support, must be provided to Māori as a matter of constitutional right.

However, the work to build mātauranga Māori capability ultimately sits with Māori. Research on the place of mātauranga Māori in society has identified that knowledge holders see Māori apathy as a key barrier to the growth and use of mātauranga Māori (Royal, 2009c). Māori organisations, educational providers and institutions of knowledge and research need to privilege work that grows our mātauranga Māori capability and continues to fill Ngā Kete o te Wānanga with more tools and knowledge. Further tools are needed to assist us to observe aspects of the world that have been overlooked since

the introduction of Western scientific approaches. This particularly includes methods and tools for applying the broader āronga of mātauranga Māori that engages not just the brain but also the puku and ngākau. Research into the other affective realms of observation might provide critical insight into the well-being of the environment and of ourselves. In particular, we need to refamiliarise ourselves with Te Kete Tua-ātea, including but not limited to the application of mātauranga Māori futuring abilities within the fields of maramataka, ocean navigation, meteorology and kaitiakitanga.

Applying Ngā Kete o te Wānanga as a whole system of knowledge has required us as an iwi to re-engage with and revitalise our inherited skills to see the world again through a mātauranga Māori lens. To see in terms of aronui, tua-uri and tua-ātea, that is, to have not only a broad view of natural systems in a lateral sense, but to see behind our reality, what has given rise to it, and to see further beyond, to see the world beyond our current space and time. In returning to the mythopoetic symbology of Ngā Kete o te Wānanga in the narrative of the pursuit of knowledge by Tāne, the research process has taught us that we attain Ngā Kete o te Wānanga when we understand and apply a worldview that is able to integrate all aspects of reality - theoretical, observable and futued - into our worldview.

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Appendix A: Consent Documentation



Tēnā koe,

My name is Jordan Aria Housiaux, and I am working on behalf of Mahina-a-rangi Baker on the Te Ātiawa ki Whakarongotai Charitable Trust Iwi (TAKW) Environmental Management Plan, and Environmental Modelling Project. I have recently returned home from studying in Dunedin, and am now helping Mahina-a-rangi with her environmental mahi through Whakarongotai.

Thank you for the interview you provided for X Project. We are now developing two new projects: The TAKW Iwi Environmental Management Plan, and the Environmental Modelling Project. I am emailing you today, to request your permission to include the information gathered from your interviews during the Project X in these new projects.

The attached document describes these current projects in more detail and includes a consent form for you to sign and return to us via email or post.

Alternatively, if you agree to all the conditions described on the consent form, you can give your consent by copying the below sentence and pasting it in a reply to this email:

“I give full permission for Te Ātiawa ki Whakarongotai Charitable Trust Iwi (TAKW) to use my recordings and accompanying material from X project for the Environmental Management Plan, and Environmental Modelling Project”.

If you wish, we can provide you with an audio copy or transcript of your interview at any time.

Ngā mihi nui,

Jordan Aria Housiaux



Te Ātiawa ki Whakarongotai Iwi Environmental Management Plan & Environmental Modelling Project

Tēnā koe,

Te Ātiawa ki Whakarongotai Charitable Trust (TAKW) are conducting two environmental research projects:

1. The Iwi Environmental Management Plan, which aims to develop an iwi environmental plan that identifies the key values, objectives and policies of Te Ātiawa ki Whakarongotai.
2. The Environmental Modelling Project, which aims to create a framework for Te Ātiawa ki Whakarongotai to conduct collaborative modelling of freshwater, to inform decision-making with local government.

You have been identified by the iwi as a potential contributor due to your past involvement in the X Project.

This consent form grants Te Ātiawa ki Whakarongotai Charitable Trust, permission to use the information gathered from your oral interviews during the X Project, for the current Iwi Environmental Management Plan and Environmental Modelling Project. By signing this consent form you are agreeing to the following (please feel free to put a line through terms you do not agree to, or add your own terms):

- The use of recordings and accompanying material from X project, to be used for the TAKW Iwi Environmental Management Plan, and Environmental Modelling Project.
- That the interview and accompanying material may be quoted in full or in part; this includes in published work.
- That the intellectual and cultural property in the interview is retained by the interviewee, but for the purpose of these projects are vested with TAKW.
- The terms agreed to may be amended at any time with the authority of the person interviewed.

Signed: _____ **Date:** _____



Te Ātiawa ki Whakarongotai Iwi Environmental Management Plan Workshop

Te Ātiawa ki Whakarongotai Charitable Trust (TAKW) are conducting a research project to develop an iwi environmental plan that identifies the key values, objectives and policies of Te Ātiawa ki Whakarongotai. We are holding workshops to assist in exploring these themes, which relies on participation and input from Te Ātiawa ki Whakarongotai iwi members.

By signing this consent form you are agreeing to participate in these workshops, and are therefore agreeing to contribute to the Iwi Environmental Management Plan. You are also agreeing to the following (please feel free to put a line through terms you do not agree to, or add your own terms):

- That information gathered from these workshops, whether oral, written, visual, or any other accompanying materials be used by TAKW to assist in developing the Environmental Management Plan.
- That the recordings and accompanying material gathered may be accessed for other TAKW research projects in the future.
- That the oral, written, or visual information and accompanying material may be quoted in full or in part; this includes in published work.
- That the intellectual and cultural property in the interview is retained by the workshop participant, but for the purpose of this project is vested with TAKW.
- For recordings and other accompanying materials gathered during these workshops, prepared for archival purposes, to be held by TAKW.
- The terms agreed to may be amended at any time with the authority of the person interviewed.

Workshop Participant Name: _____

Age: _____

Signed: _____

Date: _____



Te Ātiawa ki Whakarongotai Mahinga Kai Health Research Project

Tēnā koe,

Te Ātiawa ki Whakarongotai Charitable Trust (TAKW) are conducting a research project to develop a method for measuring the health of the mahinga kai in our rohe.

The research project will explore how we value our water and mahinga kai, and what healthy water and mahinga kai looks like from a Te Ātiawa ki Whakarongotai perspective.

You have been identified by the iwi as someone to interview for this project. By signing this consent form you are agreeing to participate in the research project and to the following (please feel free to put a line through terms you do not agree to, or add your own terms):

- To be interviewed and for the recording and accompanying material, prepared for archival purposes, to be held by TAKW.
- That the recording and accompanying material may be accessed for other TAKW research projects in the future.
- That the interview and accompanying material may be quoted in full or in part; this includes in published work.
- That the intellectual and cultural property in the interview is retained by the interviewee, but for the purpose of this project is vested with TAKW.
- That the interviewee will be provided with a copy of the transcript of the interview for review.
- The terms agreed to may be amended at any time with the authority of the person interviewed.

Signed: _____ **Date:** _____



Te Ātiawa ki Whakarongotai Prioritising Monitoring Workshop

Te Ātiawa ki Whakarongotai Charitable Trust (TAKW) are conducting a pilot project to develop a method for iwi in the Greater Wellington Region to conduct their own kaitiaki monitoring. The first step in that project is to test a proposed method for prioritising values to monitor through a workshop.

By signing this consent form you are agreeing to participate in this workshop, and are therefore agreeing to contribute to the testing of the method. You are also agreeing to the following (please feel free to put a line through terms you do not agree to, or add your own terms):

- That information gathered from these workshops, whether oral, written, visual, or any other accompanying materials be used by TAKW to assist in developing the method.
- That the accompanying material gathered may be accessed for other TAKW research projects in the future.
- That the oral, written, or visual information and accompanying material may be quoted in full or in part; this includes in published work.
- That the intellectual and cultural property is retained by the workshop participant, but for the purpose of this project is vested with TAKW.
- That accompanying materials gathered during these workshops, prepared for archival purposes, are to be held by TAKW.
- The terms agreed to may be amended at any time with the authority of the person involved.

Workshop Participant Name: _____

Signed: _____

Date: _____



Te Ātiawa ki Whakarongotai Modelling Workshop

I am conducting a research project for my PhD in partnership with Te Ātiawa ki Whakarongotai Charitable Trust (TAKW) to develop a framework and associated modelling tools to use in decision-making that effects mahinga kai. We are holding small workshops to gain input from Te Ātiawa ki Whakarongotai iwi members.

By signing this consent form you are agreeing to participate in this workshop, and are therefore agreeing to contribute to the modelling project. You are also agreeing to the following (please feel free to put a line through terms you do not agree to, or add your own terms):

- That the intellectual and cultural property in the interview is retained by the workshop participant, but for the purpose of this project is vested with TAKW
- That information gathered from these workshops, whether oral, written, visual, or any other accompanying materials be used by TAKW and Mahina-a-rangi Baker to assist in developing modelling tools for the project.
- That the recordings and accompanying material gathered may be accessed for other TAKW research projects in the future.
- That the oral, written, or visual information and accompanying material may be quoted in full or in part; this includes in published work.
- For recordings and other accompanying materials gathered during these workshops, prepared for archival purposes, to be held by TAKW.
- The terms agreed to may be amended at any time with the authority of the person interviewed.

Workshop Participant Name: _____

Age: _____

Signed: _____

Date: _____

Appendix B: Iwi Kaitiakitanga Plan



ĀTIAWA KI WHAKARONGOTAI

Whakarongotai o te moana Whakarongotai o te wā

KAITIAKITANGA PLAN *for* TE ĀTIAWA KI WHAKARONGOTAI





Nā Te Ātiawa ki Whakarongotai te mana katoa o tēnei tuhinga.
Whakarongotai o te moana, Whakarongotai o te wā

The information contained in this plan is original work, and
protected by Te Ātiawa ki Whakarongotai Charitable Trust.

*Headlands of the Waikanae River. Cover page photo by: Rakairoa Grace.
Kawakahia Wetland. Photo (above) by: Reina Solomon.*



Whakarongo atu ki ngā tai o Raukawa moana
e pāpaki mai ra, ia rā, ia rā.

Mutunga kore, pāpaki tū ana ngā tai ki uta.

I tēnei rā kua pāpaki mai ngā tai o te ao ki a Te Ātiawa.

Pī kē pea te piki atu, rere haere ai ki runga i te kaha
o te ao hurihuri;

Me kore pea te kitea he maramatanga ki ngā
whakaritenga o te wā e tika ai tātou te iwi.

Nō reira, whakarongotai o te moana,
whakarongotai o te wā.

ACKNOWLEDGEMENTS

Many iwi members have provided support and information to Ātiawa ki Whakarongotai Charitable Trust over the course of the development of this Plan or through earlier involvement in kaitiaki work and we wish to acknowledge them and their wider whānau here:

Kaunihera Kaumātua of Ātiawa ki Whakarongotai, Ngā Rangatahi o Ātiawa ki Whakarongotai, Manahi Matenga Baker, Matau Matenga Baker, John Barrett, Mahutonga Blankensop, Bill Carter, Waikuharu Cooke, Richard Davis, Sharlene Maoate Davis, Amo Clarke, Rawhiti Higgot, Hariata Mei Higgot, Rakairoa Grace, Te Tokawhakahea Graham, Tapuikura Hamuti, George Jenkins, Doris Lake, Tracey Morgan, Les Mullen, Danny Mullen, Ben Ngaia, Kristie Parata, Manu Parata, Shane Parata, Te Pehi Parata, Tutere Parata, Gabrielle Rikihana, Queenie Rikihana, Paora Ropata, Hemi Sundgren, Rakauoteora Te Maipi, Huta Thomas, Tony Thomas, Brenda Tuuta, Karl Webber, Chris Webber, and all iwi members who participated in surveys and attended hui and wānanga.

Acknowledgements also to Te Rangmārie Williams, Jordan Housiaux, and Reina Solomon of Te Kōnae Ltd. To editor Ellen McRae, designer Caroline Hind, and Te Waka Kai Ora, for the use of their images and the Hua Parakore framework to guide our planning work.

This Kaitiakitanga Plan was launched by the people of Te Ātiawa ki Whakarongotai at Whakarongotai Marae on Orongonui o Pipiri, 2019.

Ānei te mihi aroha ki a koutou katoa.

Whakarongotai o te moana Whakarongotai o te wā

KAITIAKITANGA PLAN
for TE ĀTIAWA KI WHAKARONGOTAI

CONTENTS

| | | | | | |
|----------|--|-----------|--|---|-----------|
| 1 | Kupu Arataki | 5 | 6 | Te Ao Tūroa | 35 |
| 1.1 | He Mihi..... | 5 | 6.1 | Kaupapa Kōrero mō Te Ao Tūroa | 35 |
| 1.2 | Aronga – Purpose of This Iwi Kaitiakitanga Plan | 7 | 6.2 | Te Ao Tūroa: Huanga | 37 |
| 1.3 | Kaupapa Māori Planning Framework | 8 | 6.3 | Te Ao Tūroa: Tikanga | 38 |
| 1.4 | Hua Parakore – A Kaupapa Māori Framework for Achieving Environmental Integrity through Balance | 9 | 6.4 | Te Ao Tūroa: Five-Year Priorities | 39 |
| 1.5 | Iwi Input into the Kaitiakitanga Plan..... | 10 | 7 | Mauri | 40 |
| 1.6 | Plan Structure | 12 | 7.1 | Kaupapa Kōrero mō te Mauri..... | 40 |
| 2 | Whakapapa | 13 | 7.2 | Mauri: Ngā Huanga..... | 42 |
| 2.1 | Whakapapa o Te Ātiawa ki Whakarongotai | 13 | 7.3 | Mauri: Ngā Tikanga..... | 43 |
| 2.2 | Whakapapa: Ngā Huanga | 16 | 7.4 | Mauri: Five-Year Priorities | 44 |
| 2.3 | Whakapapa: Ngā Tikanga..... | 17 | Appendices | 45 | |
| 2.4 | Whakapapa: Five-Year Priorities..... | 18 | Appendix A: Accidental Discovery Protocol | 46 | |
| 3 | Wairua | 19 | Appendix B: Te Ātiawa ki Whakarongotai Iwi Monitoring Tikanga | 47 | |
| 3.1 | Kaupapa Kōrero mō te Wairua..... | 19 | Appendix C: Te Ātiawa ki Whakarongotai Freshwater Customary Use Tikanga | 50 | |
| 3.2 | Wairua: Ngā Huanga | 22 | Appendix D: Mātauranga Māori Protocols..... | 51 | |
| 3.3 | Wairua: Ngā Tikanga..... | 22 | Appendix E: Freshwater Mahinga Kai Health Index..... | 54 | |
| 3.4 | Wairua: Five-Year Priorities..... | 24 | Appendix F: Ngā Tikanga Tohorā o Te Ātiawa ki Whakarongotai..... | 56 | |
| 4 | Mana | 25 | Appendix G: Te Ātiawa ki Whakarongotai Partnership Strategy..... | 57 | |
| 4.1 | Kaupapa Kōrero mō te Mana | 25 | Appendix H: Tāhuhu Kōrero o Te Ātiawa ki Whakarongotai..... | 58 | |
| 4.2 | Mana: Ngā Huanga | 27 | Appendix I: Te Rohe o Te Ātiawa ki Whakarongotai..... | 59 | |
| 4.3 | Mana: Ngā Tikanga | 28 | References | 60 | |
| 4.4 | Mana: Five-Year Priorities | 29 | | | |
| 5 | Māramatanga | 30 | | | |
| 5.1 | Kaupapa Kōrero mō te Māramatanga | 30 | | | |
| 5.2 | Māramatanga: Huanga | 32 | | | |
| 5.3 | Māramatanga: Ngā Tikanga | 33 | | | |
| 5.4 | Māramatanga: Five-Year Priorities..... | 34 | | | |





1 Kupu Arataki

1.1 He Mihi

Kāhore anō au i koropiko ki te mana o te Kuini.

