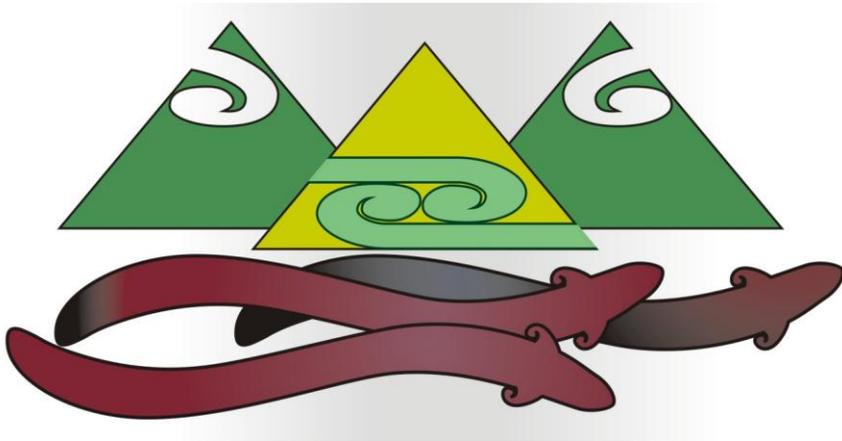


Ko Ngati Hine Pukepukerau

Catchment Management Programme Report

24 April 2015



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Culturally significant freshwater ecosystems within Ngati Hine catchments

The easy answer to which ecosystems are culturally significant to Ngati Hine is all of them. Our long history with the land means every aspect of our culture has some connection to the wetlands, rivers, springs and forests, etc.

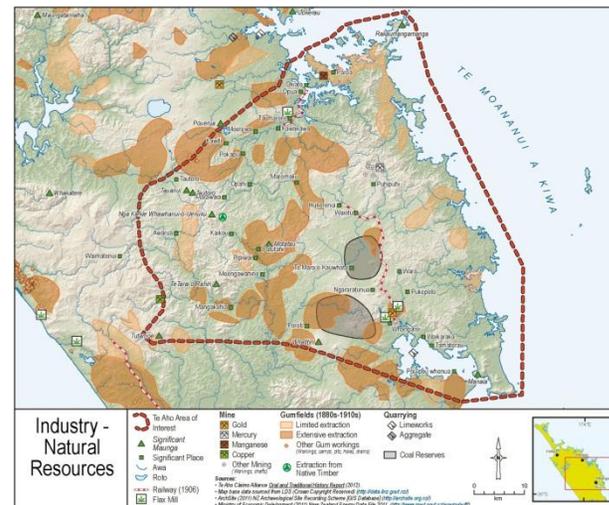
To ensure a traditional knowledge based catchment plan it is recommended that Ngati Hine consider a framework with a focus on some of the gods and goddesses who are of importance to Ngati Hine and whom are personified within our territories.

Therefore the following gods and goddesses have been identified as being culturally significant ecosystems within Taumarere catchment:

1. Papatuanuku – earth, soil, minerals, underground wetlands
2. Tane Mahuta – forests
3. Hine Te Repo - swamps
4. Tangaroa – all water and the living entities within including fish and lizards

Papatuanuku – earth, soil, minerals, underground wetlands

As stated by the Ngati Hine Environmental Management Plan 2008, the rohe of Ngāti Hine is rich in extractable mineral resources such as sand (both onshore and offshore), scoria, manganese, limestone, clays and gravels. The Plan goes on to point out that minerals are by their very nature limited and that their use must be carefully managed to ensure that their extraction does not adversely affect the environment and that sufficient mineral resources are available for future generations.



The maps above show some of the historical and current soil and minerals related information related to Taumarere Catchment. This information can be used to inform the catchment management. The management plan must ensure the mauri of mineral and geothermal resources is protected and enhanced in ways that enable Ngāti Hine to provide for their social, economic and cultural wellbeing; and that of generations as yet unborn.

Recommendations for Papatuanuku Indicators are the extent of culturally important soil and minerals such as clay and onekura used for customary purposes. Due to the lack of availability of information within the project timeframes on where these places exist within Ngati Hine territories and exactly which soils and minerals are of customary use specifically to Ngati Hine.

Fertility of soil for gardens and appropriate forest floor can be addressed in the following chapters on Tane Mahuta and Rongomatane.

Another indicator for Papatuanuku of significance to Ngati Hine are Puru Tuna. This is explained further below.

Underground Wetlands – Ruawai/Puru Tuna

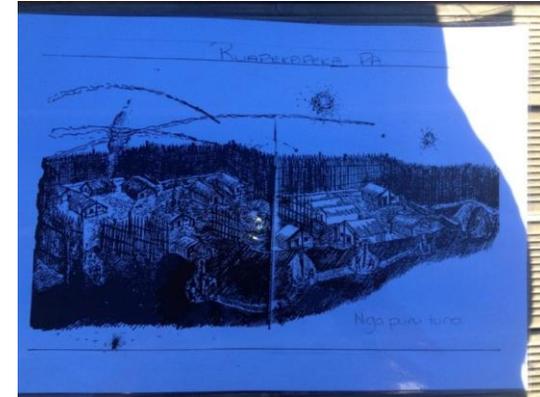
Also referred to as “ruawai¹”, puru tuna are underground wetlands that are the homes of eels. Eels use underground wetlands to migrate and hibernate in.

