

# ASSESSING THE MAURI OF THE KAIPARA

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## 1 EXECUTIVE SUMMARY

There is a need to understand and articulate Māori values of water within freshwater management frameworks. Current State of Environment reporting does not report on the status of cultural health. This is primarily due to the Māori worldview being difficult for resource managers and scientists to accommodate within existing management regimes; lack of resources; lack of support to practice kaitiakitanga of ecosystems; and capacity for hapū/whānau/marae to undertake this quantitative approach to assessing environmental health.

Ngā rangatira Te Uri o Hau state that the mauri of the Kaipara Harbour is unhealthy and disconnected. This is causing a tremendous loss of mana to the hapū. From a Mātauranga Māori perspective, natural resources are imbued with mauri, an intangible and intrinsic value. Ensuring the mauri of natural resources are maintained is an integral part in defining Kaitiaki of natural resources. Māori believed that small shifts in the mauri or life force of any part of the environment, for example through use or misuse, would cause shifts in the mauri of immediately related parts, which could eventually affect the whole system.

The purpose of this piece of work is to determine appropriate methods and indicators for monitoring freshwater-estuarine / ecosystem outcomes at a Te Uri o Hau hapū/marae level.

We reviewed and briefly evaluated 15 cultural health assessment models. Case studies included: 1) *Māori Environmental Indicators for Wetlands*; 2) *Motueka Cultural Health Indicators*; 3) *Iwi Estuarine Indicators*; 4) *Cultural Health Index for Streams and Waterways*; 5) *Waikato River Report Card (Waikato River Independent Scoping Study WRISS)*; 6) *Ngāi Tahu State of the Takiwa*; 7) *Stream Health & Assessment Kit (SHMAK)*; 8) *Marine Cultural Health Index*; 9) *Iwi Estuarine Monitoring Tool Kit (Nga Waihotanga Iho)*; 10) *Ngāti Kere Methods and Indicators for Marine Protection*; 11) *Te Roroa Iwi Cultural Indicators & Monitoring Framework*; 12) *The Mauri Model framework*; 13) *Cultural Opportunity Assessments for stream flow*; 14) *Mauri indicators and outcomes: Mauri of waterways kete*; and 15) *Kaimoana Survey Guidelines for Iwi and Hapū*.

In summary, common attributes of the models included:

- Cultural health assessment models must be tikanga-based or grounded within a tikanga framework
- Consider the past to understand the future
- Has a (w)holistic focus, for example, catchment-scale and/or land-sea scale
- Specific-level indicators of mauri health focused on: 1) nga taonga tuku iho, 2) tikanga, 3) mauri, 4) kaitiaki, 5) tapu, and 6) mana.
- Indicators sit within a framework of hapū/whānau aspirations for their tribal rohe, such as: 1) self-determination, 2) human and social capacity, 3) healthy mauri, 4) healthy and productive whenua and moana, 4) restoration and protection of mauri, 5) sustainable fisheries, and 6) co-management and community autonomy.

Finally, the assessment models varied in whom initiated their development. That is, some models were initiated by iwi/hapu while others by crown agencies as part of the Ministry for the Environment Environmental Performance Indicators program; or by research providers such as NIWA or Landcare Research.

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### 3 INTRODUCTION

Kaumatua recall a tribal record of a time when the Harbour was in full health before the forests were cleared and the effects of land clearance, sedimentation, unsustainable commercial fishing and agricultural landuses diminished its life force. In those times the harbour and its catchment provided all the physical requirements for the hapū.

Environs Holdings Ltd(2007)

‘Mauri...the elemental force that binds all things together and gives them their meaning’

Rev. Māori Marsden(1975)

From a Mātauranga Māori perspective, natural resources are imbued with mauri, an intangible and intrinsic value. Ensuring the mauri of natural resources are maintained is an integral part in defining who Kaitiaki of natural resources are. The traditional Māori worldview acknowledged a natural order to the universe, built around the living and non-living, and the central belief was that all parts of the environment were interrelated or interdependent through the domains of Atua or departmental gods (Marsden 1975). Tangata Whenua have been observing and interacting with their environment for centuries.

Traditionally, Māori believed that small shifts in the mauri or life force of any part of the environment, for example through use or misuse, would cause shifts in the mauri of immediately related components, which could eventually affect the whole system. All activities and relationships with the environment were governed by mythology, religion, and values (Marsden 1975).

Within this framework spiritual qualities guided resource use through an elaborate system of ritenga or rules or values, with goals to regulate and sustain the wellbeing of people, communities and natural resources. Guiding values and concepts included *kaitiakitanga*, *tapu*, *mauri*, *rahui*, *mana*, *noa* and *wairua* (Smith 1898, Barlow 1991, Patterson 1992, Wright 1996, Williams 2001, Mead 2003, Murton unpublished).

Restoring the mauri of the Kaipara is of upmost importance to Kaipara Kaitiaki. How this will occur is unknown. But due to the bounding relationship between kaitiakitanga and tino rangitiratanga, opportunities must be created that will nourish this relationship. One opportunity is participating in resource management through cultural health monitoring of significant awa, moana-nui and whenua. Te Uri o Hau do not currently carry out cultural health monitoring within their tribal rohe and their regional council State of the Environment (SOE) monitoring program does not support it.

This piece of work has allowed Te Uri o Hau to begin their journey to implement cultural health monitoring and reporting in their tribal rohe. The tribe’s long-term goal is a whole of Kaipara cultural reporting program that sits alongside contemporary council driven programs and assists with the tribe’s knowledge-base.

The following sections review and summarise current examples of cultural health frameworks developed and utilised over the past decade by iwi/hapū. For ease of readership, the report summarises all tools (Table 11), describing their key attributes.

## 4 EVIDENCE THAT DESCRIBES THE STATUS OF KAIPARA MAURI

Being an intangible entity, of life-supporting value, utilising quantitative or scientific evidence to understand the status of mauri is difficult. Māori ontology acknowledges the inherent or intrinsic values within an ecological system: encapsulated in the concept of mauri.

According to Barlow (1991):

“Everything has a mauri, including people, fish, animals, birds, forests, land, seas, and rivers: the mauri is that power which permits these living things to exist within their own realm and sphere. No one can control their own mauri or life-existence” [p. 83].

Te Uri o Hau consider the harbour and its ecosystem to have a mauri (Environs Holdings Ltd 2007) and as Kaitiaki of that mauri they have a cultural and spiritual responsibility to ensure it is maintained, protected and enhanced. They have witnessed significant environmental changes in their rohe as a result of changing landuse and mechanical extraction of the natural world of Kaipara. This has affected the Mauri of the Kaipara moana causing tremendous loss of mana to the tribal roopu.

From a Kaitiaki perspective there are several activities that impact on Kaipara mauri. Such as, sandmining, commercial fishing, reclamation, foreshore and seabed structures, dumping, animal effluent; and pollution from wastewater treatment plants. Te Uri o Hau also believe such activities, as the placement of marine turbines in the entrance of the Kaipara will have an impact and potential diminishing of mauri. Any resource activity that reduces or affects the flow of measureable energy will reduce or affect the mauri (Environs Holdings Ltd 2007):

“Mauri is intimately connected to the interrelationship and intertwining of all forces that make up an ecosystem – the physical and spiritual, the tangible and intangible, the past, present and future, human and non-human, individual components and interconnected wholes.”

Also, TUOH Deed of Settlement 2002 statement of the cultural, spiritual, historic and traditional association with the Wairoa River describes the importance of mauri:

“The mauri of the Wairoa River represents the essence that binds the physical and spiritual elements of all things together, generating and upholding life. All elements of the natural environment possess a life force and all forms of life are related. Mauri is critical element of the spiritual relationship for Te Uri o Hau.”

This statement is also made for the Kaipara Harbour coastal area, Ōtamatea, Ōruawharo, Arapaoa, and Whakaki Rivers.

Te Uri o Hau hapū hold numerous concerns for their mana. Mana is inter-generational. The historical degradation of the harbour over the past 200 years has already had significant adverse cultural effects on Te Uri o Hau. All resource activities and development that have occurred in the Kaipara has seen resources extracted from Te Uri o Hau rohe and given to others, most of whom are outside their rohe. Traditionally, such exchanges are governed by strict tikanga – involving concepts of manaakitanga, muru and utu – all of which involve concepts of reciprocity (Environs Holdings Ltd 2007). Mana whenua are neither making decisions about the resource nor determining the manner and value of the exchange. Numerous issues arise from this effect.

Many assumptive decisions have been made by the Crown since European arrival into the Kaipara thus, mana whenua have not been wholly and directly involved in the use and management of the Kaipara for over 200 years. The Marine Department was established in 1866 to make decisions on shipping, harbours and harbour works. The legal assumption has been that beaches and the foreshore “belong” to the Crown (Murton, Chapter 3.4.3, unpublished). Between 1866 and 1972, the Marine Department dealt with a range of activities relating to the foreshore: the approval and licensing of structures; the licensing of the right to pick oysters for commercial purposes; proposals to lease oyster beds; the leasing of the North Kaipara beaches to toheroa canners; the leasing of mudflats for reclamation purposes; the subdivision of the foreshore for oyster management purposes; oyster cultivation work; the licensing of the taking of sand, shell and shingle.

By 1879, Te Uri o Hau had lost control of most of the shoreline of the Kaipara through sale of the land above the mean spring high tide mark, but settlers, timber millers, gum diggers, and fishermen were flooding in. Ngā rangitira did express their dissatisfaction about the inability of Pākehā and a government who did not care and acknowledge the rights of access and control. The impact of this on mauri is unquantifiable. The spirituality surrounding this concept makes it even more difficult to restore. Should we measure its status since 1800’s when alienation begun? Or should it be measured from today’s kaitiaki?

## 5 ASSESSMENT MODELS FOR CULTURAL HEALTH

Contemporary development of cultural health indicators and ecological assessment tools has been recognised as a positive, scientifically robust and supportive element to current resource management decision-making processes (Tipa and Teirney 2003, Young *et al.* 2008, Rickard & Swales 2009). The development of these cultural health indicators and environmental outcomes was due to the concern that Mātauranga Māori in research, resource management, environmental management, sustainable management and monitoring is ‘tacked-on’. That is, research is already underway and the framework for management is already confirmed (Kennedy & Jefferies 2009). This co-opting of Mātauranga Māori see’s it being reshaped in order to fit into a totally different western research/management framework thus, removing and/or distorting the holistic, fundamental connections and patterns within Mātauranga Māori (Kennedy and Jefferies 2005).

Northland and Auckland regional managers have trouble with addressing Te Uri o Hau values in policy, planning and application of environmental management in the Kaipara Harbour and its catchment tributary rivers. Te Uri o Hau have the right to manage, access, protect and use natural resources of significance to them and this right was recognised in Te Uri o Hau (Treaty of Waitangi) Deed of Settlement 2002. For Ngāti Whatua o Kaipara this is also underway and will be recognised in their Deed of Settlement in late 2011.

Harmsworth (2002b) states that in order for Māori culture to survive, values and knowledge relies on:

*“..an indigenous renaissance that takes traditional concepts and values and sets them equally in a contemporary context next to Western concepts and values, as a basis for living”.*

Development of Māori environmental indicators came to a head in 2002 due to the requirement to introduce more systematic and defensible monitoring standards within national and international frameworks. There was high-level support, and under legislation, to address the need to incorporate Māori perspectives and aspirations in environmental monitoring. Māori were invited to participate in the national MfE environmental indicator program in 1998, through reference groups, forums and related projects. The final indicators were based on Māori environmental concepts of: Kaitiakitanga, Whakapapa, Mauri and Taonga. With this development it was clear to portray that Māori have different beliefs, values and cultural perspectives from western environmental view (Harmsworth & Tipa 2006).

In addition to the development of cultural monitoring indicators was the FRST<sup>1</sup>-funded program ‘Planning Under a Cooperative Mandate’ (PUCM). Since 1995, this program has been examining the quality of plans and policies under the Resource Management Act (RMA) 1991 and Local Government Act (LGA) 2002 and how they consider the interests of Māori. A comprehensive literature review was carried out to establish definitions of environmentally significant concepts of kaupapa and tikanga Māori (Kennedy & Jefferies 2009). Particular regard was given to Māori perceptions of the environment and the relevance of kaupapa and tikanga. This was to form the platform to build a framework for Māori environmental outcomes and indicators for planning and policy documents (Kennedy & Jefferies 2009).

Kennedy & Jefferies (2009) recommends a kaupapa/tikanga-based framework compared to the wa-based and Atua-based frameworks. This was the least complex model to follow and allows for close examination of terminology and concepts already in use in the domain of environmental management. For example, using the key concept of tapu, the links to key issues such as wahi tapu

<sup>1</sup> FRST – Foundation for Research, Science and Technology. Today known as Ministry of Science and Innovation.



are easily made. The decision was pragmatic to complement current understandings by both Māori and environmental management agencies and other practitioners.

**Important criteria for selecting an effective Māori environmental monitoring framework**

As Māori researchers became increasingly involved in systematic indicator research, it was recognised that key social and cultural factors needed to be in place before identifying, developing and using Māori environmental indicators in a monitoring program (Harmsworth 2002a, Harmsworth & Tipa 2006). Critical factors that are important to have in place to develop indicators include:

- Understanding and adherence to tikanga
- Prior knowledge and access to relevant knowledge sources held by tangata whenua
- Appropriate Māori environmental indicator frameworks in which to work
- Capacity and resources (e.g. skilled persons, funding)
- Organisation and leadership
- Access to scientific information and knowledge including databases
- Communication, trust, collaboration and coordination (i.e. community or hapū based)
- Access to areas, ecosystems, natural resources
- Māori classification systems and organisational frameworks for collecting and recording information
- Appropriate and consistent methodology
- Understanding of Māori environmental indicators and their relevance to providing information on environmental change and trends; and understanding on purpose of monitoring
- Ability to interpret, analyse, synthesise and integrated information
- Regard to intellectual property rights, a system, process, acknowledgement to information sources, agreement or protocol to collect, record and store sensitive or confidential information
- Ability to synthesise or aggregate selected Māori environmental indicator information for community, tribal, regional or national State of Environment (SOE) reporting.

Recognition must also be given to the following themes:

- Environmental or resource management is not Mātauranga Māori resource management. The current approach that underpins sustainable management in New Zealand, principally the Resource Management Act, is anthropocentric (humanity is separate from the environment – human needs are the starting point, the centre of attention). Versus traditional Māori ideology of sustainable management, where humans are part of nature; where all life is equal.
- Māori values to be included effectively in resource management process must recognise: access and control of intellectual property, preventing the misuse of Māori values in culturally inappropriate ways; enabling iwi/hapū to participate fully in development of information tools.
- Co-opting of Mātauranga Māori by building a body of knowledge together with iwi/hapū. Search for better relationships between human communities and the natural world must be gained (Blackhurst *et al.* 2003, Whangapirita *et al.* 2004).
- Placing a dollar value on indigenous values is why iwi/hapū are reluctant to share their indigenous knowledge. Indigenous knowledge should not be valued against/with other western knowledge when evaluating resource allocation in the current New Zealand resource and environmental management paradigm (Awatere 2009).
- Importance of kaupapa Māori research to be conceived, developed and conducted by Māori and the outcomes benefit Māori (Jefferies & Kennedy 2009a).
- A true kaupapa Māori environmental indicators and outcomes framework is limited when developed in English rather than Te Reo Māori. Mātauranga Māori encapsulates knowledge, cultural, language, beliefs, and values, which are expressed in language.

Traditional Māori indicators, or tohu, of environmental “health” have been used for hundreds of years and enable Kaitiaki to both interpret and care for the natural environment (Young *et al.* 2008, Jefferies and Kennedy 2009). Tohu continue to be used today, such as alignment indicators (Table 1), where one event in nature aligns/occurs with another.

**Table 1. Past and present seasonal indicators, tohu, used for harvesting kaimoana from the Kaipara by Te Uri o Hau hapū (Environs Holdings Ltd 2009).**

Plant Cycle	Maramataka (Month)	Kaimoana Harvested	Season
<b>Kowhai</b>	November	Snapper, stingrays	Spring
<b>Pohutukawa</b>	December	Kingfish, Mullet	Summer
<b>Algal Bloom</b>		Mullet	
	February	Tuna/Eel	
<b>Heather</b>		Toheroa (fattest)	

Māori have been observing, interacting and acquiring knowledge about the natural world for centuries (Young *et al.* 2008, Te Rūnanga o Ngāi Tahu 2004, Environs Holdings Ltd 2007), operating within a holistic framework that was/is guided by system of ritenga (rules) and tikanga. The wellbeing, regulation and sustainability of people, communities and the natural world were guided by particular values of kaitiakitanga, tapu, rahui, mauri, wairua, noa and mana, whereby strong, spiritual relationships were established with a given area, catchment or region (Young *et al.* 2008).

