

Policy and Planning Committee

Tuesday 19 March 2019
10.30am

Taranaki Regional Council, Stratford



Agenda for the meeting of the Policy and Planning Committee to be held in the Taranaki Regional Council chambers, 47 Cloten Road, Stratford, on Tuesday 19 March 2019 commencing at 10.30am.

Members	Councillor N W Walker Councillor M P Joyce Councillor C L Littlewood Councillor D H McIntyre Councillor B K Raine Councillor C S Williamson Councillor D L Lean Councillor D N MacLeod	(Committee Chairperson) (ex officio) (ex officio)
Representative Members	Ms E Bailey Councillor G Boyde Mr J Hooker Councillor R Jordan Mr P Muir Councillor P Nixon Mr M Ritai	(Iwi Representative) (Stratford District Council) (Iwi Representative) (New Plymouth District Council) (Taranaki Federated Farmers) (South Taranaki District Council) (Iwi Representative)

Apologies

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Closing Karakia and Karakia for kai

Agenda Memorandum

Date 19 March 2019

**Memorandum to
Chairperson and Members
Policy and Planning Committee**



**Subject: Confirmation of Minutes – 5 February
2019**

Approved by: A D McLay, Director-Resource Management
B G Chamberlain, Chief Executive

Document: 2221237

Resolve

That the Policy and Planning Committee of the Taranaki Regional Council:

1. takes as read and confirms the minutes of the Policy and Planning Committee meeting of the Taranaki Regional Council held in the Taranaki Regional Council chambers, 47 Cloten Road, Stratford, on Tuesday 5 February 2019 at 10.35am
2. notes the recommendations therein were adopted by the Taranaki Regional Council on 26 February 2019.

Matters arising

Appendices

Document #2197366 – Minutes Policy and Planning Committee

Minutes of the Policy and Planning Committee Meeting of the Taranaki Regional Council, held in the Taranaki Regional Council Chambers, 47 Cloten Road, Stratford, on Tuesday 5 February 2019 at 10.35am.



Members	Councillors	N W Walker	(Committee Chairperson)
		M P Joyce C L Littlewood D H McIntyre B K Raine C S Williamson	
		D N MacLeod	(ex officio)
Representative Members	Councillor	G Boyde	(Stratford District Council)
	Mr	J Hooker	(Iwi Representative)
	Mr	P Muir	(Taranaki Federated Farmers)
	Councillor	P Nixon	(South Taranaki District Council)
Attending	Messrs	B G Chamberlain	(Chief Executive)
		A D McLay	(Director-Resource Management)
		G K Bedford	(Director-Environment Quality)
		C L Spurdle	(Planning Manager)
		S Tamarapa	(Iwi Communications Officer)
		P Ledingham	(Communications Officer)
	Mrs	K van Gameren	(Committee Administrator)
	Mr	R Phipps	(Science Manager)
	Mrs	V MacKay	(Science Manager)
	Mrs	H Gerrard	(Science Manager)
	Ms	K Langton	(Policy Analyst)
	Mr	Q Amore	(Environment Team Leader)
Mr	J Clough	(Wrightson Consulting)	

One Member of the media.

Apologies

The apologies from Councillor D L Lean, Councillor R Jordan (New Plymouth District Council) and Mr M Ritai (Iwi Representative) were received and sustained. Ms E Bailey (Iwi Representative) requested to attend the meeting via ZOOM, but due to technical problems was unable to connect into the meeting. Ms Bailey emailed questions to the Council for response and clarification.

Notification of Late Items

There were no late items of business.

1. Confirmation of Minutes – 20 November 2018

Resolved

THAT the Policy and Planning Committee of the Taranaki Regional Council

1. takes as read and confirms the minutes and confidential minutes of the Policy and Planning Committee meeting of the Taranaki Regional Council held in the Taranaki Regional Council chambers, 47 Cloten Road, Stratford, on Tuesday 20 November 2018 at 10.30am
2. notes that the recommendations therein were adopted by the Taranaki Regional Council on 11 December 2018.

Walker/McIntyre

Matters Arising

There were no matters arising.

2. Ministry for the Environment – current work programme

- 2.1 Mr A D McLay, Director-Resource Management, spoke to the memorandum updating the Committee on the work the Ministry for the Environment has planned over the next 12 to 18 months and provided commentary on the implications for the Council, in particular the small Policy team.

Recommended

That the Taranaki Regional Council:

1. receives the memorandum *Ministry for the Environment – current work programme*
2. notes the many areas of interest or concern to the Council.

Littlewood/MacLeod

3. Report of the Parliamentary Commissioner for the Environment on *Overseer and regulatory oversight*

- 3.1 Mr G K Bedford, Director-Environment Quality, spoke to the memorandum introducing a report prepared by the Parliamentary Commissioner for the Environment on *Overseer and regulatory oversight*, together with commentary by the Chief Executive of Overseer Limited and independent experts, and provided commentary on the significance of the findings for the Council particularly with regard to the preparation of a *Regional Freshwater and Land Management Plan*.
- 3.2 The Council's position on the use of Overseer for regulatory purposes has been validated by the report.

Recommended

That the Taranaki Regional Council:

1. receives the memorandum *Report of the Parliamentary Commissioner for the Environment on Overseer and regulatory oversight*
2. notes that the Parliamentary Commissioner for the Environment has recommended that if the Government wants to see Overseer used as a regulatory tool it needs to undertake a comprehensive evaluation of the model, including its suitability, uncertainties and inaccuracies, ownership, governance and funding
3. notes that the Council has already commissioned an independent analysis of the suitability of using a model like Overseer as a regulatory tool as part of the review of the *Regional Fresh Water Plan*, and the conclusion of that analysis was that Overseer was not suitable for use in a regulatory context because of accuracy issues.

Williamson/Raine

Councillor M J Joyce left the Policy and Planning Meeting at 11.15am.

4. Proposed regulation of municipal waste water discharges

- 4.1 Mr G K Bedford, Director-Environment Quality, spoke to the memorandum to outline and present commentary on a recent Cabinet paper proposing future regulation of wastewater management in New Zealand.

Recommended

That the Taranaki Regional Council:

1. receives the memorandum *Proposed regulation of municipal waste water discharges*
2. notes the information contained therein concerning the regulatory management of wastewater systems in Taranaki
3. confirms that an evidential basis for the Government's proposals is not apparent in Taranaki and that this position forms the basis for any future engagement with the Ministry for the Environment in respect of an appropriate regulatory framework for wastewater management.

MacLeod/Nixon

5. Key Native Ecosystems programme update

- 5.1 Mr A D McLay, Director-Resource Management, spoke to the memorandum presenting an update to the Committee on the identification of 11 new Key Native Ecosystems (KNE) sites.

Recommended

THAT the Taranaki Regional Council:

1. receives this memorandum and the attached inventory sheets for Mount View, Cotebrook, Kaka Creek Bush, Hann Bush and Kahikatea Block, Te Huia Holdings Wetlands, Lowe South Block, BMW Farms, Corbett Road QEII Covenants, Te Urenui and Pohokura Pa, Ralph Arnold, and Mathews QEII
2. notes that the aforementioned sites have indigenous biodiversity values of regional significance and should be identified as Key Native Ecosystems.

Raine/Williamson

Closing Karakia Mr J Hooker (Iwi Representative) gave the closing Karakia to the Policy and Planning Committee and Karakia for kai (lunch).

There being no further business, the Committee Chairperson Councillor N W Walker, declared the meeting of the Policy and Planning Committee meeting closed at 11.30am.

Confirmed

Chairperson

_____ **N W Walker**

Date

19 March 2019

Agenda Memorandum

Date 19 March 2019



**Memorandum to
Chairperson and Members
Policy and Planning Committee**

Subject: Update on *Taranaki Taku Tūranga - Our Place: Towards a Predator-Free Taranaki*

Approved by: S R Hall, Director - Operations
B G Chamberlain, Chief Executive

Document: 2217479

Purpose

The purpose of this memorandum is to present for Members' information an update on the progress of the *Taranaki Taku Tūranga - Our Place: Towards a Predator-Free Taranaki* project.

Officers will be making a presentation at the meeting.

Executive summary

- *Taranaki Taku Tūranga - Our Place: Towards Predator Free Taranaki* is an ambitious commitment to protect our native biodiversity from predator pests.
- Led by the Taranaki Regional Council (the Council), the aim is removing introduced predators such as stoats, rats and possums from the region. This ambitious goal has not been attempted in New Zealand before.
- To support the project, Predator Free 2050 Limited (PF2050) will provide co-funding to enable the landscape predator control and eradication projects.
- On 30 May 2018, the Conservation Minister launched the *Taranaki Taku Tūranga - Our Place: Towards Predator Free Taranaki* project. The Government (through Predator Free 2050 Limited) is contributing \$11 million towards the \$47 million project.
- This year, Council commenced three different phases of work around the mountain, starting in the New Plymouth area, Oakura, and the Kaitake ranges. These phases represent the three different elements to the project:
 - urban trapping in New Plymouth and Oakura;
 - rural mustelid (ferret, stoat and weasel) control between New Plymouth and Egmont National Park.
 - zero density possum trial.
- The attached quarterly report provides an update on the various aspects of the project.

Recommendations

That the Taranaki Regional Council:

1. receives this memorandum *Update on Taranaki Taku Tūranga - Our Place: Towards Predator Free Taranaki*; and
2. notes the progress and milestones achieved in respect of the urban and rural predator control and the zero density possum projects of the *Towards Predator-Free Taranaki* project.

Background

Taranaki Taku Tūranga - Our Place: Towards Predator Free Taranaki is an ambitious commitment to protect our native biodiversity from predator pests.

Led by the Taranaki Regional Council (the Council), the project aims to remove introduced predators such as stoats, rats and possums from the region. This ambitious goal has not been attempted in New Zealand before. Initially, the project focus is on the complete removal of possums from the Kaitake ranges and surrounding farmland, build and maintain a predator trapping network across the ring plain, and coordinate urban communities to undertake predator control.

The project builds on successful Council-led community initiatives including the Self-help Possum Control, urban pest, riparian and Key Native Ecosystem (KNE) programmes. It involves Council working with others (including urban and rural landowners, iwi, hapu, and community groups) to undertake landscape predator control across the region. In so doing, we hope to restore the sound and movement of our wildlife, rejuvenate native plants in urban and rural areas, and protect agriculture. Amongst other things, the project will create bird safe corridors from mountain to sea and protect kiwi and whio populations in and around Egmont National Park. The project will also assist to protect recent philanthropic and government investment within Egmont National Park through the *Taranaki Mouna Project* and is a key objective of the community-driven *Wild for Taranaki - Restore Taranaki Initiative*.

Predator Free 2050 Limited (PF2050) was established in 2016 by the Government to help deliver its goal of eradicating possums, stoats and rats in New Zealand by 2050. PF2050 provide co-funding to enable predator control and eradication projects at large landscape scale and to undertake the breakthrough science needed to underpin them. The Chair, David MacLeod, is one of nine directors on PF2050.

PF2050 is currently contributing towards five projects across New Zealand. One of which is the *Taranaki Taku Tūranga - Our Place: Towards Predator Free Taranaki* project, whereby PF2050 contributes \$11 million towards total project costs of \$47 million.

On 30 May 2018, the Conservation Minister launched the *Taranaki Taku Tūranga - Our Place: Towards Predator Free Taranaki* project.

The first phase of the project will trial control methodologies, new tools and monitor results to inform future implementation. The latest technologies – including remote sensors, wireless nodes and a trapping application – and trapping techniques will be used to remove predators and prevent re-infestations. The high-tech equipment makes trapping

more efficient, particularly in rural areas, and sends a smartphone alert to the user when the trap goes off.

From the Waiwhakaiho catchment around New Plymouth, the predator control programme will be rolled out in sections around the mountain, over 10 years, to eventually cover the current extent of the Self-help Possum Control Programme (i.e. the ring plain and coastal terraces).

This memorandum and the attached quarterly report provides an update in respect of the main elements of the project and details future work. The quarterly reporting is a PF2050 funding requirement.

Quarterly report

Starting in June 2018, the Council has commenced three different phases of predator control work around the mountain, starting in the New Plymouth area, Oakura, and the Kaitake ranges. These phases represent the three different elements to the project: urban trapping, rural control, and zero possums.

Monitoring work and site-led work has begun and officers have had input into several technological innovations.

Project progress and highlights noted in the February 2019 quarterly report are as follows:

- 1,356 households engaged in the urban project with traps in their backyards
- 860 additional rat and stoat traps deployed across New Plymouth District Council reserves in New Plymouth and Oakura urban areas
- 1,999 traps deployed in the first stage of the rural project
- Zero-density possum trial commenced - virtual barrier tracks complete and trap installation progressing, zero possum Block A control complete.

For further information, please refer to the February 2019 quarterly report attached to this item.

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual Plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks

including, but not restricted to, the *Local Government Act 2002*, the *Resource Management Act 1991* and the *Local Government Official Information and Meetings Act 1987*.

Iwi considerations

This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the *Local Government Act 2002*) as outlined in the adopted long-term plan and/or annual plan.

Similarly, iwi involvement in adopted work programmes has been recognised in the preparation of this memorandum. Ngā Iwi o Taranaki support the project and supported the application for funding through the Taranaki Iwi Chairs Forum. Council is working closely with hapu of Te Atiawa and Taranaki Iwi in all three phases, but especially in the Kaitake range, which is of high cultural importance.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices

Document number 2217501: *Towards Predator-Free Taranaki – Quarterly Report February 2019*.

Agenda Memorandum

Date 19 March 2019



**Memorandum to
Chairperson and Members
Policy and Planning Committee**

Subject: Report of the Tax Working group and findings on environmental taxes

Approved by: AD McLay, Director – Resource Management
BG Chamberlain, Chief Executive

Document: 2219352

Purpose

The purpose of this memorandum is to introduce the report of the Tax Working Group entitled '*Future of Tax*', and to highlight in particular, the findings and recommendations from the report on environmental taxes.

Executive summary

On the 21 February 2019, the Tax Working Group released its final report to the Government the future of the tax system.

Proposals concerning the introduction of a capital gains tax has been one of the main areas of reform of the tax system put forward by the Tax Working Group, and one that has attracted the most public comment. However, the report contains many recommendations for changes to the tax system that are designed to address the overall structure, fairness and balance of the tax system.

In addition to its recommendations on a tax on capital gains, other recommendations include taxation of business, changes to taxation on personal income, retirement savings, charities, the digital economy, the rate of GST and what it should apply to, taxation on sugar, alcohol, smoking and gambling, and a range of tax proposals to enhance New Zealand's environmental and ecological outcomes. Several recommendations are made in relation to the integrity of the tax system and its administration, including establishing a taxpayer advocacy service and a shorter disputes process for small taxpayers.

In relation to environmental taxes, the report sets out measures that could help deal with negative externalities in the short term before turning to medium-term measures (5-10 years) that could be taken to support the move to a more sustainable, circular economy, and longer term possibilities (10-30 years) that could see an extension to the environmental tax base.

In the short term (1-5 years), the Working Group recommends five specific areas for further attention: greenhouse gas emissions; water pollution; water abstraction; solid waste; and road transport.

The Government has stated that it will seek technical advice on the report and make further announcements in April 2019 on its preferred tax policy changes. The Government's intention is to have legislation enacted on tax reform during the current parliamentary term but that it would not come into force until after the next General Election in 2020.

Recommendation

That the Taranaki Regional Council:

1. receives the memorandum '*Report of the Tax Working Group and findings on environmental taxes*'.