Kāhore ano au i takoto atu ki ngā whakahaere a ngā rangatira o te motu nei.

Nō te mea, e kaha ana te kai pēhi i te mana me te kaha ki raro ki ōku waewae.

nā Tohu Kakahi

Tēnā tātou katoa e whiwhi ana te mahi whai tikanga o Ātiawa ki Whakarongotai, kia pātūtū te taiao mai Kūkūtauākī ki Whareroa, tatū atu ki Paripari. Rere whakauta ngā tini tapu ko Wainui, ko Maunganui, Pukemore, Kapakapanui, Pukeatua ūngutu atu ki te pou whakararo ki Ngawhakangutu, ko Ātiawa ki Whakarongotai e.

Nei rā te mihi te whakaminenga me te rahi ka rarau i te kaupapa kia tohua ai ā tātou tēnei pukapuka, 'Whakarongotai o te moana, Whakarongotai o te wā'. Tēnā tātou katoa.

Ātiawa ki Whakarongotai Charitable Trust inherits the responsibility for maintaining and progressively promoting the generational values of our tūpuna to express kaitiakitanga as mana whenua.

The Trust recognises our collective iwi leadership and the contributions of successive governance and operational kaitiaki who have contributed to the vision and application of ngā kaupapa tuku iho embedded in this new Iwi Kaitiakitanga Plan. The unique and defining relationship within the confederation of hapū and iwi of Ātiawa ki Whakarongotai, Ngāti Raukawa and Ngāti Toa Rangatira endures, and will continue to be informed by the Plan.

The Plan will also support achieving appropriate engagement with Kāwanatanga to ensure compliance with mana whenua under Te Tiriti o Waitangi. It will support our iwi to articulate the nature of partnership arrangements they want to see with the Kāwanatanga, including local government. Through the course of reviewing our partnership arrangements we have also identified

the following three key kaupapa to guide our own governance:

1. **Nōu te rourou, Nāku te rourou;** clear designation of roles within Ātiawa ki Whakarongotai iwi structure.
2. **Mahi Ngaio;** ensuring competence of Ātiawa ki Whakarongotai representation and work.
3. **Kotahitanga;** a cohesive approach to representing Ātiawa ki Whakarongotai taiao interests.

The Plan will also support the iwi in our role to respond to resource consenting as we face ever-increasing development in our rohe.

I commend the visionary leaders and creators of our iwi for their individual and collective expertise that has culminated in the genesis of our Iwi Kaitiakitanga Plan and commit this taonga to our future and the generations yet to follow.

Nā reira, Kia Piki Te Ora,

André Baker

Chairman

Ātiawa ki Whakarongotai Charitable Trust

The name of this Iwi Kaitiakitanga Plan; 'Whakarongotai o te moana, Whakarongotai o te wā' is a pepeha taken from a speech given by Wi Te Kākākura Parata, where he proclaimed that 'As you listen to the tides of the ocean, so must you listen to the tides of the time.'

The development of this Plan occurred at a time for Ātiawa ki Whakarongotai where we have been slowly but surely building capacity and capability to respond to unprecedented levels of development and other pressures on te taiao in our rohe. We have been expanding our team that actively works to exercise kaitiakitanga on behalf of the iwi. To do this in a way that is cohesive and truly reflective of the vision of our people, we have developed this Plan to guide us all in our work. The Plan articulates our own kaupapa or values, our own tikanga or 'best practice' and our own huanga, or measures of well-being.

I wish to acknowledge the many strong and visionary kaitiaki that have come before us, and who continue to guide us today. The work to develop this Plan has been a labour of love for our people and the whenua and wai that sustain us all. We will take great pride in inheriting their legacy of caring for the taiao and one another.

Mahina-a-rangi Baker

Pou Takawaenga Taiao

Ātiawa ki Whakarongotai Charitable Trust

1.2 Aronga – Purpose of this Iwi Kaitiakitanga Plan

The purpose of this Kaitiakitanga Plan is to identify the key kaupapa, huanga and tikanga (values, objectives and policies) of Te Ātiawa ki Whakarongotai (TAKW) that guide our kaitiakitanga as mana whenua. The key intention of this plan is to be internally focused, in order to support and direct the kaitiaki practice of our iwi. It is a living document that should be periodically reviewed and updated as the objectives, policies and values of the iwi continue to develop and adapt over time.

The development of the plan has been overseen by the Taiao Committee of the Ātiawa ki Whakarongotai Charitable Trust. The Trust is the mandated iwi organisation that works to benefit the community and all members of Ātiawa ki Whakarongotai and has responsibilities under its trust deed to 'exercise and assist with kaitiakitanga over the environment and to protect and preserve all wāhi tapu, urupā and ngā taonga tuku iho'.

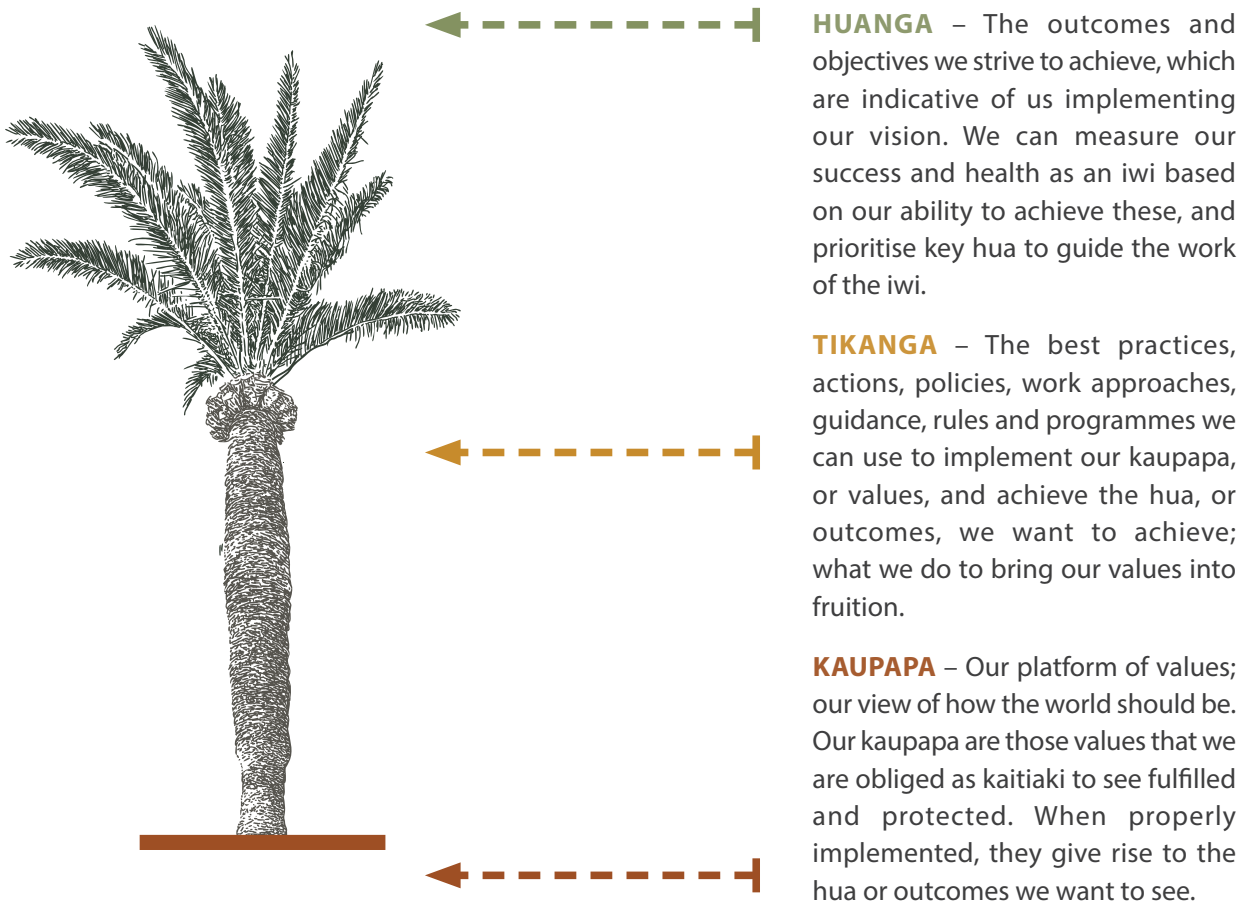
The plan may, however, be used to inform other entities of the values and policies of the iwi, and in particular, should provide more insight and detail regarding specific key concepts and values within the environmental statutory framework. The plan has been lodged with the relevant local authorities and thus must be taken into account when regional policy statements or regional and district plans are prepared or changed.

Specifically, the plan assists in providing information to support the implementation of the following parts of the statutory framework:

- Section 6(e) of the Resource Management Act 1991 (RMA), by providing information on the nature of the relationship of TAKW and their culture and traditions with their ancestral land, water, sites, wāhi tapu and other taonga
- Section 7 of the RMA, by providing policy that, if supported and abided by, can demonstrate how persons exercising functions and the RMA can have regard for the kaitiakitanga of TAKW
- Section 8 of the RMA, by providing information on the key interests of TAKW that should be subject to active protection by the Crown
- Objective AA1 of the National Policy Statement for Freshwater Management (NPS-FM), by providing information on the connection between the health of water and the health of people, and the values that must inform the setting of freshwater objectives and limits
- The National Objectives Framework of the NPS-FM, by providing information on mahinga kai species and places, and policy on how this value can be protected and inform freshwater management
- The Natural Resources Plan for the Wellington Region, by providing a framework that supports an understanding of the interconnections between a range of different values, and policies for how our relationship with natural and physical resources can be managed in a holistic and integrated manner.

1.3 Kaupapa Māori Planning Framework

This Kaitiakitanga Plan has been developed within a kaupapa Māori planning framework. 'Kaupapa Māori' refers broadly 'to any plan of action created by Māori, expressing Māori aspirations and certain Māori values and principles'.¹ There are typically three key conceptual components to kaupapa Māori plans:



Kaupapa are often fundamental in that they seldom change, except perhaps in terms of how they are seen in the world. In contrast, tikanga can change and develop slowly over several generations as new 'best practices' emerge, and huanga are likely to change and develop more quickly, ideally as iwi continue to achieve their objectives, and as new generations face new contexts, challenges and priorities across which to implement kaupapa tuku iho, or the enduring values they've inherited.

For a kaupapa Māori plan to be coherent, it should identify a clear progression from each kaupapa, through to the respective tikanga or practices required to implement them, and then to the respective hua or outcomes we would see as a result of implementing them. This plan is structured in accordance with this kaupapa Māori framework.

¹ Royal, 2012. Politics and knowledge: Kaupapa Māori and mātauranga Māori. *New Zealand Journal of Educational Studies*. 47(2).

1.4 Hua Parakore – A Kaupapa Māori Framework for Achieving Environmental Integrity through Balance

A wide range of different kaupapa Māori planning frameworks exist to support different types of work that iwi and Māori communities are engaged in. In the environment and kaitiakitanga field, 'Hua Parakore' emerged as a framework developed by Te Waka Kai Ora, the Māori Organics Collective, to provide guidance and support to growers in implementing tikanga Māori to produce 'hua parakore', or 'pure products'.

The Hua Parakore Framework requires that practitioners provide documentation or demonstration of the practices they use to implement the six key kaupapa identified in the framework as central to Hua Parakore production.

These six kaupapa are:

- Whakapapa
- Wairua
- Mana
- Māramatanga
- Te Ao Tūroa
- Mauri.

The six kaupapa reflect a broad spectrum of different types of values, from tangible values of energy and biology, through to more abstract values of connectivity and spirituality. However, the key theoretical concept of Hua Parakore, as illustrated in Figure 2, is that when all the diverse values represented by the different colours are integrated together in holistic practice, and balanced so that the expression of one hasn't been achieved at the expense of another, integrity is manifested, as reflected by the white component. This is what is meant by Hua Parakore.²



The structure of the plan has been informed by this vision of manifesting environmental integrity through the balance of diverse values. Te Ātiawa ki Whakarongotai recognises the wisdom in these six kaupapa of Hua Parakore being identified as essential, and has adopted them in the plan, and follows the guidance of Hua Parakore that practitioners should seek to develop plans with their own whānau, hapū and iwi articulations of those key kaupapa, the tikanga to implement them and the vision of what achieving integrity looks like.

² Te Waka Kai Ora, 2011. Te Papawhāriki mō Hua Parakore; Ngā Ahuatanga o Hua Parakore: Resource 1. Te Waka Kai Ora, Kaikohe.

1.5 Iwi Input into the Kaitiakitanga Plan

A key intention when developing this plan has been to ensure that it reflects as best as possible the collective environmental vision, values and position inherited and held by Te Ātiawa ki Whakarongotai.

A rigorous method of kōrero collection and analysis has been used to ensure full iwi input into the development plan. Collection of kōrero for input into the plan was facilitated both through passive means, by utilising existing information and any opportunities where engagement was occurring with iwi members, and through targeted means, by interviewing or conducting workshops with groups to gap-fill particular parts of the plan where information didn't already exist. This included the following methods:

- full review of all historical and existing iwi environmental and planning documents that were available to ensure the legacy of previous generations is built upon
- full review of all archived oral interview transcripts and recordings held by the iwi where consent for such use had been provided
- three marae-based workshops, one focused on rangatahi

Kaitiaki Wānanga. Photo by: Jordan Housiaux.





Kaitiaki Wānanga. Photo by: Jordan Housiaux.