Reasons behind the development of environmental frameworks founded on the Māori worldview and Mātauranga Māori were summarised by Young *et al.* (2008). Being:

- Kaitiakitanga – the responsibility to carry out and practice the protection and guardianship of mauri, whakapapa, tikanga. Environmental monitoring is an opportunity to apply their responsibilities and knowledge and achieve particular cultural aspirations.
- Undertake flax-roots action on a particular issue that is significant to their cultural well being, such as contamination, cultural heritage, water quality, and declining fish stocks. Undertaking cultural monitoring programs of the natural resources can provide iwi/hapū with a measure or detection of change that require long-term monitoring strategies and/or policy/rule development.
- Legislative or statutory obligation – particularly under the RMA, Treaty of Waitangi, Treaty Settlement Acts and Deed of Settlement. Giving effect to these obligations and responsibilities that require monitoring.

However, it is important to note that initiation of a cultural health monitoring program must be with the iwi/hapū, an example of which is discussed below: the State of the Takiwā program initiated by Ngāi Tahu.

#### **Cultural and Western scientific measures**

Tipa and Tierney (2003) point out that the focus of cultural and western scientific measures of stream health are completely different. Such as:

- (1) Western measures are based on specific measurable components in the stream. For example, the Stream Health Monitoring and Assessment Kit (SHMAK) for community groups, integrates habitat and an invertebrate component. But, in terms of recognising iwi values, both components are based on Western scientific measures of stream health using instruments; SHMAK does not currently incorporate iwi values.

- (2) Cultural measures are of the entire catchment, meaning a holistic perception of health. A measure that better serves this is one that measures the overall state of the catchment.
- (3) Māori values are outside those captured by Western methods.

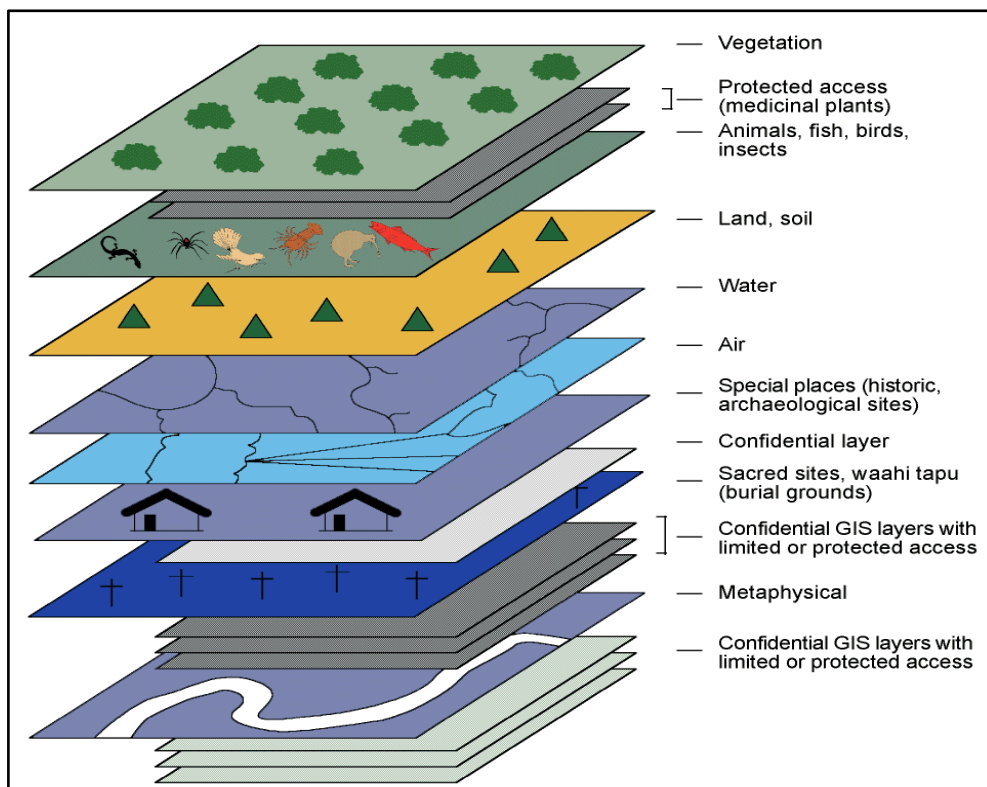
Most assessment models reconfirm the significance of holism to Māori and attempting to combine cultural and western methods is philosophically inappropriate. However, the outcome and practice that is supported is that cultural measures fit comfortably alongside Western measures and provides a significant and complementary addition to tools for assessing stream health.

**Knowledge protection and access**

The Māori knowledge system (Mātauranga Māori) is culturally sensitive. From reviewing the various case studies, iwi/hapū stated when developing indicators, that not all their knowledge will be freely published and available. Access restrictions to sensitive information needed to be put in place when reporting on the indicators to the public versus their own iwi/hapū/whānau. For example, when reporting on taonga species Māori preferred that the species list not be released but a pooled or grouping be provided and the specific details remain with the hapū/whānau.

Cultural and intellectual property rights need to be considered when storing and accessing information systems and databases. This sensitivity has been considered in the development of spatial (GIS) databases where particular data layers are confidential and access is restricted to particular users (e.g. tribal kaumatua/kuia, whānau group) (Figure 1).

**Figure 1. Factors related to Māori indicators are stored in layers with restricted access (Source: Harmsworth 1997).**



**Information systems**

Integrated information systems have been identified as a key resource to further cultural monitoring, building capacity, and up-skilling. Many Māori organisations, marae or whānau wish to contribute to their own environmental management but also to mainstream regional and national policy,

monitoring and planning. However, they are hampered by access to information, such as water quality monitoring data; pest management plans; aerial photographs; spatial data. Many tribal entities have already used databases and spatial information (e.g. maps) for Treaty of Waitangi claims, iwi and hapū management plans and to support environmental and cultural planning and policy.

The development of a central database that improves access to other information, security of data, access restrictions, cultural information and Mātauranga Māori contributes to up-skilling in information technology (e.g. Geographic Information Systems) and building tribal capacity for environmental monitoring. Information systems can also establish a baseline for future reports on indicators that connect to and evaluate.

## 6 CASE STUDIES

### 6.1 Māori Environmental Indicators of Wetlands

#### **Background and framework**

The Māori indicators of wetlands program was part of a national-wide project, *Coordinated Monitoring of New Zealand Wetlands*, managed by the Ministry for the Environment (Harmsworth 1999, 2002a). This program developed a Māori approach for assessing the state of wetlands and a set of indicators. The research was participatory with a strong linkage with a number of iwi and hapū throughout New Zealand.

The well recognised Pressure-State-Response (PSR) model was used to frame the development of the main indicator groups and specific key indicators per group. The framework includes three components organised on Māori concepts (Table 2) and Māori wetland terminology (Table 3 and Table 4): 1) what causes the problem, 2) taonga and mauri, and 3) trends (positive, negative) from a cultural perspective.

Harmsworth (2002a) points out that it was important to establish a conceptual and culturally appropriate process and framework and establish whakapapa to identify the indicators that would be measured.

**Table 2. Indicator framework reflects key Māori concepts.**

<b>Māori Key Concepts</b>	
Whakapapa	<i>Ranginui, Papatuanuku, departmental Atua – the spiritual and natural world. For wetlands, the Atua used was Tangaroa, Tutewehiwehi, Tane Mahuta</i>
Te reo Māori	<b>See</b> Table 3 <i>Directed whakaaro (thinking) for development and understanding of wetland ecosystems, landscapes, ecological processes and social connections</i>
Mauri	<i>Very important concept to Māori; the essence of life; the life principle; the internal element; the sustaining life force of everything; the source of life. The basis of mauri is whakapapa. Embraces the connection between tangata whenua and the environment. Signifies the spiritual significance of a place and emphasises the human relationship to that part of the environment.</i>
Tikanga	<i>A set of principles and practices to achieve the goal of mauri maintenance utilising four planes of reality: 1) taha tinana – a material state, the body; 2) taha hinengaro – a mental state of improving knowledge and understanding, and thinking holistically about the natural environment; 3) taha wairua – a spiritual state, strongly tied with people’s values, relationships, beliefs, attitudes and feelings; 4) taha whānaungatanga – related or associative state, which recognises the association between people and the natural environment and understanding the effect human activities have on</i>

Māori Key Concepts	
	<i>the environment.</i>
Kaitiakitanga	<i>Represents responsibilities, obligations, guardianship, care and reinforces spiritual attachment to natural environment; wise management; is inextricably linked to tino rangatiratanga (authority, inherent sovereignty, autonomy)</i>
Māori frameworks & classifications	<i>Wahi tapu, Wahi taonga, Urupa, Mahinga Kai, Wairoa, nohanga, waitapu, waipuna, waiwera, waimate. Frameworks established to communicate knowledge, understand, regulate, restrict and manage parts of natural and spiritual environment.</i>

**Table 3. Māori terminology used for the main wetland types**

NZ Wetland classification <sup>2</sup>	Māori equivalent terminology
Estuarine (estuaries, lagoons)	Wahapū/Hapūa
Palustrine (emergent plants over freshwater, swamps, bogs, marsh)	Repo
Marine (saline, coastal, subtidal)	O Te Moana A Tangaroa
Lacustrine (lakes, ponds)	Roto, Moana
Riverine (rivers, streams, creeks)	Awa, Manga
Geothermal (warm to hot subsurface and surface water)	Waiariki, Wai puia, Ngawha Waiwera, Waipuna (springs)
Plutonic (underground water from springs, limestone or karst terrains)	Rarowhenua, Waipuna (springs)

**Table 4. The scientific hierarchical classification of wetlands used with Māori environmental indicators.**

Wetland Level	Wetland Type:
Level 1	Hydrosystem
Level 1A	Subsystem
Level II	Wetland Class
Level IIA	Wetland Form
Level III	Structural Class
Level IV	Wetland composition or dominant cover

### **Methodology and indicators**

With a process of hui, collation of Māori knowledge, review of iwi/hapū documents, field trips to wetlands and discussion groups, Māori indicators were identified. These were based on presence or absence of taonga iconic species; presence and absence of pest and weeds; mauri assessment and

<sup>2</sup> Johnson, P. & Gerbeaux, P. (2004). Wetland Types in New Zealand., Department of Conservation Ministry for the Environment.

cultural heritage indicators (e.g. wahi tapu, wahi taonga) (Table 5). To assess progress towards desired cultural and environmental goals for wetland rehabilitation indicators were linked to a particular goal.

The indicators can be used across both a site and catchment scale; and methods can be used to compliment other Māori and scientific approaches. The indicators can also be used to compliment long-term monitoring programs and cultural impact assessments. The final assessment form is found in Appendix 1.

**Table 5. Māori environmental indicators for wetlands.**

<b>Indicator</b>	<b>Examples</b>	<b>What to measure/assess</b>
<b>Positive cultural values indicators</b>		
Ngahere (Plants)	<i>harakeke, kuta, raupo, kahikatea, carex, toetoe, kanuka-manuka</i>	Numbers, proportion, quantity, spatial extent; height & size of plant
nga kararehe, nga ika (Fish/Animals)	<i>tuna, koura, kokopu, toheroa, tuangi, kanae, pipi, tuatua</i>	Size, condition (colour, texture, taste) of mussels, pipi, toheroa, karoro (cockle); proportion, quantity, spatial extent of fish species, natural habitat maps; size & abundance of tuna; area of suitable tuna habitat; size, colour, texture of fish; present fishing grounds versus historic
nga manu (Birds)	<i>tui, pukeko, kereu, weak, shags</i>	Observation of birds; number taonga versus introduced species; amount native birdlife present; sound (intensity) of native birds (within some time-frame)
<b>Negative/impact on Māori values indicators</b>		
Pest Plants	<i>Willow, grey willow, gorse, blackberry, pinus radiata, algal growth</i>	Invasion, numbers, type, spatial extent; proportion exotic versus native plants; mahinga kai areas affected by exotic plants
Pest fish	<i>koi carp, catfish, trout, rudd, mosquitofish</i>	Numbers, type, quantity, density, affect on native habitats, catch, numbers caught in certain timeframe
Pest animals	<i>possum, rats, deer, cattle, stoats, ferrets</i>	Number, type, quantity, density, affect on native habitats, catch, number of animals caught within a timeframe
Micro-organisms	<i>giardia, bacteria, viruses, cryptosporidium</i>	Numbers, quantity present; illnesses associated with

		microorganisms
<b>Mauri (wetland health) indicators</b>		
te mauri, mauri	(life force of wetland system, life support, wairua, mana, tapu, wehi, waiora, degree of contamination, degree of modification	Presence/absence of taonga species; spiritual association with wetland; name of wetland in te reo Māori; mahinga kai; access to wetland; riparian vegetation; observed pollution; nutrients; level of contamination; assess number of drains carrying pollutants; identify contaminants; effluent; heavy metals; other water mixing; introduced plants/animals; livestock access; landuse around catchment; number of drains & watercourses discharging into wetland system
water quality	water clarity, taste, feel, ingredients	Water quality assessment by tangata whenua; Māori water/water quality classifications; water clarity; observations; observed or measured sediment, pollution; water colour, taste and feel; frequency of floods
Mahinga kai	Taonga, number of people using wetland for mahinga kai, number of people with access, amount of food collected per year from mahinga kai	Area of healthy mahinga kai, amount of kai collected within timeframe, observation of native plants, fish, tuna quality and quantity
Māori wellbeing/health condition	Health illnesses, psychological illnesses	Number people from marae who collect food from wetland; number people with reported sickness; proportion of marae persons with concerns of health of mahinga kai; number/spatial extent of culturally significant plants, fish, habitat at risk from pollution, sediment, contaminants
<b>Cultural Heritage Indicators</b>		
Cultural sites, cultural heritage sites, wahi taonga, wahi tapu	wahi tapu, wahi taonga within or adjacent to wetlands, te reo Māori	Spatial extent, modification/destruction that has occurred, number sites affected by human activity,



	terms, names	number of sites protected, degree & use of Māori terms and names; use and length of fencing used to protect wetlands, cultural sites, native plants
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After undertaking a priority analysis with kaitiaki, a final set of nine (9) indicators was identified to monitor positive and negative environmental changes as determined by Māori communities' values and aspirations. They are:

1. % Area of landuse/riparian factors affecting cultural values
2. Number of sites delivering point-source pollution degrading te mauri
3. Degree of modification (e.g. draining, water table, in-flows, out-flows) degrading te mauri
4. **Number of (and change of) unwanted (e.g., exotic, introduced, foreign) plants, algae, animals, fish, birds (pest types) affecting cultural values (\*)**
5. **Number of (and change of) taonga species within wetland**
6. **% Area of (and change in area) taonga plants within total wetland**
7. **% Area of (and change in area) unwanted (e.g. exotic, introduced, foreign) plants covering total wetland**
8. **Assessment of, and change in Te mauri (scale)**
9. Number of cultural sites protected within or adjacent to wetland.

Harmsworth (2002) identified the indicators between 4-8 as the most critical for assessing environmental health from a Māori perspective.

When reporting results of the state of indicators, illustrating them could be done using radar diagrams/maps (Figure 2) or bar charts (Figure 3) (Harmsworth 2002).