Background

On the 21 February 2019, the Tax Working Group released its final report to the Government the future of the tax system. The report followed the release of an interim report in September 2018 that underwent further rounds of engagement and consultation. This resulted in further refinement of the conclusions in the interim report before the final report was presented to the Government.

The final report can be found at <https://taxworkinggroup.govt.nz/resources/future-tax-final-report>. Volume 1 contains the final report and recommendations while Volume 2 contains design details of the proposed extension of capital gains taxation.

The Working Group's final report is wide ranging. It recommends reform of many aspects of the tax system in an effort to make it fairer for all New Zealanders, as well as to safeguard the integrity of the tax system and improve its overall administration (see the Press release that accompanied release of the report <https://taxworkinggroup.govt.nz/resources/tax-working-group-delivers-final-report>).

Members will be well aware of the report's recommendations to introduce a tax on capital gains. This would see a tax introduced on the capital gain on the sale of land, shares, business assets, and on intangible assets such as intellectual property. A capital gains tax would not apply to the family home and personal assets such as cars, jewellery and household appliances.

A capital gains tax would be imposed when the asset is sold and levied at the seller's marginal tax rate. Assets would be valued from when the tax is imposed. The report recommends that the Government engages further with Māori to determine the most appropriate treatment of transactions relating to collectively owned Māori assets.

Proposals concerning the introduction of a capital gains tax has been one of the main areas of reform of the tax system put forward by the Tax Working Group (although three of its eight members did not agree with such a broad extension of a capital gains tax), and one that has attracted the most public comment. However, the report contains many recommendations for changes to the tax system that are designed to address the overall structure, fairness and

balance of the tax system. On this aspect, the Tax Working Group's Chairman Sir Michael Cullen, on the release of the report, said that

'New Zealanders earning just salary and wages are taxed on their full income but we have several situations where you can earn income from gains on assets and not be taxed at all.'
and

'All members of the Group agree that more income from capital gains should be taxed from the sale of residential rental property'. The majority of us on the Group ... support going further and broadening that approach...

(Press release: 'Tax Working Group delivers Final Report'
<https://taxworkinggroup.govt.nz/resources/tax-working-group-delivers-final-report>)

There will be much public debate and discussion over the coming months over whether there should be a capital gains tax and if so, what form it will take.

Apart from its recommendations for a tax on capital gains, other recommendations include taxation to sustain and enhance New Zealand's environmental and ecological outcomes (see below for further details), changes to the taxation of business (excluding company tax rates and some other company tax provisions), and changes to taxation on personal income, and retirement savings. The Working Group supports the Government's review of the taxation of charities and makes some recommendations in this regard.

The Working Group also supports continued participation in discussions at the OECD on the future of the international income tax framework and recommends that the Government 'stand ready' to implement a digital services tax.

As to GST, the Working Group recommends no change to the rate of GST and does not recommend removing GST from certain products. However, it considers there is a 'strong in-principle' case to apply GST to financial services but that there are significant impediments to a workable system. It recommends continued monitoring of international developments in this area.

The Working Group considers how changes in the tax system could encourage the achievement of the Government's objectives in relation to the consumption of sugar, alcohol, smoking and gambling activity (what it calls corrective taxes), and considers additional tax reform in housing.

There are a number of recommendations to do with the integrity of the tax system, including further action on the 'hidden economy' and further measures to improve tax collection and compliance. There are also recommendations made in relation to the administration of the tax system including the establishment of a taxpayer advocacy service to assist with the resolution of tax disputes and a more efficient disputes process for small taxpayers.

The Working Group does not recommend the introduction of a wealth tax or a land tax.

Environmental and ecological taxes

The Working Group's report states that there are urgent environmental problems facing both New Zealand and the globe, and mentions climate change as an especially critical threat. Other environmental challenges are linked to and extend beyond climate change and include biodiversity loss and freshwater quality, among others.

It notes that internationally, New Zealand is a relatively low user of environmental taxes.

It quotes Stats NZ data that in 2016, the Government raised \$5 billion in environmental taxes, which was 6.2% of total tax revenue (30th out of 33 OECD countries). Over 80% of environmental tax revenue comes from fuel taxes, road user charges and vehicle registration fees, which pay for land transport infrastructure and road-related injuries and are neither levied nor used for environmental purposes. There are almost no taxes intended to address water issues, biodiversity or climate change.

The Working Group considers that the tax system could play an expanded role in New Zealand's environmental policy by incentivising and changing behaviours and funding 'the transition towards a more regenerative, circular economy' (*Future of Tax* report, page 39).

However, the Working Group considered that taxation was not always the best tool to change behaviour with respect to the environment, and proposes a framework for when taxation can be used as a tool to enhance natural capital (page 41 of the report). For example, the case for an environmental tax is considered stronger if the damaging activity is susceptible to pricing pressures (e.g. a tax on fertiliser) or large revenues could be raised.

Tax is also said to be suitable policy instrument if the damaging activity can be measured or the problem is sufficiently large-scale and persistent to justify taxing when compared to the use of regulation or spending.

The report outlines principles for designing externality taxes but concedes that especially over the long-term, more work is required to develop new tools that would broaden the scope of negative externalities that can be measured, valued and taxed.

The Working Party therefore sets out what it sees as the role of environmental taxes in the short, medium and long term.

The short term – dealing with negative externalities

In the short term (next 1-5 years), the Working Party recommends five specific areas for further attention: greenhouse gas emissions; water pollution; water abstraction; solid waste; and road transport. The Working Party:

- supports a reformed, more 'tax-like' Emissions Trading Scheme including pricing agricultural emissions, by providing greater guidance on price and auctioning NZUs to raise revenue (as recommended by the Productivity Commission);
- describes the pollution of fresh waterways as a significant environmental problem in New Zealand but takes a cautious approach to taxation to address the issue. It notes input-based approaches to measuring emissions (e.g. fertiliser use) are generally easier to measure but can be poor proxies for actual discharges and environmental impacts. The report notes that output-based modelling approaches such as OVERSEER were designed as an on-farm nutrient budgeting and management tool, and acknowledges concerns raised by a number of submitters about OVERSEER. The report goes on to state:

The Group welcomes the recent findings of the Parliamentary Commissioner for the Environment, which highlights current limitations of OVERSEER as a regulatory tool (Future of Tax report, page 45).

The report encourages the further development of tools to estimate (and ultimately directly measure) diffuse water pollution, which would enable more accurate and effective water pollutant tax instruments. If significant progress is not made in the near term on implementing output-based tax instruments or other regulatory measures, the Working Group recommends the introduction of input-based tax instruments, including on fertiliser.

- considers that freshwater abstraction generally meets the criteria in the Group's framework. However, it acknowledges that water abstraction is a particularly challenging policy area in New Zealand owing to a range of different interests in the resource. It concludes that if Māori rights and interests can be addressed, water tax instruments could be useful tools for improving the efficiency of water use and be a significant and sustainable source of revenue over the long term;
- supports the Ministry for the Environment's review of the coverage and rate of the Waste Disposal levy (currently raising a modest \$30 million per year) which now applies to only 30% of waste in the 11% of landfills that accept household waste, and recommends a reassessment of the negative externalities of landfill disposal to determine if a higher levy rate is appropriate;
- supports current work by the Government and Auckland Council on whether to introduce congestion pricing in Auckland;
- considers that the impact of any change to the petroleum and minerals royalty regimes will be relatively minor and does not therefore recommend any changes to those regimes;
- acknowledges submitter concerns about the use of pesticides and suggestions for the introduction of a pesticides tax but considered that it did not have sufficient information to assess whether a tax was the most appropriate response to the underlying concerns; and
- agreed that costs associated with the care of land subject to QEII covenants and Ngā Whenua Rāhui should be treated as deductible expense for tax purposes.

The Working Group also recommends that the Government consider allowing employers to subsidise public transport use by employees without incurring fringe benefit tax, and further recommends that the Government review various tax provisions relating to farming, forestry and petroleum mining with a view to removing concessions harmful to natural capital, while also considering new concessions that would enhance natural capital.

The Working Group conceded it had not conducted a detailed assessment of the distributional impacts of proposed environmental taxes but stated it did not believe that potentially regressive impacts should rule out consideration of these taxes. Instead, it considers that the Government should be alert to distributional impacts and look to mitigate them as appropriate.

It does note that their proposals relating to personal income tax outlines a number of options for increasing the progressivity of income tax, which could also offset the distributional impacts of environmental taxation.

The medium term – revenue recycling

With respect to the medium term (next 5-10 years), the Working Group says there is a strong case to recycle some or all of the revenue from environmental taxes into measures that

support the transition to a more sustainable economy. The example given is helping a farm with high emissions and high resource use in an ecologically sensitive area transition to a lower-impact operation.

Recycling environmental tax revenue in this way is seen as reinforcing the purpose of the tax by funding complementary activities, and enhancing transparency.

Longer-term possibilities – an extension of the tax base

Over the longer term (10-30 years) the Working Group considers that environmental taxes could play a significantly greater role in the tax system and become a much more significant tax base. Innovative new tools could broaden the scope of negative externalities that can be measured, valued and taxed.

The report concedes, however, that there are significant environmental challenges in New Zealand that are less well suited to environmental taxes. These tend to be environmental issues where specific activities that drive environmental change are more difficult to measure, such as biodiversity loss and impacts on ecosystem services.

The Working Group noted that it had received several submissions highlighting new approaches that could be developed to address some of these challenges. Examples given include an environmental footprint tax or a natural capital enhancement tax, set according to the intensity of land use. Biodiversity tax credits should also be considered.

The Working Group recommends that some or all of environmental tax revenue should be used to help fund a transition to a more sustainable, circular economy. It further recommends that the Government strengthen its environmental tax capabilities and do further work to rigorously assess how taxes can complement other environmental policy measures.

Next steps

In receiving the report, the Government has been at pains to emphasise that the Government is not bound to accept all the recommendations put forward. In fact, Ministers have stated that it is highly unlikely that all recommendations will need to be implemented.

The Government has stated that it will seek technical advice on the report and make further announcements in April 2019 on its preferred tax policy changes. At the time of writing this memorandum, the Government's intention was to have legislation enacted on tax reform during the current parliamentary term but that it would not come into force until after the next General Election in 2020.

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual Plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the *Local Government Act 2002*, the *Resource Management Act 1991* and the *Local Government Official Information and Meetings Act 1987*.

Iwi considerations

This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the *Local Government Act 2002*) as outlined in the adopted long-term plan and/or annual plan. Similarly, iwi involvement in adopted work programmes has been recognised in the preparation of this memorandum.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Agenda Memorandum

Date 19 March 2019



**Memorandum to
Chairperson and Members
Policy and Planning Committee**

**Subject: Kaupapa Māori Freshwater
Assessments report and Wai Māori
working group**

Approved by: A D McLay, Director – Resource Management

B G Chamberlain, Chief Executive

Document: 2219740

Purpose

The purpose of this memorandum is to present for Members' information a national Mātauranga Maori stocktake entitled *Kaupapa Māori Freshwater Assessments – A Summary of Iwi and Hapū-based Tools, Frameworks and Methods for Assessing Freshwater Environments* and an update on the establishment of a Wai Māori working group of iwi and hapū representatives to inform the review of the regional freshwater and soil plan reviews.

Executive summary

- The Taranaki Regional Council (the Council) has commenced a review of its freshwater and soil plans.
- While many tangata whenua principles and values are closely aligned with commonly recognised RMA sustainable management concepts, some principles, values and issues (or ways of expressing principles, values and issues) are uniquely Māori and there is an obligation for this Council (and other councils) to better recognise and provide for them.
- Pursuant to the *National Policy Statement for Freshwater Management* (NPS-FM) regional councils are required to incorporate mātauranga Māori into their freshwater monitoring programmes.
- To support the incorporation of mātauranga Māori into its freshwater policy and monitoring frameworks, councils must first have a good understanding of the key concepts and principles that underpin mātauranga Māori and explore how to best integrate it into its own plans and programmes. To assist in this task the regional council sector commissioned a report to identify the different methods being used by councils to support and enable cultural monitoring and the inclusion of mātauranga Māori into council processes across the sector.
- The attached report summarises the findings of a literature review and council survey into methods.

- Initial observations from the report was that there were a lot of differing approaches and methods being used by councils and that councils' understanding of mātauranga Māori tools varied. However, the report also confirmed the availability of a range of tools, frameworks and methods available to iwi, hapū and council. Most of these tools, frameworks and methods are able to be adapted to suit local priorities, preferences and cultural protocols. A partnership type approach is envisaged if agreements can be made.
- As part of the freshwater and soil plan reviews, Council has established the Wai Māori working group. This group includes iwi and hapū representatives and provides a forum to facilitate tangata whenua input into the plan review processes, particularly in relation to identifying cultural values, policy development by co-design, limit setting and establishing mātauranga Māori monitoring methods.
- A series of meetings will be held throughout 2019 and early 2020 leading up to the completion of a *Proposed Freshwater and Land Plan for Taranaki* ready for public notification.
- A draft terms of reference for the Wai Māori group has been requested and is in development. A draft will be considered by that group at its next meeting.
- Engagement with iwi and hapū will also be possible throughout the Plan review process and the development of mātauranga Māori monitoring methods.

Recommendations

That the Taranaki Regional Council:

1. receives this memorandum *Kaupapa Māori Freshwater Assessments report and Wai Māori working group*;
2. notes Council is seeking to establish a Wai Māori working group; and
3. notes Council officers will also be able to engage with individual iwi and hapū throughout the Plan review and the development of mātauranga Māori monitoring methods.

Background

Tangata whenua have a special relationship with natural and physical resources through whakapapa. Inherent in this relationship is kaitiakitanga, which seeks to maintain the māuri of natural and physical resources, while allowing their use and development for social, cultural and economic well-being.

Wāhi tapu, sites, or places of cultural significance, including tauranga waka landing sites, taonga, and customary resources, are integral to the identity, well-being and cultural integrity of tangata whenua. As kaitiaki, tangata whenua have a responsibility to nurture and safeguard these resources for future benefit. This stewardship ethic is reflected in customary practices and rules such as rotational or seasonal harvesting, collection techniques aimed at preserving taonga species, the natural state of waterways, the use of rahui (for example on food gathered to prevent exploitation), and avoiding contamination of the waterways by human and animal waste.

Of particular relevance to Maori interests and values under the *Resource Management Act 1991* (RMA) are:

- Section 5 of the RMA, which outlines the purpose of the Act which is to promote the sustainable management of natural and physical resources. In the RMA, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety.
- Section 6(e) of the RMA, which recognises and provides for the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga as a matter of national importance.
- Section 7(a) of the RMA, which requires the Council to have particular regard for kaitiakitanga when managing the use, development and protection of natural and physical resources.
- Section 8 of the RMA which requires the Council to take into account the principles of Te Tiriti o Waitangi.

As Members are aware, the *National Policy Statement for Freshwater Management* (NPS-FM) includes requirements for councils to consider and recognise Te Mana o te Wai in the management of fresh water and to incorporate mātauranga Māori (or traditional Māori knowledge) into their freshwater monitoring (alongside “western science”). Every regional council is to implement these requirements no later than 31 December 2025.

The Taranaki Regional Council (the Council) has commenced a review of its freshwater and soil plans. While many tangata whenua principles and values are closely aligned with commonly recognised RMA sustainable management concepts, some principles, values and issues (or ways of expressing principles, values and issues) are uniquely Māori and there is an obligation for this Council (and other councils) to better recognise and provide for them.