- three focused workshops with mahinga kai and kaitiakitanga experts
- structured interviews with 12 mahinga kai and kaitiakitanga experts
- an online survey.

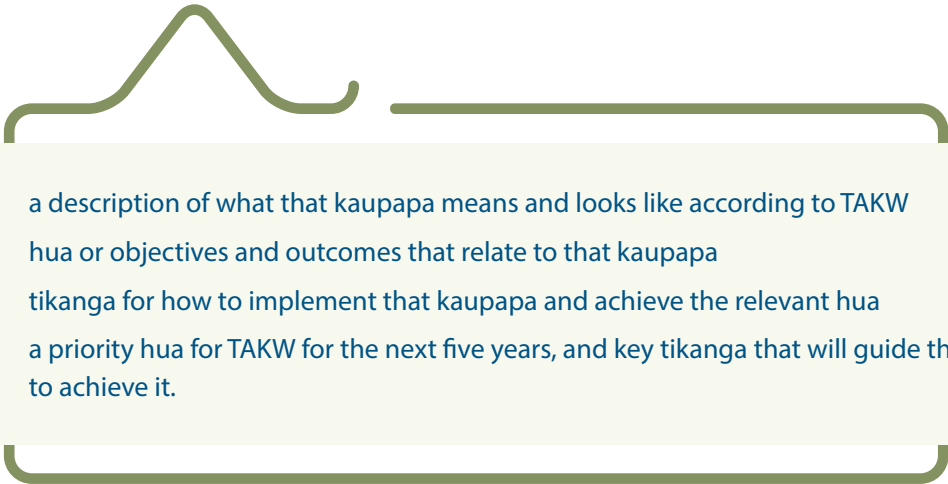
This generated a large volume of rich information, which then needed to be analysed to identify key kaupapa, hua and tikanga, and how that information could be input into the plan. The qualitative data analysis software NVivo was then used to apply a grounded theory methodology to systematically read through all kōrero generated through the kōrero collection phase, and code the information with key kaupapa themes that arose from kōrero. This allowed for key kaupapa, hua and tikanga that were widely repeated to emerge, and ensured that all kōrero collected contributed to the final kōrero presented in the plan.



1.6 Plan Structure

The structure of this Kaitiakitanga Plan is based on a kaupapa Māori approach, and the guidance of the Hua Parakore Framework.

It comprises six interconnected parts, one for each key kaupapa, and sets out the following for each:

- 
- a description of what that kaupapa means and looks like according to TAKW
 - hua or objectives and outcomes that relate to that kaupapa
 - tikanga for how to implement that kaupapa and achieve the relevant hua
 - a priority hua for TAKW for the next five years, and key tikanga that will guide them to achieve it.



2 Whakapapa

2.1 Whakapapa o Te Ātiawa ki Whakarongotai

Mai i Kūkūtauākī ki Whareroa, tatu atu ki Paripari
Rere whakauta ngā tinitapu ko Wainui, Ko Maunganui,
Pukemore, Kapakapanui, Pukeatua,
Ūngutu atu ki te pou whakararo ki Ngāwhakangutu
Ko Te Ātiawa ki Whakarongotai e

Our unique identity as indigenous mana whenua, as Te Ātiawa ki Whakarongotai, arises from the land and water. As much as we influence the local land and waterscapes, they have shaped who we are as a people; our identities are inextricably linked. The pepeha outlines our rohe from the key waterways and peaks that mark the extent of our mana whenua. Whakapapa, or the genealogical lineage and connection to the land and water, is a fundamental value for the people of Te Ātiawa. It is through this whakapapa to Te Ātiawa ki Whakarongotai that we inherit our birthright and responsibility as kaitiaki of all that is living and existing within our rohe.

Through our whakapapa to land and water, we are also connected to the atua, or the divine processes that are physically manifest in the natural world. All descendants of Te Ātiawa have always recognised their lineage from divine origins, as encapsulated in the pepeha:

“ *Te Ātiawa nō runga i te rangi.* ”
Te Ātiawa who descend from the heavens.

The earliest accounts of Te Ātiawa in the rohe go back to the Kāhui Mounga collective that had spread itself from Taranaki and the Central Plateau region through to Te Upoko o te Ika. Since then, further waves of migration have occurred. The journey of the ancestor named Haunui-a-Nanaia, who has a direct relationship with the ancestral canoes of Kurahaupō and Aotea, is widely known.

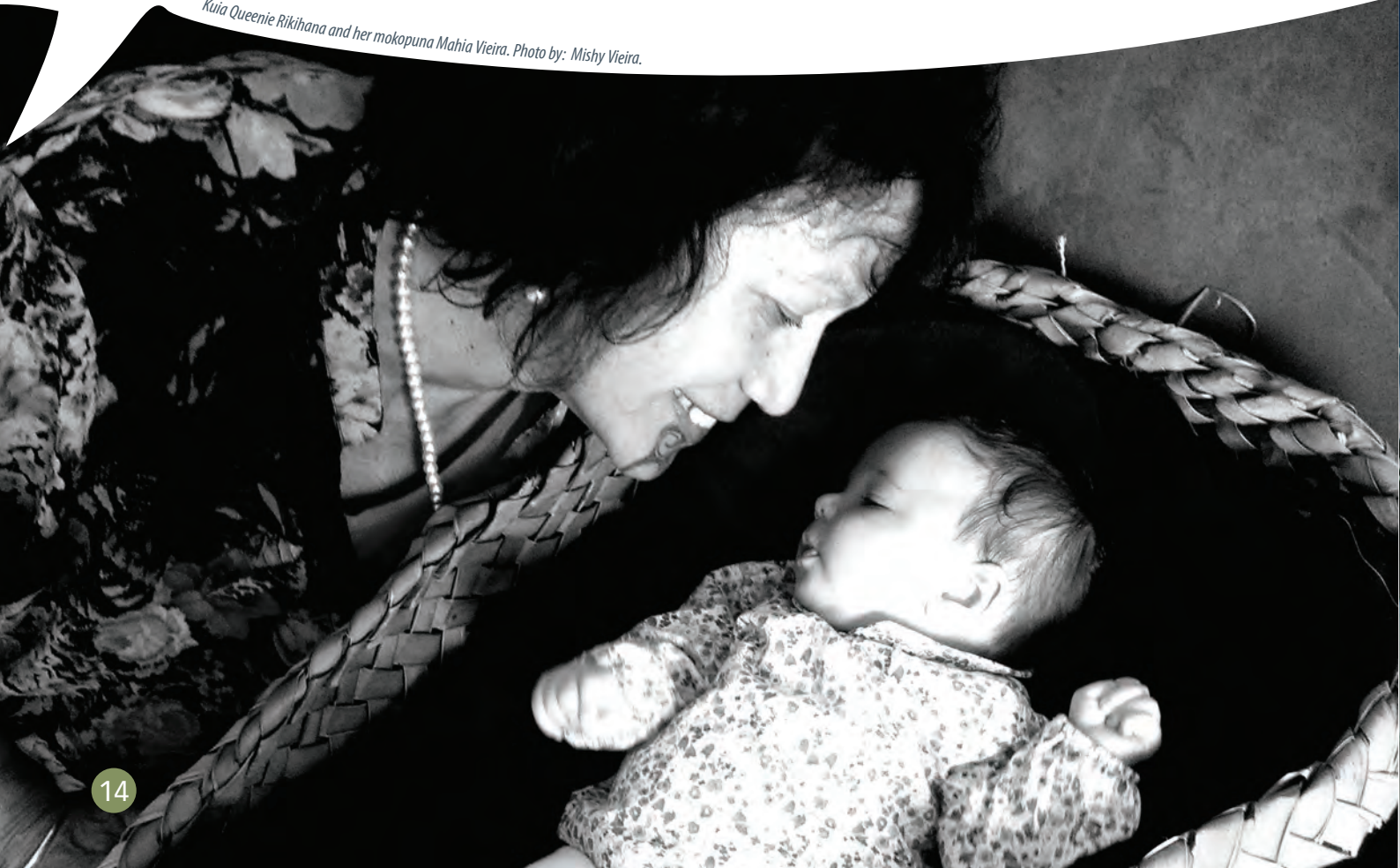
During his pursuit of his wife, Wairaka, he named various tributaries and landmarks from Whanganui to Wellington, within the boundaries of Te Ātiawa ki Whakarongotai. This included Waimeha and Waikanae. Tāhuhu kōrero connected to our rohe such as this, which have been passed on through successive occupants of the land, provide invaluable insight into the natural history of our rohe.

Generations later, in 1821, 'Te Heke Mai Raro' began. These were the migrations of Te Ātiawa from Taranaki with their Ngāti Toa kin to the Kāpiti area, with Ngāti Raukawa eventually joining. This culminated in the establishment of resource rights and relationships for Te Ātiawa through raupatu, or conquest in their present-day rohe. Various pā and kāinga have been established since, but Whakarongotai Marae has become the principal home of the iwi. More comprehensive information on the history of Te Ātiawa ki Whakarongotai can be found in Appendix H – Tāhuhu Kōrero.

Since then, our relationship to our rohe, and the Waikanae River in particular, has informed the development of our collective identity as Te Ātiawa ki Whakarongotai. The river is layered with a history of intimate relationships between it and various whānau. There are many historical and present-day kāinga and mahinga kai sites along the length of the river that have been accessed to sustain and nourish the whānau that reside there. This intimacy of our relationships to the natural world means that we have inherited a cultural memory of how natural features like waterways should look, taste, smell, sound, feel and behave.

Our whakapapa to the natural world also tells us about our close kinship to other living beings that we share the world with. Some are of particular significance to us; Te Ātiawa have always had a special connection to ngārara, the taxonomic group that includes taniwha, lizards and insects. The taniwha Mukukai is an important kaitiaki of the whole of Te Upoko o te Ika, who appears at times of abundance. Tuatara are recognised as our tuakana and spiritual protectors; they are respected for their third eye, denoting wisdom and the ability to see the unseen. The tuatara Kopaeara is the

Kuia Queenie Rikihana and her mokopuna Mahia Vieira. Photo by: Míshy Vieira.



guardian of knowledge from higher realms and is depicted on the pou Te Puna o te Aroha, which stands on Whakarongotai Marae.

Whakapapa is also felt through our connection to certain mahinga kai species, sites and customary practices. Certain kai such as a piharau have long been associated with people from Taranaki and evoke our connections there. Equally, our people have typically taken local delicacies such as pipi or whitebait back to Taranaki, or ensured it is served at our marae for special events as a reflection of our identity on the Kāpiti Coast. The activity of mahinga kai is a central part of our way of life, and going out as a family to special places to fish or camp renews those whakapapa connections to place, to the atua and to each other. Our whakapapa connections across neighbouring iwi have also always provided us with the ability to access sites outside our own rohe, and share resources. Kaumātua talk fondly of taking trips to connect with relations from Ngāti Toa and Ngāti Raukawa to go diving or fish the tuna heke together.

Appendix I – Te Rohe o Te Ātiawa ki Whakarongotai presents a depiction of the GIS map held by the Charitable Trust of all sites and waterways of significance, which is annotated with relevant information on their associated values, practices and stories that reflect our whakapapa to the land, water and each other.

Through our collective whakapapa, we are connected to one another as the people of Te Ātiawa ki Whakarongotai. We share the same ancestral maunga, awa, tūpuna and histories. It is from understanding our position within this network of relationships to land and water, ngā atua, and each other that we find a sense of identity and place in the world, that we find meaning in knowing who we are:


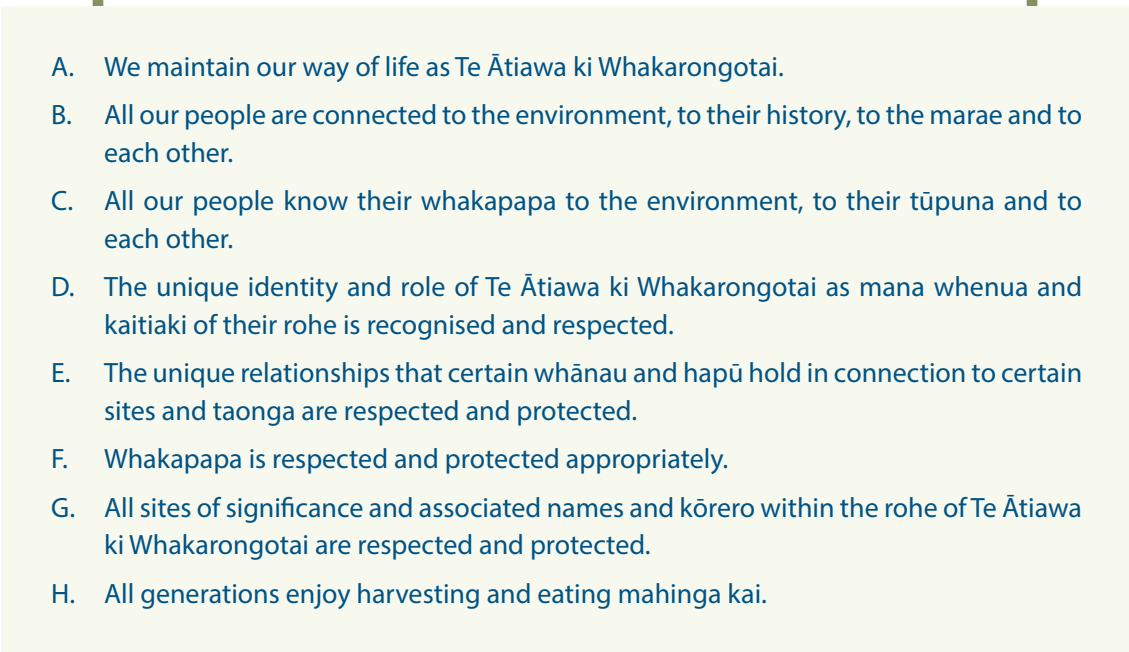

Ko Te Ātiawa ki Whakarongotai e.

Whakarongotai Marae. Photo by: Mahina-a-rangi Baker.





2.2 Whakapapa: Ngā Huanga

The following are the key objectives of the iwi that relate to our whakapapa:

- 
- 
- 
- A. We maintain our way of life as Te Ātiawa ki Whakarongotai.
 - B. All our people are connected to the environment, to their history, to the marae and to each other.
 - C. All our people know their whakapapa to the environment, to their tūpuna and to each other.
 - D. The unique identity and role of Te Ātiawa ki Whakarongotai as mana whenua and kaitiaki of their rohe is recognised and respected.
 - E. The unique relationships that certain whānau and hapū hold in connection to certain sites and taonga are respected and protected.
 - F. Whakapapa is respected and protected appropriately.
 - G. All sites of significance and associated names and kōrero within the rohe of Te Ātiawa ki Whakarongotai are respected and protected.
 - H. All generations enjoy harvesting and eating mahinga kai.