**Outcomes and recommendations**

Harmsworth (2002) identifies a number of key requirements to developing Māori indicators for wetlands:

1. It is essential for iwi/hapū to have a vision or purpose for monitoring
2. Indicators developed within a framework of Māori aspirations or goals
3. Indicators reflect tangata whenua or Māori values
4. Measurement of indicators to be defined by kaitiaki
5. Importance of the framework to complement and enhance current environmental monitoring programs rather than be in conflict

**Figure 2. Illustrating the state of cultural values using radar maps (Source: Harmsworth 2002)**

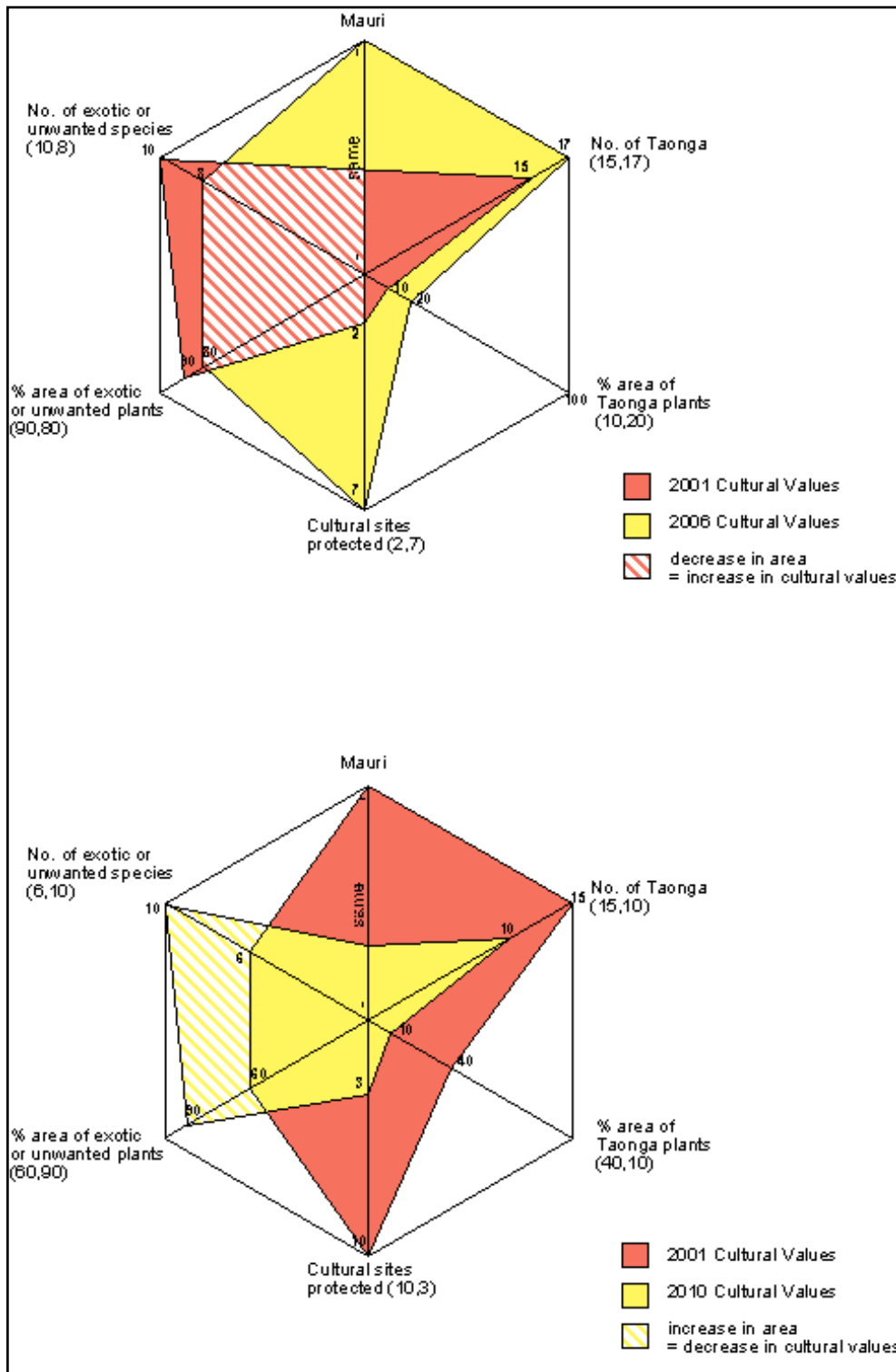
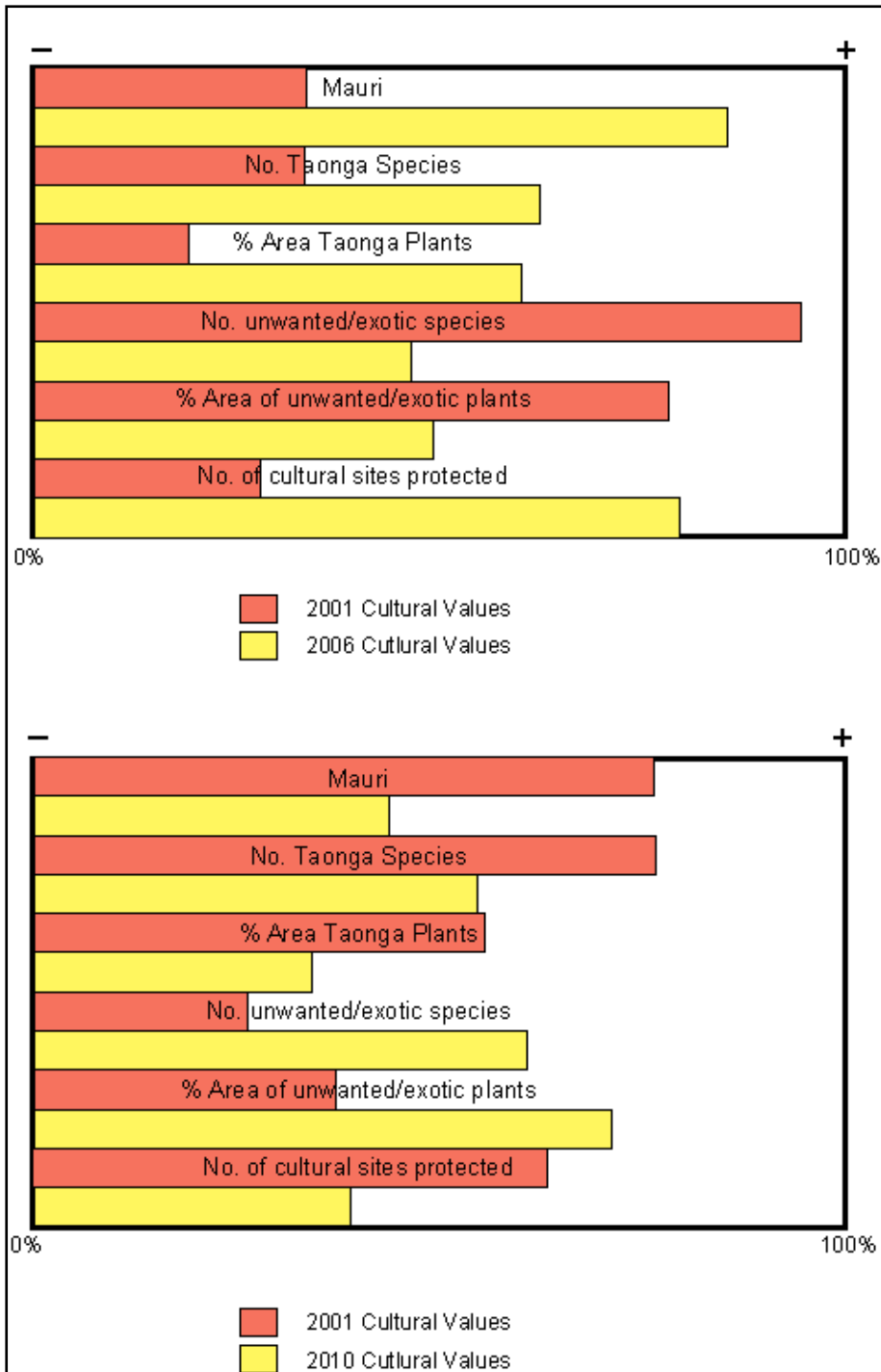


Figure 3. Illustrating cultural values using bar charts. (Source: Harmsworth 2002)



## 6.2 Motueka Cultural River Health Index

### **Background**

Iwi/hapū groups from the Motueka catchment have modified a Cultural Health Index (CHI) developed in the Otago region (see section 6.4 for details) and applied the health assessment framework throughout the Motueka and Riwaka catchments (Young *et al.* 2008, Harmsworth & Walker 2010).

The Motueka Cultural Health Index frames the catchment into Atua domains, such as Tangaroa, Tāne Mahuta, Haumie tiketike, Rongomatane, Tūmatauenga and Tāwhiri Matea (Figure 4); cultural themes, indicators and descriptors.

### **Aims of the Motueka Cultural River Health Index**

The central aim of developing and applying the Motueka Cultural River Health Index was to:

- Provide a Māori perspective to the state of the environment using Mātauranga Māori – holistic and interconnectedness perspective
- Articulate cultural values and aspirations
- Report on iwi/hapū state of environment (from a cultural perspective)
- Identify trends and/or changes from a Māori perspective
- Ability to feed into SOE reporting (i.e. local, regional, national)
- Build iwi/hapū/whanaū capacity in environmental management
- Ability to practice and contribute to kaitiakitanga, tino rangatiratanga and their responsibilities to whakapapa
- Address the lack of engagement with tangata whenua under the RMA (1991).

### **Methodology**

Tiakina Te Taiao<sup>3</sup> invited Gail Tipa and Laurel Teirney to Motueka and Riwaka catchments to train and run workshops in early 2006. Tiakina Te Taiao then modified and adapted the original CHI.

All the data collected from field assessments is recorded using maps, aerial photos, and given precise Global Positioning System (GPS) coordinates. A score sheet is filled out by trained iwi members and then entered into the Tiakina Te Taiao GIS database based at Whakatu marae in Nelson (Young *et al.* 2008).

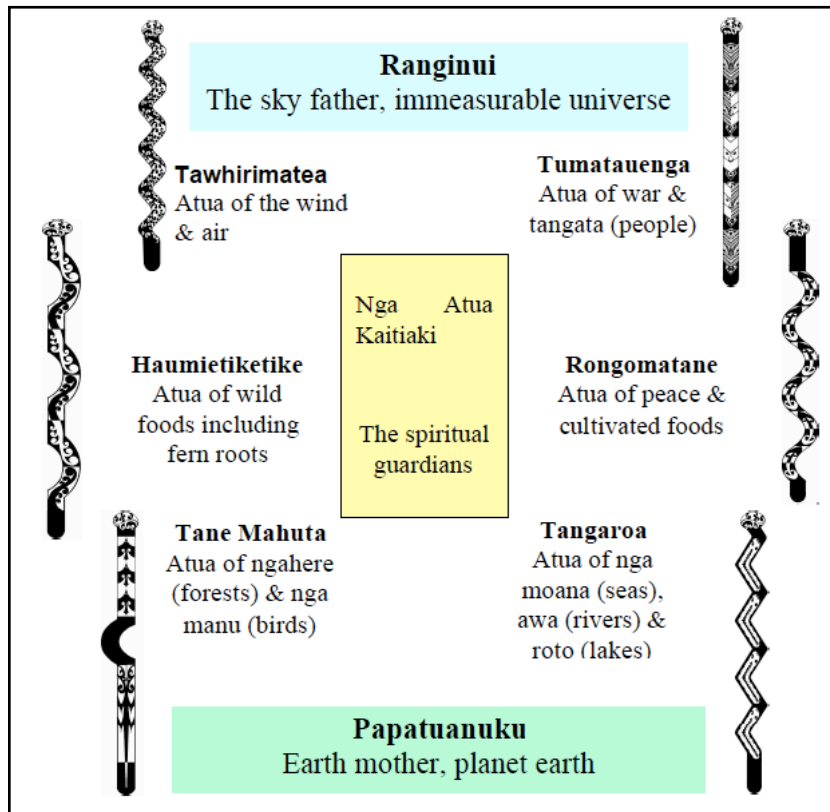
Iwi indicators (Appendix 2) are given a rating between 1 (poor) and 5 (excellent) and cover attributes such as: riverbank condition, riverbed composition, water clarity, water flow, water quality, channel shape (Tangaroa); riparian vegetation, catchment vegetation (Tāne Mahuta); river modifications/use, use of river margins (Tūmatauenga); and smell (Tāwhirimātea). The overall cultural stream index is the average score for these indicators.

An assessment of mahinga kai (Haumie tiketike) status and traditional site (Tūmatauenga) status is also determined with a judgment on whether iwi would return to the site.

Many of the river and stream sites assessed support where freshwater scientific indicators have been measured (Young *et al.* 2008). This was to ensure that the cultural health assessment makes a valuable contribution towards current state of environment reporting and future research areas (e.g. integrated catchment management, biodiversity, sustainable resource management, effects-based planning).

<sup>3</sup> Pan-tribal regional resource management agency.

**Figure 4. Atua domain framework for the Motueka Cultural River Health Index (Source: Young et al 2008).**



**Outcomes Achieved**

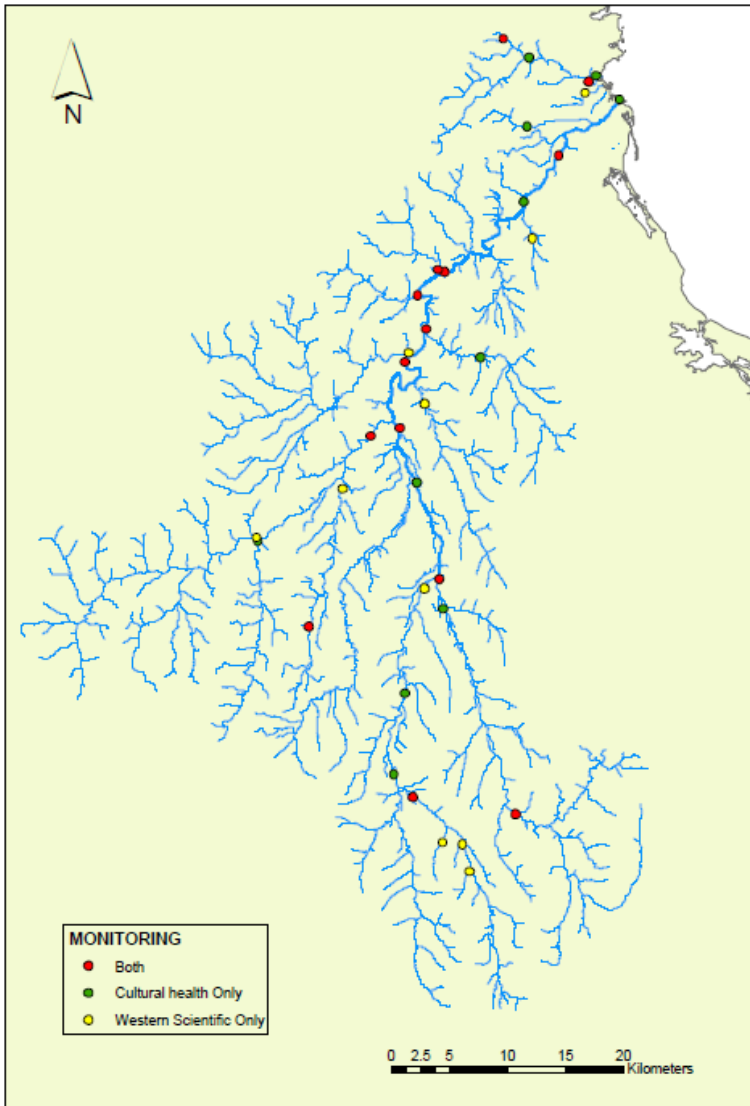
Since 2007 Tiakina has had a monitoring program in place for the Motueka and Riwaka catchments (Figure 7.4) (Walker ppt, 2010, (Harmsworth & Walker 2010)).

The scientific monitoring network consists of 23 sites from the upper catchment to the coast and has a large number of river and stream sites, on a range of landuses (e.g. forestry, pastoral, native) and rock types. Some of these sites were significant to Māori and some were not. The cultural monitoring has been carried out at an additional 11 sites, which included sites near a timber treatment plant and sewage treatment system (Figure 5).

Good correlations were found between cultural health scores and scientific scores particularly percentage of native vegetation. There were weak relationships between cultural health measure and water clarity, concentration of *E. coli* and semi-quantitative measure of macroinvertebrate community index (SQMCI) (Young et al. 2008). These relationships confirm that both types of indicators are successfully capturing aspects of river health

Tiakina believes the combination of science with cultural monitoring gives a rich and full picture of river health and the environment. This model of combined environmental monitoring satisfies iwi/hapū ability to practice tino rangitiratanga and kaitiakitanga and to give effect to relevant sections of the RMA (1991).