Members will recall that in March 2018 a draft report was presented which undertook a stocktake of tools and methods by which the Council might incorporate mātauranga Māori into its freshwater monitoring programmes. To support the incorporation of mātauranga Māori into its freshwater policy and monitoring frameworks, the Council must first have a good understanding of the key concepts and principles that underpin mātauranga Māori and explore how to best integrate it into its own plans and programmes. This is likely to include finding how Māori determine the quality of waterways, both spiritually and physically, based on traditional knowledge, and then finding indicators and tools to monitor those indicators. This information can only be obtained through engagement with local iwi and hapū.

However, across New Zealand, other regional councils are investigating the same matters. Hence, the regional council sector undertook to commission a national mātauranga Māori stocktake to identify the different methods being used by councils to support and enable cultural monitoring and the inclusion of mātauranga Māori into council processes across the sector.

Mātauranga Māori Report

Appended to this agenda is the report *Kaupapa Māori Freshwater Assessments – A Summary of Iwi and Hapū-based Tools, Frameworks and Methods for Assessing Freshwater Environments* undertaken by Hannah Rainforth (Perception Planning) with support from Garth Harmsworth to provide:

- an overview of kaupapa Māori tools, frameworks and methods available across New Zealand to assess and evaluate aspects of freshwater;
- information on the range of indicators used across these tools, frameworks and methods; and
- an overview of which tools are used in which areas of Aotearoa.

The report was commissioned by the Resource Managers Group, on the behalf of the regional council sector. The project was managed by a multi-council working group consisting of members from this Council, plus Bay of Plenty Regional Council, Environment Canterbury, Greater Wellington Regional Council, Horizons, Northland Regional Council, and West Coast Regional Council with assistance from the Ministry for the Environment and the Environmental Protection Authority.

Initial observations from the exercise was that there were a lot of differing approaches and methods being used by councils and that councils' understanding of mātauranga Māori tools varied. However, it also confirmed the availability of a range of tools, frameworks and methods available to iwi and hapū, and their council partners. These range from decision-making tools, to digitally-based assessments, to mapping approaches for understanding and recording cultural knowledge, preferences and monitoring requirements, to research around important species, through to kaupapa Māori assessments of the state and health of a waterbody. Most of these tools, frameworks and methods are potentially able to be adapted to suit local priorities, preferences and protocols following consultation with tangata whenua.

The report identifies 13 Kaupapa Māori tools, frameworks and methods. They are:

Table 1: Summary of Kaupapa Māori assessment tools

Taonga species monitoring	A range of tools, methods and approaches to monitor individual species that are important to iwi
Cultural Health Index (original version)	The seminal Māori cultural monitoring tool, the CHI monitors site status, mahinga kai and cultural stream health. It has been widely adapted for other uses.
Mauri Compass	A digital tool covering 12 aspects in three kete: Tangata Whenua, Tāne and Tangaroa. It combines mātauranga Māori with Western indicators to answer questions important to iwi and hapū. The results are presented in an accessible, visual compass.
Mauri Model / Mauri-o-meter / Ngāti Mākino Model	A tool to assist with decisions around potential engineering projects and their benefit to or impact on mauri.
Cultural flow preference study	A method to assess cultural values and satisfaction for different flow regimes.
Wai Ora Wai Māori	A framework and digital tool to assess the state of a waterbody from a Māori perspective. It can be adapted to local iwi and hapū views.
Cultural mapping	Various approaches to mapping cultural information and values.
Māori environmental performance indicators for wetland condition and trend	A method and set of indicators to assess wetland condition from a Māori perspective.
Mauri of Waterways Kete	A comprehensive assessment of environmental outcomes according to kaupapa Māori.
Waikato River Catchment Report Cards	A means of conveying available (largely Western science-based) data to iwi and communities.
State of the Takiwā	A database and method for cultural and environmental assessments of freshwater environments. No longer active but provides useful examples of what is possible.

Mātauranga Māori Knowledge Networks	A project to examine factors affecting river quality from a Māori perspective. It provides a model for iwi and councils wishing to research important aspects for freshwater monitoring locally.
Significance assessment method	A means of applying cultural values into the RiVAS assessment system. RiVAS is a standardised method to help resource managers grade rivers by relative importance for different uses.

The report noted that the most common aspects included by councils as indicators in kaupapa Māori assessments were:

- mauri;
- iwi health and well-being;
- tikanga and cultural practices;
- sites of significance;
- fish and mahinga kai species presence/absence;
- species abundance;
- species health;
- food safety;
- access;
- availability of mahinga kai (links with species abundance above);
- landscape-level habitat and catchment land use;
- riparian habitat; and
- water quality parameters (clarity, pH, temperature, dissolved oxygen etc).

These above indicators broadly cover five key areas: meta-physical aspects, cultural and social aspects, species information, mahinga kai aspects, and ecology, water quality and habitat aspects. These indicate that state of the environment monitoring plans that include mātauranga Māori will need to cover a broad range of matters in order to meet iwi and hapū aspirations and understandings around what is important for monitoring.

The report also examined what kaupapa Māori assessment tools councils themselves are using with iwi partners. As such, the results do not necessarily capture instances where iwi are using tools and councils are unaware of that work.

The report notes that the most widely used and adapted tool was the Cultural Health Index, with 12 out of 16 regions reporting its use. The application of the Cultural Health Index was closely followed by cultural mapping, which is known to be used in 11 of the 16 regions. The Māori environmental performance indicators for wetland condition and trend is widespread, but does not seem to be have used greatly since its development. Taonga species monitoring is relatively common, with half of all regions undertaking some form of individual species monitoring.

The Waikato and Bay of Plenty regions used the widest range of tools. This is possibly a reflection of the number of research institutes who are involved in kaupapa Māori tool development that are located in or nearby these areas, such as The University of Waikato, NIWA and Manaaki Whenua.

In relation to Taranaki, cultural monitoring tools used in the region by the Council and / or tangata whenua are:

- taonga species monitoring;
- cultural health index;
- cultural mapping; and
- Māori environmental performance indicators for wetland condition and trend.

Several key considerations were noted by the authors as the report was developed.

First, iwi and hapū have multiple demands on their time and resources. While environmental concerns are high on the agenda, the resources and capacity to undertake the sort of monitoring iwi aspire to is not always available. Increasing capacity within councils was also highlighted.

Second, monitoring using mātauranga Māori needs to meet Māori aspirations and requirements, and answer questions that are important to iwi and hapū. It needs to be undertaken by Māori, for Māori, based on kaupapa Māori. Iwi and hapū across the country have different approaches, and some tools will suit some groups more than others. The decisions on whether to undertake mātauranga-Māori based monitoring, and which tools, frameworks and methods each iwi or hapū chooses to use will need to remain with those iwi and hapū.

Third, many of the tools involve collecting or using sensitive data. This intellectual property will need to be protected in a manner that iwi and hapū feel comfortable with. Structures and agreements will need to be developed so that mātauranga Māori is not at risk of being misappropriated.

Wai Māori Group

As previously noted the Council is reviewing its freshwater and soil plans. As part of that review, Council officers are working with iwi and hapū representatives to establish a forum and process to facilitate tangata whenua input into the plan review processes. Through this forum – the Wai Maori working group – the Council seeks to address key aspects relating to tangata whenua including identifying cultural values, policy development by co-design, limit setting and establishing mātauranga Māori monitoring methods.

Through the Wai Maori group, iwi and hapū will have the opportunity to co-design how their values and interests in the management of, and decision making regarding fresh water and fresh water ecosystems are expressed in resource management plans.

A series of meetings will be held throughout 2019 and early 2020 leading up to the completion of a *Proposed Freshwater and Land Plan for Taranaki* ready for public notification. Meetings will be conducted in a formal and professional manner with an agenda and any associated reading material provided to Wai Māori working group members to inform the development of Plan provisions.

Reimbursement for meeting attendance and transport costs is proposed. Meeting fees will be paid to the iwi/hapū at the standard rate currently paid for Council committee members. Only one member from each iwi/hapū group attending will be eligible for the payment. This

approach is similar in kind to that adopted by New Plymouth District Council's Kaitiaki Group for the review of their district plan. This Council has four RMA plans to review.

Without limiting any matters that iwi and hapū representatives may wish to discuss, likely topics for discussion are likely to include:

- Reviewing draft Plan provisions to ensure they address tangata whenua principles and values, including mātauranga Māori;
- Co-designing draft Plan provisions to identify and meet NPS-FM requirements relating to Te Mana o te Wai. The concept of Te Mana o te Wai involves looking at the holistic health and wellbeing of a freshwater body, including: Te Hauora o te Wai (the health and well-being of the water); Te Hauora o te Tangata (the health and well-being of people); and Te Hauora o te Taiao (the health and well-being of the environment);
- Identifying and ensuring generic principles and values associated with Mātauranga Māori are reflected in draft Plan provisions. Mātauranga Māori is a key part of Te Mana o te Wai. The first step is to ensure draft Plan provisions provide the necessary framework for ensuring mātauranga Māori is integrated into freshwater management in the Taranaki region. Subsequent steps will involve Council working closely with tangata whenua to determine how mātauranga Māori is monitored and used alongside "western science".
- Recognising and providing for other values in draft plan provisions including identifying taonga species and identifying sites and places of significance to Māori that will be afforded added protection through revised Plan policies.

Iwi environmental advisers are able to participate in the group. Draft terms of reference for the Wai Māori group is in development and will be considered by that group at their next meeting.

In addition to the Wai Māori working group, Council officers will be able to engage with iwi and hapū individually and collectively throughout the Plan review process.

Other related initiatives

In addition to the above, other related discussions are occurring with tangata whenua including developing Mana Whakahono a Rohe (iwi relationship) agreements for policy and consents processes, and joint council/iwi mātauranga Māori project. A State of the Environment Estuarine Monitoring Programme is also under development.

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual Plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the *Local Government Act 2002*, the *Resource Management Act 1991* and the *Local Government Official Information and Meetings Act 1987*.

Iwi considerations

This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the *Local Government Act 2002*) as outlined in the adopted long-term plan and/or annual plan.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices

Document number 2219754: *Kaupapa Māori Freshwater Assessments: A summary of iwi and hapū-based tools, frameworks and methods for assessing freshwater environments.*

Kaupapa Māori Freshwater Assessments

A SUMMARY OF IWI AND HAPŪ-BASED TOOLS, FRAMEWORKS AND METHODS FOR ASSESSING FRESHWATER ENVIRONMENTS



Hannah Rainforth¹ and Garth Harmsworth²

2019

¹ Perception Planning Ltd

² Manaaki Whenua - Landcare Research

Disclaimer:

This document has been prepared using information and data from external documents, and information from third parties. Where possible, we have attempted to verify the accuracy of this material but accept no responsibility or liability for any inaccuracies or omissions from that material that may affect the accuracy of the assessment or recommendations made in this report. It should not be construed that we have conducted an audit of any of the information used in this report or any of the individuals, companies or organisations consulted during the course of preparing the document.

We reserve the right, but are under no obligation, to revise or amend our report if any additional information (particularly regarding the assumptions we have relied upon) which exists on the date of our report but was not drawn to our attention during its preparation, subsequently comes to light.

Suggested citation:

Rainforth, H. J. & Harmsworth, G. R. (2019). Kaupapa Māori Freshwater Assessments: A summary of iwi and hapū-based tools, frameworks and methods for assessing freshwater environments. Perception Planning Ltd. 115 pp.

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Acknowledgements

E tika ana te kōrero, nāu te rourou, nāku te rourou, ka ora ai te iwi. He maha ngā rourou kua mahora e ngā ringa raupā o te motu hei kai mā tātou katoa. Tēnei te mihi ki a koutou.

The work of a large number of researchers, designers, thinkers and leaders is canvassed in this report. The contribution that your work makes to the recognition of mātauranga Māori³ and the realisation of iwi and hapū hopes and aspirations is appreciated. In particular the authors would like to thank those who gave their time to speak directly with us, and to those who gave permission for their unpublished or private work to be included in this report. Arā, ko koutou, ko:

- Jon Procter and Rangitaane o Manawatu
- Jane Kitson and the Waikawa Whānau
- Ian Ruru and Ngāti Māhaki
- Ngāti Rangī Trust
- Kiri Reihana – Landcare Research Manaaki Whenua.

Tēnei anō te tuku mihi ki a koutou.

³ Māori knowledge and knowledge systems

1 Executive Summary

1.1 Project and client

Kaupapa Māori Freshwater Assessments was written at the request of regional councils and territorial authorities across Aotearoa. Recent changes to the National Policy Statement for Freshwater Management (NPS-FM) now require that councils include mātauranga Māori in their monitoring plans. Councils sought information that would aid them in meeting this requirement, and wanted to understand the range of tools available and the matters that iwi and hapū considered important around the freshwater environment. It is hoped that the report will not only be of assistance to councils, but will be a useful summary for iwi authorities, tangata tiaki and iwi environmental staff as well.

1.2 Objectives

The purpose of the report is to:

- provide an overview of kaupapa Māori tools, frameworks and methods available to assess and evaluate aspects of freshwater
- provide information on the range of indicators used across these tools, frameworks and methods, and
- provide an overview of which tools are used in which areas of Aotearoa.

1.3 Methods

The report is based on a literature review and summarises a total of 13 tools, frameworks or methods. Some approaches were not able to be covered in the timeframe. These are listed at the end of Section 2. Case studies were developed for four of the tools, as an example of how they can be used. Indicators found within each kaupapa assessment approach were categorised according to type, and assessed for how often they occurred across the approaches. A survey of which tools are used in which regions was conducted with council staff. Recommendations are suggested for consideration.

1.4 Results

1.4.1 Tools, frameworks and methods

The 13 tools, frameworks and methods are listed Table 1-1, with a brief summary as to their purpose. Two of the tools are available as a digital app (the Wai Ora Wai Māori app and the Mauri Compass), and cultural mapping generally uses GIS and Google Earth tools. The remainder of the approaches are paper-based. Many could easily be adapted to a digital format.

TABLE 1-1: SUMMARY OF KAUPAPA MĀORI ASSESSMENT TOOLS COVERED IN THIS REPORT

Taonga species monitoring	A range of tools, methods and approaches to monitor individual species that are important to iwi.
Cultural Health Index (original version)	The seminal Māori cultural monitoring tool, the CHI monitors site status, mahinga kai and cultural stream health. It has been widely adapted for other uses.
Mauri Compass	A digital tool covering 12 aspects in three kete: Tangata Whenua, Tāne and Tangaroa. It combines mātauranga Māori with Western indicators to answer questions important to iwi and hapū. The results are presented in an accessible, visual compass.
Mauri Model / Mauri-o-meter / Ngāti Mākino Model	A tool to assist with decisions around potential engineering projects and their benefit to or impact on mauri.
Cultural flow preference study	A method to assess cultural values and satisfaction for different flow regimes.
Wai Ora Wai Māori	A framework and digital tool to assess the state of a waterbody from a Māori perspective. It can be adapted to local iwi and hapū views.
Cultural mapping	Various approaches to mapping cultural information and values.
Māori environmental performance indicators for wetland condition and trend	A method and set of indicators to assess wetland condition from a Māori perspective.
Mauri of Waterways Kete	A comprehensive assessment of environmental outcomes according to kaupapa Māori.
Waikato River Catchment Report Cards	A means of conveying available (largely Western science-based) data to iwi and communities.

State of the Takiwā	A database and method for cultural and environmental assessments of freshwater environments. No longer active but provides useful examples of what is possible.
Mātauranga Māori Knowledge Networks	A project to examine factors affecting river quality from a Māori perspective. It provides a model for iwi and councils wishing to research important aspects for freshwater monitoring locally.
Significance assessment method	A means of applying cultural values into the RiVAS assessment system. RiVAS is a standardised method to help resource managers grade rivers by relative importance for different uses.