2.3 Whakapapa: Ngā Tikanga

The implementation of the following tikanga will support the achievement of ngā huanga:

- 
- A. Regular visits as whānau, hapū and iwi that take place to important sites (i.e. awa, marae) to maintain connections and foster kaitiakitanga are provided for and supported.
 - B. Individuals live a lifestyle that provides for them to have regular contact with nature.
 - C. Iwi members are involved in kaitiakitanga of the natural environment through involvement in the protection, care, nurturing, growing and restoration of natural sites and systems.
 - D. The right to carry out customary use and activities as mana whenua is provided for and protected.
 - E. Effort will always be made to involve whānau and hapū as leaders in environmental planning for places or areas they have special relationships to.
 - F. The Charitable Trust will develop and implement a naming policy for adoption by local government to ensure the rights to name roads and other sites.
 - G. Where they exist, all original names of sites, features and areas will be given precedence.
 - H. Gathering, preparation, cooking and eating of mahinga kai is provided for and taught.
 - I. The use of traditional natural foods, fibres, medicines and other resources is provided for, supported and encouraged.
 - J. Tamariki and rangatahi are familiar with mahinga kai and are taught to appreciate our traditional delicacies.
 - K. Efforts are made to bring hui and kaupapa to the marae.
 - L. Appropriate knowledge of whakapapa is shared intergenerationally so that people of Te Ātiawa have a strong understanding of their identity.
 - M. Wānanga are held to learn our histories, waiata, te reo, tikanga, mahinga kai, rongoā, etc.
 - N. Connection and reconnection to the iwi and Taiao activities are supported through the communication and sharing of information by the Charitable Trust.
 - O. The iwi do not support genetic engineering or the taking, analysis, use or sharing of genetic information without their explicit consent.
- 

2.4 Whakapapa: Five-Year Priorities

The key priority whakapapa huanga for Te Ātiawa ki Whakarongotai to work towards in the next five years is:

2.2.A. We maintain our way of life as Te Ātiawa ki Whakarongotai.

This huanga is somewhat all-encompassing in that it requires us to protect and support the continuation of all the aspects of our life that give expression to our whakapapa. A key aspect of maintaining our unique way of life is the ability to continue traditional practices that connect us to the environment, our tūpuna and each other.

Tikanga 2.2.C. and H. have been identified as priorities for Te Ātiawa ki Whakarongotai to support the achievement of Huanga 2.2.A. and will be implemented in the following ways:

- Any wānanga or learning opportunities such as Hui Rangatahi will include opportunities for teaching and experiencing traditional practices such as rongoā and mahinga kai.
- The Charitable Trust will promote with Treaty partners and the community the need to provide opportunities to include iwi members in environmental work in the rohe.
- Environmental monitoring and natural resource management work carried out by the Trust will prioritise attention to species and sites that support traditional customary use practices.
- The Charitable Trust will support the pursuit of vocational opportunities that involve kaitiakitanga practices such as natural habitat restoration, environmental monitoring, etc.
- The Charitable Trust will develop initiatives that promote the enjoyment of mahinga kai.



3 Wairua

3.1 Kaupapa Kōrero mō te Wairua

“ *Ko tōku Waikanaetanga tēnei. This is my peace and humility.* ”

This pepeha comes from Haunui-a-Nanaia, who bestowed the name Waikanae based on the tranquil nature of the area he felt when he arrived there on his journey. The association with the beauty of the area, and the river in particular, as a source of peace and humility is still held today.

The well-being of the environment and the well-being of the people are intricately connected. Wairua is the aspect of well-being that reflects the connection between the human condition, in particular our mental, emotional, psychological and spiritual well-being, and that of the wider physical and non-physical environment.

Different parts of the land and waterscapes are imbued with different wairua, or different spiritual and emotional characters, often as a result of events that have occurred there over time. A key aspect of keeping the wairua of the people well and safe is having knowledge or a sense of the character of natural spaces, in order to interact with them in an appropriate way.

Some spaces are nourishing for the wairua of people as a place to visit and interact with. People might describe them as a sanctuary or haven. People may go there to find solace and calm. People may visit spaces that stir feelings of connection to place. Certain spaces may hold significance for different whānau, as being places where they have shared important experiences with one another.

Other spaces may have the power to provide people with a feeling of connection to the atua, or the natural elements, that is important to keeping them healthy. People generally associate familiarity with the natural world in the form of atua, with the ability to keep themselves safe. Iwi members call on atua, and that feeling of connection to the natural world in different practices such as karakia and waerea in order to clear their minds, or to feel grounded in their day-to-day lives, as a way of ensuring they are mentally, emotionally and spiritually well. Familiarity with the environment is also important for ensuring physical safety and well-being. In the modern-day context, this familiarity and connection to what is happening in the environment ensures that people don't access areas that are physically dangerous or unsafe, or consume things that are unsafe.

Some spaces are important for providing cleansing of wairua. In particular, certain water sites have always had a crucial role in providing for physical and spiritual cleansing of the people. There are several specific sites known to have been used for traditional cleansing practices, and many iwi members talk about going to visit waterways when they need spiritual cleansing, often from whatever might be causing stress in their life. This may be through using water, being submerged in water or feeling the clarity that is often generated by simply visiting water sites. Groundwater in particular is highly valued for its pristine quality and safety and therefore being ideal for cleansing.

It is not just the visitation of spaces that is good for the wairua but also certain types of activities that the environment provides for. Mahinga kai in particular is good for the wairua of the people. People get a great deal of enjoyment and stimulation not just out of eating mahinga kai but also from the process of gathering and preparing it, and the connection to the land and water they experience through that activity. It is an activity that has a calming and relaxing effect on people. Many of our elders have fond memories of gathering mahinga kai as it always gave them something to do as children. It supports people's self-esteem and their sense of satisfaction to be able to continue these practices, and to be able to provide for their whānau and for others. Further to that, the broader activity of being capable kaitiaki collectively as an iwi is important to the emotional and psychological well-being of the people, as it is central to our identity as mana whenua.

“ *It's the enjoyment at the end; eating the food is all to do with the gathering and the cleaning.* ”

Photo by: Daniel Brown.







Matua Les Mullens at Waikanae River Mouth. Photo by: Mahina-a-rangi Baker.

It is important to be aware that some spaces should not be accessed, but left alone, to show reverence for certain historical events that have given that site a state of tapu. This applies especially to areas where people have been buried or fallen in battle. In particular, it is not appropriate to disturb these sites or gather food there. The protection of these sites is an important way to show respect for the dignity and identity of those who have gone before us. Many highly tapu sites, including urupā, have already been desecrated or destroyed. This process of making the history of Te Ātiawa ki Whakarongotai invisible on the landscape has generated profound trauma for our people, who continue to fight to maintain their identity as tangata whenua, people of the land. It has also meant that there is significant ignorance in the wider community about the true history and heritage of our rohe, which also puts our well-being and wairua at risk. The work to protect and respect wāhi tapu is therefore not in the interests of just our people but also the community at large. Certain wāhi tapu, or sacred sites, are identified in Appendix I. Not all sites are made available publicly, and some information on the location and nature of sites is held in confidence by the Trust, kaumātua or whānau of the iwi.

In addition to the physical spaces or artefacts whose protection is important for maintaining the well-being of our wairua, there is a range of other taonga, such as tikanga and kōrero tuku iho, that are also important to protect. This includes certain knowledges, memories, aspects of language, stories, rituals, practices, concepts, taniwha kaitiaki, karakia and waiata that the people of Te Ātiawa ki Whakarongotai have inherited as their ancestors' legacy to protect.


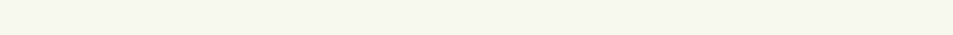
3.2 Wairua: Ngā Huanga



The following are the key objectives of the iwi that relate to wairua:

- 
- A. The environment is a place that supports healthy wairua of the people. It is clean, calm, safe and conflict free.
 - B. The presence of native animals can be observed and heard in the environment.
 - C. The wairua of people is supported through their ability to practise mahinga kai.
 - D. The people of Te Ātiawa ki Whakarongotai have good self-esteem about the state of the environment.
 - E. Our people feel a sense of pride and fulfilment about the capability of our iwi as kaitiaki.
 - F. The people of Te Ātiawa ki Whakarongotai are free of stress and trauma brought about through environmental degradation and change.
 - G. Wāhi tapu, tikanga and kōrero tuku iho are respected and protected.
 - H. Tikanga Māori and the mana motuhake of Te Ātiawa ki Whakarongotai is abided by in the active protection of wāhi tapu and kōrero tuku iho.
- 

3.3 Wairua: Ngā Tikanga

The implementation of the following tikanga will support the achievement of ngā huanga:

- 
- A. The qualities of the environment that restore, cleanse and heal wairua are protected and enhanced where possible.
 - B. Access to places that are good for the wairua are protected and provided for. That includes both those that provide solace and serenity, and those that support mahinga kai, or other types of recreation.
- 

- 
- C. The people of Te Ātiawa ki Whakarongotai are able to understand and practise tikanga that connect them to the atua and the environment, and protect their wairua, e.g. karakia, whakawātea, pure, conflict resolution.
 - D. The conduct of iwi members working in kaitiakitanga is always cognisant and respectful of the well-being of people's wairua, including their own.
 - E. Events are held in which people can share experiences that support healthy and healing wairua, e.g. noho marae, te reo, waiata, rongoā wānanga, whare tāpere, seminars.
 - F. Te Ātiawa ki Whakarongotai identify and support initiatives that support the healing of trauma created through environmental degradation and change.
 - G. The role of mana whenua as kaitiaki is recognised and upheld in any management of cultural heritage issues.
 - H. Wāhi tapu sites are mapped so that kaitiaki can ensure any potential effects of development on them are avoided.
 - I. Kaitiaki determine measures for providing necessary protection for wāhi tapu, wāhi tūpuna and archaeological sites.
 - J. The Accidental Discovery Protocols are abided by in any earthworks undertaken in the rohe of Te Ātiawa ki Whakarongotai (Appendix A).
 - K. Cultural monitoring of any earthworks is undertaken in accordance with the Cultural Monitoring Protocols (Appendix B).
 - L. Any response to an accidental discovery of kōiwi is undertaken through the guidance of kaumātua, and in a way that creates limited disturbance to people and the environment.
 - M. The collection, holding, use and dissemination of taonga, tikanga and kōrero tuku iho that are under the kaitiakitanga of Te Ātiawa ki Whakarongotai is always conducted with the clear consent of the individuals from whom it was sourced, or their whānau if they are no longer living.
 - N. Taonga tuku iho, archaeological artefacts or deceased animals discovered in the rohe of Te Ātiawa ki Whakarongotai are held and managed under their kaitiakitanga. Whale strandings and discoveries are managed in accordance with the Whale Protocols (Appendix F).
 - O. Te Ātiawa ki Whakarongotai supports only the trade of taonga made from bone or feathers of native animals that has been sourced under tikanga Māori with the consent of mana whenua, and requires that the origin of source is known.
- 

3.4 Wairua: Five-Year Priorities

The key priority wairua huanga for Te Ātiawa ki Whakarongotai to work towards in the next five years is:

*3.2.A. The environment is a place that supports healthy wairua of the people.
It is clean, calm, safe and conflict free.*

Through consultation with the iwi, two key interactions with the environment have been identified as high priorities to support the wairua of the people:

- the ability to partake in mahinga kai activities for enjoyment and good self-esteem
- the ability to swim or be submerged in water to cleanse or restore wairua.

Poor water and soil quality, and the contamination of water, soil and mahinga kai itself is currently prohibiting the ability to undertake these activities freely, in that it can be unsafe to have contact with water or consume mahinga kai. Not only does this limit the ability of people to undertake activities that are good for their wairua, but knowing that we haven't been able to prevent the causes of contamination as kaitiaki creates further distress for people.

Tikanga 3.3.A. and B. have been identified as priorities for Te Ātiawa ki Whakarongotai to support the achievement of Huanga 3.2.A. and will be implemented in the following ways:

- Kaitiaki monitoring of water and mahinga kai quality will be implemented to understand the nature of water quality and contamination issues.
- Activities that are contributing to water quality and contamination issues will be addressed by the iwi.
- The iwi will pursue means for bioremediation of areas that are particularly affected by contamination.
- New activities or development will not further degrade environmental health.
- New activities or developments must not breach iwi water quality standards or objectives.

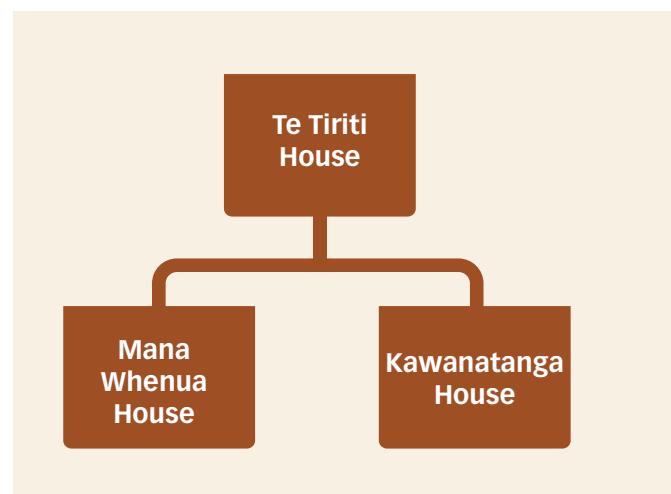


4 Mana

4.1 Kaupapa Kōrero mō te Mana

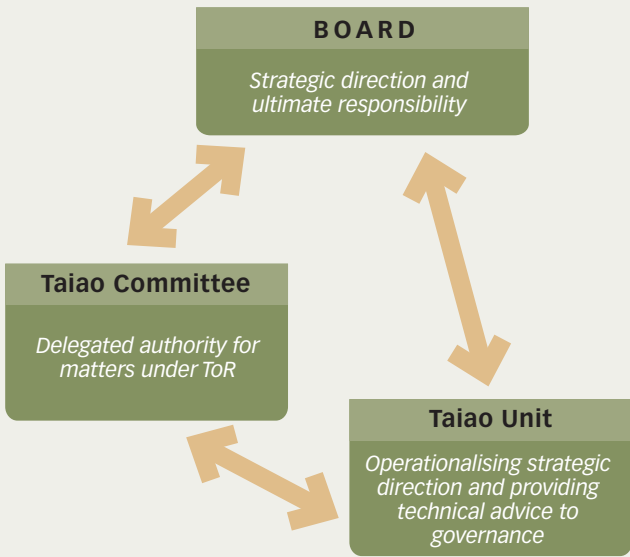
Mana is the authority that Te Ātiawa ki Whakarongotai holds as mana whenua from Kūkūtauākī in the north to Pariipari in the south. Te Ātiawa’s mana whenua derives from our whakapapa to the taiao as well as our undisturbed occupation of the whenua.