**Figure 5. Distribution of western scientific and cultural health monitoring sites in the Motueka catchment (Source: Young et al 2008)**



**Constraints**

It has been important for Tiakina Te Taiao to plan the long-term and ongoing CHI reporting not only to its hapū/whānau, but to the wider community and councils. SOE reporting is mandatory under the RMA (1991) to acquire accurate information of the environment. Also, under section 7 of the RMA, persons involved in managing the use, development and protection of natural and physical resources, shall have particular regard to kaitiakitanga and the ethic of stewardship. Therefore, it is important that decision-makers understand the Māori worldview and are able to take account of those views in making decisions on plans and resource consent applications.

Most ecosystems are at risk, particularly freshwater and wetlands, which are of high value for tangata whenua. Informed decisions are necessary for reducing this risk and enabling councils and other groups to apply controls, rules, restoration and protection mechanisms. The SOE provides baseline information from a western scientific perspective for environmental monitoring but no formal systematic monitoring program for iwi/hapū has been developed.

The CHI methodology and reporting has proven it is a valid and meaningful assessment of river health, can be replicated and compliments current SOE monitoring methodology (Young et al. 2008; Harmsworth 2002a, 2006; Tipa & Tierney, 2003, 2006a). In addition, iwi/hapū have proven themselves to carry out the function of environmental monitoring and reporting.

Tiakina would like to be able to feed into Tasman District Council's SOE (Surface Water Quality) reporting system and reports to government agencies (Walker 2010) to articulate their perceptions of environmental change, environmental health and Māori wellbeing.

### 6.3 Iwi Estuarine Indicators

#### **Background**

Walker (2009) reviews cultural literature and Mātauranga Māori on monitoring tools and indicators applicable to coastal and estuarine ecosystems; and proposes suitable methodology and indicators. This was supported by the Nelson City Council in their advancement to understand the cultural health of four estuaries (i.e. Kokorua Inlet Wakapuaka (Delaware) Inlet, Paruroa (The Haven) and Waimea Inlet. The Wakapuaka inlet was chosen as the case study to test particular monitoring sites.

#### **Framework and methodology**

Walker (2009) proposes the use of Nga Atua kaitiaki framework to direct the development of estuarine indicators. There are many Atua kaitiaki (spiritual guardians) but the ones that provide context for the development of indicators are: Tawhirimatea, Tumatauenga, Tane Mahuta, Tangaroa, Rongomatane and Haumie-tiketike. All the Atua are in balance with each other. If there is an imbalance in the domain of one Atua, this impacts on the realms of the other Atua (Kroos 2006).

After 2-3 hui and site visits, 6-7 Tiakina kaitiaki visited 5 estuarine sites to discuss potential indicators and issues within the Atua framework. Each individual kaitiaki submitted their notes taken at each site and submitted to the Tiakina facilitator whom developed a draft monitoring assessment form and guidelines.

The draft monitoring form and guidelines were tested across Tiakina rohe at a variety of estuarine sites. The final sites that would become the final monitoring program were discussed with Cawthron Research Institute and the local district council. The final 6 sites were chosen based on the following criteria:

- *Cultural significance (all significant to Tiakina te Taiao)*
- *Adjacent landholder (private, iwi, crown)*
- *Mahinga kai value (low, medium, high)*
- *Human influence (low, medium, high)*
- *Established monitoring site (Cawthron, Regional Council, not monitored)*

#### **Outcomes**

Walker (2009) states that the estuarine CHI is evolutionary in nature and will adapt and change over time with ongoing use and time. A program based on seasons was dismissed and replaced with being a program based on annual animal and plant events which was when monitoring was traditionally carried out. For example, annual migration of tuna, or whitebait, tamure or kuaka/bar-tailed godwit.

The final recommendations also included twice yearly monitoring of sites and these to be assessed by three iwi monitors; with data to be entered into the Tiakina te Taiao GIS database. Annual reports would be generated on the status and change in the health of the estuaries. This would also involve linkage with the district councils SOE reporting every 5 years.

#### **Constraints**

Funding security constraints the future of the program and therefore the ability for iwi and RMA authorities to report on the wellbeing of Māori with respect to coastal ecosystems.

## 6.4 Cultural Health Index (CHI) for Streams and Rivers

### **Background**

Tipa and Teirney (2003, 2006a) developed the Cultural Health Index (CHI) tool based on holistic Māori values and knowledge. The CHI was developed from the concern about the degradation of freshwater health and mahinga kai of significance to indigenous communities; and to build capacity for Māori to participate in collaborative management of the environment, specifically streams and rivers.

Initially developed and piloted on the Taieri and Kakaunui rivers in the South Island, the CHI can be used confidently by any iwi/hapū at sites or small sections along a river/stream or used for an entire catchment. Refinement and testing followed with another iwi (Ngati Kahungungu, Tukituki river, Hawke's Bay) and also in a different river type (Hakatere river). In total, four catchment studies were completed and a cultural health index was developed that was generic so that any iwi could apply in their rohe.

More recently iwi/hapū groups in the Motueka catchment have adapted and applied the CHI (Young *et al.* 2008). The Motueka CHI stratifies the landscape into Atua domains (a Māori cultural framework). They are Tangaroa, Tane Mhuata, Haumietiketike, Rongomatane, Tumatauenga and Tawhiri Matea. The CHI was one component or tool used in Ngai Tahu State of the Takiwa assessment.

The CHI allows iwi/hapū to assess the cultural and biological health of a stream or catchment of their choosing. The development of the CHI was directed from the national Ministry for the Environment's Environmental Performance Indicators (EPI) Program. It was important that the tool be consistent with the directions prescribed at the national level.

The CHI recognises that the mauri is tangibly represented by the physical characteristics of a freshwater resource, including indigenous flora and fauna, the fitness for cultural usage and its productive capacity. Different to current resource management approaches, which are very technical, rather than based on a holistic philosophy that Māori utilise to protect mauri.

Using mahinga kai was agreed by all kaumatua as the abundance, diversity and health of the life supported by the river as an indicator of its mauri (Tipa and Teirney 2003). From the beginning the use of the term 'mauri' in the CHI was difficult, primarily because of the intangible aspects of mauri that cannot be encompassed by an index. It was agreed that a mauri index would be demeaning to the tikanga mauri concept. Therefore, the phrase 'cultural health index' was chosen that addresses aspects of stream health and mahinga kai. Indicators were developed for sites located at the headwaters of the river to the lower reaches (streams).

### **Components of the CHI**

The CHI has three components (Figure 6):

- (1) *Site Status* — Identifies whether or not site is of traditional significance; would tangata whenua return to the site in future;
- (2) *Mahinga Kai* — assesses mahinga kai values of sites;
- (3) *Stream Health measure* — which uses eight indicators.

The overall, three-part Cultural Health Index, is expressed as:

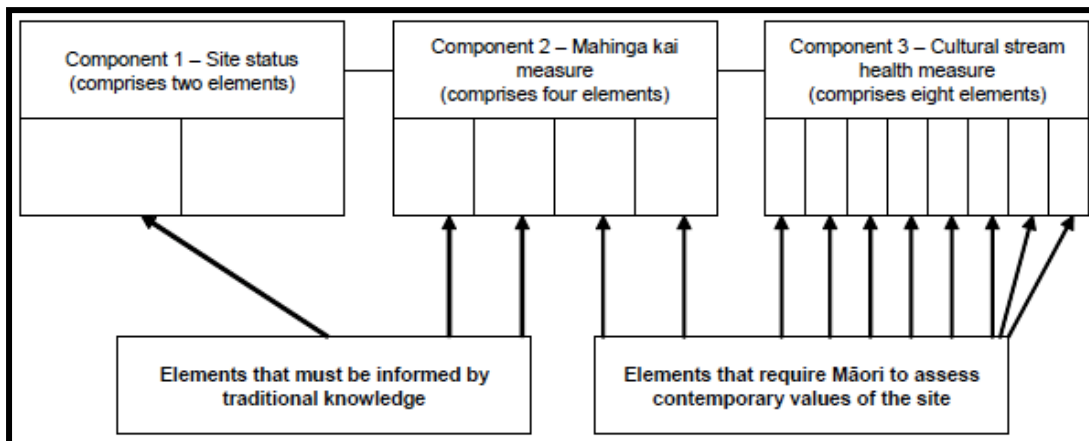
$$A-0/2.1/4.2.$$



Where:

- A identifies the site as traditional (versus B for non-traditional);
- 0 identifies that the site will not be used in the future (versus 1 for will be used);
- 2.1 is the mahinga kai score (1–5 scale and averaged);
- 4.2 is stream health score (1–5 scale and averaged).

**Figure 6. Components of the CHI illustrating, which indicators must be assessed by Māori.**



### **Cultural Values recognised in the CHI**

The design and incorporation of the three components recognises and provides for Māori values. The process in which tangata whenua participate and apply the CHI also recognises and provides for those values. Those values follow:

- Mauri
- Whakapapa
- Wahi tapu and wahi taonga
- Rangitiratanga
- Mahinga kai
- Taonga
- Kaitiakitanga
- Tikanga Māori – mana and mana whenua -

### **Component 1 – Site Status**

Site Status component of the CHI is made up of two questions that classifies the stream/river sites according to traditional association and intention to use in the future. This component distinguishes between traditional and contemporary sites. Kaitiaki are required and mandated to ensure traditional sites are preserved and protecting traditional sites is significant to preserving cultural identity (Tipa & Tierney 2003).

Returning to a traditional site was included to ascertain how the site sits within the context of other beliefs and values (Tipa & Tierney 2003).

The questions are:

1. Is the site either:	<b>A</b> – traditional site of significance to Māori
	<b>B</b> – not traditional site but significant in other ways (e.g. regional council monitoring site)
2. Would Māori return to this site:	<b>1</b> – return to site
	<b>0</b> – not return to site

Possible answer combinations are:

<b>A1</b>	This is traditional site and Māori would return
<b>A0</b>	This is traditional site and Māori would <b>not</b> return
<b>B1</b>	This is <b>not</b> a traditional site and Māori would return
<b>B0</b>	This is <b>not</b> a traditional site and Māori would <b>not</b> return

**Component 2 – Mahinga Kai**

Component 2 identifies the mahinga kai values at a particular site. Sites are evaluated and scored (1-5 score) on an individual indicator.

It was essential for the CHI to encapsulate the many facets of mahinga kai, mostly using tangible measures with connection to the intangible. Such as water quantity, quality to ensure maintenance of healthy mahinga kai resources and their related values, ability to access the resources, the abundance and condition of species gathered, the health of site where gathering occurs and the activity of gathering (Tipa & Tierney 2003, 2006a).

Appendix 3 describes the reporting forms that encapsulate component 2 of the CHI for nationwide use.

**Component 3 – Cultural Stream Health Measure**

This component again asks for a score (1-5) for 19 indicators. The scores are then averaged. The average for all indicator scores is calculated as the Cultural Stream Health Measure (CSHM). No mahinga kai values appear in this component. They are all captured in component 2.

The overall CHI is calculated by averaging the scores of different indicators. After refining the CHI with another iwi and river type, Tipa and Tierney (2006a) reduced the number of indicators to 19, which were considered to be clearly measurable. The mahinga kai indicators were derived from interviews with kaumatua and iwi resource managers (Table 6).

**Table 6. Initial Cultural Health indicators used at Taieri, Hukatere, Tukituki and Kakauni catchments**

Taieri, Kakaunui & Hakatere catchment "mahinga kai" focus	Tukituki catchment Broader "stream health" focus
Catchment land use	Catchment land use – indicator description modified
Riverbank condition	Riverbank condition
Riparian vegetation	Riparian vegetation
Indigenous species	Indigenous species
Use of riparian margin	Use of riparian margin
Riverbed condition	Riverbed condition – indicator description modified
Used of river channel	Used of river channel – indicator description modified
Uses of the river (takes/discharges)	Uses of the river (takes/discharges)
River flow (see)	River flow (see)
River flow (listen)	River flow (listen)
Water quality (odours)	Water quality (odours)

<b>Taieri, Kakaunui &amp; Hakatere catchment “mahinga kai” focus</b>	<b>Tukituki catchment Broader “stream health” focus</b>
Water quality (appears polluted)	Water quality (appears polluted) – indicator description modified
Water clarity	Water clarity
Sediment	Sediment
Would you fish	Would you fish
Would you taste the water	Would you taste the water
Would you fish	Would you fish
	Would you swim
	Variety of habitats present

Tipa and Tierney (2003) describe tangible measures of mauri. This is represented by physical characteristics, including water clarity; depth, velocity and volume of water/stream flow; natural character; flora and fauna; connectivity of flow from mountain source to the sea; cultural use of natural resources.

An effective measure had to be repeatable and consistent, irrespective of iwi, river and catchment (Tipa and Tierney 2003). Therefore, statistical testing of the correlation and regression between an individual indicator with overall stream health was performed to ensure valid indicators of health are used. This testing also avoided the problem of using several indicators of the same condition. Therefore the resulting 8 indicators are within the following categories:

- (1) Water quality
- (2) Variety of habitats
- (3) Catchment land use
- (4) Riparian vegetation
- (5) Use of riparian margin
- (6) Riverbed condition/sediment
- (7) Water clarity
- (8) Channel modification

Tipa and Tierney (2006a) also compared CSHM of individual rivers with other stream health measures. This included the macroinvertebrate community index (MCI) and semi-quantitative macroinvertebrate community index (SQMCI), used extensively by regional council managers and researchers across New Zealand. The CSHM was also compared with the percentage of developed land in catchment area of the site. The statistical testing results concluded that the CSHM like other stream health measures successfully measures stream health, given the holistic combination of river margin, catchment and in-stream characteristics.

### ***Using the CHI***

For Māori to participant and apply the CHI provides for and recognises Māori values such as kaitiakitanga, mana (the right to access, use and manager waterways) and mana whenua (i.e., recognises that those individuals mandated to apply the index will be chosen on the basis of ancestry whakapapa) (Tipa & Tierney 2003, 2006a). User guidelines have been developed to implement the CHI and the necessary steps are shown in Figure 7 and described in the following paragraphs.

### ***Site Selection***

A team of kaitiaki (mandated by the hapū/iwi) applies the CHI to their local stream, creek or river. Sites are selected on the basis of stream size (ki uta ki tai), traditional association and land use. The CHI can be applied reliably throughout a catchment on streams of different sizes and types (e.g. lowland, highland) and various land uses (e.g. indigenous forest, grazed pasture, forestry).

Tangata whenua will need to identify: important qualities of the river; values associated with the river; traditional sites along the river and traditional uses of the river.

Knowledge and experience is critical to the success of the CHI.

### ***The CHI Team***

The CHI team includes a coordinator, kaumatua/kuia and knowledge holders to interview, and kaitiaki team that carry out the recording. A CHI coordinator is beneficial to the success of implementing the CHI and Tipa and Tierney (2006b) outline the qualities tangata whenua should look for when appointing a coordinator.

The regional councils are informed of the CHI and asked to assist with landuse data and conducting the MCI and SQMCI sampling of invertebrates to assist with validating the indicators scored.

The kaitiaki team is composed of 5-6 members and is appointed by tangata whenua. Particular technical, knowledge and skills should be sought in members. Training will be needed for members on applying the CHI.