“The dry puru provided the Ngāti Hine people with the knowledge by which to keep eels alive when they are out of water for any length of time. That is, if you put eels in a dry sugar bag they will coat the inside of the bag with slime which will allow them to breathe and move freely within the sugar bag. If the bag becomes wet, the slime tends to ooze through the weave in the bag thereby blocking the pores of the bag through which the eel would have breathed.” (Tuna population survey of Te Rohe Whenua o Ngāti Hine – 2008)

The locations of puru tuna are fiercely protected by Ngati Hine families as some rely on them for sustenance outside of the koroma migratory period. Perhaps due to the secretive nature of puru tuna there is very little published in New Zealand regarding them. They are extremely vulnerable ecosystems which once destroyed cannot be restored. They are located throughout Ngati Hine and can be located by experts who maintain knowledge of them.

One expert who used his traditional knowledge of puru tuna was the Ngati Hine chief, Kawiti. During the land wars Kawiti saw too many Ngati Hine people fall in battle and therefore devised a strategy to avoid this catastrophe again. He went about constructing a fortified pa at Ohaeawai. Inside the pa he dug underground caverns akin to the puru tuna, whereby his warriors could slip underground and surface elsewhere in the battlefield. This technique has become known today as trench warfare. The second

battle ground of similar design and better known was at Ruapekapeka. The picture below shows the puru tuna beneath the pa.



Supplied by Tohe Ashby 1

Rongomatane – Hua Whenua (Cultivated Food)

E kō, nā na taua whenua

On seeing the quantity and quality of the kumara Torongare declared, “My daughter, behold our land”.

The use of diverse heritage seeds and planting methodologies holds important traditional knowledge and customary use of biodiversity. The practice of traditionally gardening the forest, rivers, coast line came up during research related discussions.

An assessment of the current cultivation activities within Ngati Hine in comparison to recent times of self-sustainability is recommended. This could be considered as the Ngati Hine Pukepukerau monitoring regime is developed further.

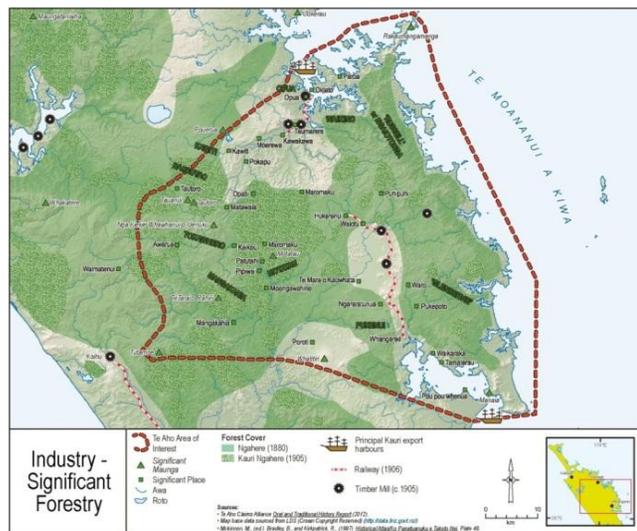
¹ Joey Rapana, 2013

Heritage crops within Ngati Hine include a wide range of carbohydrates and greens. It is well known that a variety of potatoes such as kumara, peruperu and urenika and taro were brought here to Aotearoa during the early migrations. More recently adopted varieties of crops are corn, watermelon, pumpkin, tomatoes, peas, peanuts, and honey.

Despite cultivated foods not being a normal component of catchment management plans, self-sustainability initiatives of Ngati Hine since our original occupation requires that environmental responsible management be measured by our livelihoods and how we look after our soils.

Tane Mahuta – Ngahere - Forests

The forests within Taumarere catchment were predominantly low-land mixed broadleaf podocarp and kauri forests (shown by the map below Industry – Significant Forestry). Forests are seen as taonga for their bounty of food, medicine and materials. Ngati Hine hold the forests’ sustainability as an utmost priority not for aesthetic reasons, but because we see our own survival as intertwined.



The paragraph below demonstrates the worldview of Ngati Hine in regard to forests.