Te Tiriti o Waitangi is the founding document of Aotearoa. It guarantees the tino rangatiratanga of Te Ātiawa ki Whakarongotai over the land, waterways and all other taonga in our rohe. This type of authority differs from other forms of authority, such as that from the kāwanatanga or the governance of local or central government, which is subject to the tino rangatiratanga of mana whenua. A Tiriti partnership recognises these two types of authorities functioning together. This is represented in the ‘Tiriti House Model’, which shows that a Tiriti approach to decision-making ensures equal recognition of, protection of and input from each house.



Tino rangatiratanga should be enacted at all levels of decision-making, from governance and decision-making, through to the social and technical inputs into decision-making, into the analysis of decision-making, and in ensuring compliance with decision-making and other types of regulation. Tino rangatiratanga cannot be facilitated through tokenistic input. Appendix G sets out the Te Ātiawa ki Whakarongotai Charitable Trust Partnership Strategy. It establishes the following three kaupapa that inform how the Trust should conduct its partnership: clear designation of roles, ensuring competency of representation and work, and a cohesive approach to representing the iwi’s interests. The diagram (over) shows how the key roles of the Trust function together.

Flowing from our position as mana whenua and our tino rangatiratanga is the responsibility we inherit through whakapapa as kaitiaki. As kaitiaki we have rights to access our taonga but implicit



in this are the responsibilities to sustainably manage use of our taonga so that they endure for future generations. Our ability to exercise our kaitiakitanga appropriately greatly affects our mana. An example of sustainable management is the practice of rotating the waterbodies that are fished. This ensures that people are able to provide kai to whānau year-round, but also ensures that fish stocks are only disrupted for short periods, and then for the remainder of the year the mahinga kai communities regenerate. Resources should be cared for in a way that prioritises their health and ability to support the community to thrive over the ability to generate profit. This is particularly critical for the care of water that all life relies on to survive.

Mana is also reflected in a community with social cohesion and community strength. Connection to each other through connection to the taiao is a key factor in strengthening social cohesion and enhancing the mana of Te Ātiawa. The ability to share resources also ensures social cohesion and community strength, and reflects on the mana of the people. The ability to connect to the land and water has been limited in recent generations through alienation of the people from their land and waterways.



An important concept that is intertwined with the mana of Te Ātiawa is manaakitanga, which is the acknowledgement of the mana of others through showing aroha, respect, generosity and care. Through the practice of manaakitanga, the mana of both the person practising manaakitanga and the person receiving the benefits of that manaaki is enhanced. Te Ātiawa commonly expresses manaakitanga through our ability to provide kai at hui where we are hosting manuhiri. An inability to provide plentiful kai to manuhiri would greatly affect the mana of Te Ātiawa, and therefore, it is critical that we are able to continue to access healthy abundant mahinga kai that is sourced in our rohe.

The expression mana tangata, the mana of the people, can sometimes be in excess, and create imbalance in the relationship between people and the environment. The well-being of the environment, including the ability to access this kai or clean and safe water, has diminished greatly in recent generations due to an increase in development that has not ensured that its impacts to the environment are minimal. This has affected the relationship Te Ātiawa has to the taiao through mahinga kai, and to others through the practice of manaakitanga, and consequently, the mana of Te Ātiawa has been affected.

Ultimately, the mana of Te Ātiawa ki Whakarongotai is reflected through free expression of tino rangatiratanga and the upholding of kawa and tikanga Māori at all opportunities.

4.2 Mana: Ngā Huanga

The following are the key objectives of Te Ātiawa ki Whakarongotai that relate to our mana:

- 
- A. People are able to live their lives in the rohe of Te Ātiawa ki Whakarongotai in harmony with te taiao.
 - B. Our relationship with the environment supports our economic and social security and all abundance is shared.
 - C. People of Te Ātiawa ki Whakarongotai have access to mahinga kai sites.
 - D. There is intergenerational participation in mahinga kai.
 - E. The mana of our marae Whakarongotai is supported by the abundance of the environment.
 - F. Traditional economies of mahinga kai and other resources create and strengthen relationships with others.
 - G. Te Ātiawa ki Whakarongotai have tino rangatiratanga, authority over resource use.
 - H. Te Ātiawa ki Whakarongotai have positive working relationships with Treaty partners.
 - I. The implementation of tikanga in relationship to the environment is upheld by the iwi and supported by Treaty partners.
 - J. The iwi collective are engaged and feel that they can influence decision-making in their rohe.
 - K. Iwi kaitiaki and decision-making roles are filled with a diverse range of ages and genders.
- 

4.3 Mana: Ngā Tikanga

The implementation of the following tikanga will support the achievement of ngā huanga:

- 
- A. Ensure the sustainable use of taonga and minimal impacts to our taonga and community through decision-making around development.
 - B. Lead by example in the way we live in our rohe and utilise resources, particularly to ensure the regeneration of traditional food sources accessed by Te Ātiawa.
 - C. Freely express tino rangatiratanga through upholding our kawa and tikanga.
 - D. Enact and uphold the Tiriti House Model in our partnership arrangements.
 - E. Ensure there is clarity about the roles of each group within the internal structure of the Trust.
 - F. Support the capability of all those who work for the Trust to enact their roles.
 - G. Representatives report back to the Trust to ensure a transparent and cohesive approach.
 - H. Use technology to communicate and re-engage the wider iwi in decision-making.
 - I. Employ valuation of the environment in terms of how it sustains and supports life to thrive, rather than in terms of financial value.
 - J. Connect with the taiao as whānau, hapū and iwi collectives through activities such as mahinga kai, maara kai and restoration work.
 - K. Increase iwi holdings of land.
 - L. Enact and empower sharing economies.
 - M. Uphold the mana of Whakarongotai and the mana of Te Ātiawa through manaakitanga.
- 

4.4 Mana: Five-Year Priorities

The priority mana huanga for Te Ātiawa ki Whakarongotai to work towards in the next five years is:

4.2.A. People are able to live their lives in the rohe of Te Ātiawa ki Whakarongotai in harmony with te taiao.

The iwi have identified that one of the key determinants of overall well-being of their rohe is the way that development occurs, or the way that residents in the rohe live their lives, interact with the environment and use resources. In particular, quality of decision-making determines how development is planned and implemented to minimise risks to the community and their values.

Tikanga 4.3.A., D. F. and I. have been identified as priorities for Te Ātiawa ki Whakarongotai to support the achievement of Huanga 4.2.A. and will be implemented in the following ways:

- All partnership arrangements with local government and Crown agencies will be reviewed to ensure they reflect Te Tiriti House Model and can implement the Ātiawa ki Whakarongotai Charitable Trust Partnership Strategy (Appendix G).
- Input to decision-making that has the broadest implications for the environment will be targeted.
- Governance capability and resourcing will be strengthened to ensure effectiveness in decision-making.
- This Kaitiakitanga Plan and the Information and Monitoring Strategy will be utilised to support planning and assessment of development.





5 Māramatanga

5.1 Kaupapa Kōrero mō te Māramatanga


Māramatanga is the enlightenment that arises from being in the world. It is inherited from the collective cultural memory of our tūpuna who have gone before us and is built on and created through our interaction with the world around us.

The pou that stands on the marae of Whakarongotai, 'Te Puna o te Aroha', signifies the Te Ātiawa ki Whakarongotai interpretation of how māramatanga is generated. It shows that the fundamental source and purpose of all pathways to enlightenment is aroha. It then shows the ascent to the heavens made by Tānenuiarangi in the pursuit of knowledge. It depicts the kaitiaki of knowledge, a tuatara named Kopaeara, sitting towards the top of this ascent, where Tāne had to overcome him to attain Ngā Kete o te Wānanga, the three baskets of knowledge creation:

- **Te Kete Tua-uri:**
knowledge that pertains to the 'real world' behind the world we perceive
- **Te Kete Aronui:**
knowledge that we gain from what we observe in the world
- **Te Kete Tua-ātea:**
knowledge we create about future worlds.



*Te Puna o Te Aroha, Whakarongotai Marae.
Photo by: Mahina-a-rangi Baker.*



Our māramatanga is informed through the development and attainment of mātauranga Māori, and then our ability to integrate this in our ngākau in a way that inspires us and brings enlightenment and true understanding. Māramatanga also comes from applying both existing and novel technologies in our activities as kaitiaki. Kaitiaki have always developed new technologies to support their kaitiakitanga and mahinga kai, and māramatanga is enhanced when the iwi has access to or develops new technologies.

Māramatanga provides us with important insight into the function and health of the environment. The survival and well-being of our taonga in the environment and knowledge are connected. Because the land and waterscape, and special places in our rohe are imbued with knowledge, about their historical and current value and use, the loss of or damage to land or water threatens the survival of this knowledge. Equally, much of the knowledge of the land and waterscape informs our understanding of its value and how to care for it, and therefore the loss of our traditional knowledge, stories, waiata and karakia threatens our ability to care for, protect and enhance our taonga.

From a Māori perspective, rather than knowledge being about the environment, about natural systems, knowledge is a part of the environment; it's a part of natural systems. Just like other aspects of natural systems, knowledge can have different characters and quality. Kaitiaki look at whether the knowledge that informs behaviour and decision-making is of good or poor quality, and look to manage and care for the quality of knowledge, as much as they care for the other parts of natural systems. Kaitiaki knowledge, as with all knowledge, is a taonga; it has a tapu, or sacred nature, to it due to its power to affirm or oppose different values and agenda. This means that the creation, application and sharing of it must be done in accordance with the tikanga and kawa of Te Ātiawa ki Whakarongotai. All knowledge that is utilised to reflect an iwi view must come from the iwi, to ensure that this is done in an appropriate way.

For decision-making about the environment and human use and activities to be well-informed and have integrity, it's absolutely critical that it is informed by the māramatanga of the iwi and reflects full awareness. As mana whenua and kaitiaki, Te Ātiawa ki Whakarongotai is the only entity that has the ability to provide knowledge input into decision-making from a kaitiaki perspective in the rohe. Due to the impacts of colonisation on Māori knowledge, we have to continue to reassert the validity, legitimacy and strength of our own knowledges as crucial in informing the management of human behaviour in relation to the environment.

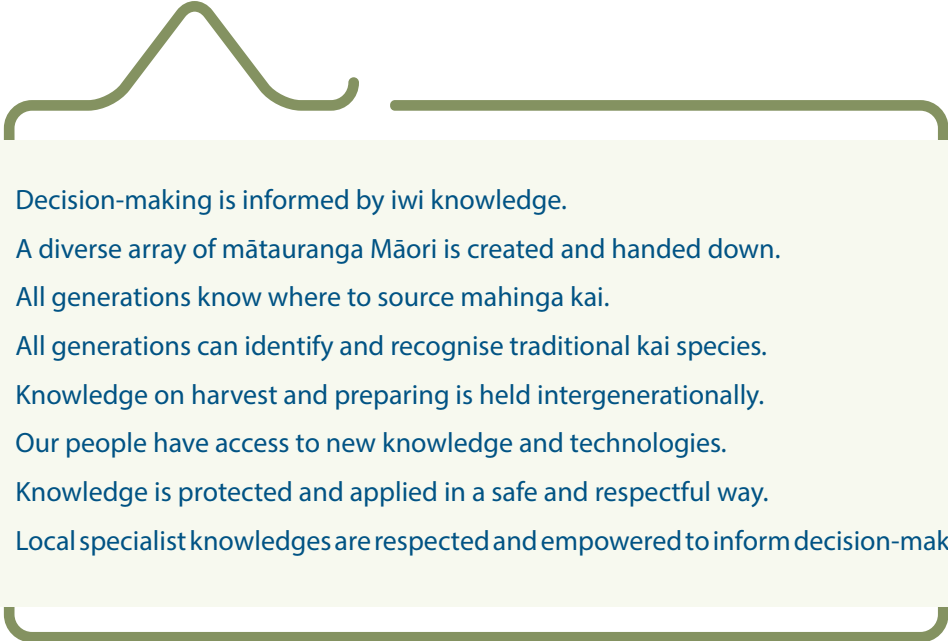
This also means that the transfer of intergenerational knowledge is extremely important, as this ensures not only that stories about our identity are passed on but that good quality knowledge required to protect the taiao and specific values in relation to it are passed on as well. The passing

on of knowledge is critical to the self-esteem of our people, to the succession of future kaitiaki and ultimately to the leadership of the iwi as a whole. It is also important to recognise that knowledge is passed on in a way that is deemed appropriate by knowledge holders. Some types of knowledge are not for common knowledge, but entrusted to those who will be able to apply it in an appropriate way. It's important that specialist knowledge holders are recognised for their important role as keepers and utilisers of knowledge. This is particularly important when responding to environmental issues in areas of significance to specific hapū and whānau. It's important that hapū and whānau are empowered as the knowledge holders to inform decision-making that relates to their taonga.

Each of the three baskets of knowledge is important to build and maintain to support the māramatanga of the iwi. Te Kete Tua-uri can be supported through the teaching and upholding of the fundamental understanding of our values, such as those set out in this Kaitiakitanga Plan. Te Kete Aronui can be supported through the various types of monitoring that kaitiaki do of their environment, and Te Kete Tua-ātea can be supported through enabling the various assessments and informed predictions that kaitiaki make about how our world will change and evolve, based on their knowledge from the first two kete.