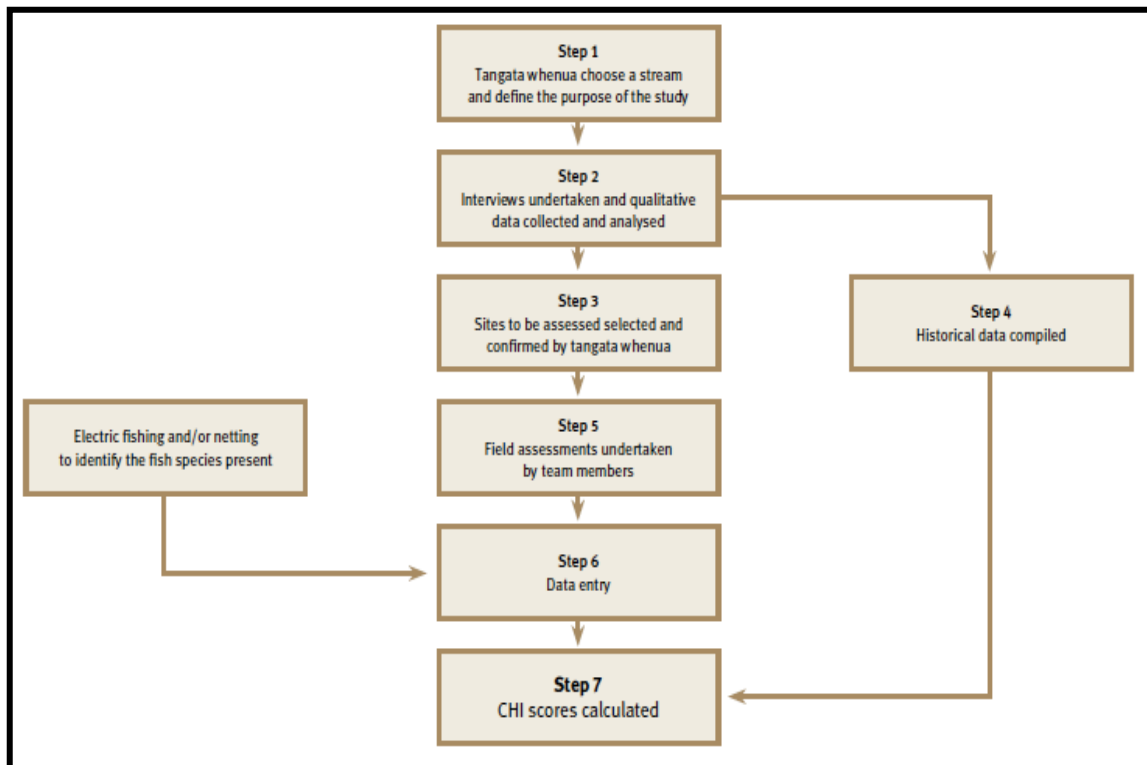
### ***Data collection***

The kaitiaki team will be responsible for recording interviews, compiling a list of sites, producing maps, acquiring data, and recording their scores for the listed indicators at each site. Over 100 sites are visited and scored against indicators, which can take several days depending on the availability of the team, access, and timeframes. The kaitiaki team will visit sites and walk along river/stream banks and view the stream/river upstream and downstream, visually assessing the health of the site (Tipa & Tierney 2006b).

Different techniques and tools are used to collect information on mahinga kai at the site. For example, electro-fishing, set or drag netting are tools required to understand what freshwater fish reside at the site.

From the site assessments and recording of data, a lot of information is collected, that requires processing to reach a final CHI overall score for the site. Guidance for undertaking this analysis is provided for in Tipa and Tierney (2006b).

***Figure 7. Steps to implement the CHI (Source: Tipa & Tierney 2006b).***



### Outcomes

The CHI has probably been the most successful freshwater assessment of cultural health in New Zealand. It has been used as proposed by Tipa and Tierney (2003, 2006a) or adapted and modified to align with a particular iwi or hapū worldview (e.g. Townsend *et al.* 2004, Harmsworth & Tipa 2006, Kroos 2006, Tipa & Tierney 2006a, Pauling *et al.* 2007a, Pauling 2007b, Pauling & Arnold 2008, Walker 2009).

## 6.5 Waikato River Independent Scoping Study: Report Cards

### Background

The objective of this tool is to describe the health and well-being (state) of the Waikato River (Figure 8), against management goals and progress to these goals using a report card system. This system basically 'reports' on a group of indicators that describe the state of the environment and assigns a 'grade', for example, A, B, C or D. This type of reporting system is commonly used in New Zealand. For example, reporting on the state of water quality; and in Queensland, on the health and status of Morton Bay<sup>4</sup>.

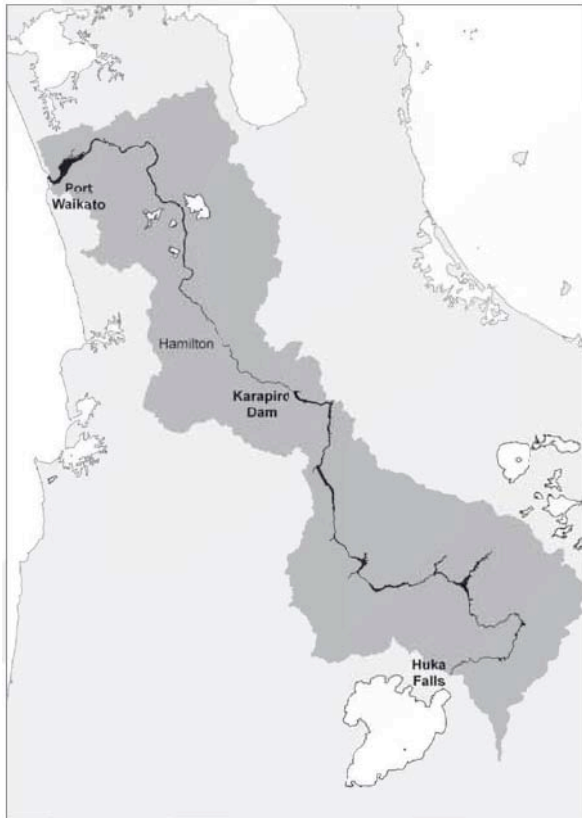
The unique feature that is being developed for the Waikato River Independent Scoping Study (WRISS) is the ability of the report card framework to integrate Mātauranga Māori with scientific information, and incorporate indicators of management action (Rutherford & Williamson 2010). The report card will be developed to report back on achieving the overarching vision for the Waikato River, set by the Guardians Establishment Committee (Guardians Establishment Committee 2009). The vision is:

"Restoring and protecting the health and wellbeing of the Waikato River"

The vision is also consistent with the overarching purpose and principles of the Treaty of Waitangi settlement between Waikato-Tainui and the Crown to restore and protect the health and wellbeing of the Waikato River.

<sup>4</sup> See: [www.healthywaterways.org](http://www.healthywaterways.org)

**Figure 8. The area to which the report card framework applies (Source: Guardians Establishment Committee 2009)**



The Vision responds to four major issues. They are:

1. The degradation of the Waikato River and its catchment has severely compromised Waikato River Iwi in their ability to exercise kaitiakitanga or conduct their tikanga and kawa.
2. Over time, human activities along the Waikato River and land uses through its catchments have degraded the Waikato River and reduced the relationships and aspirations of communities with the Waikato River.
3. The natural processes have been altered over time by physical intervention, landuse and subsurface hydrological changes. The cumulative effects of these uses have degraded the river.
4. It will take commitment and time to restore and protect the health and wellbeing of the Waikato River.

### **Framework**

The framework consists of the following components (Figure 9):

1. **Principles** – for example, Mana O Te Awa, Mana Whakahaere, Manaakitanga, Whakapapa, Kaitiakitanga, Equity, Prosperity. Identified as important too community that develops the report card.
2. **Values** – for example, Hospitality, Tourism, Respect, Whānau, Identity, Guardianship, Connectivity, Control/Authority
3. **Attributes** – for example, whakatauki, availability of mahinga kai, access to the River, transfer of knowledge to future generations, rahui, respect for the River not discharging sewage to the River; and increased engagement in planning, decision-making, restoration and monitoring.

4. **Measures** – for example, what is the condition of riparian margins; what riparian health; what % of river is fenced off to stock.
5. **Indicators** – for example, % of awa without stock access; % kilometres adjacent to rongoa plants.
6. **Targets** – (not shown in Figure 9) for example, 25km of inanga spawning habitat; 2 million trees planted along major tributaries.

The framework also incorporates guidance on restoration efforts. For example, possible actions to restore water quality, aquatic and terrestrial plant communities will be provided.

### **Requirements**

- The framework is promoted as a more holistic approach rather than ad hoc to managing the Waikato River. This was a key attribute required of the framework when first discussed during initial hui.
- The report card framework requires a ‘science baseline’ and a ‘cultural-social baseline’ before pressures can be measured (Rutherford & Williams 2010). This usually done through hui and interviews with tangata whenua and literature reviews. Rutherford and Williams (2010) summarised the baseline data for the Waikato River.
- Blending Mātauranga Māori with science to develop the report card. This is regarded as the success of the report card framework. This is usually achieved through hui and interviews with tangata whenua and literature reviews.
- A separate report card will be required for different parts of the River because values, attributes, issues, pressures and targets vary along the River.
- Rutherford & Williams (2010) state that report card scores need to be robust, and involve extensive consultation with the community.
- Identifying whom is best to ‘score’. This is under development.

### **Māori values to be recognised**

For example (Figure 10), ten indicators are used to assess the whitebait fishery and measure its state. The indicators reflect the ‘pressures’ to whitebait such as loss of spawning habitat and loss of adult habitat.

### **Constraints**

The report card process remains to be implemented and tested. The Waikato River baseline data has been compiled into a report (Rutherford & Williams 2010) with attributes, principles and values identified. The remaining components of the report card – that is measures, targets, pressures and management actions – remain to be identified with tangata whenua through community consultation and hui. Therefore, the time, skill, knowledge, expertise and resources required to implement this type of “reporting” framework is uncertain. Questions are raised on whether this is a hapū-led approach involving just the hapū, versus a science-hapū-led approach; or if it is to be developed for the wider community. Developments are currently underway with Ngāti Whatua Nga Rima o Kaipara in the southern Kaipara Harbour being led by NIWA expertise (T. Davis, pers.comm., June 2011).

**Figure 9. The WRISS Report Card framework illustrating the relationship between principles, values, attributes, measures and indicators.**

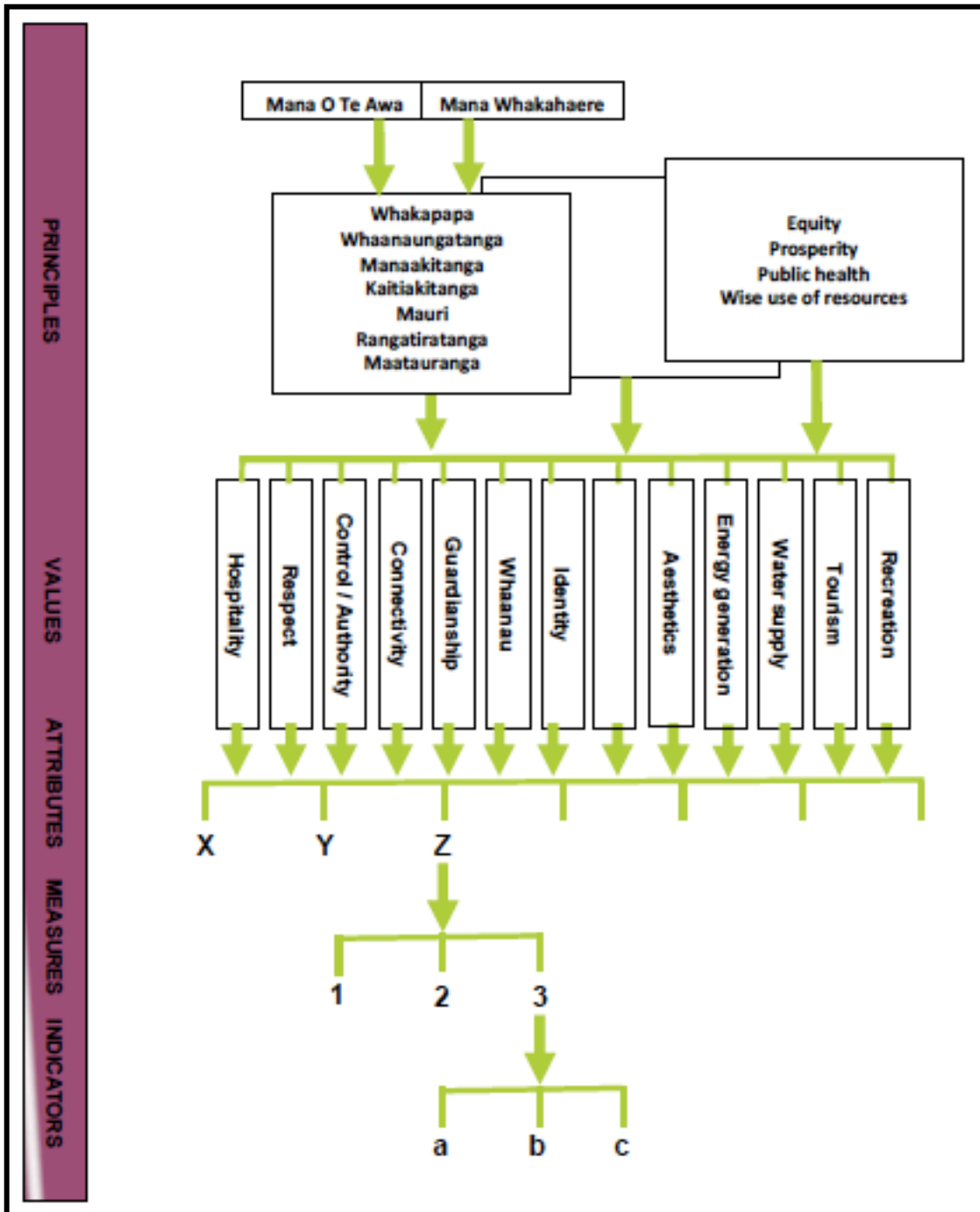
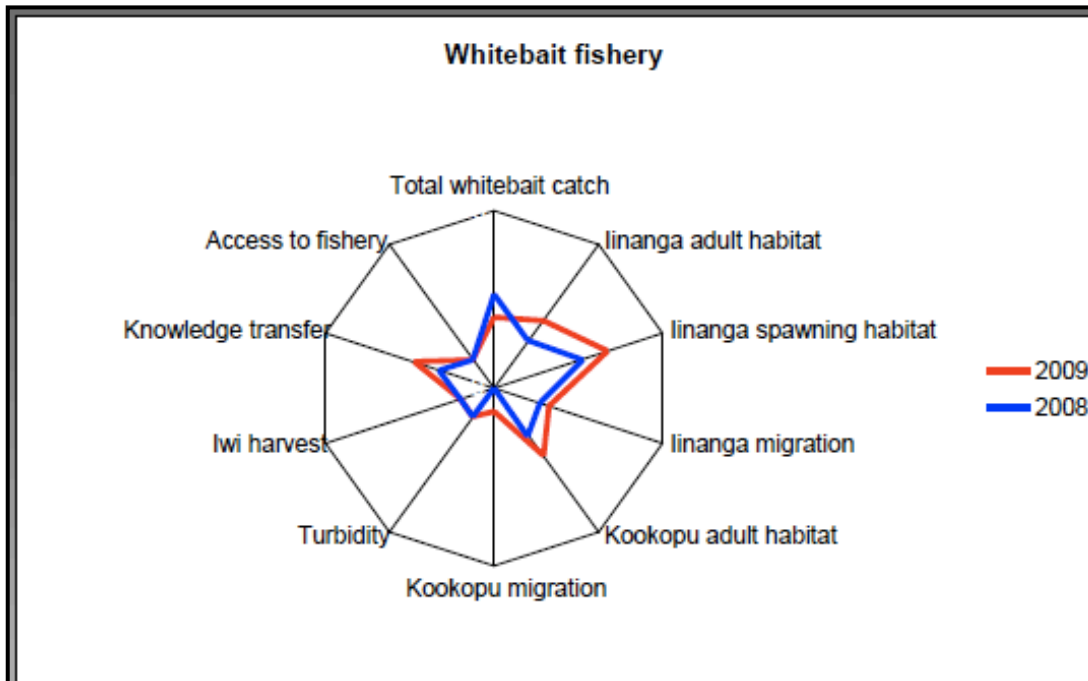


Figure 10. Example of the Report Card for the Whitebait Fishery. This is for illustrative purposes only. The report card 'score' is provided as a figure or decagram and an alphabetical grading. The closer to the outside of the decagram the higher the score.





Issue	Indicator	Target	2009	2009	2008
Total whitebait catch	kg caught	5000	2300	D+	C
linanga adult habitat	ha restored/protected	500	250	C-	D
linanga spawning habitat	km restored/protected	25	17	B-	C
Inanga migration	barriers removed	20	7	D	D-
Kookopu adult habitat	km restored/protected	150	75	C-	D
Kookopu migration	barriers removed	100	15	E	F
Turbidity	reduction in NTU	5	1	E+	E+
Iwi harvest	kg caught	50	10	E+	E+
Knowledge transfer	numbers trained	50	25	C-	D
Access to fishery	number of iwi stands	20	5	E+	E+
Overall score				D	D-

## 6.6 State of the Takiwā – Ngāi Tahu

### **Background**

State of the Takiwā is defined as:

“An environmental monitoring and reporting approach that integrates Mātauranga Māori and western science to gather information about the environment and to establish a baseline for the creation of policy and improvement of environmental health. A program developed as an alternative to conventional state of the environment reporting used by the Ministry for the Environment, that takes into account tangata whenua values.”