“Indigenous plants and trees are the result of countless generations of whakapapa from ngā Atua. They are a priceless taonga bequeathed to us from the dawning of all time. Under kaitiakitanga, our tūpuna have interacted with these plants and trees since their arrival in Aotearoa. They had to because their very survival depended on these taonga and their sustainable management. Maori, as with all Pacific peoples, had no concept called conservation where resources or areas were locked away for ‘natural’, ‘aesthetic’ or ‘amenity’ values.” (Ngati Hine Iwi Environmental Management Plan 2008, p. 44)

In the forest, all the flora and fauna are seen as equals. One cannot exist without the others; all are intertwined. *“Ngahere” means the binding together of diverse species living together. One cannot thrive without the other. The individual species within the ngahere rely upon one another to thrive; each is as important as the other no matter how tall, small, or large.* (Te Warihi Hetaraka, 2011).

Hine Te Repo – Swamps

Ngati Hine consider ourselves as “swamp people” and even resisted government efforts in the 50s and 90s to drain our swamps to further economic development². There communally owned areas are now regarded as nationally and regionally significant “wetlands”.

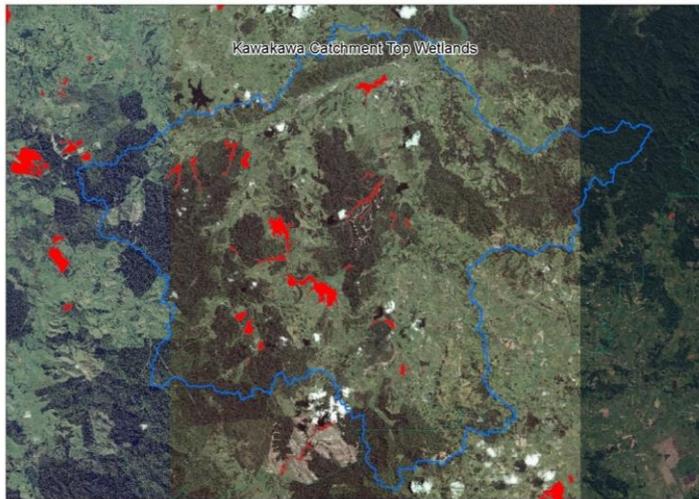
“Our association with repo (swamps) is well known and recognized. The repo has a very special spiritual quality as well as its cultural and traditional significance. Our ancestral links with repo are varied. Such links could be an abode of a taniwha, a burial place, or a place utilized for its resources. Repo contain kai (tuna, kēwai, taro, and watercress), dyes (paru –black mud which is used for dyeing flax) and weaving materials (raupo,

² Erima Henare

harakeke, kōrari, kuta).” (Ngati Hine Iwi Environmental Management Plan 2008, 35)

Once utilised for the trading of muka for fibre and to make raupo bread; repo are now mostly used for storing koroma (a type of long-fin eel) outside of the migratory months. Ngati Hine knowledge of how to store tuna for an entire year until the next tunawhakaheke (migration of sexually mature eels to the Pacific) is a significant practice that must be maintained to ensure culture and livelihoods.

The picture below shows the extent of some of the repo remaining within Taumarere catchment.



Nortland Regional Council 1

Tangaroa – all water, fish and lizards

Freshwater

The reverence paid to water by Ngati Hine cannot be overstated. Water is a central theme in our creation story.

“Kaua e wareware, kia tuhono ra ano te matua, te whaea, te tuakana me te teina, a Ranginui, Papa-tu-a-nuku, Tawihirimatea ratou ko Tangaroa, katahi ano ka hua te wai. Koina te mana o te wai, ehara na te Atua Maori kotahi noa iho. I timata te tapu o te wai I te wehenga o Ranginui raua ko Papatuanuku. Ka hua ake te wai I nga roimata o Ranginui ki tana hoa rangatira e takoto tahanga ana I raro iho I a ia. Ka ruia te whenua ki ana roimata ka hora ki te whenua katoa, waipuke rawa hei huna I a ia. Ko tona matenga, u, huha hoki anake I ihu puta ki runga ake I te wai. Ki aua wahi ka tupu te tini o Tane, tae noa ki te aitanga a Tiki, ki te moana ko te tini o Tangaroa. I hua katoa ai enei tini I te whakapapa mai I a wai. Koia e tapu nei te wai.”³

It is understandable, then, that Ngati Hine see water as having a specific life force that sustains all others. This life force, called “mauri”, must be kept healthy if that water is to uphold the ecosystem around it. However, the mauri of one body of water is not the same as that of another. Thus, if mauri from one body were to mix with that of another, both risk damage to themselves and the surrounding environment. Likewise, the unnatural separating of a body of water is said to carry with it the same risks. The overarching theme with mauri as it pertains to waterways is that nature’s word is final. Water is to be left where nature put it and as pure as nature made it.