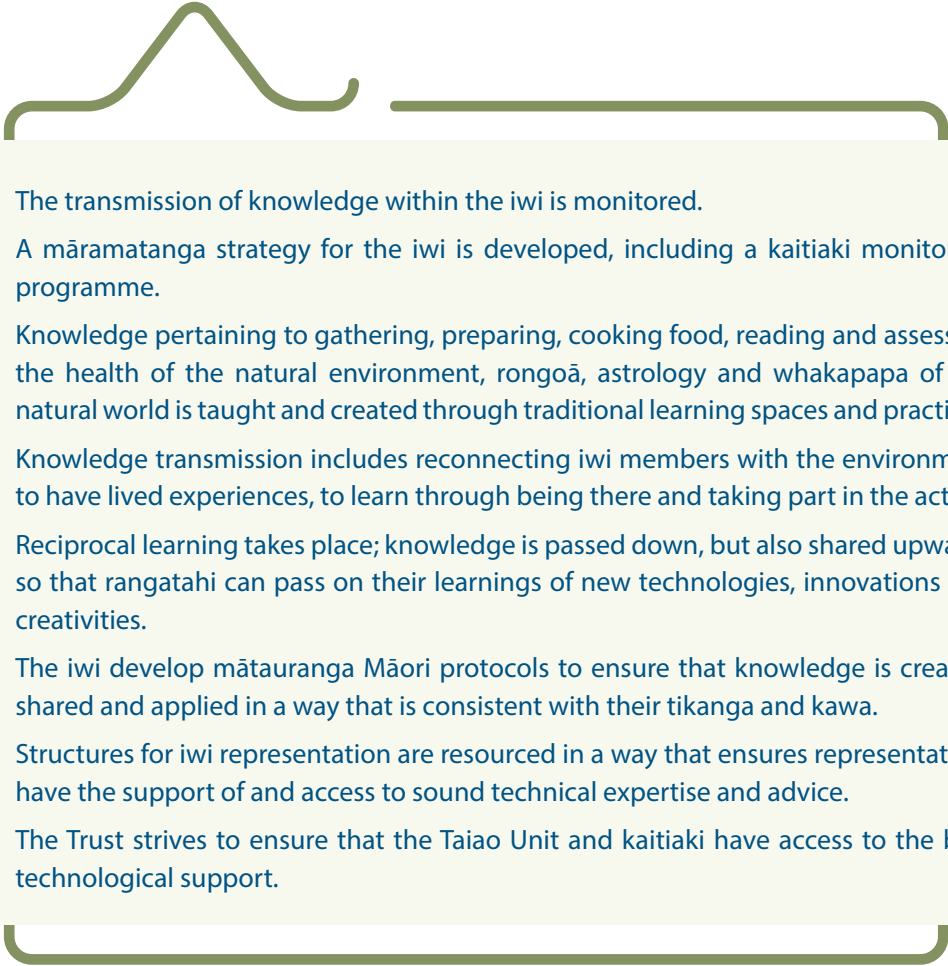
5.2 Māramatanga: Huanga

The following are the key objectives of Te Ātiawa ki Whakarongotai that relate to māramatanga:

- 
- A. Decision-making is informed by iwi knowledge.
 - B. A diverse array of mātauranga Māori is created and handed down.
 - C. All generations know where to source mahinga kai.
 - D. All generations can identify and recognise traditional kai species.
 - E. Knowledge on harvest and preparing is held intergenerationally.
 - F. Our people have access to new knowledge and technologies.
 - G. Knowledge is protected and applied in a safe and respectful way.
 - H. Local specialist knowledges are respected and empowered to inform decision-making.

5.3 Māramatanga: Ngā Tikanga

The implementation of the following tikanga will support the achievement of ngā huanga:

- 
- A. The transmission of knowledge within the iwi is monitored.
 - B. A māramatanga strategy for the iwi is developed, including a kaitiaki monitoring programme.
 - C. Knowledge pertaining to gathering, preparing, cooking food, reading and assessing the health of the natural environment, rongoā, astrology and whakapapa of the natural world is taught and created through traditional learning spaces and practices.
 - D. Knowledge transmission includes reconnecting iwi members with the environment to have lived experiences, to learn through being there and taking part in the action.
 - E. Reciprocal learning takes place; knowledge is passed down, but also shared upwards so that rangatahi can pass on their learnings of new technologies, innovations and creativities.
 - F. The iwi develop mātauranga Māori protocols to ensure that knowledge is created, shared and applied in a way that is consistent with their tikanga and kawa.
 - G. Structures for iwi representation are resourced in a way that ensures representatives have the support of and access to sound technical expertise and advice.
 - H. The Trust strives to ensure that the Taiao Unit and kaitiaki have access to the best technological support.

5.4 Māramatanga: Five-Year Priorities

The priority huanga of māramatanga for the iwi to work towards in the next five years is:

5.2.A. *Decision-making is informed by iwi knowledge.*

All tikanga that have been identified in this plan will be employed by Te Ātiawa ki Whakarongotai to support the achievement of Huanga 5.2.A. and will be implemented in the following ways:

- The implementation of this Kaitiakitanga Plan and the Information and Monitoring Strategy and lodgement of it with local authorities will be the first step in having better input into decision-making; all environmental decisions will be informed in terms of the kaupapa, tikanga and huanga set out in this plan.
- A plan for kaitiaki monitoring will be developed and implemented on a regular basis, to generate mātauranga that can be used to inform decision-making.
- The review of our partnership arrangements as set out in Section 4.4 will identify ways to ensure that governance representatives on decision-making groups will have access to and support from the technical expertise of the iwi.
- Hui Rangatahi will be held at the marae to support intergenerational knowledge transmission.
- The findings of our kaitiaki monitoring will be regularly reported back to iwi members.

Matua Les Mullens teaching Anaru Clegg how to process tuna, Kōwhai Stream. Photo by: Mahina-a-rangi Baker.



6 Te Ao Tūroa

6.1 Kaupapa Kōrero mō Te Ao Tūroa

Te Ao Tūroa, literally ‘the enduring world’, is the world of natural order, balance and pattern that is fundamental to the world we live in. Te Ao Tūroa comprises the characteristics of living systems that ensure balance in what would otherwise be a chaotic world. We see and interpret this balance in terms of balance between all the different atua of the natural world, all the different deities and the various natural processes that they reflect.

Understanding the value of Te Ao Tūroa, the value of natural order and balance, informs the holistic Māori view of kaitiaki, that the health of one component of the environment can’t be understood in isolation from the whole, that all things are connected and that the well-being of the whole always has to be the frame within which kaitiakitanga is actioned.

This also informs an understanding that change in one aspect can have systemic effects that are felt across a broad range of aspects. This is particularly important in the present day; as the population increases, kaitiakitanga anticipates that these changes inevitably will create further change and stresses on other parts of the environment, and kaitiakitanga guides us to alter our behaviour and our expectations of what we can consume and how we can treat the environment in order to protect what we have. An adaptive approach to managing human behaviour is absolutely fundamental to kaitiakitanga.

The valuing of balance in systems means ensuring that all the critical components of systems are protected, are well-functioning and are connected. Kaitiakitanga is therefore deeply interested in protection of the diverse and healthy habitat that is required to support life.

Wetlands are a particularly important habitat to the people of Te Ātiawa ki Whakarongotai. When our ancestors first arrived in the rohe, it was the abundance and vitality of the wetland habitat they saw that led them to decide it was a place they could stay to be sustained and nourished. The wetlands support not only a range of mahinga kai species but also important ecological processes in the waterways in our rohe. Water passing through wetlands is cleaned as sediment drops out, and the organisms living in wetlands remediate contaminants they might bring.

Protecting connectivity between diverse habitats is also important for system health. In the water networks of our rohe, tributaries and other small watercourses have their own important role in the health of the larger river and stream channels. These include the upper catchment area, which ensures that there is attenuation in water catchments, to hold water and release it slowly into the catchment. They also provide the different habitats that are required for many of our mahinga kai species in their different life-cycle stages. For example, inanga spawning habitat has been identified as a priority habitat to protect for the well-being of freshwater systems, as it provides for a critical part of the life cycle of whitebait species. Good habitat availability ensures healthy and diverse populations of mahinga kai species and therefore healthy mahinga kai catches. Connectivity in freshwater systems should always be protected to ensure there are no barriers to movement of aquatic species throughout the freshwater network.

Order in natural systems is also interpreted to mean that the right type of organism or ecological community is living in the right place. Native species are valued because of the important role they play in maintaining the natural structure of ecological communities. This underscores the importance of native flora and fauna being able to thrive, and the need to limit the impact of invasive and exotic species that threaten the order and balance of natural systems.

The value of Te Ao Tūroa, of balance and order, also informs the way that we as humans interact with and use the natural world. This is particularly important in informing and regulating the practice of harvesting mahinga kai; harvest should always occur in a way that ensures the sustainability of stocks. Kaitiakitanga is based on tikanga Māori, a regulatory approach that promotes people abiding by their sense and collective understanding and consciousness of the 'right way' to live. Ideally, communities intuitively follow practices that are appropriate and endorsed collectively. Te Ātiawa ki Whakarongotai have observed, however, that people's general disconnection from the environment and understanding of their impact on it has led to a lack of consciousness and an inability to rely on people's sense of the 'right way' to live and interact with the environment. Where necessary, Te Ātiawa ki Whakarongotai have had to develop explicit policy and tikanga to regulate human behaviour and use (see Appendix C, the Te Ātiawa ki Whakarongotai Freshwater Customary Use Tikanga). Te Ātiawa ki Whakarongotai look forward to communities and people relearning how to live in a way that requires less enforcement of top-down regulation.

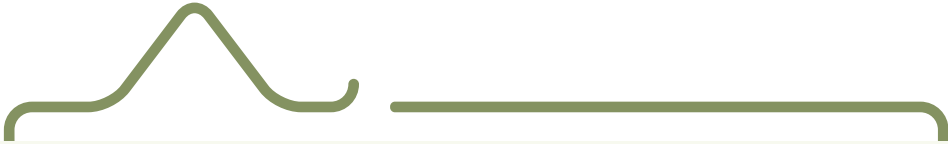

In supporting communities and people to self-regulate their behaviour, use and interaction with the environment, the natural patterns of Te Ao Tūroa are highly valuable to our people. These patterns are observed and relied upon to predict changes of state in the environment. The observation of tohu, or environmental indicators, is used to determine when it is the best time to harvest, and also to determine whether a system is in a state of imbalance, which can then trigger a management response.

Changes in climate caused by global warming have created unprecedented threat to the natural order, balance and patterns of the environment. Climate change has set in place new system dynamics that are working to re-establish balance and order, which may ultimately result in changes to the climate and planet that make our existence in it impossible. These new climate and environmental dynamics are altering the patterns and consequently the occurrence of environmental indicators that our people have relied upon to guide their interactions with the environment for many generations. Environmental indicators may now be seen at different times, at different scales or not at all, which indicates significant environmental changes and threat to different species.

Valuing Te Ao Tūroa is also about valuing the natural āhua, or natural character of the environment. For example, this may be about ensuring that there is the appropriate flow in the river for the types of activities people want to enjoy. Or ensuring that waterways have the right bed morphology. However, much of the natural character of the environment has been threatened or destroyed through human modification. This might also inform design and development, by recognising the superiority of nature as a designer, and ensuring that natural patterns and processes are utilised as much as possible. An example of this would be in dealing with the issue of waste, in ensuring that resources are used in a closed system. Ultimately, valuing Te Ao Tūroa is about valuing the divine wisdom in the natural order and balance of our world, and demonstrating this through the conscientious practice of kaitiakitanga.

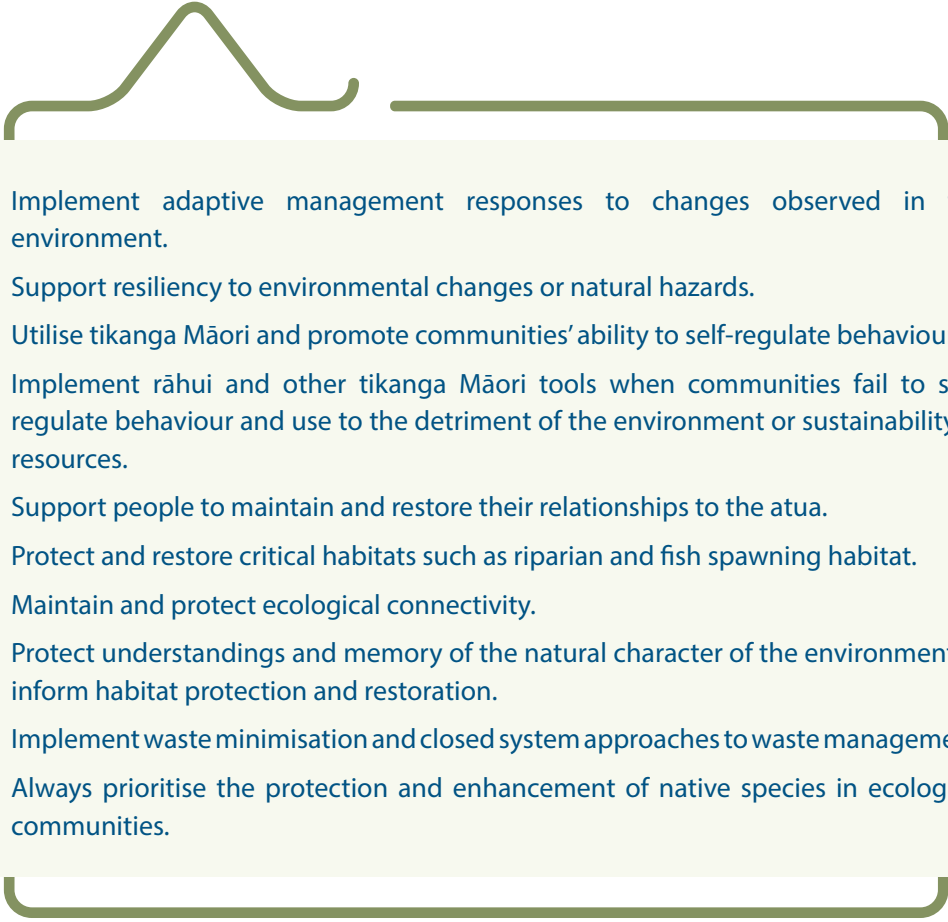
6.2 Te Ao Tūroa: Huanga

The following are the key objectives of Te Ātiawa ki Whakarongotai that relate to Te Ao Tūroa:

- 
- A. The natural order and balance of the environment is maintained to support the security of the people who rely upon it.
 - B. People's behaviour, use and interaction with the environment is regulated by the collective respect for Te Ao Tūroa, for all the atua and for natural order and balance.
 - C. Habitat that's required to support mahinga kai and other native species is available.
 - D. The natural character of the environment waterbodies is protected and enhanced.
 - E. Diverse mahinga kai can be sourced efficiently in all seasons and harvest methods should not allow for exploitation.
 - F. Native fauna are able to complete their full life cycle.
 - G. Ecological communities are well-structured and stable.
- 

6.3 Te Ao Tūroa: Tikanga

The implementation of the following tikanga will support the achievement of ngā huanga:

- 
- A. Implement adaptive management responses to changes observed in the environment.
 - B. Support resiliency to environmental changes or natural hazards.
 - C. Utilise tikanga Māori and promote communities' ability to self-regulate behaviour.
 - D. Implement rāhui and other tikanga Māori tools when communities fail to self-regulate behaviour and use to the detriment of the environment or sustainability of resources.
 - E. Support people to maintain and restore their relationships to the atua.
 - F. Protect and restore critical habitats such as riparian and fish spawning habitat.
 - G. Maintain and protect ecological connectivity.
 - H. Protect understandings and memory of the natural character of the environment to inform habitat protection and restoration.
 - I. Implement waste minimisation and closed system approaches to waste management.
 - J. Always prioritise the protection and enhancement of native species in ecological communities.