1.4.2 Common indicators across all tools, frameworks and methods

The most common aspects included as indicators in kaupapa Māori assessments covered in this report were:

- Mauri
- Iwi health and well-being
- Tikanga and cultural practices
- Sites of significance
- Fish and mahinga kai species presence/absence
- Species abundance
- Species health
- Food safety
- Access
- Availability of mahinga kai (links with species abundance above)
- Landscape-level habitat and catchment land use
- Riparian habitat and
- Water quality parameters (clarity, pH, temperature, dissolved oxygen etc)

These cover five key areas: meta-physical aspects, cultural and social aspects, species information, mahinga kai aspects, and ecology, water quality and habitat aspects. These indicate that monitoring plans that include mātauranga Māori will need to cover a broad range of matters in order to meet iwi and hapū aspirations and understandings around what is important for monitoring.

1.4.3 Use of kaupapa Māori assessment tools, frameworks and methods by region

The survey focused on tools that councils themselves are using with iwi partners. As such, the results do not necessarily capture instances where iwi are using tools and councils are unaware of that work, however, where possible data was added in to augment the survey responses. The results are presented in Figure 1-1.

The most widely used and adapted tool was the Cultural Health Index, with 12 out of 16 regions reporting its use. The CHI is closely followed by cultural mapping, which is known to be used in 11 of the 16 regions. The Māori environmental performance indicators for wetland condition and trend is widespread, but does not seem to be used greatly since its development. Taonga species monitoring is relatively common, with half of all regions undertaking some form of individual species monitoring.

The Waikato and Bay of Plenty regions used the widest range of tools. This is possibly a reflection of the number of research institutes who are involved in kaupapa Māori tool development that are located in or nearby these areas, such as The University of Waikato, NIWA and Manaaki Whenua. It may be helpful for research institutions to actively pursue relationships with iwi in more remote areas of the country, in order to support local development of tools, frameworks and methods in those areas too.



FIGURE 1-1: THE USE OF KAUPAPA MĀORI MONITORING TOOLS, FRAMEWORKS AND METHODS BY REGION

1.5 Key considerations

Several key considerations became evident as this report was developed. These are outlined below.

1.5.1 Resourcing

Iwi and hapū have multiple demands on their time and resources. While environmental concerns are high on the agenda, the resources and capacity to undertake the sort of monitoring iwi aspire to is not always available. Support to undertake kaupapa Māori assessments would often be welcomed. Capacity within councils is also likely to be needed.

1.5.2 The mandate to decide

Monitoring using mātauranga Māori needs to meet Māori aspirations and requirements, and answer questions that are important to iwi and hapū. It needs to be undertaken by Māori, for Māori, based on kaupapa Māori. Iwi and hapū across the country have different approaches, and some tools will suit some groups more than others. The decisions on whether to undertake mātauranga-Māori based monitoring, and which tools, frameworks and methods each iwi or hapū chooses to use will need to remain with those iwi and hapū.

1.5.3 Intellectual property

Many of the tools involve collecting or using sensitive data. This intellectual property will need to be protected in a manner that iwi and hapū feel comfortable with. Structures and agreements will need to be developed so that mātauranga Māori is not at risk of being misappropriated.

1.6 Conclusions and recommendations

There are a range of tools, frameworks and methods available to iwi and hapū, and their council partners. These range from decision-making tools, to digitally-based assessments, to mapping approaches for understanding and recording cultural knowledge, preferences and monitoring requirements, to research around important species, through to kaupapa Māori assessments of the state and health of a waterbody. Most of these tools, frameworks and methods are able to be adapted to suit local priorities, preferences and protocols. Many are inter-related. The various approaches can be used in tandem to meet different aspects of kaupapa Māori-based monitoring needs. Given the developments in recent years and the resourcing now being put into mātauranga Māori-based assessment approaches, it is likely that even more tools, frameworks and methods will become available in the near future.

We recommend that:

- this report be distributed to iwi and hapū throughout Aotearoa, as a resource for their use in decision-making around monitoring programmes
- the appetite for a national, iwi-run database to support kaupapa Māori-based assessments be tested
- wānanga to discuss the concepts, issues and opportunities around kaupapa Māori-based assessments be held, and
- that research with iwi partners be conducted to investigate why mātauranga Māori has not been included in council-run monitoring programmes to the extent possible to date, and what solutions to this might be.

2 Introduction

Kaupapa Māori Freshwater Assessments was written at the request of regional councils and territorial authorities across Aotearoa. Recent changes to the National Policy Statement for Freshwater Management (NPS-FM) now require that councils include mātauranga Māori in their monitoring plans. Councils sought information that would aid them in meeting this requirement, and wanted to understand the range of tools available and the matters that iwi and hapū considered important around the freshwater environment. It is hoped that the report will not only be of assistance to councils, but will be a useful summary for iwi authorities, tangata tiaki and iwi environmental staff as well.

3 Monitoring – What and why?

3.1 Freshwater legislative and policy reform framework

In response to increasing demands and pressures on New Zealand's freshwater resources, and widespread and worsening degradation of freshwater ecosystems, new policy and planning processes were introduced in 2009–2017⁴. The intention was to provide an effective policy and planning framework to incorporate multiple values and improved processes for collaboration, management, and decision-making, to ensure the long-term sustainability and viability of our freshwater resources. New Zealand's freshwater habitats and the species that live in them are intimately linked to our national identity and ways of life, whether it is through recreation, industry, tourism, energy production, biodiversity, ecological function or cultural and social values. Freshwater ecosystems are significant to Māori, and are integral to Māori cultural identity.

With increasing demands on finite freshwater resources and pressures on water quality and habitats, there is potential for increased resource conflict and the need for balancing competing demands as a part of decision-making and management. This raises many questions when using freshwater resources locally and regionally, namely: What values are important and which take priority? Who decides this? How are indigenous rights taken into account? Who has the final say over how freshwater is managed and used? Who are the major stakeholders? And how are community, societal, and cultural values recognised and incorporated into decision-making processes and management? These issues further raise questions about the dimensions of power between various user groups and stakeholders, including local and central government, and iwi and hapū, and about the need to understand the complex processes and dynamics between stakeholders – often with various agendas – before finding and determining long-term equitable solutions and implementing effective management strategies to sustain freshwater resources.

Internationally, there is an increasing trend to engage with indigenous communities for research and collaboration, including indigenous groups as active participants in resource management decision-making. The drivers (e.g. indigenous rights, treaties, legislation, social policy, strategies to achieve equity, and ethical considerations) to encourage and promote engagement and collaboration with indigenous communities are very different in each country. In New Zealand, the Treaty of Waitangi provides the foundation for giving effect to indigenous rights and fulfilling requirements and obligations to the Treaty by the Crown. Importantly, in the context of environmental monitoring, the most recent (2017) amendments to the NPS-FM include a requirement that regional councils produce monitoring plans that 'must at least include ... mātauranga Māori' (Policy CB 1 aa v.). This has given rise to the need for support for both councils and iwi and hapū in order to meet this requirement. This report aims to

⁴ i.e. Resource Management Act (1991) reforms, National Policy Statement for Freshwater Management (NPS-FM) 2011 and its 2014 and 2017 amendments, including the National Objectives Framework – NOF

meet that need, by providing a summary of kaupapa Māori⁵ assessment tools, methods and frameworks to guide councils and iwi in developing appropriate monitoring plans.

3.2 Māori and freshwater management

To understand the role of Māori within a modern collaborative freshwater management and policy space, it is important to first acknowledge and understand the unique te ao Māori⁶ world view and perspective. This perspective is largely derived from traditional mātauranga Māori⁷, providing concepts and values that shape contemporary perspectives and thinking. Māori have developed a comprehensive knowledge base of New Zealand's ecosystems, habitats and species that evolved and endured over the last 1000 years, through an intimate connection with the natural environment, usually in local areas. In terms of resource management, freshwater resources were sustained, managed and regulated through local cultural practice, based on iwi and hapū values and principles, such as kaitiakitanga⁸, whakapapa⁹, and rangatiratanga¹⁰, linked to and managed through spiritual atua¹¹ domains. This connection and knowledge provides Māori today with a unique indigenous perspective for planning, policy, decision-making and other activities (Tipa and Teirney, 2003, Selby et al., 2010, Harmsworth, 2005). Many Māori resource management issues will therefore be inherently different from those of other stakeholder and community groups.

Since the Resource Management Act 1991 (RMA), there have been difficulties through lack of formal recognition for incorporating and understanding this unique Māori perspective and knowledge at the local and central government level (Jollands and Harmsworth, 2007, Allen et al., 2011, Harmsworth, 2005). This is starting to change under the freshwater reforms as policy and planning seeks greater involvement of Māori in freshwater management. Outside drivers such as Government policy and legislation, Māori wish to play a greater role in the management of resources because of their values and responsibility to their ancestors to uphold, express and articulate Māori culture and values in modern society (Nelson and Tipa, 2012, Harmsworth, 2005). The importance of working with Māori groups, particularly around issues affecting the natural environment, therefore goes beyond considering Māori as just another stakeholder.

Ultimately the effective inclusion of Māori values and mātauranga Māori in freshwater planning will have wide reaching benefits to all stakeholders and the community.

⁵ Something based on Māori principles, practices, or ideology; "a philosophical doctrine, incorporating the knowledge, skills, attitudes and values of Māori society" MOORFIELD, J. 2011. *Te Aka Māori-English, English-Māori Dictionary and Index*, New Zealand Longman/Pearson Education

⁶ Māori world

⁷ Māori knowledge, data, understandings and observations

⁸ kaitiakitanga as a concept embodies the responsibility of iwi and hapū to care for and protect the land, air and water in their tribal regions. A kaitiaki is also a spiritual or supernatural being, and some iwi use the term tangata tiaki instead of kaitiaki to acknowledge the special nature of those beings and differentiate between the role of humans as environmental caretakers.

⁹ genealogical links, genealogy, interconnectedness

¹⁰ sovereignty, autonomy, self-governance

¹¹ god, deity

Shared knowledge and experience are very important in collaborative processes; they help build capacity within groups and can lead to innovative solutions to address specific issues (Allen et al., 2011, Robb, 2014, Harmsworth, 2005). Since the signing of Treaty of Waitangi, a raft of Crown legislation and policies have historically been viewed as disempowering for Māori with regard to resource management decision-making. A number of authors (Selby et al., 2010, Mead, 2012) suggest that the combination of power, legislation, and social inequality has typically led to the undermining and diminishing of Māori values, issues, and knowledge. In addition, the privileging of non-Māori values and knowledge systems has often marginalised iwi and hapū groups from constructive dialogue and created barriers for meaningful engagement (Tipa and Welch, 2006, Ahuriri-Driscoll et al., 2007, Joseph, 2008).

3.3 Mātauranga Māori and the environment

Loss of indigenous knowledge and barriers to the transmission of knowledge are significant issues well documented in New Zealand (Williams, 2001, Pihama, 2012, Royal, 2012). The scarce use and understanding of mātauranga Māori in respect to environmental research and resource management can be attributed to a range of factors, including: general lack of understanding of mātauranga Māori and its role in modern society; loss of mātauranga Māori in local areas; knowledge inequality in decision-making; lack of mātauranga Māori used in science and resource management; disconnection of Māori from customary resources; and the way historical legislative barriers have impacted on the use of knowledge.

Māori epistemology, beliefs and philosophy, and the natural environment can be thought of as a broad foundation for developing many forms of mātauranga Māori, influencing modern attitudes and patterns of thinking (Durie, 2005). However, in many areas of cross-cultural research there is a risk of assimilating the indigenous world view into the dominant cultural world view for that geographical area (Agrawal, 1995, Pihama, 2012, Smith, 2012). In terms of mātauranga Māori, the Māori world view is valid in its own right, but the co-option of this knowledge within a more dominant knowledge system – such as Western knowledge – can perpetuate power inequality and the dominance of the mainstream and scientific world view. To this end there are inherent difficulties describing concepts and values of te ao Māori using scientific language and scientific frameworks (Metge and Kinloch, 1978, Townsend et al., 2004, Joseph, 2008, Allen et al., 2011, Muru-Lanning, 2012, Harmsworth, 2001). Te reo Māori¹² is typically shaped by Māori communities to express their Māori culture and there are risks of this being ‘lost in translation’ (Joseph, 2008). Attempts to manipulate, assimilate or interpret a Māori world view using scientific methods or language are therefore fraught with difficulties.

Communicating mātauranga Māori and stressing its importance within a science-dominated collaborative arena is a challenge, given the prevailing world view is often unaccommodating of alternative and indigenous views and values. However, this can

¹² The Māori language

also be an opportunity for innovation and relationship building, should both parties be working towards a common vision or set of goals.

3.4 The development of environmental monitoring and cultural monitoring

Environmental monitoring is a concept, framework, methodology, collection of indicators, and set of applications that follows international approaches and agreements to assess, monitor and report on the state of the environment (SOE). Environmental monitoring was largely promoted around the world within a sustainable development framework, such as the pressure-state-response model (Organisation for Economic Co-Operation and Development, 1997, Organisation for Economic Co-Operation and Development, 1993), and an agenda item at the United Nations (UNCED) Earth Summit in Rio de Janeiro 1992. Although some New Zealand approaches were developed early in the 1950s and 1960s for localised monitoring of key aspects of the environment (particularly rivers, lakes, soils, and indigenous flora and fauna species), these were piecemeal and in a national context poorly resourced and uncoordinated. In New Zealand, in line with international concepts and initiatives, the development of national environmental indicators began in earnest in the early 1990s. Most monitoring initiatives followed legislative requirements in the 1990s 'to monitor', such as in resource management legislation (e.g. the RMA 1991), but were not mandatory, and largely focussed on local government and Government science agencies with minimal community and iwi or hapū input and involvement. A national Ministry for the Environment environmental performance indicator (EPI) programme that ran from 1998-2000 was short-lived (Ministry for the Environment, 1998a, Ministry for the Environment, 1998b, Ministry for the Environment, 1999, Jollands and Harmsworth, 2007, Ministry for the Environment, 1997b, Ministry for the Environment, 1997a), and had limited opportunity for Māori involvement.

From this early work on Māori environmental indicators, some progressive work did eventuate (Ministry for the Environment, 1998a, Ministry for the Environment, 1997a), which provided the building blocks for Māori-led cultural monitoring. A Māori advisory panel was asked to provide a concept and definition of a Māori environmental performance indicator or MEPI (Ministry for the Environment, 1998a, Ministry for the Environment, 1998b). The concept evolved from a series of ideas and culturally-based concepts, and the following definition was given:

A Māori Environmental Performance Indicator (MEPI) is a tohu¹³ created and configured by Māori to gauge, measure or indicate change in an environmental locality. A Māori EPI leads a Māori community towards and sustains a vision and a set of environmental goals defined by that community.

Very few formal Māori-led monitoring and indicator approaches were developed pre-2000 (i.e. they were not recognised in monitoring programmes, didn't inform planning

¹³ sign, indicator

and policy, and relied on observation rather than any formal recording or assessment). Since 2000 reasonable progress has been made on the development of approaches, information systems, and datasets to support state of the environment reporting both at regional and national levels.

The Environmental Reporting Act (2015) requires the Ministry for the Environment and Statistics New Zealand to regularly report on the state of the environment using a pressure-state-impact framework model (Ministry for the Environment and Statistics New Zealand, 2015). Data and knowledge will be aggregated up to national scale from regional, district, and local groups such as local government and Māori (iwi and hapū) in the form of regional and national statistics, case studies and supporting information. It is hoped this will provide a constructive Māori lens or cultural perspective for environmental monitoring and reporting in New Zealand.