Water itself is the primary component of many Ngati Hine medicines. Ngati Hine utilize it for a number of health benefits including, drinking water, hot and cold compresses, showers, short “dunks”, long baths-detoxifying, foot baths, hand baths, herb & medicated baths, packs, sponging, steams and teas with infused herbs and/or perspiration inducing. Some of these are carried out or administered in rivers or beside springs but many are prepared in the home where the waiora is taken to. All natural water has value and sustains some form of life. Water is a sacred resource to Ngāti Hine, to be given the highest level of protection. Water, in all its many forms – rain, springs, wetlands, streams, lakes, estuaries and the sea itself – is central to our existence as Ngati Hine. It is used to feed,

³ Ngati Hine kaumatua

sustain, transport, cleanse and purify all those that inhabit our ecosystems including people. Significant puna were named, some were tapu, some were associated with pa, and some were associated with gardens. Ngati Hine history, strength and mana stems from water – water are a sacred resource and a taonga. ⁴

There is no aspect of water ignored.

Mahinga kai– areas and locations where food or any sort is gathered, grown or hunted, including forests, swamps, lakes, rivers, cultivatable soils, etc.

“Some of the food we eat out of our waterways are, Torewai – freshwater pipi, Watercress, Mussels (Gradual decline), Mohi (whitebait), Kewai – freshwater crayfish, Short jaw Kokopu (At Risk), Tunatuna (juvenile eels), Tuna kuwharuwharu - Longfin eel (Chronically Threatened so not so much is eaten at the moment), etc.”
(Shortland, 2012, p. 28)

The Ngati Hine diet is comprised of many animals that make their home in or around water. Fish, shellfish, reptiles, amphibians, birds and insects are all resources Ngati Hine use for sustenance. Wetlands also supply plants of cultural significance like harakeke, raupo, toetoe for weaving, kuta for carving and to make tools and other plants used to make traditional medicines.



Tui Shortland 1

⁴ Ngati Hine, 2008

Cultural indicators for each Ecosystem

Cultural indicators are signs indigenous people look for in our environment to assess its overall health. As early as 1991, the (then new) MfE sought expert advice on the potential role of Maori in this new era of environmental monitoring. That advice (Ward 1991) concluded that:

“An holistic approach to environmental monitoring cannot ignore social and cultural values. Traditional monitoring carried out by Maori people was an essential part of survival in New Zealand.

They developed an in-depth understanding of the environment upon which they depended. Their traditional view of the environment reflects an integrated approach that needs to be incorporated into a national or regional monitoring system by involving Maori people in planning and decision making at the regional level. The Resource Management Act 1991 clearly expects consultation to occur between the takata whenua and local authorities. Maori people with traditional knowledge of the environment and an understanding of traditional environmental indicators need to be empowered to contribute to a bicultural monitoring system. Assurance of funding for any work undertaken and the provision of training programs may be prerequisites for Maori input into this monitoring process.” (Repo Consultancy, 2011, p. 7)

Currently, there is a lack of established standards related to traditional knowledge and customary use within Taumarere Catchment. The importance in using these indicators to assess an ecosystem’s health becomes increasingly important as they risk more adversity every year.

Although a fairly new concept yet to be fully recognised by local and central government, cultural indicators utilising traditional knowledge have been recognised at the international level by UNESCO as Dr. Rupert Sheldrake, PhD, Biologist expresses, “Any observant local knows more about his surroundings than any visiting scientist. No exceptions.”

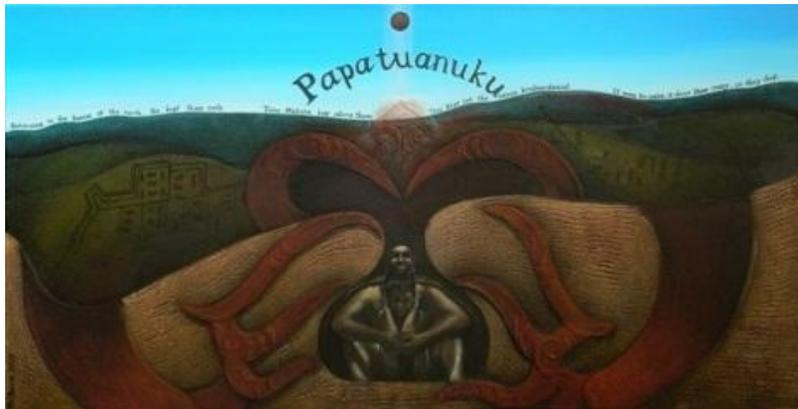
Enough emphasis can’t be placed on mauri as a Cultural Indicator to Ngati Hine. It could even be said to be the final evaluation, as even if all else seems fine, an ecosystem with poor mauri indicates otherwise. An

ecosystem with good mauri is indicative not only of a healthy environment, but one that is in line with Ngati Hine ideals.

Ngati Hine is involved in reporting on the Convention on Biological Diversity traditional knowledge and customary use of biodiversity indicators described as the following:

- Status and trends of linguistic diversity and numbers of speakers of indigenous languages
- Status and trends in land-use change and land tenure in the traditional territories of indigenous and local communities
- Status and trends in the practice of traditional occupations
- The full and effective participation of indigenous peoples in the implementation of the National Biodiversity Strategy

This kind of global support for indigenous peoples like Ngati Hine could usher in real advancements in monitoring land like the Taumarere catchment with respect to Cultural Indicators.