6.4 Te Ao Tūroa: Five-Year Priorities

The priority huanga of Te Ao Tūroa for our iwi to work towards for the next five years is:

6.2.A. The natural order and balance of the environment is maintained to support the security of the people who rely upon it.

As discussed in Section 6.1, climate change poses an unprecedented threat to the well-being and survival of people on planet earth. Regular climatic patterns have changed significantly to the extent that natural resources are at risk and extreme weather events pose threats, including loss of life to our community. Te Ātiawa ki Whakarongotai must work both towards halting global warming that drives climate change and to support the community to adapt in order to limit the impacts of climate change and extreme weather events.

Tikanga 6.3.A., B. and D. have been identified in this plan and will be employed to address climate change risks in the following ways:

- Enter into strategic relationships to work collaboratively to address climate change risks.
- Conduct a vulnerability assessment to understand the nature of vulnerability in our community and the areas at greatest risk.
- Support the managed retreat of people and key infrastructure from areas of highest vulnerability.
- Prevent land use that increases the risk of extreme weather events.
- Develop or enter into a zero-carbon strategy for Te Ātiawa ki Whakarongotai.

Waimeha Lagoon. Photo by: Reina Solomon.





7 Mauri

7.1 Kaupapa Kōrero mō te Mauri


Mauri is the essential energy required for all life. It is a systemic quality, and speaks to the vitality of processes and systems as opposed to individuals. Protection, nurturing and enhancement of mauri is our fundamental role as kaitiaki.

Mauri gives rise to the diversity and abundance of life on which our survival relies. It has a vibrational quality that reverberates through systems. When the mauri of our environment is well, the mauri of all that live in it is well. Our mauri is supported through the quality of the food and water we consume, or the healing we receive from the environment. Our kaumātua speak proudly about the great abundance and diversity of mahinga kai they enjoyed in their childhood in our rohe, and accounts of our tūpuna speak of our rohe as a place that thrived with life and vitality. This is the state of mauri that we seek to restore and enjoy again.

The following is a list of mahinga kai species that are all highly valued by our people, not just as a source of food, but as a necessary part of local ecological communities if they are to be in a state of mauri ora or thriving well-being:

Mahinga kai species of Te Ātiawa ki Whakarongotai

| | | | |
|--------------------|--------------------|-------------------|--------------|
| tuna (eel) | giant kōkopu | banded kōkopu | pipi, tuatua |
| short-jawed kōkopu | kōaro | inanga | paua |
| kanae (mullet) | pātiki (flounder) | oyster | watercress |
| kōura (crayfish) | kumukumu (gurnard) | common bully | kahawai |
| red fin bully | blue fin bully | herring | kākahi |
| piharau (lamprey) | karengo (seaweed) | kina (sea urchin) | snapper |
| tarakihi | butterfish | kingfish | cod |
| trevally | hapuka (cod) | puha | kererū |



The health of certain key natural features in our rohe is also integral to the mauri of our rohe and our people. The Waikanae River is a highly valuable taonga, and the protection and enhancement of its mauri is of paramount importance. At times, it's been referred to as the lifeblood of our people. There are also various puna, or springs, in our rohe from which pristine and special waters still flow. The forests of our maunga, Wainui, Maunganui, Pukemore, Kapakapanui and Pukeatua, and the birds that live in them are highly valued by our people. And the islands of Kāpiti, Tokomāpuna, Tahoramaurea and Motungārara are all valued for the special native flora and fauna that have been able to flourish there.

Protecting mauri involves protecting the vital and life-giving character of ecosystems, and particularly relating to mahinga kai, ensuring that food has integrity in that its quality hasn't been compromised by contaminants. An imbalance of Te Ao Tūroa, for example, through the dominance of invasive species or tipping of chemical equilibria, typically leads to impacts on mauri, on the vitality and abundance of ecological communities. In recent times, excessive inputs of nutrients and other contaminants into waterways have created imbalance, and had devastating effects for the mauri of waterways, beaches, mahinga kai and our people.

The process of wānanga within the iwi has identified heavy metal contamination, in particular, as a serious threat to mauri in our rohe and a critical issue for Te Ātiawa ki Whakarongotai, as the type and scale of the effects of this are still not well understood. The inputs of this type of contamination in our waterways is making our mahinga kai unsafe for consumption, which is having profound systemic effects on our people across all our key kaupapa. Addressing this starts with restoring the mauri of the soil and waterways that are at the source of this contamination, and nurturing mauri back to a state of wellness again.

Te Ātiawa ki Whakarongotai looks forward to a future of restoring and enhancing mauri within its rohe, through activities such as removing invasive species, planting and restoring the right native plants back onto the land and waterscape, and stopping the input of contaminants into waterways. We look forward to once again enjoying the natural bounty that our rohe has to offer.

Tihei mauri ora.

7.2 Mauri: Ngā Huanga

The following are the key objectives of Te Ātiawa ki Whakarongotai that relate to mauri:

- A. Land, waterways and mahinga kai are healthy, clean and free of pollutants.
- B. The temperature and oxygen in waterways support stable ecological communities.
- C. Species are lively and in good condition.
- D. Mahinga kai is abundant.
- E. Mahinga kai tastes delicious.
- F. Biodiversity is strong in that the full suite of mahinga kai species can be found in our catchments.
- G. The land and waterways are safe for people to access.
- H. The vitality and health of people is strong.

Waikanae River. Photo by: Reina Solomon.



Long finned tuna. Photo by: Reina Solomon.

7.3 Mauri: Ngā Tikanga

The implementation of the following tikanga will support the achievement of ngā huanga:

- A. Prevent contaminants, excess nutrients and rubbish from entering all waterways.
- B. Remediate contaminated soils.
- C. Revegetate the land with the right types of vegetation.
- D. Prevent activities that cause erosion and sediment entering our waterways.
- E. Ensure there is adequate flow in waterways to sustain diverse and abundant mahinga kai.
- F. Protect, maintain and enhance all mahinga kai sites, including through reseeding stocks.
- G. Prevent mahinga kai species from being exposed to contaminated sites.
- H. Prioritise the protection of species that are threatened.
- I. Feed our people with clean, safe and delicious mahinga kai from our rohe.
- J. Heal people with clean and safe rongoā from our rohe.
- K. Eradicate invasive and pest predator species from our rohe.
- L. React quickly to knowledge about contamination or degradation of the environment.

7.4 Mauri: Five-Year Priorities

The priority huanga of mauri for the iwi to work towards in the next five years is:

7.2.A. Land, waterways and mahinga kai are clean and free of pollutants.

As mentioned in Section 7.1, heavy metal contamination of soil, waterways and mahinga kai has been identified as a critical issue for Te Ātiawa ki Whakarongotai. This type of contamination typically comes from old unlined landfills or the disturbance of sites that have historical land use that is likely to have contaminated soil, such as old market gardens and old industrial sites.

Tikanga 7.3.A., B., C. and D. have been identified in this plan and will be employed by Te Ātiawa ki Whakarongotai to support the achievement of Huanga 7.2.A. They will be implemented in the following ways:

- Identify all 'Selected Land Use Register' sites, and any other known or suspected contaminated sites in the rohe.
- Include testing for heavy metal and microbiological contamination of mahinga kai in kaitiaki monitoring.
- Prevent disturbance of all contaminated sites through response to resource consenting.
- Work to remediate or require responsible parties to remediate contaminated sites.

Appendices

Appendix A: Accidental Discovery Protocol

Ātiawa ki Whakarongotai Charitable Trust Accidental Discovery Protocol

Evidence of archaeological sites may include kōiwi (human skeletal remains), taonga Māori (Māori artefacts), oven stones, charcoal, shell middens, ditches, banks, pits and old building foundations.

If any archaeological site(s) are uncovered during physical works, Ātiawa ki Whakarongotai Charitable Trust will require the contractor to adopt the following protocols:

1. Work shall cease immediately within 100 metres of the site of discovery.
2. The contractor and subcontractor(s) must shut down all machinery, isolate and secure the site, and advise the project manager.
3. No materials relating to the artefacts or site shall be removed.
4. The project manager shall promptly advise Ātiawa ki Whakarongotai Charitable Trust.
5. If skeletal remains are uncovered, the project manager will also advise New Zealand Police.
6. An archaeologist approved by Ātiawa ki Whakarongotai Charitable Trust shall be employed at the expense of the contractor to examine and record the site.
7. Ātiawa ki Whakarongotai Charitable Trust will at their discretion contact other iwi groups and organise a site inspection by appropriate tangata whenua advisors and the archaeologist.
8. If as a result of the site inspection and investigation there is a need for an appropriate ceremony, Ātiawa ki Whakarongotai Charitable Trust will arrange such at the contractor's expense.
9. Materials discovered will be handled and removed by the Ātiawa ki Whakarongotai Charitable Trust representatives responsible for the tikanga appropriate to their removal and preservation, or re-interment.
10. Works affecting the archaeological site shall not resume until Ātiawa ki Whakarongotai Charitable Trust, and the New Zealand Police in the case of skeletal remains, have given the appropriate consent, approval or authority for work to continue.

The contractor and subcontractor(s) will allow representatives of Ātiawa ki Whakarongotai Charitable Trust and the archaeologist all reasonable access to the site to carry out their respective responsibilities or activities under this protocol.

Contact details for iwi representatives are as follows: Ātiawa ki Whakarongotai Charitable Trust
11 Elizabeth Street
P O Box 509
Waikanae 5250

Applicant: _____ Date: _____

Appendix B: Te Ātiawa ki Whakarongotai Iwi Monitoring Tikanga

Purpose

To provide protocols for all formally engaged iwi monitors working on behalf of Te Ātiawa ki Whakarongotai Charitable Trust (TAKW), to ensure an appropriate, accountable and consistent approach to undertaking monitoring in the rohe of TAKW.

Background

TAKW Iwi Monitoring Tikanga has been developed specifically to ensure an appropriate and consistent approach:

- to the discovery of kōiwi and other taonga
- to the undertaking of kaitiaki and environmental monitoring
- in relation to the appointment of monitors to undertake monitoring and in the management of accidental discoveries at sites of significance
- if there are associated impacts during the undertaking of works
- to the upholding of the principles of the TAKW Trust Deed in all work undertaken for TAKW
- to ensure that Crown and private entities meet their Te Tiriti o Waitangi obligations, other legal obligations, local government plans and policies and any relevant Memorandum of Understandings and Memorandum of Partnerships.

The tikanga have been developed by the Taiao Unit of TAKW under the guidance of the Taiao Committee of TAKW. TAKW encourages iwi monitors to seek further appropriate guidance from kuia and kaumātua as to appropriate tikanga, particularly regarding the siting and handling of kōiwi.

Relevant Legislation

- Resource Management Act 1991
- Heritage New Zealand Pouhere Taonga Act 2014
- Local Government Act 2002
- Burial and Cremation Act 1964
- Coroners Act 2006

Related Documents

- TAKW Trust Deed
- TAKW Accidental Discovery Protocol
- TAKW Iwi Environmental Management Plan (currently being developed)
- Any cultural impact assessments that apply to an area where monitoring is required
- Te Tiriti o Waitangi

- Greater Wellington Regional Council (GWRC) Proposed Natural Resources Plan, in particular any Schedules of Sites of Significance
<http://www.gw.govt.nz/proposed-natural-resources-plan/>
- Kāpiti Coast District Council (KCDC) Proposed District Plan
<http://www.kapiticoast.govt.nz/proposed-district-plan>
- Memorandum of Partnership between TAKW and GWRC
<http://www.gw.govt.nz/assets/Democratic-Services/MemorandumofPartnership2012.pdf>
- Memorandum of Partnership between TAKW, Te Rūnanga o Toa Rangatira Inc, Ngā Hapū o Ōtaki and KCDC
<https://www.kapiticoast.govt.nz/media/20844/memorandum-of-partnership-signed-5-dec-2017.pdf>
- New Zealand Archaeological Association Cultural Heritage Sites database
<http://www.archsite.org.nz/>
- New Zealand Historic Places Trust register and the waahi tapu registers
<http://www.heritage.org.nz/the-list>
- Statutory acknowledgements arising from Treaty of Waitangi settlement legislation, including those in neighbouring iwi of Ngāti Toa Rangatira and Ngāti Raukawa ki te tonga
- Memorandum of Understanding between TAKW and NZTA

Iwi Monitoring Process

1. Any iwi members wishing to conduct work as iwi monitors register their interest with Te Taiao Committee of TAKW by emailing taiao@teatiawakikapiti.co.nz with a brief outline of their expertise and/or experience conducting monitoring, and confirming their familiarity with TAKW Iwi Monitoring Tikanga.
2. Te Taiao Committee review any registrations of interest and appoint suitable monitors to the TAKW Register of Monitors, along with supporting information of their specific expertise and experience.
3. Any request or need for iwi monitoring, including in the case of accidental discoveries, is directed in the first instance to the TAKW Administrator at admin@teatiawakikapiti.co.nz, or under urgency, on 0272612986.
4. Where there is a request or need for iwi monitoring, including in the case of accidental discoveries, the TAKW Administrator has delegated authority from the TAKW Board to use their discretion to contact any number of suitable potential monitors from the TAKW Register of Monitors in order to secure an appropriate monitor in a timely fashion.
5. In securing an appropriate monitor, the Administrator will liaise with Te Taiao Unit to determine what specific requirements for monitoring may have been identified through relevant cultural impact or mana whenua assessments.
6. Iwi monitors must sign a Short Form Agreement between themselves and TAKW outlining the scope of the monitoring required, including estimated time frames and specific tasks.