3.5 Cultural Monitoring

Since early Polynesian arrival 1000 years ago, Māori have always monitored their environment in some way, to assess natural resources as a basis for sustenance, well-being, and survival. As a result, Māori have increasingly used this knowledge to guide the management of important resources, their scarcity, and their condition. Traditional concepts and values were fundamental to this management responsibility, which reinforced the interconnection with the natural and spiritual environment. Since the late 1990s, Māori have become increasingly interested and active in national environmental programmes, and Māori monitoring approaches were developed to complement and contribute to mainstream state of the environment monitoring and reporting. At the heart of most kaupapa Māori approaches is the concept of mauri, which provides the fabric or whāriki¹⁴ for defining Māori aspirational targets and outcomes.

There are a growing number of cultural monitoring and assessment methods and tools. These are based on a blend of mātauranga Māori, traditional concepts, and Western science, and are being continually adapted and modified for local use (Awatere and Harmsworth, 2014, Environs Holding Trust, 2014, Harmsworth et al., 2013). Most cultural monitoring has developed a set of standard indicators (e.g. water quality, taonga¹⁵ species, mahinga kai¹⁶) that builds up a knowledge base of local areas. In some iwi and hapū monitoring projects, indicators have been organised into atua domains, or, in the first instance, selected within these atua domains as part of a mātauranga Māori framework.

3.5.1 The value of cultural monitoring

Robb et al. (2015) found that cultural monitoring can be used to build capacity and capability of Māori communities, identify cultural values and priorities, strengthen connections between Māori and freshwater resources, build skills and knowledge in

¹⁴ Woven mat

¹⁵ something valued and treasured

¹⁶ the practice of gathering food, or a site for doing so

both mātauranga Māori and Western science and measure progress towards agreed goals to achieve desired freshwater outcomes and Māori aspirations. It has also been found that cultural monitoring and cultural projects provide a basis to build understanding, share learnings, and develop methods (e.g. through wānanga and field work) in order to set standards and limits within freshwater ecosystems. Cultural monitoring is typically used to articulate values as well as assess, measure, and monitor changes to the environment from a Māori perspective, and report those changes.

Cultural monitoring tools can be used to contribute to, or inform, some formalised assessment (qualitative or quantitative) or statement of cultural values through time and space. This is especially relevant when assessing habitat and water quality to show trends.

Although still somewhat in its infancy as a tool, cultural monitoring is being carried out in many parts of New Zealand from early development to implementation. Because of iwi and hapū capacity and resourcing issues, the methods and assessment approaches are often not used regularly. However, monitoring provokes much interest and can increase participation at the local level in many iwi and hapū-led projects. Many groups have developed planning and policy frameworks to show where monitoring fits, to help meet overall objectives, and to monitor change. Te Uri o Hau, in the Kaipara harbour region, developed the framework in Figure 3-1, showing how monitoring is linked to outcomes and aspirations as part of a regular cycle providing information on progress towards addressing issues and goals (Enviroins Holding Trust, 2014).

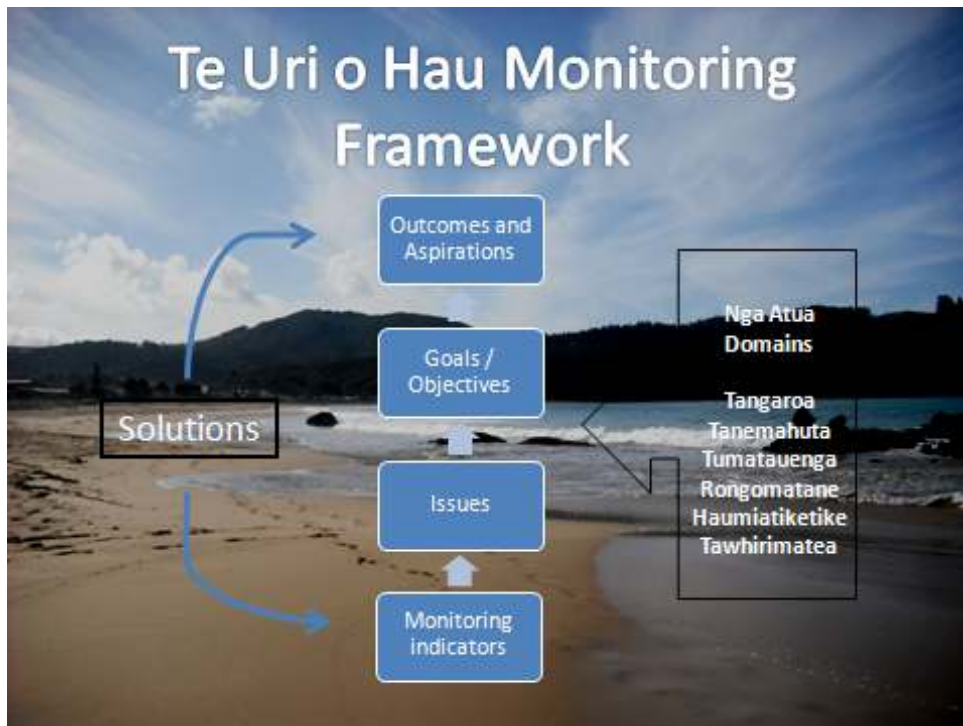


FIGURE 3-1: TE URI O HAU MONITORING FRAMEWORK FOR THE KAIPARA HARBOUR



FIGURE 3-2: BUILDING EXCELLENT RELATIONSHIPS AND COLLABORATIVE RESEARCH PROVIDES THE BASIS FOR INTEGRATING MĀTAURANGA MĀORI IN COMPLEMENTARY MONITORING FRAMEWORKS IN NEW ZEALAND.

Cultural monitoring can help build strong relationships between Māori communities, stakeholders, local Government and scientists (Figure 3-2). As well as tracking progress towards goals and aspirations for particular local ecosystems, it can be used to link or make a statement about relationships between human and cultural well-being and the health of the environment, given that they are intimately connected. It can also be used in local iwi and hapū areas to identify the source of issues and problems, to pin-point impacts and effects (e.g. critical source areas), and to identify suitable responses to address issues through a set of actions (e.g. limiting nitrates, restoration, riparian planting, best management practice).

Beyond monitoring

Cultural monitoring is becoming increasingly important to enable kaitiaki to carry out their duties as environmental resource managers and provide information to their communities. This goes beyond the monitoring itself, with mana whenua¹⁷ retaining control over data interpretation and reporting. By tāngata whenua connecting with their tribal lands and environments on a practical level, knowledge is gained and capacity is built. This also strengthens connections between people and across generations. Tāngata tiaki become a link between people and place, as well as facilitating discussion around the state of environment and issues that are affecting the group (Robb, 2014).

¹⁷ The people holding responsibility in a location; tāngata whenua

3.6 Considerations around including mātauranga Māori in council monitoring plans

3.6.1 Potential barriers to including mātauranga Māori in monitoring

Further research is needed into potential barriers to including mātauranga Māori in monitoring programmes, but it is likely that some of the same difficulties apply as for those identified by Robb et al. (2015) around participation in collaborative processes, for example:

- Overcoming historical tension and conflict
- Lack of capacity and resourcing, for both parties
- Difficulty getting 'buy-in' for institutional change
- Uncertainty about who to engage with
- Internal politics
- Lack of capability/capacity to understand Māori values
- Lack of capability/capacity to implement Māori values

3.6.2 Intellectual property concerns

The 2017 amendments to the NPS-FM included, amongst other things, a requirement that information gathered under regional council monitoring plans be made publicly available (New Zealand Government, 2017). For many iwi and hapū, this will raise questions around ownership and control of the data and whether iwi and hapū knowledge is at risk of being appropriated (or misappropriated) for council needs, as opposed to kaupapa Māori assessments being used by Māori, for Māori, to answer questions important to Māori. Intellectual property protection mechanisms will need to be in place to answer this concern.

3.6.3 Suitability of tools for use nationwide

As discussed above, iwi and hapū have been developing tools that suit local uses since the early 2000s. It is important, when discussing how to meet the monitoring requirements of the NPS-FM, to remember that local developments suit local needs, local priorities and local tikanga¹⁸. While some tools may be transferrable from region to region, not all tools will be suitable in all situations. Again, the decisions around what and how tools are used with regards to mātauranga Māori needs to rest with iwi and hapū.

¹⁸ protocols and ways of doing things

4 Tools, frameworks and methods

As outlined above, numerous tools have been developed in the past two decades or so to help iwi and hapū monitor or assess aspects of the freshwater environment from a kaupapa Māori perspective. This section provides summaries of a number of those tools, frameworks and methods. Some are generic approaches, such as taonga species monitoring and cultural mapping, and some are specific tools developed for a particular purpose. Case studies for some of the approaches are included in Section 6. The summaries are provided in a consistent format, covering:

- the tool name
- the developer/s
- where to source information about the tool
- whether or not is it available in a digital form (ie as an app)
- whether variants exist
- when it was developed
- a general overview
- a summary of how to use the tool
- what sort of data is collected
- who it is designed for use by
- where in the country it has been used
- any considerations concerning the tool and
- references.


A summary of the tools covered is provided in Table 4-1.

TABLE 4-1: SUMMARY OF KAUPAPA MĀORI ASSESSMENT TOOLS COVERED IN THIS REPORT

Taonga species monitoring	A range of tools, methods and approaches to monitor individual species that are important to iwi.
Cultural Health Index (original version)	The seminal Māori cultural monitoring tool, the CHI monitors site status, mahinga kai and cultural stream health. It has been widely adapted for other uses.
Mauri Compass	A digital tool covering 12 aspects in three kete: Tangata Whenua, Tāne and Tangaroa. It combines mātauranga Māori with Western indicators to answer questions important to iwi and hapū. The results are presented in an accessible, visual compass.
Mauri Model / Mauri-o-meter / Ngāti Mākino Model	A tool to assist with decisions around potential engineering projects and their benefit to or impact on mauri.

Cultural flow preference study	A method to assess cultural values and satisfaction for different flow regimes.
Wai Ora Wai Māori	A framework and digital tool to assess the state of a waterbody from a Māori perspective. It can be adapted to local iwi and hapū views.
Cultural mapping	Various approaches to mapping cultural information and values.
Māori environmental performance indicators for wetland condition and trend	A method and set of indicators to assess wetland condition from a Māori perspective.
Mauri of Waterways Kete	A comprehensive assessment of environmental outcomes according to kaupapa Māori.
Waikato River Catchment Report Cards	A means of conveying available (largely Western science-based) data to iwi and communities.
State of the Takiwā	A database and method for cultural and environmental assessments of freshwater environments. No longer active but provides useful examples of what is possible.
Mātauranga Māori Knowledge Networks	A project to examine factors affecting river quality from a Māori perspective. It provides a model for iwi and councils wishing to research important aspects for freshwater monitoring locally.
Significance assessment method	A means of applying cultural values into the RiVAS assessment system. RiVAS is a standardised method to help resource managers grade rivers by relative importance for different uses.

4.1 Taonga species monitoring

Taonga species monitoring	
Tool name	There is no one tool name for this, instead it covers a range of approaches to investigate aspects about species of high importance to iwi and hapū.
Designed by	Multiple investigators, utilising mātauranga handed down from their pahake ¹⁹ and kaumātua ²⁰ .
Available at	Kusabs et al. (2015b), Kusabs et al. (2015a), Williams et al. (2014), Kitson et al. (2012), Kitson et al. (2010), Rainforth (2008), Morris et al. (2013), Kapa and Clarkson (2009)
Digital version	N/A
Developed/in use since	N/A
Variants	Multiple variants. This topic covers monitoring of kōura, kākahi/kāeo/freshwater mussels, tuna, kanakana/piharau/lamprey, native fish species such as īnanga, kōkopu and kōaro, and plants such as kuta, raupō and harakeke.

Overview

Taonga species monitoring can involve any technique deemed appropriate by iwi, hapū and whānau to answer questions about the species that are important to them. To date it has involved using measures of catch per unit effort, counts by expert harvesters, habitat assessments, tracking using PIT (passive integrated transponder) tags, traditional trapping methods such as tau kōura, traditional knowledge of abundance and distribution, measures of growth and health (e.g. examining otoliths, parasite load), research around spawning grounds, and plant ecology.

¹⁹ elders, one's parents' generation

²⁰ elders, older generation

How to use

The method used depends on the questions iwi and hapū seek to answer, and can involve a number of different approaches (see the Taonga Species Monitoring – Kanakana in the Waikawa case study in Section 6). The main points to note are that taonga species monitoring is focused around iwi and hapū questions, is heavily reliant on local iwi and hapū knowledge (of the species, of catch methods for that species, and of catch history, for example historic abundance and distribution of populations, and historic size ranges), and is undertaken by iwi, hapū and whānau, or in partnership with them.

Type of data collected

The type of data collected varies greatly, depending on the research questions and the methods. It ranges from abundance estimates, to size class distributions, habitat requirements and use, range and distribution, and data on growth rates and species health. This data often helps to quantify iwi and hapū kōrero²¹ and observations about decline in species abundance, distribution and size.

Designed for use by

iwi and hapū, at times in partnership with or supported by researchers or organisations such as Crown Research Institutes or councils.

Places used

Throughout Aotearoa, with documented work available for the Waikato region, the Rotorua district, the Whanganui River, the Kāpiti Coast, the Wairarapa, and Murihiku.

Considerations

When undertaking taonga species monitoring, consideration should be given to intellectual property arrangements and agreements. Sensitive data will need to remain within iwi, hapū and whānau control.

References

Kusabs et al. (2015b), Kusabs et al. (2015a), Williams et al. (2014), Kitson et al. (2012), Kitson et al. (2010), Rainforth (2008), Morris et al. (2013), Kapa and Clarkson (2009), Kusabs et al. (2018)

²¹ Discussion, discourse, narrative, story, statement, information

4.2 Cultural Health Index

Cultural Health Index	
Tool name	Cultural Health Index
Designed by	Gail Tipa and Laurel Tierney
Available at	https://www.mfe.govt.nz/sites/default/files/chi-for-streams-and-waterways-feb06-full-colour.pdf
Digital version	No
Developed/in use since	2003/2004
Variants	Yes. The Cultural Health Index has been adapted to local situations and for different kaupapa by many different iwi and hapū across Aotearoa.

Overview

The Cultural Health Index, or CHI, is the seminal cultural monitoring tool. It was developed in the early 2000s to help iwi quantify cultural knowledge around and assessments of local waterbodies. It has been widely used across the country, both in its original form and as local variants.

How to use

The original CHI has three key elements:

- Site Status** This classifies whether a site is of traditional significance to iwi and hapū, and whether or not iwi and hapū would return to that site in future.
- Mahinga Kai** This assesses the status of mahinga kai values at a site. It covers four areas: how many different kai species are present at the site; how many kai species are present in

comparison to the numbers traditionally present; do iwi members have access to the site; and would iwi and hapū return to the site in future?

Cultural Stream Health This covers eight parameters: catchment land use, riparian vegetation, use of riparian margin, riverbed condition/sediment, channel modification, flow and habitat variety, water clarity and water quality.

Scores for **Site Status** are allocated based on the following:

- A-1 is a traditional site Māori would return to in future;
- A-0 is a traditional site Māori would *not* return to in future;
- B-1 is not a traditional site, but Māori would go there in the future; and
- B-0 is not a traditional and not a site Māori would use in future.

Scores for **Mahinga Kai** are allocated as follows:

- The number of mahinga kai species present at a site is given a score between 1 and 5. A site with a higher number of mahinga kai species is considered healthier.
- The comparison between the species present today and the traditional mahinga kai species found at a site is also given a score between 1 and 5.
- The site access is given a score of either 1, 3, or 5.
- A score of either 1 or 5 is given for the assessment of whether tangata whenua would return to the site in the future as they did in the past.