Theresa Reihana 1

Papatuanuku Indicators

	Tohu	Kaupapa
Soil		Refer to Tane Mahuta & Rongomatane Indicators
Underground wetlands	Puru Tuna  Theresa Reihana 2	Ground movement Signs early in the morning or at night Internal view Fungi and bacteria, snails, insects, crustaceans, beetles, weta, spiders, harvestmen, centipedes and glow worms, etc. Internal temperature Volume of water inside puru tuna Earthworks

Tane Mahuta Indicators

Cultural indicators for Te Waonui a Tane should include the species relied upon over generations to sustain Ngati Hine, such as for medicinal, food, adornment, housing, symbolism, and other cultural purposes. Having had a circle gift relationship with these species over a long period of time Ngati Hine have the knowledge of their healthy characteristics and behaviours and the management of such ecosystems to ensure their sustainability.

When assessing the health of a tree, Ngati Hine do not look at it as an individual, but rather see it as a part of a whole. The true health of one tree cannot be established until the health of its ecosystem has been taken into account. This is indicative of Ngati Hine cultural indicators as a whole. No one indicator is relied on without the others.

Simply because a plant or animal belongs in the forest, however, is not a good cultural indicator in and of itself. Having a long history for reference, Ngati Hine know to look for in their plants: their life expectancy, the health of its outer appearance, its soil, moisture and the diversity of the species itself (i.e., is the plant reproducing?). Furthermore, Ngati Hine take into consideration the abundance of native species.

Due to the abundance of diversity of Te Waonui a Tane it is suggested that rather than providing an extensive list of all of the species utilised by Ngati Hine, that we focus on a few significant species to begin monitoring within this ecosystem which rely on a healthy ecosystem. After extensive discussions with traditional knowledge holders, the following aspects are recommended as indicators of forest health.

	Tohu	Kaupapa
<p data-bbox="1094 138 1201 164">Ngahere</p>	<p data-bbox="1226 138 1283 164">Kiwi</p>  <p data-bbox="1226 613 1535 889">Tui Shortland 2 Justifying the significance of kiwi is certainly not required. It is a national symbol and a kahu kiwi (cloak made of kiwi feathers) is of the utmost reverence.</p> <p data-bbox="1226 938 1549 1279">Kiwi eggs are vulnerable to carnivorous pests such as possums, rats and mustelids. Today, Ngati Hine have some of the most abundant numbers of kiwi and we are proud to have supplied other areas with kiwi.</p>	<p data-bbox="1575 138 1892 164">Primary Indicators for Kiwi</p> <ol data-bbox="1604 175 1990 375" style="list-style-type: none"> 1. Forest floor soil health ideal for burrowing and foraging; 2. Calls during breeding season; 3. Active pest control including stray dogs and cats. 4. Sufficient food sources

	Tohu	Kaupapa
Ngahere	Kukupa  Tui Shortland 3	Primary Indicators for Kukupa <ol style="list-style-type: none"> 1. Sound of kukupa flying in the forest - Count comparison (trends) as previously undertaken with the Motatau Scenic Reserve project 2. monthly checks for diverse canopy food including puriri and miro 3. Spatial extent mapping 4. Appropriate numbers for food 5. Pest control to maintain tree foliage and bird eggs, etc
Ngahere	Totara  Tui Shortland 4 The totara is considered to	Primary Indicators for Totara <ol style="list-style-type: none"> 1. monthly checks for abundance, diversity and health 2. spatial extent

	be the rakau rangatira of the forest for the purposes of carving and housing. “Kua hinga he totara”, is an often used saying when a great man has passed. Ngati Hine has gifted much totara for many marae of neighbouring hapu including Takahiwai Marae, Te Puna o te Matauranga Marae, Rawhiti Marae, and Te Whare Runanga o Waitangi.	
Ngahere	Kauri  Dave Milner 1 A fungi like disease was identified as having a fatal effect on kauri populations. A report produced in 2011 on Cultural Indicators for Healthy Kauri Ngahere identified a myriad of species within the forest that could be considered as indicators	Primary Indicators for Kauri <ol style="list-style-type: none"> 1. monthly checks for abundance, diversity and health including signs of kauri dieback 2. visual signs of ring barking, oozing of gum and/or loss of foliage. 3. Alignment of indicators to national programme

	of health such as kauri snails. As above, another proverb of Ngati Hine is, “Kua hinga he kauri”, which is referred to a great woman who has passed. ⁵	
Ngahere	Tupakihi  Tui Shortland 5	Primary Indicators for Tupakihi 1. monthly checks for abundance, diversity and health
	Tupakihi is an important medicinal plant of Ngati Hine. It can be found growing along the banks of rivers. It has numerous uses amongst medicine practitioners.	