7. The standard rate to be paid by TAKW to iwi monitors is \$50 an hour, except in cases where specialised expertise are required and recommended by an expert in an assessment of works. In this case, a special rate will be mutually agreed by the Ultimate Party funding the monitoring, TAKW and the iwi monitor.
8. The iwi monitor will take responsibility to be compliant with all relevant Health & Safety and induction requirements of the project that they are monitoring.
9. The iwi monitor is not in any circumstance permitted to directly propose an extension of monitoring services to the Ultimate Party funding monitoring. Any discussion regarding the scope of monitoring must be directed to the TAKW Administrator.
10. The iwi monitor is not permitted to make decisions on site regarding management of kōiwi, taonga or sites, but instead must act as a conduit to TAKW and report back to Te Taiao where there is a requirement for any such decisions to be made.
11. Iwi monitors will provide a report to Te Taiao Committee, either a week before their monthly meeting in a written form to taiao@teatiawakikapiti.co.nz, or in person.
12. As per the Short Form Agreement, all monitors shall provide an invoice addressed to:

Administrator
TAKW Charitable Trust
admin@teatiawakikapiti.co.nz
PO Box 509
Waikanae 5250

Date: _____

Appendix C: Te Ātiawa ki Whakarongotai Freshwater Customary Use Tikanga

This document outlines the tikanga to manage freshwater customary use for Te Ātiawa ki Whakarongotai. The tikanga outlines the appropriate process by which permission for customary use shall be granted; this includes the take of whitebait as provided by Section 18 of the Whitebait Fishing Regulations 1994.

Permits

1. All permits to access reserves such as the Waikanae Estuary must be granted by the Te Ātiawa ki Whakarongotai Kaunihera Kaumātua.
2. These permits will determine explicitly who is granted access, for what period and whether this access includes the use of a vehicle.
3. An appointed cultural monitor from the Kaunihera Kaumātua will contact the Department of Conservation (DOC), Ministry of Primary Industries (MPI), Kāpiti Coast District Council (KCDC) and the New Zealand Police to communicate information on who holds permits, and to arrange for access if necessary.
4. The Kaunihera Kaumātua will keep a record of all permits issued.

Rāhui

1. The Kaunihera Kaumātua will have the right to put rāhui in place over mahinga kai should they determine the need for one.
2. This will be communicated by a representative from the Kaunihera Kaumātua to Te Ātiawa ki Whakarongotai Charitable Trust, DOC, MPI, KCDC and the NZ Police.
3. DOC will be asked to consider implementing a ban to complement any rāhui.

Restricted access

No nets will be used within 20 metres of the 'pipe' / fish pass at the Waikanae Estuary.

Enforcement

In the event of a community member acting in breach of these tikanga, DOC, KCDC and the NZ Police are responsible for enforcement.

Review

These tikanga will be revised periodically by the Kaunihera Kaumātua, in consultation with DOC and KCDC.

Breaches of the tikanga

TAKW will not be held responsible for individuals acting in breach of these tikanga and any permits issued in accordance with them.

Date: _____

Appendix D: Mātauranga Māori Protocols

Protocols for working with mātauranga Māori

Protocols are required to ensure appropriate process and use when engaging and working with mātauranga Māori. This is both for kaitiaki who are responsible for the creation, use and protection of mātauranga Māori, but also for those who work in the public and private sector who will encounter and engage with mātauranga Māori. Mātauranga Māori is a significant taonga protected by Te Tiriti o Waitangi and through the Resource Management Act provisions that relate to Māori relationships with taonga.

A literature review was conducted to identify protocols that were discussed and approved with kaitiaki of Ātiawa ki Whakarongotai. This resulted in three key types of protocols:

- Understanding a mātauranga Māori view of reality
- Ethical protocols in creating or using mātauranga Māori
- Understanding mātauranga Māori view of knowledge itself

More detail can be found by consulting the literature referenced here

Understanding a mātauranga Māori view of reality

1. *The universe is 'energised process'*

Mātauranga Māori defines the universe as dynamic lineal process, so that as opposed to focusing on 'knowing' the universe, the process of 'Being' is central to a Māori understanding of reality. In a Māori worldview, the material world that we live in was created by applying patterns of energy to the previous states of nothingness and potential. Creation is not considered a moment or discrete event, but a constant and infinite energised process.³

2. *That which causes the process of the universe is divine*

3. *The spiritual and material world are not distinct from one another*

Those natural processes of the universe are deified under the Māori worldview in the form of atua, or gods and goddesses, and the more fundamental those natural processes are, the more divine. Within this view, the material and 'spiritual' world aren't distinct from one another, they are always interacting, as the realm of the atua, or cosmic causal processes, are always acting upon the material world. Whilst beings that existed in the material world, eventually transition back to an immaterial existence. Māori concept of time, is therefore that those who existed in the past, can also exist in the present or future.⁴

4. *The universe is gendered through the association of male and female atua with different processes and phenomena*

Dualism and balance are key themes of the Māori worldview, which is can be seen in the gendering of the universe. It is important to note that the Māori recognition of female elements of the universe has been the target of systematic undermining through the introduction of colonial Judaeo-Christian thinking and that this knowledge needs to be revitalised within mātauranga Māori.⁵

³ Marsden, 2003a; Marsden, 2003c, p. 44; Mika, 2012; Royal, 2003, p. xiii.

⁴ Henare, 2016; Marsden, 2003a, p. 20; Mikaere, 2011a, p. 320.

⁵ Milroy & Temara, 2013, p. 15; Mikaere, 2011a, pp. 314-315; Yates Smith, 1998, p. ii.

5. *Reality is continuously constructed through one's interpretation of it, often described in whakapapa*

A Māori worldview is conscious that humans construct their reality in order to give meaning to their existence, often through the reciting of whakapapa, or genealogies of the cosmos, of natural phenomena and of people themselves. These 'knowledge continuums' are developing over time, and subject to recital, protection and transmission through oral tradition. For this reason, the voice and oral tradition are considered powerful and to hold a degree of sacredness, given their function to create conscious reality.⁶

Ethical principles of mātauranga Māori

6. *Mātauranga Māori is created or applied in order to manifest certain kaupapa or values. It is not a 'value free' or 'objective' knowledge system.*

The application of mātauranga Māori to fulfil Māori kaupapa or values is referred to broadly as a 'kaupapa Māori' approach. Kaupapa Māori is widely recognised in academic literature and in the practices of various disciplines in Aotearoa. There are obviously many diverse Māori values, however the following are some of the fundamental values implicit in the creation and application of mātauranga Māori:

- Mana, or the power or worth of a person related to a sense of self-esteem and identity
- Tapu, or the potentiality for power, in particular spiritual power
- Wairua, spiritual values connected to authenticity, divinity, and higher consciousness
- Mauri, the biological values which provide what is required for physical survival⁷

7. *Mātauranga Māori is sacred. The appropriate kaitiaki of any mātauranga determine the limitations who can access mātauranga and how it can be used.*

Mātauranga Māori is considered sacred due to an awareness of its power to manifest certain values or agenda as outlined above. Māori have actively sought to have Māori knowledge, in particular of natural taonga protected through bringing the Treaty of Waitangi Tribunal claim WAI 262. The report on this claim identified clear existing protocols around kaitiaki having control over mātauranga Māori.⁸

8. *The generation and holding of mātauranga Māori must be pursued in a way that is authentic*

In order to truly manifest kaupapa Māori, knowledge must be generated, held and created in way that is 'authentic'. According to traditional Māori knowledge experts, authenticity requires a 'passionate and subjective approach' that involves actually living in and experiencing the Māori world through the heart, not the head. It requires learning through full membership in Māori society and tribal life. Recent scholars have also emphasised that being authentic also implies an ability to be relevant to the Māori world.⁹

⁶ Barlow, 1991, p. 174; Marsden, 2003a, p. 19; Mikaere, 2011b; Royal, 1998, pp. 56-57; Royal, 2003, pp. xiv-xii; Walker, 2013, p. 37; Winiata, 2006.

⁷ Marsden, 2003a, pp. 3-5; 2003c, pp. 27-45; Royal, 2012; Tau, 1999, p. 20.

⁸ Marsden, 2003b; Royal, 2003, p. xii.; Waitangi Tribunal, 2011, p. 44.

⁹ Marsden, 2003a; Smith, 2016, p.145.

9. *The creation, use and validation of authentic mātauranga Māori requires tikanga Māori spaces.*

In frameworks for conceptualising how mātauranga Māori can interact in a contemporary world with other foreign knowledges, a key principle is that one cannot create for the Māori culture from within the paradigm of another. Māori knowledge must be created, used and validated in distinct tikanga Māori spaces.¹⁰

Principles of a mātauranga Māori view of knowledge itself

10. *Mātauranga is a universal phenomenon of life*

Māori view knowledge not as something specific to human beings, but a universal phenomenon of life experienced by all living beings, like matter and energy.¹¹

11. *All mātauranga can be considered the product of either;*

- Te Kete Tua-uri; relating to the time before Te Ao Mārama, the fundamental laws of the universe
- Te Kete Aronui; relating to Te Ao Mārama, the world we experience
- Te Kete Tua-ātea, relating to the future.

This way of conceptualising knowledge comes from the oral history tradition in which the deity Tānenui-a-rangi, ascended to the heavens to receive Ngā Kete o te Wānanga, the three baskets of knowledge.¹²

12. *Mātauranga Māori is embodied; it is experience or practice based*

A principle of mātauranga Māori that is heavily emphasised by many Māori knowledge experts is that it is created as a result of being in and experiencing the universe, having practical everyday engagements and by learning through doing. The role of artworks, performance, activity or spatial layouts to convey meaning that words cannot is an important aspect of mātauranga Māori.¹³

13. *Mātauranga Māori can be produced and exchanged through a range of different physical, mental and spiritual aspects of a person*

Experience-based knowing can be facilitated by a range of different aspects of a person; not just their mind, but their heart, soul, head, gut etc. The experienced universe also encompasses more than just the material realm, as identified earlier, there is a broad range of knowledge that pertains to the emotional, immaterial, intuitive, psychic, conscious, subconscious and spiritual world.¹⁴

14. *Expertise in mātauranga Māori is attributed by Māori collectives*

Experts in mātauranga Māori come in many different forms, however it is very clear to Māori communities who their own experts are, and the kind of roles, functions and responsibilities they perform in their communities.¹⁵

Date: _____

¹⁰ Royal, 1999, p.5.

¹¹ Royal, 1998, p. 57.

¹² Marsden, 2003b.

¹³ Meyer, 2014; Mika, 2012; Milroy & Temara, 2013; Moller, Kitson, & Downs, 2009; Pere, 1991, p. 5; Royal, 2008; Tau, 1999, p. 15.

¹⁴ Marsden, 2003b, p. 59; Meyer, 2014; Royal, 2008; Smith, 2000.

¹⁵ Smith et al., 2016, p. 144.

Appendix E: Freshwater Mahinga Kai Health Index

| WHAKAPAPA |
|---|
| We maintain our way of life as Te Ātiawa ki Whakarongotai. |
| Through water, our people are connected to their history, to the marae and to each other. |
| All our people know their whakapapa to the water and water bodies. |
| The unique identity and role of Te Ātiawa ki Whakarongotai as mana whenua and kaitiaki of water in their rohe is recognised and respected. |
| The unique relationship that certain whānau and hapū hold in connection to certain sites and taonga is respected and protected appropriately. |
| All sites of significance and associated names and kōrero within the rohe of Te Ātiawa ki Whakarongotai are respected and protected. |
| All generations enjoy harvesting and eating mahinga kai from the water. |
| WAIKUA |
| Water supports healthy waihua of the people. It is clean, calm, safe and conflict free. |
| The presence of native flora and fauna can be observed and heard in the waterscapes. |
| The waihua of people is supported through their ability to practise mahinga kai. |
| The people of Te Ātiawa ki Whakarongotai have good self-esteem about the state of waterways. |
| Our people feel a sense of pride and fulfilment about the capability of our iwi as kaitiaki of water. |
| The people of Te Ātiawa ki Whakarongotai are free of stress and trauma brought about through degradation and change of waterways. |
| Wāhi tapu, tikanga and kōrero tuku iho are respected and protected. |
| Tikanga Māori and the mana motuhake of Te Ātiawa ki Whakarongotai is abided by in the active protection of wāhi tapu and kōrero tuku iho. |
| MANA |
| People are able to live their lives in the rohe of Te Ātiawa ki Whakarongotai in harmony with the water. |
| Our relationship with the waterscape supports our economic and social security, and all abundance is shared. |
| People of Te Ātiawa ki Whakarongotai have access to mahinga kai sites. |
| There is intergenerational participation in mahinga kai. |
| The mana of our marae Whakarongotai is supported by the abundance of the waterscape. |
| Traditional economies of mahinga kai and other resources create and strengthen relationships with others. |
| Te Ātiawa ki Whakarongotai have tino rangatiratanga, authority over use that affects water. |
| Te Ātiawa ki Whakarongotai have positive working relationships with Treaty partners. |
| The implementation of tikanga in relationship to the water is upheld by the iwi and supported by Treaty partners. |
| The iwi collective feel that they can influence decision-making on water. |

MĀRAMATANGA

Decision-making is informed by iwi knowledge.

A diverse array of mātauranga Māori is created and handed down: rongoā, astrology, mahinga kai.

All generations know where to source mahinga kai.

All generations can identify and recognise traditional kai species.

Knowledge on harvest and preparing is held intergenerationally.

Our people have access to new knowledge and technologies.

Knowledge is protected and applied in a safe and respectful way.

Local specialist knowledges are respected and empowered to inform decision-making.

TE AO TŪROA

The regular patterns of nature are observed and can be relied upon to provide abundance and safety.

People's behaviour, use and interaction with the environment is regulated by the collective respect for Te Ao Tūroa, for all the atua and for natural order and balance.

Habitat that's required to support mahinga kai and other native species is available.

The natural character of the environment waterbodies is protected and enhanced.

Diverse mahinga kai can be sourced efficiently in all seasons and harvest methods should not allow for exploitation.

There is good presence and cover of native vegetation.

Native fauna are able to complete their full life cycle.

Ecological communities are well-structured and stable.

MAURI

Waterways and mahinga kai are healthy, clean and free of pollutants.

The temperature and oxygen in waterways support stable ecological communities.

Species are lively and in good condition.

Mahinga kai is abundant.

Mahinga kai tastes delicious.

Biodiversity is strong in that the full suite of mahinga kai species can be found in our catchments.

Waterways are safe for people to access.

The vitality and health of people is strong.

Appendix F: Ngā Tikanga Tohorā o Te Ātiawa ki Whakarongotai

In development

Appendix G: Te Ātiawa ki Whakarongotai Partnership Strategy

Under development

Appendix H: Tāhuhu Kōrero o Te Ātiawa ki Whakarongotai

To be compiled with evidence presented post Tribunal Hearing

Appendix I: Te Rohe o Te Ātiawa ki Whakarongotai

Private to TAKW

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