The four mahinga kai elements are averaged to give a single mahinga kai score between 1 and 5.

The **Cultural Stream Health** component is scored based on observers' judgements, with a range of 1 to 5. Examples from the field sheet are briefly included in Table 4-2. The eight components in Cultural Stream Health are then averaged for a final score between 1 and 5.

TABLE 4-2: EXAMPLES OF QUESTIONS ON THE FIELD SHEET FROM THE ORIGINAL CULTURAL HEALTH INDEX (SOURCE: TIPA AND TEIRNEY (2006B))

Indicators	Unhealthy				Healthy
Riverbed condition (sediment)	1. Covered by mud/sand/slime/weed	2.	3.	4.	5. Clear of mud/sand/slime/weed
Water clarity	1. Water badly discoloured	2.	3.	4.	5. Water is clear

Finally, the three component scores are collated to give an overall assessment, such as:

Component 1: Site status	Component 2: Mahinga kai measure	Component 3: Stream health measure
A-1	3.25	4.87

Type of data collected

Tipa and Teirney (2006b) list the following as types of data collected using the CHI:

- recordings, transcripts or notes from interviews
- maps and plastic overlays from interviews
- photographs and diagrams
- lists of traditional sites
- mahinga kai information
- record and assessment sheets
- consent forms
- various other notes, planning papers and reports.

Designed for use by

Primarily designed for use by iwi practitioners.

Places used

The CHI is publicly recorded as being used in: Waikato, Bay of Plenty, Hawke's Bay, Tasman, Canterbury, Otago, Southland (see https://statisticsnz.shinyapps.io/cultural_health/). Other locations of use may exist, however that information is likely to rest with individual iwi and hapū.


Considerations

As with all mātauranga Māori tools, the decisions on whether and how to use the CHI needs to rest with iwi and hapū, as would decisions around how data is managed and handled. Given sensitive data is likely to be collected through the CHI process, intellectual property considerations would need to be agreed if councils were wanting to utilise the CHI with local iwi and hapū.

References

Tipa (1999), Tipa and Teirney (2003), Tipa and Teirney (2006b), Tipa and Teirney (2006a), Townsend et al. (2004), Nelson and Tipa (2012), Hughey and Taylor (2009), Taranaki District Council (2007), Walker (2009), Harmsworth et al. (2011), Tipa (2013), Pauling et al. (2007), Young et al. (2002)

4.3 Mauri Compass

Mauri Compass	
Tool name	Mauri Compass
Designed by	Ian Ruru, Te Rūnanga o Tūrangānui a Kiwa, and David Wilson, Gisborne District Council
Available at	https://www.mauricompass.com
Digital version	Yes, for any device or browser. It works offline in remote locations. It is supported by an online database.
Developed/in use since	2014
Variants	Yes – coastal, catchment, aquifer.

Overview

Mauri is deeply important to iwi across the country. In Gisborne, it is included as a compulsory freshwater value in the Tairāwhiti Resource Management Plan. As such, the Gisborne District Council (GDC) must aim to improve the water quality and mauri of Turangānui a Kiwa under their Wastewater Resource Consent.

To do this, iwi and the GDC needed a pragmatic tool founded on tikanga Māori, scientific research and resource management planning. The Mauri Compass was developed to answer this need.

Developers Ian Ruru and David Wilson describe the Mauri Compass as a tool for assessing the current state of the mauri of any ocean, river or lake, and a framework for planning the restoration of those waters.

How to use

The compass assesses 12 aspects of a water body, ranging across three kete: the Tangata Whenua Kete, the Tāne Kete, and the Tangaroa Kete. Tangata whenua aspects are assessed in the first four attributes: Tangata Whenua, Tikanga, Wairua, and Mahinga Kai. Values are assessed by the tangata whenua of each iwi or hapū area using narrative questions (see Figure 4-1 as an example). Tangata whenua cultural knowledge and data is safeguarded throughout the process. The next four attributes, in the Tāne Kete, are environmental – Habitat, Biodiversity, Biohazards and Chemical Hazards. The final four attributes, from the Tangaroa Kete, assess the quality and quantity of fish species – these attributes are Fish species, Abundance, Fish Health and Growth Rates.



FIGURE 4-1: AN EXAMPLE OF HOW THE WAIRUA ATTRIBUTE OF THE MAURI COMPASS IS DERIVED FROM A LIKERT SCALE.

Once the values are assessed, the scores are presented on a ‘compass’ or dashboard (see Figure 4-4 and Figure 4-6 for examples). The dashboard provides a quick view of the 12 attributes and indicates the state of mauri of any particular waterbody. Past, present and future states are used to show key priorities for restoration (Figure 4-4).

Type of data collected

Data incorporates both qualitative and quantitative measures. The voice of tangata whenua is measured through narrative objectives. Figure 4-4 shows an example of a question used to collect data for the Mauri Compass assessment; it is based on a Likert scale.

The environmental attributes include data from Land, Air, Water Aotearoa (LAWA), the regional council monitoring programme and ongoing monitoring by tangata whenua. Figure 4-6 shows an example of how LAWA data is used to derive the Biohazard attribute data for the Mauri Compass assessments. The fisheries attributes are derived from a standardised stock assessment model that includes catch-per-unit effort (CPUE) and growth model data.

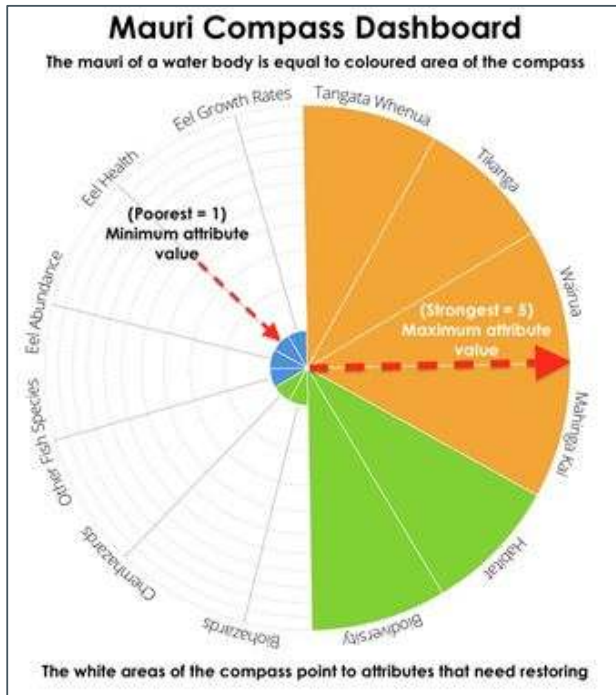


FIGURE 4-2: AN EXAMPLE OF THE MAURI COMPASS SHOWING THE RELATIONSHIPS BETWEEN THE 12 ATTRIBUTES. EACH ATTRIBUTE VALUE RANGES BETWEEN 1 (POOR) AND 5 (STRONG). EELS ARE TYPICALLY USED AS A SENTINEL FOR RIVERS. KŌURA (ROCK LOBSTERS) HAVE BEEN USED AS A SUITABLE SENTINEL

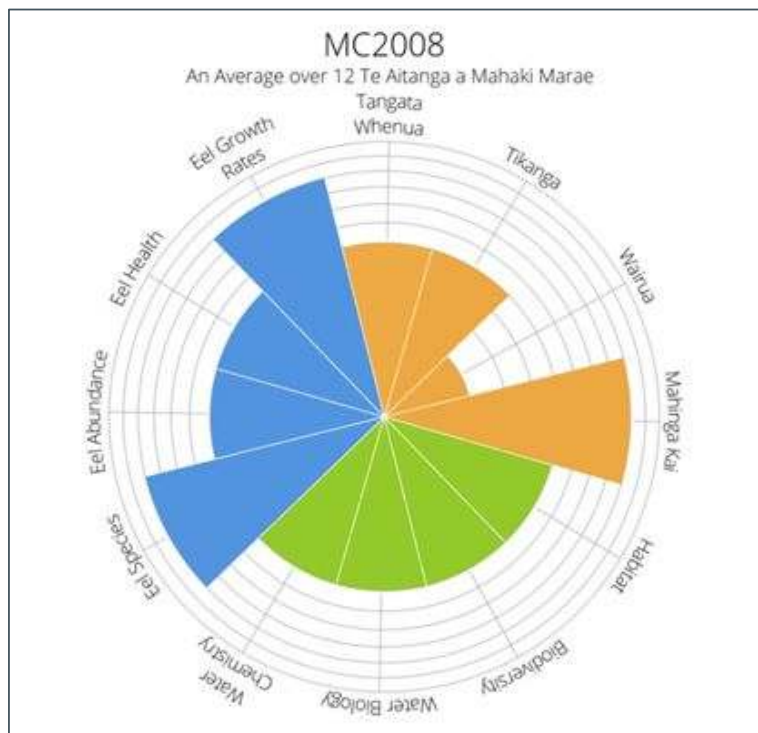


FIGURE 4-3: RESULTS FROM A MAURI COMPASS STUDY IN 2008, SHOWING SCORES ACROSS THE VARIOUS ATTRIBUTES

Mauri Compass*

Identify the waterbody being assessed.

Makauri Aquifer

Select your option

- Past (eg pre-1800)
- Present State (eg before a resource consent is applied for)
- Future (Aspirational State)
- Ongoing Mauri Monitoring (AEE)
- Extra Information

FIGURE 4-4: A SCREEN SHOT OF A MAURI COMPASS ASSESSMENT QUESTION, SHOWING HOW IT CAN BE USED FOR PAST, PRESENT OR FUTURE STATES, AS WELL AS ONGOING MONITORING.

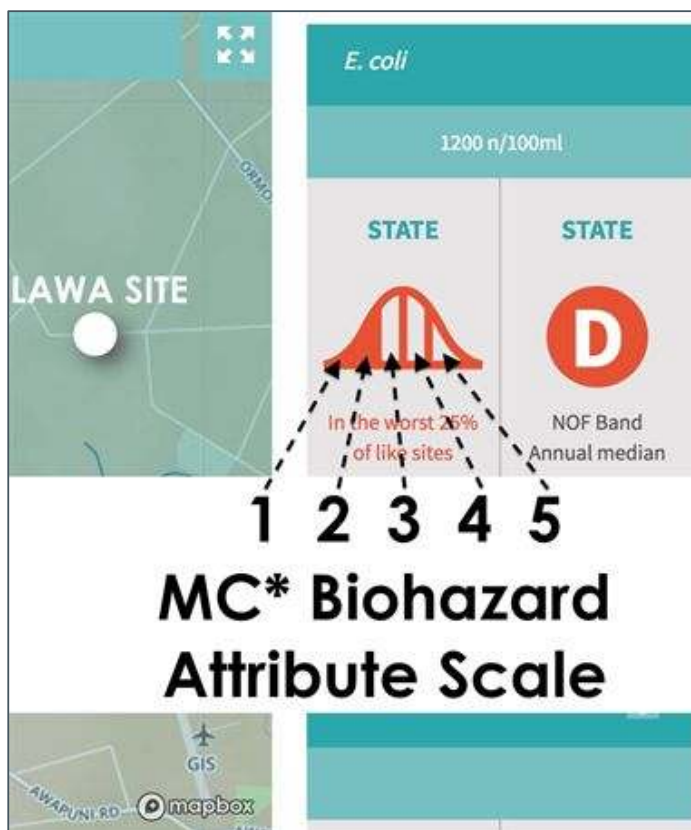


FIGURE 4-5: AN EXAMPLE OF HOW THE BIOHAZARD ATTRIBUTE IS DERIVED USING E. COLI LEVELS. SOURCE: WWW.LAWA.ORG.NZ

Designed for use by

Iwi, regional councils, planners and schools. Currently the Mauri Compass is endorsed by Te Rūnanga o Tūrangānuī a Kiwa, Te Aitanga a Māhaki, Ngāti Oneone, Te Rūnanganui o Ngāti Porou, Ngāti Porou Seafoods Group and the Gisborne District Council.

Places used

The Mauri Compass is widely used in Te Tairāwhiti by iwi and in joint projects with GDC. Examples include:

- Toitū te Mauri o Te Pā o Kahu – a landfill remediation project between the Paokahu Trust and the GDC.
- Te Rūnanga o Tūrangānuī a Kiwa and Te Aitanga a Māhaki are using the Mauri Compass to assess and restore the mauri of the Waipaoa River Catchment, the Makauri Aquifer and the local marine environment.
- The framework is being used in Gisborne District Council's 2017 Freshwater Plan and to assist with state of the environment reporting for the Waipaoa River and the rohe²² of Te Aitanga a Māhaki.
- GDC Wastewater Management Committee is using the tool to assess the efficiency and effectiveness of the council's wastewater consent condition "to improve the mauri and water quality of Turanganui a Kiwa".
- The Te Aitanga a Māhaki Iwi Management Plan.

Considerations

This tool provides an immediate visual representation of the state of a waterbody across a range of values. It is therefore useful for providing an understanding of the range of factors affecting mauri at any one time. As with all tools discussed in this report, the decision on whether the Mauri Compass is the most appropriate tool for a local situation needs to remain with local iwi and hapū.

References


www.mauricompass.com



FIGURE 4-6: IWI MEMBERS INVESTIGATING THE STATE OF A TUNA AS PART OF THE MAURI COMPASS ASSESSMENT. PHOTO: MAURICOMPASS.COM

²² Tribal area; region

4.4 Mauri Model/Mauri-o-meter/Ngāti Mākino Model

Mauri Model	
Tool name	Mauri Model (also known as the Mauri-o-meter or Ngāti Mākino Model)
Designed by	Te Kipa Kepa Brian Morgan
Available at	Numerous academic papers describing the tool are available, but in general it is best sourced through direct instruction from the developer.
Digital version	No. The spreadsheets used for calculations are digital, but there is no portable app for field use available.
Developed/in use since	~2003
Variants	To some extent. It has been applied in different situations with different weightings and ranges of scores, but the underlying structure remains consistent.

Overview

The Mauri Model is a tool to help to incorporate iwi values and viewpoints into decision-making, particularly around engineering projects such as stormwater infrastructure.

Often, iwi views are overlooked in selecting engineering solutions, predominantly in favour of economic considerations. The Mauri Model helps decision-makers to avoid this, and to adequately weight iwi views.

Fundamentally, it works by asking a team of assessors to judge the effect that a particular option will have on the mauri, from a range of categories from mauri-enhancing to mauri-degrading. The Mauri Model is not a tool to collect mātauranga Māori about the current state of a waterbody or ecosystem, but is instead focused on selecting between options for future projects. The developer states that, “This tool is

intended to significantly improve the quality of decision-making within and outside the engineering profession”.

How to use

Participants assess options to determine what effect each option will have on the mauri. Each option is given a rating depending on how it will affect mauri. The descriptions and scores are listed below²³.

Enhancing	mauri kaha	+ 2
Maintaining	mauri ora	+ 1
Neutral	mauri māori	0
Diminishing	mauri kino	- 1
Destroying	mauri mate	- 2

These ratings are applied for each option across four ‘contexts’ – economic, social, cultural, and environmental. Some examples are given below.

Example one: Discharge to water	Example two: Full treatment with land-based disposal
Economic (whānau) + 2	Economic (whānau) - 1
Social (community) + 1	Social (community) + 2
Cultural (hapū) - 2	Cultural (hapū) + 2
Environmental - 2	Environmental + 2

Finally, these scores are multiplied by a weighting set out by the users before the assessment. This gives a total score between -2 and +2.