The State of the Takiwā (SoT) forms a component of the overarching Ngāi Tahu ki uta ki tai mountains to the sea natural resource management framework and outlined in the tribal vision, Ngāi Tahu 2025. The development of the tool was partly funded by Ministry for the Environment and supported by Environmental Science and Research (ESR), Manaaki Whenua, NIWA, Envirolink Southern Community Laboratories, Environment Southland and Environment Canterbury (Pauling 2004, 2010).

The main objective is to ensure tangata whenua can build robust and defensible information on the health of the environment. This information can then be used to assess the effectiveness of iwi and agency policy and practices.

Currently the SoT approach integrates a specially designed Microsoft ACCESS database, monitoring forms and reporting templates. This allows Ngāi Tahu to capture, store, analyse and report on their perspective of the state of the environment. It also links with MfE Environmental Performance Indicator (EPI) national program and CHI for rivers and streams.

Ngāi Tahu describe the SoT as a diagnostic tool for identifying issues and identifying priority remedial actions, implementation and monitoring (Pauling & Arnold 2008).

### **Framework**

The framework is values-based with a main focus on freshwater water quality. There are three overarching influences in the framework: (1) Mahinga Kai, (2) Mauri, mana, manaaki, and (3) Mātauranga.

(1) Mahinga kai (and whakapapa) is the main contributor with which Ngāi Tahu identify themselves with the whenua and moana (Te Runanga o Ngai Tahu 2004). Mahinga kai (translated by Ngāi Tahu as ‘working for food’) customs underpin Ngāi Tahu and are central to their relationship with places, resources and their ongoing spiritual, economic, social and cultural wellbeing. Ngāi Tahu require that to undertake direct food gathering rivers, beaches, oceans and forests must be in pristine condition and are “good enough to eat from” (Te Runanga o Ngāi Tahu 2004). It is vital that species and their habitats are maintained in pristine condition to fulfill this relationship.

(2) Mauri, mana and manaaki are fundamental values that Ngāi Tahu required in any environmental monitoring and reporting program. Mauri is both a physical and metaphysical expression of environmental health (Te Runanga o Ngāi Tahu 2004). The mauri in all living and non-living objects originate from the beginning and is a value that is distinguished by qualities of health, abundance, vitality - the pristine and unpolluted. Mauri is a sacred taonga to Ngāi Tahu that is integral to their whakapapa, which provides a spiritual link to the past, the present and to the future; hence Ngāi Tahu vision to “continue to provide for our people and our manuhiri (visitors), now and in the future *mo tatou, a, mo ka uri a muri ake nei – for us and our children after us.*” Upholding the mauri for Ngāi Tahu has a direct relationship to their ability as an iwi, hapū or whānau to provide manaaki to their manuhiri and in turn has an effect on their mana.

(3) Mātauranga is traditional knowledge gained through centuries of observation and continued practice of mahinga kai customs (Te Runanga o Ngāi Tahu 2004). This is a unique body of knowledge and experience that is required to manage the natural environment, particularly the health and wellbeing of the mauri. This provides Ngāi Tahu historical accounts and knowledge of the past and changes that have occurred in their Takiwā into the SoT.

### **Application of State of the Takiwā**

The main components (Figure 11) of the SoT monitoring framework are:

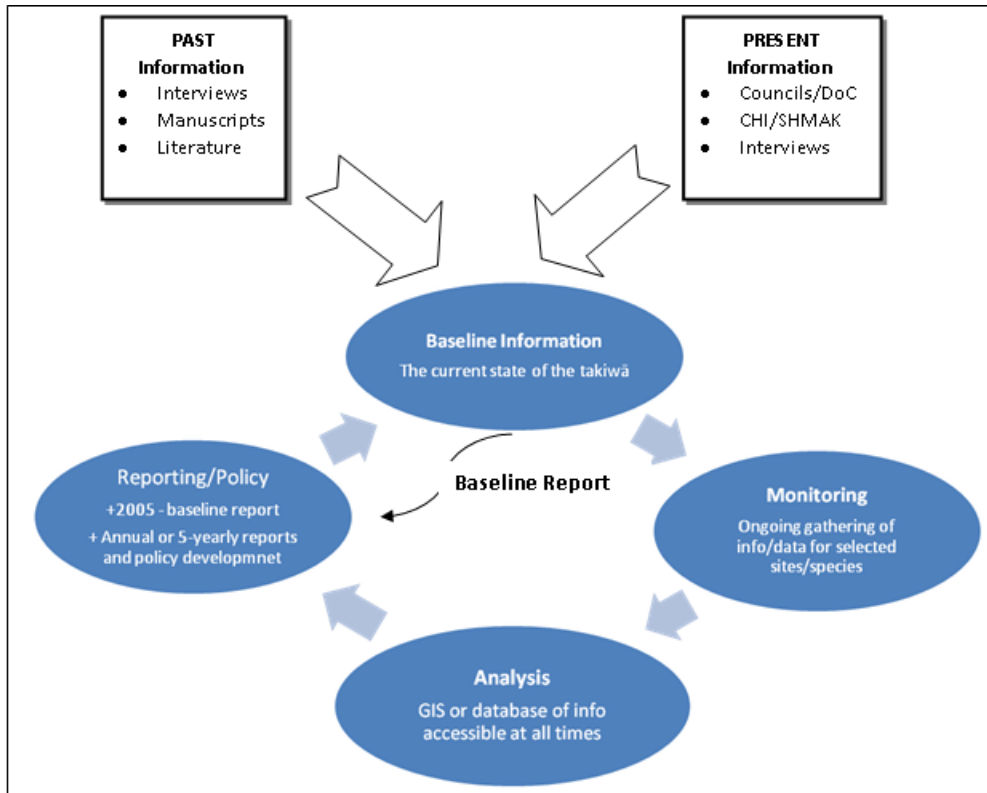
- **Baseline Information** – is collected from the past (e.g., via interviews, manuscripts, literature) and present/current information (e.g., provided from councils and Crown departments, CHI, SHMAK, national/regional monitoring data, interviews). This collection of information forms the core of the current state of the Takiwā. It was important for Ngāi Tahu to gather information on the past (1840 baseline) so they can understand the health of the environment as it was to their tupuna and the present baseline information provides an idea of what has happened since. Desktop research of written records, drawings, paintings, photographs was used to form a ‘state’ of the Takiwā at 1840; all stored in the SoT database.
- **Monitoring** – the design of the monitoring program depended on the sites (e.g. freshwater, lake, coast, marine), indicators and tools. Sites were chosen based on historical use, level of written and oral information, access, and relationship to existing monitoring sites (i.e., council monitoring sites). Indicators were determined for each monitoring program and objective of the program, such as a resource (e.g., Tuna), issue (e.g., water pollution), or ecosystem (e.g., lake). The type of tools required was dependent on the site and the indicator (e.g., SHMAK kit, Cultural Health Index tool). Te Rūnanga o Ngāi Tahu have completed several SoT baseline reports, such as, for the Avon-Heathcote estuary and catchment (Pauling *et al.* 2007a), South Island freshwater waterways (Pauling 2007b); Lakes (Pauling & Arnold 2008).
- **Monitoring Forms** – there are three: Site Definition (name, latitude/longitude, cultural significance); Visit Details (e.g. date, time, weather, photographs); Assessment Questionnaire (e.g. overall health of site, level of modification, suitability for harvesting, accessibility, pressures, biodiversity measures, willingness to return).
- **Analysis** – A combination of hard copy literature, Microsoft Access databases and Geographic Information System (GIS) databases are utilised and stored in their own Takiwā 2.0 Database. The Ngāi Tahu resource inventories and information databases are strongly integrated with the SoT and Ki Uta Ki Tai Plans. Information gathered through baseline studies, monitoring and reporting will be stored and organised.
- **Reporting/Policy Development** – this is the final product of the monitoring program and includes baseline monitoring reports and annual/seasonal reports. These reports will inform policy direction and development for Te Rūnanga o Ngāi Tahu.

### **Outcomes**

Ngāi Tahu continues to refine, evaluate and report on the State of the Takiwā. They are also developing a more comprehensive tool for lakes. This is to provide a more complete cultural health assessment which the Takiwā tool currently does not provide (Pauling & Arnold 2008). Limitations include the lack of reporting on indicators for water and native fish values. A process has been taken to develop a cultural health tool for Te Waihora Lake Ellesmere. This involved several steps: identifying key participants and interviews; analyzing interviews and producing a report; identifying indicators, sites and mahinga kai to be measured; hui to develop draft tool; testing tool at 3-4 sites; reporting and refining through engaging local tangata whenua; statistically correlated assessments to refine indicators; finalising tool; assess remaining sites using final tool.

Development continues on identifying suitable cultural indicators for lake water quality, quantity or lake level, lakebed, native fish and customary food gathering effort and quality within the tool (Pauling & Arnold 2008).

**Figure 11. Essential elements of Ngāi Tahu State of the Takiwā program. (Source: Te Rūnanga o Ngāi Tahu, 2004).**



## 6.7 Stream Health Monitoring and Assessment (SHMAK) Kit

The Stream Health Monitoring and Assessment Kit (SHMAK) has been designed by NIWA in partnership with Federated Farmers of New Zealand, for farming families to monitor the “health” of the streams that flow across their land. Community groups, schools and regional councils, or anyone wishing to obtain an idea of general “health” of particular streams and freshwater waterways can also use the methodology.

The SHMAK Kit philosophy defines “health” as the condition of the whole waterway, where water quality and ecology are measured. Like most monitoring, long-term data trends are required to provide a robust and adequate picture of “health” using standard set of measurements and observations each sampling period.

The assessment part of the kit<sup>5</sup> involves assigning scores to each monitoring result, which will inform an “overall” score for the condition of the stream. These scores are compared over time to see whether stream health is changing.

The SHMAK kit is a tool rather than a monitoring framework, and is mainly restricted to freshwater ecosystems. The kit can be considered costly.

## 6.8 Marine Health Index

The Marine Health Index (MHI)<sup>6</sup> is based on community knowledge and is a practical tool being developed by Te Tiaki Mahinga Kai (a national network of tangata kaitiaki, kaumatua, environmental managers, researchers, formed to improve management of mātaimitai<sup>7</sup>, taiapure<sup>8</sup>, temporary closures (rahui)) for Te Runanga o Ngāi Tahu. The MHI builds on the Cultural Health Index for streams and waterways (Tipa & Teirney 2003), and applies similar methodology to the rohe moana.

The key factor to its development is that the MHI is developed for and with a particular community of people. The MHI uses science and community knowledge. The vision of the project is for the MHI to become a tool for communities to judge the state of their mātaimitai and taiapure themselves, in an independent, inexpensive and scientifically robust manner. Key indicators that have been nominated include: continuation of traditional harvest practices, changes in the taste, smell and size of kai, and visual water pollution and litter.

Te Tiaki Mahinga Kai are currently working with the Te Whaka A Te Werra mātaimitai (Paterson Inlet, Rakiura, Stewart Island) and East Otago Taiapure at Karitane to develop the MHI.

## 6.9 The Kaimoana Survey Guidelines for Hapū and Iwi

The kaimoana guidelines were developed as another of the MfE Environmental Performance Indicator (EPI) case studies. A set of guidelines and a template for surveying and monitoring kaimoana from a Maori perspective was developed by Otaraua hapū, Shell New Zealand and MfE between 2000 and 2001 (Ministry for the Environment 2003). Other groups involved were Taranaki Regional Council and Ngati Rahiri iwi.

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5 Kit comprises of: monitoring forms, instruction manual and background information; identification guides; monitoring equipment (water clarity measuring tube, conductivity meter, pH papers, thermometer, sample containers, magnifier).

6 See: [www.mahingakai.org.nz](http://www.mahingakai.org.nz)

7 Taiapure is a community reserve to support customary fishing.

8 Mātaimitai is a community reserve to support customary fishing.

The guidelines seek to provide hapū and iwi with information and a suggested process for undertaking a survey of kaimoana. Resources provided include a video, CD and guideline package. They provide a structured framework and method for hapū and iwi to work alongside a range of agencies with mutual interests, such as local government, industry, community and stakeholder groups, to manage marine and coastal resources sustainably.

### 6.10 Iwi Estuarine Monitoring Tool Kit (Nga Waihotanga Iho)

The main objectives of the Nga Waihotanga Iho (*what is left behind, lift up*), the estuary monitoring toolkit for iwi, is to empower tangata whenua in the resource management decision-making process; provide easy-to-use inexpensive and robust tools for tangata whenua and community groups to monitor environmental changes in their estuaries; and provide an educational resource for high-school students (Rickard & Swales 2009).

Like the CHI, the estuarine toolkit is a combination of western scientific principles and tangata whenua values. The toolkit is comprised of seven modules: habitat mapping, sediments, water and sediment quality, plants, fish, shellfish, and coastal management. This was to relate to the physical, chemical and biological aspects of estuaries. The toolkit manual provides step-by-step description of methods for each module.

The toolkit was field trialed in February 2009 at Manaia estuary on the west coast of Coromandel Peninsula, working with participants from Ngāti Whānaunga, Ngāti Pukenga and Coromandel Area School. The participants underwent training with NIWA staff in order for them to conduct future assessments independently.

### 6.11 Māori Environmental Indicators and Outcomes: Mauri of Waterways Kete

#### **Background**

Jefferies and Kennedy (2009) developed a kete of environmental indicators and outcomes for mauri of waterways, mana whenua and waahi tapu as they relate to statutory plans. The Māori Outcomes and indicators framework and methodology was developed to provide an effective suite of tools to evaluate and assess the performance of councils in relation to their obligations under the RMA 1991 and Local Government Act 2002. These were developed to align with environmental outcomes under the RMA and Local Government Act, and those of the wider community. Mauri of waterways also receives substantial attention under the RMA (Jefferies and Kennedy 2009).

This kaupapa sits within a wider research program called Planning Under Cooperative Mandate (PUCM). The Māori environmental indicators and outcomes kete was developed after 5 years of research and was led by Dr Richard Jefferies, KCSM Consultancy Solutions Ltd in partnership with Waikato University and the International Global Change Institute (IGCI). PUCM was a FRST funded program, which, since 1995, has been examining the quality of policies, plans, plan implementation and environmental outcomes under the RMA 1991 and LGA 2002. An essential component of PUCM was to understand the consideration of Māori interests as the Crown's treaty partner.

The final kete developed and piloted were: mauri of waterways, mana whenua and waahi tapu. Discussed further is the kete for mauri of waterways.

#### **Framework**

The hypothesis tested was, did the implementation of the RMA result in sustainable management of the environment. Jefferies and Kennedy (2009a) considered three theoretical frameworks to inform the approach. They are: Ngā wa, Ngā Atua and Ngā tikanga/kaupapa (Kennedy & Jefferies 2009). It was concluded that the tikanga/kaupapa framework was to be used, as a result of having less

complexity to follow and would allow for close interpretation of key terms and concepts already being used for environmental management. It was hoped that Māori indicators based in tikanga would facilitate Māori involvement in planning processes.

The final framework recognised three key kaupapa: mana, mauri and tapu; to which the three tikanga relate – mana whenua, mauri of water, waahi tapu.

The mauri of waterways outcomes and indicators kete was intended to provide tangata whenua a suite of tools to judge whether the mauri of waterways within their rohe is in good health; and to understand the contribution councils and Crown agencies make in achieving this goal (Jefferies & Kennedy 2009a, 2009b).

**Mauri of waterways kete**

Trialing of the Mauri of Waterways kete was carried out with Ngāti Maru in Hauraki, Ngāti Whānaunga in Hauraki, and Ngāti Awa in Whakatane. Matamata-Piako District Council and Environment Bay of Plenty also participated in the trial.

The Mauri of Waterways kete has a multi-level structure (Table 7 and Table 8). The outcome is the mauri of all waterways are in optimum health, and this is measured through indices, indicators and measures, examples of which are provided in Table 8.