⁵ Hoterene Tipene

Ngahere	Kawakawa  Tui Shortland 6	Primary Indicators for Kawakawa 1. monthly checks for abundance, diversity and health
	Kawakawa is another very important medicine for Ngati Hine. Over the past few years medicine practitioners have reported alarming signs of ill health of kawakawa. Therefore this is another species which Ngati Hine will actively monitor.	
Puriri Groves	Puriri  Tui Shortland 7	Primary Indicators for Puriri: 1. monthly checks for abundance, diversity and health 2. spatial extent of puriri groves
	Puriri are a culturally significant tree to Ngati Hine used as strong palisades	

	<p>during the land wars, whereby the weapons of the redcoats could not penetrate the extremely thick wood.</p> <p>Puriri are also important to supplying the kukupa with food during the winter season as it produces berries all year round.</p> <p>Puriri were also used to store or hang koiwi.</p> <p>Puriri groves are ecosystems where the puriri foliage has spread so far and thick that very few other trees are able to grow beneath them.</p>	
<p>Kahikatoa Scrub</p>	<p>Kahikatoa</p>  <p>Most Maori refer to Kahikatoa as Manuka, however to Ngati Hine the Manuka is the pink flowering tea tree.</p>	<p>Primary Indicators for Kahikatoa</p> <ol style="list-style-type: none"> 1. monthly checks for abundance, diversity and health

	<p>Kahikatoa are known as a nursery species that raise other indigenous species beneath them in areas for regeneration.</p> <p>Kahikatoa is known to produce good medicine in the form of oil, honey, propolis, etc.</p>	
<p>Repo</p>	<p>Swans</p>  <p>Tui Shortland 8</p> <p>Too many swans in a repo system can create and imbalance causing excessive faecal matter entering into the waterways.</p>	<p>Primary Indicators for Swans</p> <ol style="list-style-type: none"> 1. Abundance in a waterway

Repo	<p>Koroma</p>  <p>Cilla & Adam Brown 1</p>  <p>Cilla & Adam Brown 2</p> <p>Repo are wetlands high in nutrients and when healthy they can sustain our koroma held in boxes for an entire year until the next customary harvest during the annual migration.</p>	<p>Primary Indicators for Koroma</p> <ol style="list-style-type: none"> 1. Flow sufficient to store koroma 2. Quality sufficient for elvers 3. Passage for elvers and sexually mature migrants 4. Adequate food <p>Also refer to Nga Kete Tangariki report for more info on monitoring eels.</p>
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Repo	<p>Pupu Harakeke</p> <p>Of great importance as a medicine and a indicator of ecosystem health as considered to be vulnerable to environmental toxins and pollutants</p>	<p>Primary Indicator of Pupu Harakeke</p> <ol style="list-style-type: none"> 1. Abundance, diversity and health
Repo	<p>Poraka</p> <p>The research team expressed a concern for a lack of presence of frogs in and around waterways particularly as these are known to be indicators of pollutants</p>	<p>Primary Indicators for Poraka</p> <ol style="list-style-type: none"> 1. Abundance, diversity and health 2. Spatial extent
Repo	<p>Tunatuna</p>  <p>Tohe Ashby 1</p> <p>Juvenile eels or tunatuna⁶ are an indicator of the diversity of tuna in a catchment.</p>	<p>Priority Indicator for Tunatuna</p> <ol style="list-style-type: none"> 1. Finding an abundance within certain areas of the repo 2. Status and trends 3. Spatial extend 4. Threats

⁶ Adam Paraone

Kahikatea Swamp Forest	Kahikatea  Tui Shortland 9 Kahikatea forest trees such as kahikatea, pukatea, and cabbage trees (ti kouka).	Primary Indicators for Kahikatea: <ol style="list-style-type: none"> 1. Spatial extent 2. Water flow 3. Abundance and health
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Tangaroa Indicators