Example one: Discharge to water	Example two: Full treatment with land-based disposal
Economic (whānau) + 2 x 10% = 0.2	Economic (whānau) - 1 x 10% = - 0.1
Social (community) + 1 x 20% = 0.2	Social (community) +2 x 20% = 0.4

²³ NB Some versions of the Mauri Model use scores of 1-5 instead of -2 to 2, but the principle is the same.

Cultural (hapū)	- 2 x 30% = - 0.6	Cultural (hapū)	+2 x 30% = 0.6
Environmental	- 2 x 40% = - 0.8	Environmental	+2 x 40% = 0.8
Total score:	- 1	Total score:	1.7

Type of data collected

The data collected using the Mauri Model is scores and rankings of options for engineering or infrastructure projects that reflect a Māori worldview, making it easier for decision-makers to meet their obligations in giving weight to cultural views in RMA and planning matters.

Designed for use by

Trained practitioners, engineers and decision-makers

Places used

Locations in the Bay of Plenty including Tauranga, Rotorua, Tarawera and Rotoitipaku.


Considerations

This is a tool to assist with decision-making around potential mitigation, infrastructure or engineering options. It can help iwi and hapū to make choices based on cultural, social, environmental and economic concerns from a Māori perspective. It is not a monitoring tool *per se*. As with all tools, some iwi and hapū will find it more suitable and aligned with their values than others, and decisions around its use need to rest with iwi and hapū.

References

Morgan (2007), Morgan et al. (2013), Morgan (2006a), Morgan (2006b), Morgan (2015), Nelson and Tipa (2012)

4.5 Cultural flow preference studies

Cultural flow preference studies	
Tool name	Cultural Flow Preference Studies
Designed by	Gail Tipa
Available from	Gail Tipa
Digital version	No
Developed/in use since	2011, with concept development from 2009
Variants	No

Overview

The Cultural Flow Preference Study is a decision-making and negotiation tool. It documents iwi values for and use of a water body, and provides a statistical analysis of iwi satisfaction scores for different flows.

How to use

The first stage entails interviews with iwi members to document kōrero for the rohe, including what aspects are important to the iwi, and the connections to and use of local water bodies. This stage also involves a mapping exercise. This information is then used to develop a set of assessment statements that are specific to that iwi or hapū and the waterbody in question. The assessment statements often cover three main categories:

- cultural use,
- wai, and
- cultural landscape and health and well-being.

Examples of assessment statements include: “Flow will enable use of the site for kai gathering”; “Flow will keep riparian wetlands, springs, or tributaries connected to the mainstem”, and “Flow will protect features important in tribal stories, waiata”.

Iwi members then use these statements to assign a score of 1-7 for different flow levels, with 1 being little or no satisfaction, 4 being moderate satisfaction and 7 being

very satisfied. Flows can be assessed throughout the year if the assessments are undertaken independently by the iwi, or assessments can be undertaken in pre-arranged blocks if the iwi is working collaboratively with a consent holder who has the ability to set river flows, for example through dam releases. Information on flow levels needs to be accessed for each flow assessment event, either through specific hydrological assessments or through use of existing flow monitoring data (e.g. regional council monitoring or consent-holder monitoring). Statistical analyses of the scores are calculated, producing data on potential flow regimes that will meet iwi requirements and aspirations.

Type of data collected

Iwi kōrero, mapping information, and satisfaction scores on different flow levels.

Designed for use by

The developer, to assist iwi and hapū during flow-setting procedures, such as in resource consent hearings and appeals, negotiations with applicants, or in plan reviews. It can also be used to monitor impact on cultural values of an established flow regime.


Places used

Upper Whangaehu, Kakaunui, Waimakariri/Selwyn-Te Waihora

References

Tipa (2009, 2012), Tipa and Severne (2010), Tipa and Nelson (2011, 2012), Tipa and Associates (2013), Rainforth (2014), (Hayes et al., 2014)

4.6 Wai Ora Wai Māori

Wai Ora Wai Māori	
Tool name	Wai Ora Wai Māori
Designed by	Kiri Reihana, Shaun Awatere, Mahuru Robb, Garth Harmsworth, Yvonne Taura, Evelyn Forrest, John Te Maru, Erina Watene-Rawiri
Available from	Landcare Research Manaaki Whenua
Digital version	Yes, available as an app and supported by a database.
Developed/in use since	2017
Variants	Currently two versions of the tool exist. However, this is a new tool and versions are currently being developed for other iwi.

Overview

Wai Ora Wai Māori is a framework that utilises iwi and hapū-specific mātauranga and tikanga to assess the health of local waterbodies. It is available as a paper-based version and as a digital app with a supporting database.

It is deliberately aligned with the National Objectives Framework and can be used to set limits in a Freshwater Management Unit. It is developed collaboratively with Landcare Research Manaaki Whenua and interested iwi and hapū.



FIGURE 4-7: THE WAI ORA WAI MĀORI FRAMEWORK AND APP IN USE.
PHOTO: KIRI REIHANA, MANAAKI WHENUA

How to use

The development team (which includes iwi members) firstly conducts research to understand attributes important to local iwi and hapū. This is achieved through wānanga and interviews, and a review of any relevant literature. These important attributes are refined to a manageable number (usually six), and grouped into domains (usually three). This stage is unique to each iwi or hapū wishing to use the framework, and results in different attributes and domains (see Table 4-3 for an example of domains and attributes of the two versions currently in use – one for Waikato Tainui and one for Ngāti Tahu-Ngāti Whaoa).

TABLE 4-3: DOMAINS AND ATTRIBUTES DEVELOPED BY WAIKATO-TAINUI AND NGĀTI TAHU-NGĀTI WHAOA FOR USE IN THE WAI ORA WAI MĀORI ASSESSMENT TOOL

Waikato-Tainui Framework		Ngāti Tahu-Ngāti Whaoa Framework and app	
Domain	Attributes	Domain	Attributes
Taha Kikokiko – Physical or biophysical type attributes	Kai is safe to eat – taonga species like kāeo ²⁴ , tuna, and īnanga are safe for human consumption.	Taiao Ora – Flourishing nature	Is it safe to eat taonga species from this site? Taonga species like kōura, tuna, and watercress are safe for human consumption.
	Kai has a strong whakapapa – taonga species like kāeo, tuna,		Do taonga species have a suitable habitat? Taonga species like kōura,

²⁴ freshwater mussels, kākahi

	and inanga are part of a flourishing ecosystem.		tuna, and watercress are part of a flourishing ecosystem.
Taha Whānau – Social type attributes	Whānau satisfaction – whānau well-being is enhanced or diminished through the availability of taonga species at functions like hui and tangihanga.	Whānau Ora – thriving families	Can whānau exercise manaakitanga? The ability for whānau to support the well-being of both themselves and wider whānau, is enhanced or diminished through the availability of taonga species at functions like hui, tangihanga.
	Kaitiaki are effective – the ability to practise what is correct from an iwi and hapū position (tikanga), e.g. maramataka ²⁵ , rāhui ²⁶ , karakia ²⁷ , and wānanga ²⁸ , etc.		Can whānau participate effectively in whānaungatanga? The ability to practise taonga tuku iho – intergenerational knowledge transfer, e.g. maramataka, rāhui, and wānanga etc.
Taha Wairua – Metaphysical or spiritual type attributes	Condition of mauri – resilience and adaptation of ecosystems as measured by the level of life-force.	Domain: Mauri Ora – The essence of vitality	Are the senses awakened at the mahinga kai site? Connecting to the mahinga kai site using all 5 senses.
	Condition of kaitiaki/tipua/taniwha ²⁹ – resilience and connectivity of human beings to metaphysical beings such as kaitiaki/tipua/taniwha.		Do tangata tiaki feel connected to the mahinga kai site? Acknowledgement of feeling connected to the mahinga kai site.

²⁵ Māori calendar, incorporating knowledge such as indicators on when to plant and when to fish

²⁶ a restriction placed on an area or resource

²⁷ prayers

²⁸ higher learning

²⁹ kaitiaki, tipua and taniwha are spiritual beings and guardians

Once this stage is completed, iwi members complete field evaluations of the state of the attributes. Attribute guidance is available to guide observers' decisions (see Table 4-4 for an example). Some fields are an āe/kāo (yes/no) assessment, while others are arranged on a Likert scale (Table 4-4). Āe/kāo answers are given values of 1 for āe and 0 for kāo, and these are added to the Likert scores to reach a cumulative total score. Cumulative scores given by individual observers are then averaged to give an overall site score (see Table 4-5 for example). A minimum of three assessments must be completed to give robust results and accuracy in the overall score. The overall site score is categorised into a band in the A-D range, as follows:

- A = 17-21
- B = 12-16
- C = 7-11
- D = 2-6

The bands can be used for reporting, and for setting standards, targets or limits. Iwi and hapū can, for example, determine that while their local waterbody is currently in the C-band, they want to restore it to an A-band. This can feed into the setting of values and attribute states required under the NPS-FM.

The developers recommend that narrative and commentary taken from observers' notes also accompany any reporting on overall score or band, to give a rounded picture of the cultural assessment.

TABLE 4-4: ASSESSMENT TYPE, SCORE RANGE, AND MEASURES/ATTRIBUTE GUIDANCE FOR ATTRIBUTES UNDER THE TAIAO ORA DOMAIN IN THE NGĀTI TAHU-NGĀTI WHAOA VERSION OF THE WAI ORA WAI MĀORI TOOL

Taiao Ora – Flourishing Nature		
Is it safe to eat taonga species from this site?		
ĀE	1	Kōura: Tail is tightly curved
KĀO	0	Kōura: Tail muscle underneath is porcelain white, or other signs of disease
ĀE	1	Tuna: Has an even colouring, fins are intact and eyes are bright
KĀO	0	Tuna: Looks dull or pale with visible signs of boils, ulcers, parasites, and pale eyes
ĀE	1	Watercress: No evidence of animal grazing, young shoots
KĀO	0	Watercress: Evidence of recent grazing by animals, or in flower, green/purple stalks, located close to riparian margins
Do taonga species have a suitable habitat?		
PAI RAWA	4	Is the habitat capacity very strong and is there minimal impact from invasive pest species and land-use change
PAI	3	Is the habitat capacity strong and is there some impact from invasive pest species and land-use change
ĀHUA PAI	2	Is the habitat capacity limited and is there significant impact from invasive pest species and land-use change

PŌHARA	1	Is the habitat capacity severely limited and is there significant impact from invasive pest species and land-use change
AUĒ	0	Is the habitat capacity very severely limited and is there significant impact from invasive pest species and land-use change

Type of data collected

In the creation of the app, the data collected involves interviews and cultural kōrero. In the use of the app, data captured includes evaluations, observations, notes and photographs.

Designed for use by

Iwi members, from young to old, regardless of experience levels.

Places used

Waikato, Bay of Plenty

TABLE 4-5: MANGAKARA STREAM ASSESSMENTS USING THE WAI ORA WAI MĀORI TOOL

MAHINGA KAI	Kaimahi 1	Kaimahi 2	Kaimahi 3	Kaimahi 4
Ingoa	Mangakara	Mangakara	Mangakara	Mangakara
Ra	21/04/2017	21/04/2017	21/04/2017	21/04/2017
Wa	10.40:00 a.m.	10.40:00 a.m.	10.40:00 a.m.	10.40:00 a.m.
Taunga	38°27'11.18"S, 176°19'33.66"E	38°27'11.18"S, 176°19'33.66"E	38°27'11.18"S, 176°19'33.66"E	38°27'11.18"S, 176°19'33.66"E
TAIAO ORA				
Is it safe to eat taonga species from this site?	AE	AE	AE	AE
Do taonga species have a suitable habitat?	PAI	POHARA	AHUA PAI	AHUA PAI
WHANAU ORA				
Can whanau exercise manaakitanga?	POHARA	AHUA PAI	AHUA PAI	AHUA PAI
Can whanau participate effectively in whanaungatanga?	AHUA PAI	AHUA PAI	POHARA	AHUA PAI
MAURI ORA				
Are the senses awakened at the mahinga kai site?	MAURI OHO	MAURI OHO	MAURI OHO	MAURI PIKI
Do tangata tiaki feel connected to the mahinga kai site?	MAURI OHO	MAURI OHO	MAURI OHO	MAURI OHO
MAHINGA KAI INDEX SCORE	11	10	10	12
AGGREGATE SITE SCORE				11

Considerations

As with all mātauranga Māori tools, the decisions on whether and how to use the Wai Ora Wai Māori tool needs to rest with iwi and hapū. One safeguard built-in to Wai Ora Wai Māori is that it is designed so that iwi are the administrators and managers of the framework, app and all collected data. This allows iwi to retain control over the sensitive

cultural data used in its development and over the observation data produced through field assessments. This protects iwi and hapū intellectual property surrounding this tool.


In their material about the tool, the developers rightly point out that iwi need to be resourced to participate in monitoring and planning processes. This applies to the development and use of the Wai Ora Wai Māori tool, as well as to other tools covered in this document.

The app can easily be adapted to other iwi, waterbodies, or environments.

References

Awatere et al. (2017), Taura et al. (2018)

4.7 Cultural mapping

Cultural mapping	
Tool name	There is no one tool name for this, instead it covers a generic method
Designed by	N/A
Available from	Iwi interested in undertaking mapping projects could contact Te Kāhui Manu Hōkai, the Māori GIS Association on https://www.tekahuimanuhokai.org
Digital version	Yes – e.g. GIS and Google Earth
Developed/in use since	N/A
Variants	Multiple approaches to this tool exist.

Overview

Cultural mapping covers a wide range of purposes and functions. It can capture broad-scale values for an area, cultural perspectives, uses and practices, specific site knowledge, and mātauranga around spiritual and metaphysical elements. For freshwater monitoring purposes, cultural mapping can be applied to determine what species were once present in a waterbody, how abundant those species were, what cultural practices occurred in an area, and what the special values and metaphysical aspects of a place are. Ngāi Tahu have a comprehensive cultural mapping project accessible online (Figure 4-8).

<http://www.kahurumanu.co.nz/atlas>

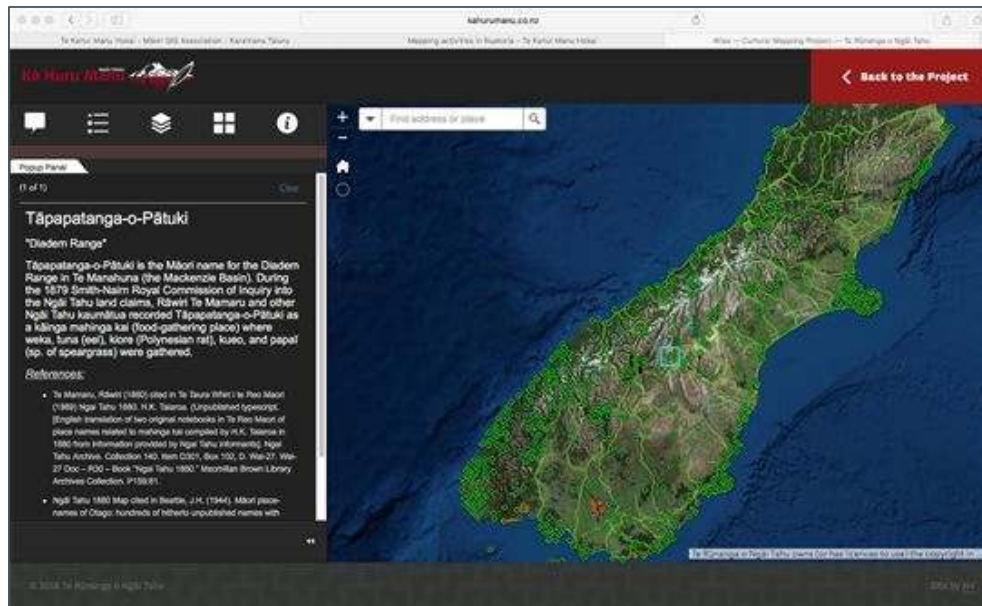


FIGURE 4-8: A SCREENSHOT FROM KĀ HURU MANU, THE NGĀI TAHU MAPPING PROJECT. SOURCE: [HTTP://WWW.KAHURUMANU.CO.NZ/ATLAS](http://www.kahurumanu.co.nz/atlas). ACCESSED 31 AUGUST 2018

Cultural mapping is also used as part of a number of tools and approaches around mātauranga Māori, including cultural flow preference studies, which can involve Cultural Opportunity Mapping Assessment (COMA) and Cultural Opportunity Mapping Assessment and Responses (COMAR) techniques.