**Table 7. Framework for the Māori environment outcomes and indicators.**

Framework/Structure	Explanation
Kaupapa	Overarching principle
Tikanga	High-level principle/rule which must be obtained and upheld
Outcome	A single expression of a group’s ideal result for a particular tikanga
Indices	A series of indicators grouped by theme
Indicators	The high-level enquiry for evaluating whether outcomes are being achieved
Measures	Lower-level enquiry or method, several of which collectively provide the information required for an indicator. Each measure is scored on a scale of 1 (best) to 5 (worst)

**Table 8. Summary of Māori environmental outcomes and indicators for Mauri kete (Source: Jefferies & Kennedy 2009b).**

**Outcome:** Mauri of all waterways are in optimum health  
**Kaupapa:** Mauri  
**Tikanga:** Mauri of Water

Indice:	Indicators:	Measures (Some examples):
<b>1. Extent to which local authorities protect mauri</b>	1. Whether respondent agrees that Territorial Local Authority actively protects mauri	<ul style="list-style-type: none"> <li>• “Strongly agree” to “Strongly disagree” scale</li> </ul> 4 measures
	2. Whether Territorial Local Authority documents contain	4 measures

Indices:	Indicators:	Measures (Some examples):
	provisions to protect mauri 3. Whether Territorial Local Authority act to protect mauri	
<b>2. Extent to which tangata whenua protect mauri</b>	1. Whether respondent agrees that tangata whenua actively protect mauri 2. Whether tangata whenua have management documents with provisions designed to protect mauri 3. Whether tangata whenua act to protect mauri	<ul style="list-style-type: none"> <li>• “Strongly agree” to “Strongly disagree” scale</li> </ul> 1 measure 4 measures
<b>3. Extent to which other agencies protect mauri</b>	1. Whether respondent agrees that other Government agencies actively protect mauri. 2. Whether agency takes measures to foster understanding of mauri. 3. Whether agency has strategies designed to protect mauri.	<ul style="list-style-type: none"> <li>• “Strongly agree” to “Strongly disagree” scale</li> </ul> 1 measure 1 measure
<b>4. Extent to which actions of the wider community affect mauri.</b>	1. Whether respondent agrees that actions of the wider community affect mauri. 2. Extent to which individuals and groups are informed about mauri and how it should be protected. 3. Whether individuals and groups take active measures to protect mauri.	<ul style="list-style-type: none"> <li>• “Strongly agree” to “Strongly disagree” scale</li> </ul> 1 measure 1 measure
<b>5. Physical evidence that mauri is protected.</b>	1. Whether respondent agrees that mauri is protected. 2. Characteristics of the water. 3. Characteristics of the waterway and its immediate environment. 4. Characteristics of waterway inhabitants. 5. Presence of potential human threats.	<ul style="list-style-type: none"> <li>• “Strongly agree” to “Strongly disagree” scale</li> </ul> 7 measures 4 measures 3 measures 2 measures



## 6.12 The Mauri Model

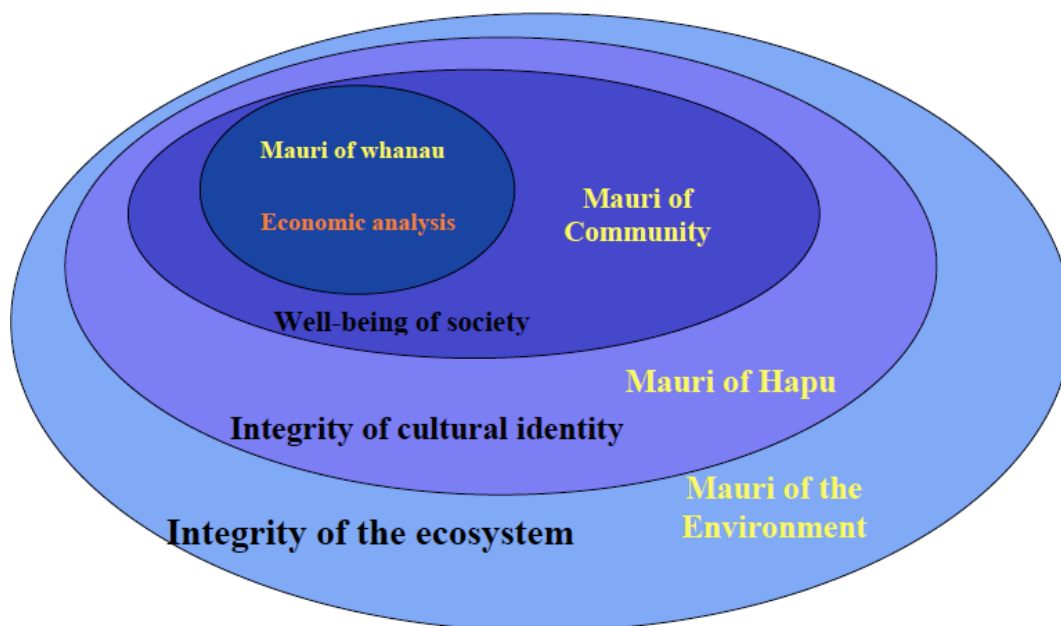
The mauri model described by Morgan (2007) uses a framework founded on traditional tangata whenua worldview and practices to report on sustainability. The mauri model is based on four circles, each weighted differently, that represent: ecosystem (35%), hapū (30%), community (20%) and family/whānau (15%) (Figure 12).

Particular indicators for ecosystem (e.g. water clarity; nutrient loss from catchment), hapū (e.g. cultural practices, transfer of waste between catchments), community (e.g., public health, recreation) and whānau (e.g., direct cost-benefit, operation cost), are scored, weighted, and then given a final score (Morgan 2007).

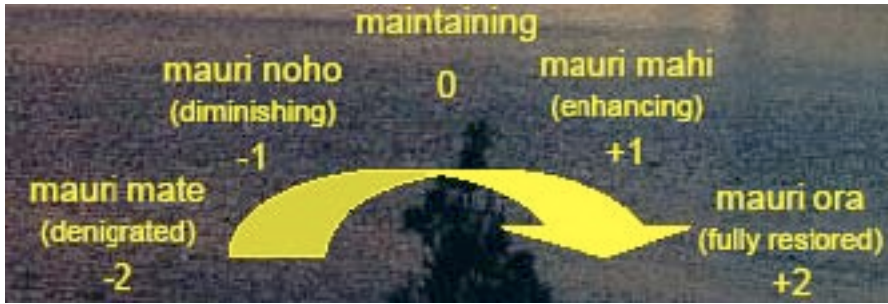
The score is referred to as the *Averaged Mauri Barometer Assessment* that sits on a scale between -2 (Denigrated), -1 (Diminishing), 0 (Maintaining), +1 (Enhancing) and +2 (Fully Restored). For example, Morgan (2007) discusses the wastewater reticulation of lakeside settlements as a score of -0.8. This score explains that the mauri of the lake is very close to diminishing (-1) (Figure 13).

The mauri model is holistic. It takes into account effects to physical health and spiritual integrity rather than just the physical. This model includes tangata whenua values and priorities in resource decision-making and combines both western and traditional knowledge systems.

**Figure 12. The Mauri Model: a holistic decision framework for Aōtearoa New Zealand (Source: Morgan 2007)**



**Figure 13. The mauri barometer (Source: Morgan 2007)**



### 6.13 Ngāti Kere Methods and Indicators for Marine Protection

This case study was also initiated through the MfE EPI program. The study was a DoC-MfE initiative and focused on working with the hapū Ngāti Kere (Hawkes Bay) at Te Angiangi marine reserve in the Hawke's Bay.

The case study looked at understanding what modern marine management systems meant to whānau. Through a survey, visions, values, species of importance and indicators of marine protection relevant to Ngāti Kere were identified (Wakefield & Walker 2005). An over-arching vision was established:

*“To strive to sustain the mauri of the rohe moana through Tikanga Māori practices”*

Through identifying species of importance, their values, and management systems Ngāti Kere wished to see the principles of manaakitanga and whānaungatanga applied to marine management. Many Ngāti Kere lack understanding of modern management regulations and there is also a lack of understanding amongst authorities of Ngāti Kere traditional management practices.

Solutions included two-way discussions and information sharing within Ngāti Kere and also between Ngāti Kere and authorities. For example, a wananga with Ministry of Fisheries so the learning can start and steps can be identified on how traditional and current management systems can be used to achieve the goals and objectives identified by Ngāti Kere.

Sites were identified and investigated to review the effect of protection on marine life with compared results with unprotected sites. Mixed with scientific monitoring methodology, Ngāti Kere utilised tohu to judge the health of the rohe moana. Such tohu included size, form, colouring or amount of kaimoana from an area. Takapua rock is a recognised rock for Karengo spores. If karengo is plentiful on the rock it provides an indication of the health of karengo in the rohe moana.

Information from this case study is being used to help hapū and DoC to meet objectives for monitoring and management; and to understand the objectives of marine reserve protection and traditional methods of protection.

### 6.14 Te Roroa Iwi Cultural Indicators and Monitoring Framework

Te Roroa iwi cultural indicators are based on a time when their tupuna managed resources under kaitiakitanga and the health of the environment was monitored under manaakitanga (Te Roroa Whatu Ora Trust 2008). Te Roroa iwi indicators were founded on Ngāti Raukawa's indicators identified under the Ngāti Raukawa Otaki River and Catchment Iwi Management Plan 2000. Monitoring of their environment must be fully integrated with monitoring the health of Te Roroa iwi as people and as a culture. Indicators have been developed under four themes:

1. **Whenua/Ngahere** – number of kukupa sustainably harvested from our forests for cultural purposes. *If there are enough kukupa in our forests that we can once again harvest them, then our forests are healthy.*
2. **Awa** – number of rivers in our rohe that are classed as pristine. *Waipoua River is classed as the most pristine river in Northland. Our rivers should all be that healthy.*
3. **Moana** – number of people commercially employed sustainably harvesting toheroa. *If we can improve our toheroa stocks and habitat to a point where we can once again commercially harvest them in a sustainable manner, then our foreshore is healthy.*  
- number of marae able to provide sustainably harvested paua to manuhiri. *If we have plentiful and healthy paua then our coasts are healthy.*
4. **Hapū** – the ability of hapū to access materials and kai of cultural importance.
  - the rate of change of consumption and preparation of traditional plant and animal foods and medicines by Te Roroa, including ceremonial/cultural use as well as daily household use;
  - extent of practice or use of karakia, wananga, powhiri, whakatau, rahui, and other oral traditions related to the use of traditional foods and subsistence practices;
  - preservation and continued use of te reo o Te Roroa, songs, stories and ceremonies, traditional names for places, sites, foods and processes (planting, hunting, gathering, harvesting, preparation) and the rate of change and factors affecting these practices;
  - integrity of and access to sacred sites;
  - rate of rural-to-urban or urban-to-rural migration of Te Roroa;
  - number of occasions that Te Roroa whānau, hapū members and representatives are effectively involved in planning, decision-making, implementation and evaluation processes undertaken by local government, agencies or other entities and the extent to which cultural concerns are considered and addressed.

### **Outcomes**

Implementation of Te Roroa cultural indicators and monitoring framework is underway.

## **6.15 Cultural Opportunity Assessments for Stream Flow**

### **Background**

This framework has been established Māori to participate in the setting of flow regimes and water allocation (Tipa 2010). This framework introduces the tool, Cultural Opportunity Assessment, that has been developed for Māori to assess their opportunities to engage in cultural experiences under different stream flows.

Issues' surrounding adequate river flow is one of many challenges for Māori. Freshwater for Māori is a sacred taonga and Māori are particularly sensitive to the use and development of freshwater ecosystems. Many concerns have arisen around reduced flow, loss of habitats, impacts to freshwater fisheries, infilling of channels and riverbeds, eutrophication, weed growth and pest animal populations, lack of access; and impacts to mauri, taonga, mahinga kai, mana and tikanga.

The challenge Māori confront is to convey to decision-makers how water allocation decisions affect cultural interests. Many of the assessments of river flow are dominated by western scientific methodology and techniques which usually fall within four groups: hydrological, hydraulic, habitat and holistic. Methodologies geared towards an ecosystem approach are evolving (Harding *et al.* 2004). Such methods evaluate riparian vegetation, channel form, sedimentation, wetland condition, water quality, groundwater and fauna.

The Cultural Opportunity Assessment has been developed to address and give recognition to cultural beliefs, values and practices within a tribal rōhe. The tool has also been built to recognise the need for a catchment-wide management perspective, reflecting the holistic conceptualized that Māori manage the environment. Together, these two framework requirements are joined to create a meaningful tool for Māori to assess the appropriateness of flow regimes.

### **Framework**

Tipa (2010) has developed the tool in consideration of the Sustainability Assessment Model (SAM)<sup>9</sup> and the large body of literature on assessing opportunities, such as the Recreational Opportunity Spectrum (ROS) and Tourism Opportunity Spectrum. The method joins social and environmental values to understand the impacts of change and describe the multi-dimensional relationship Māori have with a river catchment. The thought of putting a numerical value to river flow for 'cultural flow', similar to what current western methodologies entail, was not appropriate for Māori. It is through observation (including sensory and perceptual) that Māori determine the suitability of river conditions for diverse activities or practices. The opportunities approach to freshwater using a Cultural Opportunity Assessment tool enables Māori to identify flows that are conducive to their continued association with a river.

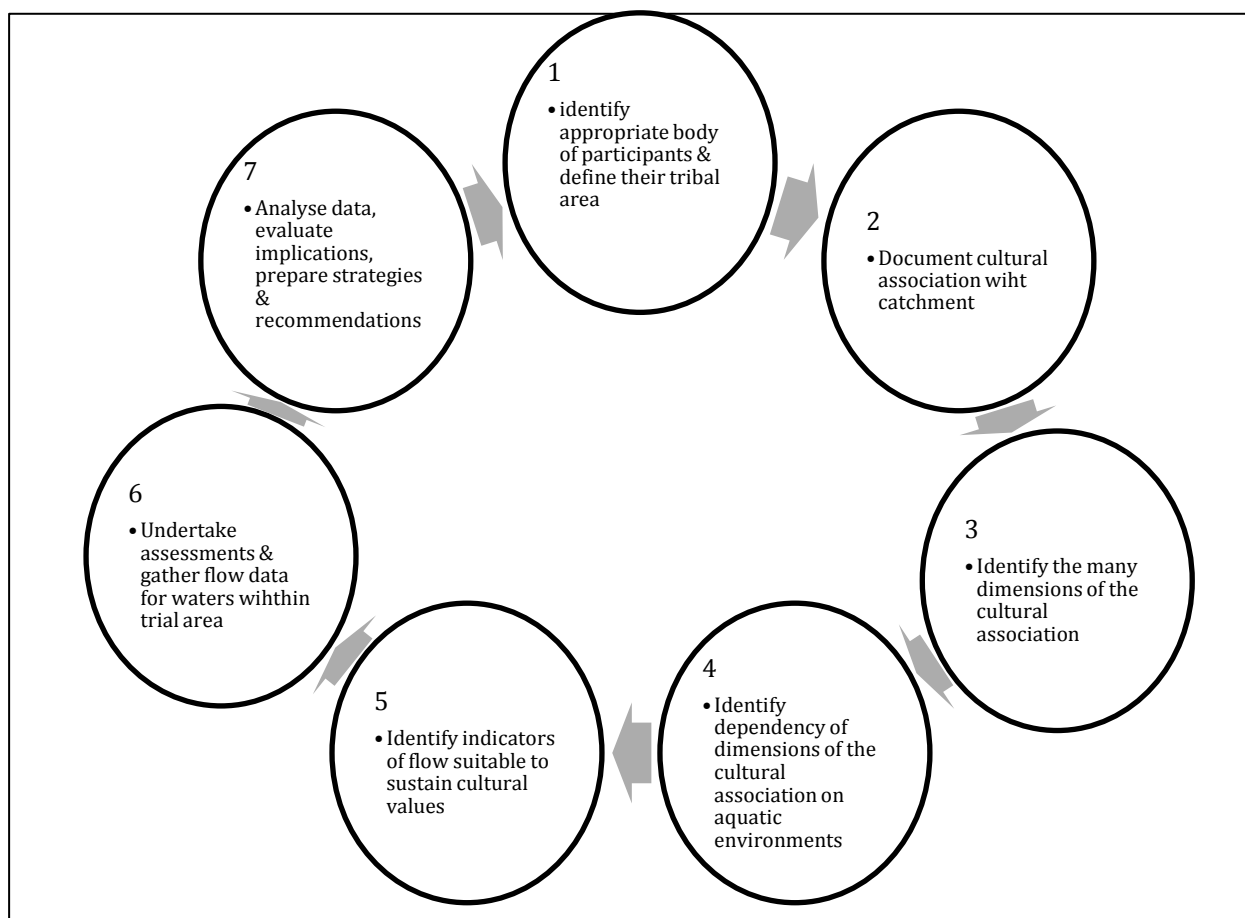
The tool adopts a catchment approach where sites of significance to Māori are assessed across the catchment. 'Cultural flow' is to be assessed using the indicators identified by Māori. Therefore, the purpose of the Cultural Opportunity Assessment method is to assess how flow attributes at a site of cultural significance influence the quality and condition of that site from the perspective of Māori.