Puna, Awa, Rere	Tohu Waioira  Tui Sh	Kaupapa Primary Indicators of Waioira <ol style="list-style-type: none"> 1. Water clarity 2. Abundance, diversity and health of vulnerable species such as pungaweriweri, kokopu, tangariki and mussels
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	<p>Water itself is subjected to different rankings based on its source and related activities. This also determines what Ngati Hine will see as a suitable use for it.</p> <p>Waioira is the purest form of water; it is the spiritual and physical expression of Ranginui's (sky father) long desire to be reunited with Papatuanuku (earth mother). Waioira is known as healing water. Traditional water could only remain pure without being mixed and was protected by ritual prayer. Traditionally waioira had the potential to give life, sustain wellbeing, and counteract evil.</p>	
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<p>Puna, Awa, Rere</p>	<p>Waimaori</p>  <p>Waimaori water is used for drinking and does not have any particularly sacred associations. Waimaori is often used to describe water that is running, unrestrained, or to describe water that is clear or lucid.</p> <p><i>He wahanga ano o te awa hei tikinga wai inu, ko raro atu hei koukou, raro tata atu hei horoi kakahu, he wahanga ano o te taha awa hei horoi tupapaku⁷</i></p>	<p>Primary Indicators for Waimaori</p> <ol style="list-style-type: none"> 1. Drinking water 2. Water of a quality to teach babies to swim 3. Flow, depth and clarity 4. Abundance, diversity and health of vulnerable freshwater species 5. Riparian planting⁸
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<p>Puna, Awa, Rere</p>	<p>Waipuke</p>  <p>Tui Shortland 11</p> <p>Waipuke is water in flood. Flooding is a way of life for Ngati Hine. Ngati Hine communities such as Pipiwai, Matawaia, Motatau & at times Moerewa and Otiria, are often isolated from the rest of the world due to flooding at least once a year during the end of summer floods. At times flooding can last between two days and one week depending on the extent of rainfall and the community road system. This has contributed to the self-sustainability of communities.</p> <p>Flooding is an important climate for migratory tuna however the flow of water can be better managed by Ngati Hine.</p>	<p>Primary Indicators for Waipuke</p> <ol style="list-style-type: none"> 1. Flooding status and trends 2. Whanau and community access to health and education services 3. Sedimentation 4. Mitigation techniques such as re-establishing swamps, bunding, swaling and terracing 5. Impacts on whanau housing and marae, and infrastructure.
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⁷ Ngati Hine kaumatua

⁸ Kevin Prime reference to Pera Prime planting the waterways when she recovered cleared lands

Puna, Awa, Rere	Waikino Waikino literally means bad or impure water (e.g., stagnant pools). Often associated with past events, polluted or contaminated water.	Primary Indicator for Waikino 1. Status and trends 2. Spatial extent
Puna, Awa, Rere	Waimate Waimate is water which does not support any living life. It's characteristics are stagnant ⁹	Primary Indicators for Waimate 1. Spatial extent 2. Status and trends
Awa	Watakirihī Although known to be an introduced green, watakirihī or watercress is a part of the staple Ngati Hine diet.	Primary Indicators for Watakirihī 1. Abundance, diversity and health 2. Yield for livelihoods
Awa	Freshwater pipi - torewai Although seldom found in lower waterways within Ngati Hine catchments, torewai are still known to exist in the upper catchments.	Primary Indicators for Torewai 1. Abundance, diversity and health 2. Yield for livelihoods 3. Threats 4. Status and trends
Awa	Whitebait - mohi Whitebait are known in the lower catchments as a livelihood species amongst those Ngati Hine whanau who live in these areas. There is potential for an increase mohi with improved management of their habitat.	Primary Indicator for Mohi 1. Spatial extent 2. Abundance and health 3. Pollutants 4. Threats to passage

⁹ Tohe Ashby

Awa	Kewai – freshwater crayfish Kewai are still found in the upper catchments of Ngati Hine. They are vulnerable to ecosystem pollutants and so are an appropriate cultural indicator	Primary Indicators for Kewai 1. Abundance, diversity and health 2. Spatial extent
Awa	Freshwater mussels Gradual decline of freshwater mussels has been recorded throughout Ngati Hine catchments but they are considered as important water purifiers. Their habitat has been altered by modification and sedimentation. Mussels also are sensitive to water pollution, the spread of exotic species, and barriers to migration.	Primary Indicators for Mussels 1. Abundance, diversity and health 2. Spatial extent 3. Yield for livelihoods
Awa	Kokopu – short jaw Kokopu are at risk. They are a common and familiar component of our freshwater environment,	Primary Indicators for Kokopu 1. Abundance, diversity and health 2. Spatial extent 3. Threats 4. Yield for livelihoods 5. Status and trends
Roto	Kuta  Tui Shortland 12 Used to make rain coats.	Primary Indicators of Kuta 1. Abundance, diversity and health 2. Spatial extent 3. Threats 4. Use by weavers

Monitoring methods to assess the health of catchments

As mentioned above, a realm approach to managing the health of the environment is ideal for Ngati Hine to maintain and enhance our traditional knowledge and customary use of the environment. The mauri, diversity of species, soil, canopy, birdlife, insects, etc of these areas to Ngati Hine as a whole need to be considered and recorded.

During the course of this programme local field monitors were chosen to assess the health of sub-catchment areas listed below. A wananga was held to confirm the freshwater monitoring indicators building on the information confirmed above. Wananga were also held to name sub-catchments and introduce monitors to GIS mapping and mobile data collection.

GIS Cloud is the chosen software to assist in the analysis of field information. The maps (see below) produced can be used to record status and trends internally and also to work with regional, national and international indicators of relevance to aggregate our results and collaborate with others.

Intellectual property issues have come to the fore during the production of this report and to manage those issues some information will not be made available to external agencies at this time.