Figure 14 describes the 7-stage assessment process. To develop the method, Tipa (2010) undertook a series of interviews with Māori living in three catchments around the South Island – Selwyn River, Kakanui River, and Taieri River. Ten individuals were interviewed per catchment. A set of cultural beliefs, values and practices were characterised with physical characteristics to describe flow. Table 9 provides examples of flow indicators for mahinga kai.

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<sup>9</sup> Promoted by the World Conservation Union (IUCN), the SAM is '*a method for measuring sustainable development, by treating the wellbeing of people and ecosystems together*'.

**Figure 14. The framework for incorporating a cultural perspective in the determination of river/stream flow.**



**Table 9. Examples of flow indicators for cultural beliefs, values and practices.**

Examples of cultural beliefs, values, practices	Examples of Flow indicators that could be assessed
Mahinga kai	<ul style="list-style-type: none"> <li>• Valued species (Fish, birds, plants) present</li> <li>• Range of habitats</li> <li>• Movement of species through catchment</li> <li>• Food available for valued species</li> <li>• Access to site</li> <li>• Site safe to users</li> <li>• River clean &amp; pollution free</li> <li>• Preferred method of fishing possible</li> <li>• Condition of species gathered healthy</li> <li>• Compatible uses occur (e.g, Fishing &amp; bathing)</li> </ul>
Whakapapa	
Taniwha	
Wai Māori – springs (puna), repo raupo (wetlands), water quality	
Hauora – health & wellbeing	
Kainga – settlements	
Tauranga waka – landing site	

Examples of cultural beliefs, values, practices	Examples of Flow indicators that could be assessed
Wanaungatanga – kinship	
Pā	
Urupā	
Recreation	
Ara tawhito – ancient trails	
Waiata/whakatauki – proverbs/songs	

**Methodology**

Tipa (2010) recommends that all stages be carried out by suitable kaitiaki with knowledge of the catchment, significant sites (that includes impacted or stressed sites from a cultural perspective), understanding of flow issues and management process. Field visits form an integral component to the assessment method and understanding the condition of sites and the appropriateness of stream flow for cultural practices.

Once the kaitiaki team members have completed their assessments against the selected flow indicators, a facilitator will record the team discussions on their assessment. After iwi/hapū/whānau have carried out the 7 stages (Figure 14), an alphabetical assessment score will be provided for cultural flow (Table 10). The cultural opportunity assessment produces a graphical representation of Māori assessment, and Tipa (2010) recommends three ways to achieve this. They are: a) photographic evidence of site conditions, b) conceptual drawings of flow issues at sites (Figure 15); and c) Table 6.8 format.

**Table 10. The flow assessment framework showing how data collected is presented.**

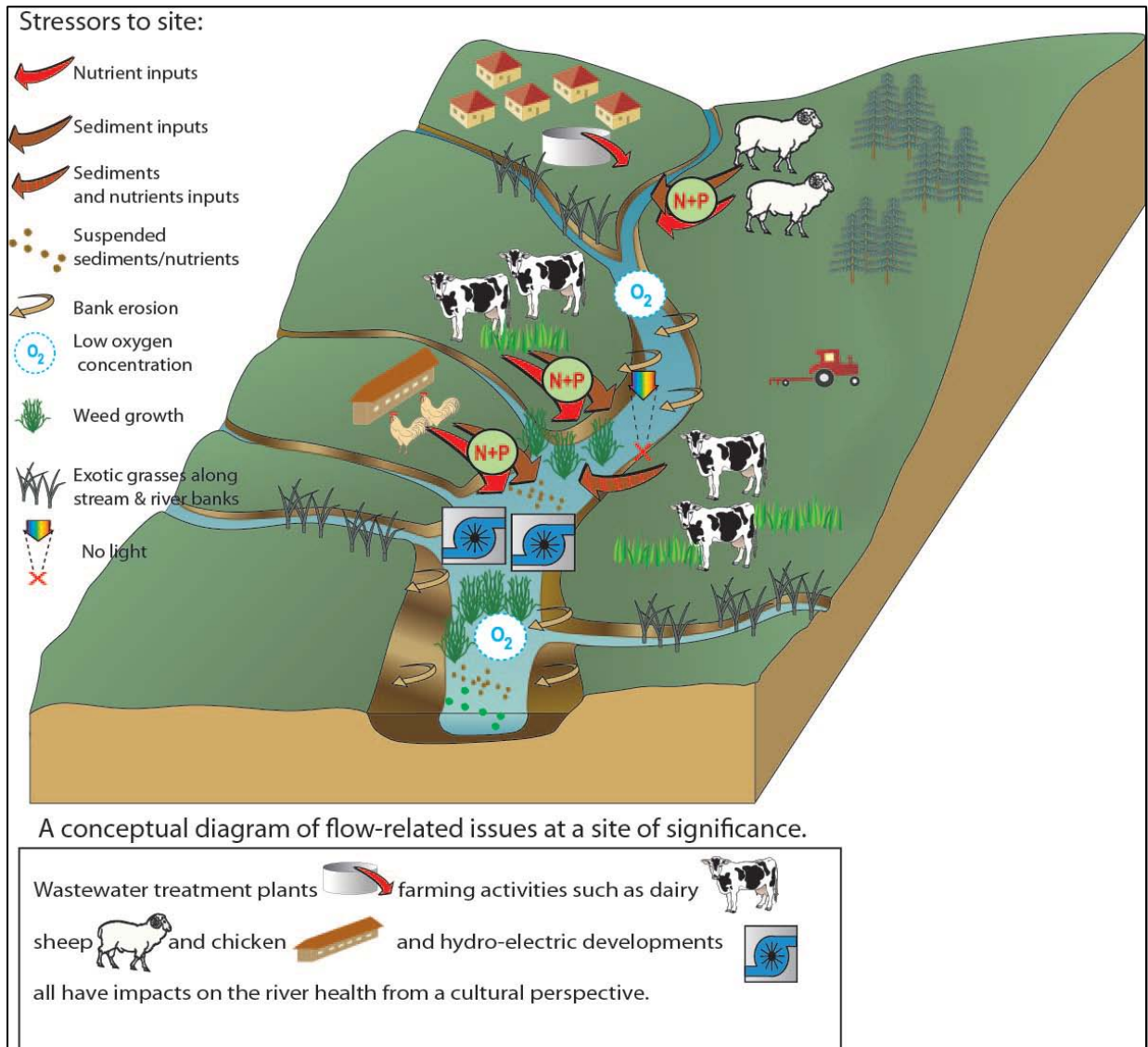
Values identification (e.g. mahinga kai, swimming)	Flow attribute assessment (for each value using prescribed indicators) Numerical scale: 1-3 (unsuitable flow), 4 (suitable), 5-7 (appropriate flow)
<b>Overall assessment site score:</b> Unsuitable (U) Suitable (S) is awarded regarding flows and sustaining cultural values	

**Implementation & Outcomes**

The complete implementation and testing of the method has yet to occur. Ongoing development is underway however, for further information, Tipa (2010) describes an example of an assessment undertaken at a site in one of the study catchments.

The utilisation of the Cultural Assessment Opportunity tool is recommended as a valuable planning tool for freshwater managers. In its simplest application, Māori would record historical and contemporary associations with the catchment and more significantly, their opportunities they wish to see afforded to them. Thus, an inventory of significant sites, associations and opportunities within the catchment is recorded.

Figure 15. Conceptual drawing of flow issues at an assessed site of significance.



## 7 CONCLUSIONS

Ngā rangatira state that the mauri of the Kaipara Harbour is unhealthy and disconnected. This is causing a tremendous loss of mana to the tribes. From a Mātauranga Māori perspective, natural resources are imbued with mauri, an intangible and intrinsic value. Ensuring the mauri of nature is maintained is an integral part in defining Kaitiaki. Māori believed that small shifts in the mauri of any part of the environment, for example through use or misuse, would cause shifts in the mauri of immediately related components, which could eventually affect the whole ecosystem.

Particular reasons for the degradation of mauri are generally due to disintegration from practicing kaitiakitanga, rangitiratanga, whānaungatanga and manaakitanga at all scales (i.e. whānau and/or hapū). It is clear that there is a need to develop monitoring frameworks grounded on the Māori worldview for Kaipara. Fortunately, other iwi and hapū have led the way forward in the development and implementation of cultural monitoring frameworks and indicators.

Various assessment models of cultural environmental health were reviewed. Case studies included: 1) *Māori Environmental Indicators for Wetlands*; 2) *Motueka Cultural Health Indicators*; 3) *Iwi Estuarine Indicators*; 4) *Cultural Health Index for Streams and Waterways*; 5) *Waikato River Report Card (Waikato River Independent Scoping Study WRISS)*; 6) *Ngāi Tahu State of the Takiwa*; 7) *Stream Health & Assessment Kit (SHMAK)*; 8) *Marine Cultural Health Index*; 9) *Iwi Estuarine Monitoring Tool Kit (Nga Waihotanga Iho)*; 10) *Ngāti Kere Methods and Indicators for Marine Protection*; 11) *Te Roroa Iwi Cultural Indicators & Monitoring Framework*; 12) *The Mauri Model framework*; 13) *Cultural Opportunity Assessments for Stream Flow*; 14) *Mauri Indicators and Outcomes: Mauri of Waterways Kete*; and 15) *Kaimoana Survey Guidelines for Iwi and Hapū*.

The features of each of model are summarised in Table 11. The various models varied in their framework being either of Atua domains (e.g., Motueka CHI) or tikanga-kaupapa (e.g., CHI); their ability to complement current western scientific monitoring indicators and program design (e.g., CHI, wetland indicators, Mauri of waterways kete). All have been developed to take into account tangata whenua values and holistic worldview. Table 11 lists the particular ecosystem the tool targets but, because Maori define ecosystems in a holistic way, these tools are not strictly of one ecosystem. Also summarised is the type of indicator(s) being understood, assessed and reported; scale of application and/or integration of the tool. For example, can the tool be applied into State of Environment reporting or across the takiwā? Another feature is the validation with western scientific methods to provide a holistic perspective on “health” of mauri. The CHI, State of the Takiwā, and the Iwi Estuarine Monitoring Kit all involved western scientific methods to support and/or explain the status of the physical ecosystem. The Māori Indicators & Outcomes –Tikanga Mauri of Waterways Kete included a combination of measures to understand health of mauri. The kete includes measures of physical evidence that mauri is protected; evidence within agencies, wider community and tangata whenua organisations (e.g. provisions in planning documents designed to protect mauri).

Day-to-day Te Uri o Hau deal with complex environmental issues that has a potential affect on mauri. Te Uri o Hau outcome is to play a more active and equitable role in the decision-making process, which specifically includes, planning, policy, monitoring and environmental management. They require the tools and capacity to engage; and they also need access to information they can readily use for engagement. The current information Te Uri o Hau use to make decisions is very much western science based research and monitoring and a paucity of cultural health information.

Opportunities exist for Te Uri o Hau to begin and leverage the need for collaborative environmental monitoring for Kaipara. Environmental monitoring is mandated through their Deed of Settlement



legislation and statutory obligations; the NZ Coastal Policy Statement 2010, future Regional Policy Statement requirements and the principles of the Treaty of Waitangi.

**Table 11. Summary information of cultural health assessment models<sup>10</sup>. ? Indicates information unavailable to provide an evaluation.**

	Māori Wetlands Monitoring Indicators	Motueka Cultural Health River Indicators	Iwi Estuarine Indicators (Tiakina te Taiao)	Cultural Health Index freshwater	State of the Takiwā (Ngāi Tahu)	Waikato River Report Card	SHMAK Kit	Ngāti Kere Indicators	Iwi Estuarine Monitoring Kit (NIWA)	Marine Cultural Health Index	Māori Indicators & Outcomes - Tikanga Mauri of the Waterways Kete
<b>Initiated by:</b>											
Crown (DoC, MfE)	X					X	X	X			X
Research providers									X	X	
Iwi/hapu		X	X	X	X						
<b>Framework:</b>											
Atua domains		X	X							?	
Value outcomes	X	X	X	X	X	X		X	?	?	X
Vision	X	X	X	X	X	X		X	?	?	X
Knowledge	X	X	X	X	X	X		X	?	?	X
Culturally significant sites only	X								?	?	na
Combination sites		X	X	X	X	X		X	X	?	na
Tool only – not framework							X		X		na
Training		X	X	X	X	?			X	?	?
<b>Ecosystem:</b>											
Freshwater – rivers and streams		X		X	X	X	X				X
Freshwater – dune lakes and lakes					X (lakes)						
Estuarine			X						X		
Coastal								X		X	
Marine								X		X	
Wetlands	X										
<b>Cultural Indicators:</b>											
Mahinga kai	X	X	X	X	X	?		X	X	X	X
Mauri	X			X	X	?					X
Plants & Animals – biodiversity	X		X			?	X		X	?	?
River or lake physical attributes	X	X		X	X	?			X	X	X

<sup>10</sup> Te Roroa Iwi Cultural Indicators not included as still being developed for mauri kete.

Assessing the Mauri of the Kaipara

	Māori Wetlands Monitoring Indicators	Motueka Cultural Health River Indicators	Iwi Estuarine Indicators (Tiakina te Taiao)	Cultural Health Index freshwater	State of the Takiwā (Ngāi Tahu)	Waikato River Report Card	SHMAK Kit	Ngāti Kere Indicators	Iwi Estuarine Monitoring Kit (NIWA)	Marine Cultural Health Index	Māori Indicators & Outcomes - Tikanga Mauri of the Waterways Kete
(e.g., water quality, flow, channel shape)											
Spiritual Value					X	?					
Traditional/Spiritual relationship		X		X	X	?				X	X
Cultural landscape/seascape						?					?
Ku uta ki tai (mountains to the sea, catchment)				X	X	?				X	
Manaakitanga					X	?		X			X
Whānaungatanga						?		X			
Taonga	X				X	?					
<b>Scale of Application or Integration:</b>											
Theory						X <sup>11</sup>					
Pilot	X		X	X				X	X	X	X
Takiwā/Rohe		X		X	X						
SoE/Regional-scale											
SoE/National-scale											
Iwi/hapū		X		X	X			X	X	X	
Community							X				
Iwi/hapū-community							X				
Te Reo version					X				X		
<b>Complementary to western scientific methods:</b>											
Yes	X	X	X	X	X	?	X		X	?	
No						?		X		?	X
<b>Information System or database required:</b>											
Yes	X	X	X	X	X			?	?	?	?

<sup>11</sup> Has yet to be implemented in its entirety. That is, from setting the vision to measuring indicators with report card produced.

Assessing the Mauri of the Kaipara

	Māori Wetlands Monitoring Indicators	Motueka Cultural Health River Indicators	Iwi Estuarine Indicators (Tiakina te Taiao)	Cultural Health Index freshwater	State of the Takiwā (Ngāi Tahu)	Waikato River Report Card	SHMAK Kit	Ngāti Kere Indicators	Iwi Estuarine Monitoring Kit (NIWA)	Marine Cultural Health Index	Māori Indicators & Outcomes - Tikanga Mauri of the Waterways Kete
No							X	?	?	?	?
Reports	X	X	X	X	X	X	X	?	X	?	X
Reports & hui	X	X	X	X	X	X		?	X	?	?
GIS / Spatial reporting		X	X	X	X	?		?	?	?	?
<b>Management Action Linkage:</b>											
Yes					X	X					X
No											

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