Sub-catchments

The Ngati Hine Pukepukerau catchment is approximately 75,000 hectares. To ensure efficiencies in monitoring and data/information management, we held a wananga to split up the monitoring into sub-catchments. The following is a description of the general land use for each sub-catchment. Some of the smaller sub-catchments were excluded from the monitoring (including Te Kopuru and Riponui) due to limited resources, however we do intend to include them during the next stages.

Name	Area	Focus
Ramarama	Maromaku to Taikirau Swamps	<ul style="list-style-type: none"> • Intensive farming • Deoxygenation of waterways after flooding causing high numbers of eel mortality
Horahora	Motatau Mountain to Taikirau Swamps	<ul style="list-style-type: none"> • Organic farms • Riparian planting
Pokere	Matawaia to Pokere Swamps	<ul style="list-style-type: none"> • Riparian planting
Taikirau - Waiharakeke	From the swamps to Kawakawa	<ul style="list-style-type: none"> • Farming • Pine forestry
Pokapu	Pokapu to Kawakawa	<ul style="list-style-type: none"> • Pine forestry • Intensive farming
Tereawatea	Lake Kaiwae to Otiria	<ul style="list-style-type: none"> • Pine forestry • Intensive farming
Rotokereru	Western Waiomio	<ul style="list-style-type: none"> • Pine forestry

		<ul style="list-style-type: none"> • Riparian planting
Tirohanga	Eastern Waiomio and Puhipuhi State Forest flowing to Kawakawa	<ul style="list-style-type: none"> • Riparian planting • Waiomio burial caves • Mining
Puhipuhi	Far eastern block of Russell State Forest	<ul style="list-style-type: none"> • Indigenous forest
Ruapekapeka	Small Ruapekapeka catchment	<ul style="list-style-type: none"> • Farming
Owhareiti	Lake Owhareiti flowing into Waitangi	<ul style="list-style-type: none"> • Shared space with Ngati Rahiri and Ngati Kawa • Lake Owhareiti flows and pollution
Hikurangi	Motatau Mountain to southwest Pipiwai to Mangakahia River	<ul style="list-style-type: none"> • Pine forestry • Riparian planting
Riponui	Motatau Mountain to south east through Riponui Swamp to Wairua River	<ul style="list-style-type: none"> • Swamp scheme • Riparian planting
Te Kopuru	Small area flowing to Hokianga	<ul style="list-style-type: none"> • Flows
Taumarere	Lower Taumarere at Kawakawa flowing past Waikare Inlet to Te Haumi	<ul style="list-style-type: none"> • Sedimentation • At risk seafood



Freshwater Attributes Monitored

More than 40 attributes were confirmed at a wananga of monitors for data collection considering the indicators identified above:

General

1. name of monitor
2. equipment used
3. device ID
4. accuracy
5. time
6. date

7. season
8. maramataka
9. location
10. weather
11. name of waterway
12. audio
13. photo
14. other

Whenua

15. altitude
16. land gradient
17. sunlight shade
18. landuse
19. plants outside

Waterway

20. clarity
21. oxygen
22. ph
23. flow
24. water use
25. depth
26. water temperature

Species

27. type
28. condition
29. non indigenous species
30. fauna
31. birdlife
32. stage of life eg eel

33. weight
34. length
35. amount
36. insects outside
37. freshwater species
38. plants in the wai

Results

39. actions needed
40. comments
41. te ahua o te wai - Waiora, Waimaori, Waikino, Waipuke, Waimate

Monitoring Results

During the course of the monitoring programme we were fortunate to have a half dozen people involved in regular monitoring. Those people included Joey Rapana, Hohipere Williams, Adam Paraone, Cilla Brown, Tohe Ashby, Tui Shortland, Albert Shortland and Julian Ihaia Reweti.

Unfortunately we did not have the resources to sustain their employment so we lost many to other jobs. We would like to address this in future projects by raising sufficient resources for a full time employed position in monitoring and enhancement work.

The attached maps show some of the results from monitoring.

Some management steps were taken during the project as a result of monitoring results, such as water flow adjustments in swamps or lakes that needed releasing, rahui (temporary prohibitions), etc.

Conclusion

Ngati Hine wishes to extend its utmost acknowledgements to the Sir James Henare Maori Research Centre and Te Wai Maori Trust in their support in the development of this Plan and to our monitors who have made extra efforts to develop our monitoring framework and collect data.

Your support has allowed us to plan out a traditional knowledge approach to managing our catchment which assists us as a people to be more strategic about our work.

This programme has assisted in the revitalisation, use, retention and potentially development of new matauranga Ngati Hine for the management of our biodiversity and natural resources and increase Ngati Hine access to and use of traditional knowledge and practices (including te reo o me ona tikanga) in kaitiakitanga and biodiversity management.

We intend to forge alliances with other agencies to build on this positive work.

The next stage of work will be to enhance water quality and quantity by using the monitoring data collected; to sustain employed field workers in further monitoring and enhancement works; to establish an integrated catchment relationship with external agencies such as council; and to continually improve upon the community based monitoring and information systems established.