How to use

Most cultural mapping either utilises GIS software or Google Earth. It captures whānau, hapū and iwi information and translates this into a visual format. Cultural mapping often involves a process of collecting data from a myriad of sources – for example manuscripts, iwi documents, interviews and old maps – and collating this into a database. Data is usually analysed and categorised during this process. Harmsworth (1997) provides one of the first models of cultural mapping in Aotearoa (Figure 4-6). The data can then be used by iwi for retention and transfer of cultural knowledge, resource management processes such as producing evidence in consenting matters and participating in regional plan development, environmental work such as restoration projects, and, relevant to this report, freshwater monitoring.

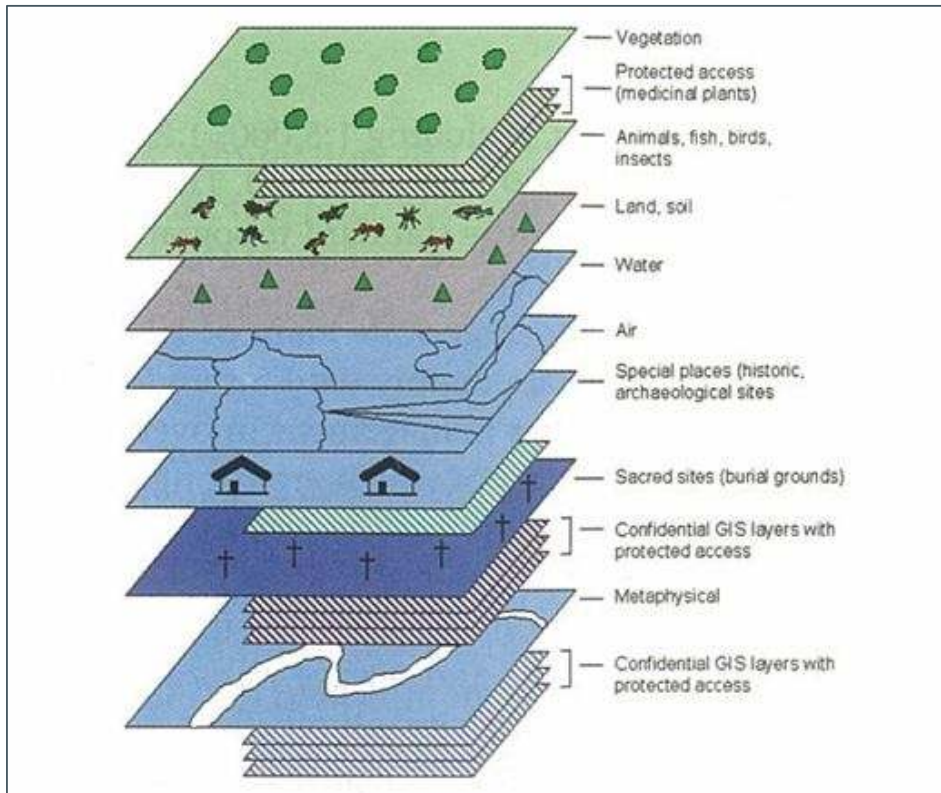


FIGURE 4-6: CONCEPTUAL MODEL OF GIS LAYERS FOR MĀTAURANGA MĀORI IN CULTURAL MAPPING PROJECTS

Type of data collected

The type of data collected usually involves mātauranga around resource use, cultural practices, species distributions and abundance. The raw data used to create the maps can be captured in interviews, video recordings, physical maps (including overlays) or sourced from historical maps, archival records, and writings such as manuscripts, land court records, briefs of evidence, iwi environmental plans and Waitangi Tribunal reports.

Designed for use by

Iwi, hapū and whānau, primarily. Information can be provided to councils for use in planning and consenting processes at the discretion of iwi, hapū and whānau.

Places used

Widely used across Aotearoa.

Considerations


Cultural mapping by nature involves capturing very sensitive data. Public access to all layers is likely to be restricted. If councils are working with iwi and hapū on mapping projects, protection mechanisms for the data will need to be established. Harmsworth (1997) provides guidance on some means to achieve this. He suggests recording the information as silent or concealed files, recording the information as an overlay with a

grid network that does not identify the actual location of restricted data (e.g. sacred sites) but gives an indication that sensitive data exists in that general area, and setting up a directory to direct an inquirer to a particular person or organisation for information.

References

Tipa (2013), Harmsworth (1997), Harmsworth (1998), Tipa and Severne (2010), Tipa (2010), Tipa and Nelson (2012), Harmsworth et al. (2005)

4.8 Māori environmental performance indicators for wetland condition and trend

Māori EPIs for wetlands	
Tool name	Coordinated Monitoring of New Zealand Wetlands, Phase 2, Goal 2: Māori environmental performance indicators for wetland condition and trend
Designed by	Garth Harmsworth, Landcare Research
Available from	Garth Harmsworth, Landcare Research, or from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.485.6751&rep=rep1&type=pdf
Digital version	No
Developed/in use since	2002
Variants	No

Overview

The Māori environmental performance indicators for wetland condition and trend were developed to enable the assessment of wetlands from an iwi and hapū perspective. The work was part of a larger project comprising four goals:

- science-based indicators for wetland condition and trend
- a generic set of mātauranga Māori based indicators for wetland condition and trend (this tool)
- an illustrated field guide and key to the national wetland classification, and
- a handbook for managers.

The developer (in conjunction with iwi representatives) considered a large number of factors in order to select mātauranga Māori-based indicators, such as availability/access to scientific and mātauranga Māori knowledge, tikanga, previous knowledge of wetlands, and other organisational frameworks (e.g. Māori Environmental

Performance Indicators (MEPIs), Māori classification systems, methodologies, and the ability to record and analyse information). Various methods were used to establish the indicators, such as understanding Māori concepts for environmental monitoring, and developing Māori methods for environmental assessment and SOE reporting by working with a number of iwi and hapū representatives, researchers and kaitiaki communities.

It was considered critical to create a conceptual and culturally appropriate process and framework that included whakapapa, te reo, mauri, tikanga, kaitiakitanga, and Māori frameworks and classifications (e.g. wāhi tapu, mahinga kai and waiora). The aim was to create a process that allowed:

- information on wetlands to be collected and stored;
- spatial databases on wetlands to be created;
- mātauranga on wetlands to be legitimised and acknowledged;
- wetlands to be restored;
- the status, changes, modification and restoration of wetlands through time to be monitored in a robust manner
- monitoring systems for use by kaitiaki or tangata whenua to monitor the health of wetlands to be made available; and
- mātauranga Māori-based contributions to be made to state-of-the-environment reporting.

The indicators

Nine key indicators were chosen through a comprehensive selection process (see below). Each of the indicators are based on Māori knowledge and can be used to monitor positive and negative environmental changes. Indicators four to eight were deemed most critical for assessing environmental change from a Māori perspective.

1. Percentage (%) area of land uses/riparian factors affecting cultural values
2. Number of point (sites) sources of pollution degrading te mauri
3. Degree of modification (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) (where mauri is defined by numerous factors – some examples are listed in the paper)
9. Number of cultural sites protected within or adjacent to wetland.

How to use

The developer has provided a wetland monitoring form (Figure 4-7) and methodology for measuring and recording data for each indicator. However, as there are no specific 'how

to' instructions, those wishing to use this methodology may find it beneficial to be supported by someone trained by the developer. Suggestions on how data might be analysed and presented were offered by the developer, and are shown in Figure 4-8 and Figure 4-9.

MAORI INDICATORS – WETLAND MONITORING FORM					
Name of wetland:					
Date:					
People involved in monitoring:					
WHAT'S CAUSING THE PROBLEMS?					
% area of land uses/riparian factors affecting Cultural Values					
0 = 0%	1 = 1-20%	2 = 21-40%	3 = 41-60%	4 = 61-80%	5 = 81-100%
No. of point (sites) sources of pollution degrading <i>te Maori</i>					
0 = 0	1 = (1-2)	2 = (3-5)	3 = (6-9)	4 = (10-14)	5 = (>15)
Degree of modification (drainage, water table, burning, in-flows, out-flows) degrading <i>te Maori</i>					
1 = low	2 = moderate	3 = high	4 = v.high	5 = extreme	
No. of exotic (introduced, foreign) plants, algae, animals, fish, birds (pest types) affecting Cultural Values					
0 = 0	1 = (1-2)	2 (3-5)	3 (6-9)	4 (10-14)	5 (>15)
TAONGA AND MAORI? (Maori information about the wetland, its attributes)					
No. of taonga species (flora and fauna) within wetland					
0 = 0	1 = (1-2)	2 (3-5)	3 (6-9)	4 (10-14)	5 (>15)
% area of taonga plants within total wetland					
0 = 0%	1 = 1-20%	2 = 21-40%	3 = 41-60%	4 = 61-80%	5 = 81-100%
% area of exotic (introduced, foreign) plants covering total wetland					
0 = 0	1 = 1-20%	2 = 21-40%	3 = 41-60%	4 = 61-80%	5 = 81-100%
No. of cultural sites within or adjacent to wetland					
0 = 0	1 = (1-2)	2 (3-5)	3 (6-9)	4 (10-14)	5 (>15)
Assessment of <i>te Maori</i> (scale)					
1 = weak or low	2 = average or moderate	3 = strong or high			
Assessment of change in <i>te Maori</i>					
1 = worse	2 = same	3 = improvement			
Or					
1 = negative/lost	2 = negative/ok	3 = neutral	4 = positive/low	5 = positive/good	
Other comments about the wetland (e.g. use of wetland, customary access, customary rights, fitness for traditional cultural usage)					

FIGURE 4-7: MĀORI INDICATORS – WETLAND MONITORING FORM. SOURCE: HARMSWORTH (2002)

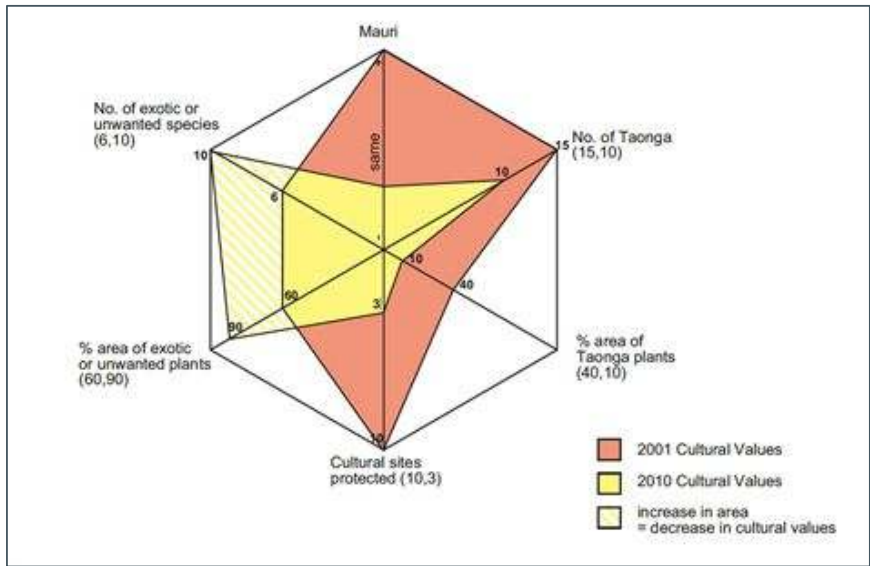


FIGURE 4-8: A RADAR MAP DEMONSTRATING HOW DATA FROM MĀTAURANGA MĀORI-BASED WETLAND MONITORING INDICATORS MIGHT BE ANALYSED AND PRESENTED. SOURCE: HARMSWORTH (2002)

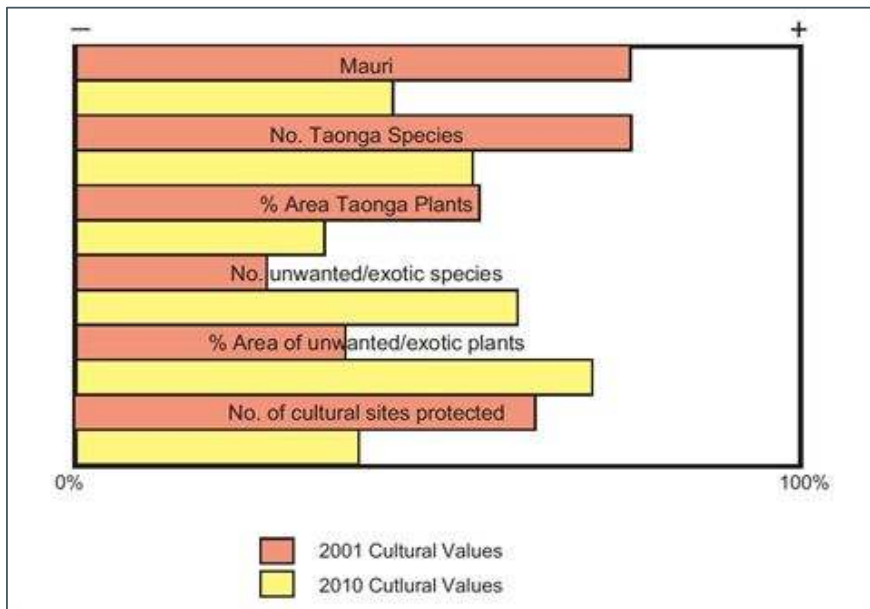


FIGURE 4-9: A BAR GRAPH DEMONSTRATING HOW DATA FROM MĀTAURANGA MĀORI-BASED WETLAND MONITORING INDICATORS MIGHT BE ANALYSED AND PRESENTED. SOURCE: HARMSWORTH (2002)

Type of data collected

The monitoring methodology collects several types of quantitative and qualitative data that can be incorporated into state of the environment reporting, if so desired by iwi and hapū, for example:

- presence and spatial extent, such as presence and spatial extent of culturally significant species. (Asking, for example, what is present, what was there and what has changed.)
- quantity of culturally significant species (e.g. areal extent, density, population, access); and
- quality or condition of culturally significant species (e.g. mauri and assessments of health).

Designed for use by

Iwi and hapū organisations individually and/or in collaboration with regional and local councils, central government and community organisations.

Places used

Developed and trialled with various iwi, hapū and Māori organisations including: Tainui (Makaurau Marae), Ngāti Te Ata, Te Arawa, Ngāti Naho, Hauraki, Ngāti Rauhoto, Ngāti Te Urunga, Ngāti Tūwharetoa, Ngāti Raukawa, Ngāti Tukorehe, Ngāti Rārua, Te Āti Awa, Ngāti Tama and Ngāi Tahu.


Considerations

Because this method was intentionally designed to apply nationally, it should be usable in any rohe across Aotearoa. However, the same considerations around iwi and hapū retaining the mana to select the tools they wish to use apply here as for other tools, as do considerations around sensitive information and intellectual property.

References

Harmsworth (2002)

4.9 Mauri of Waterways Kete and Framework

Mauri of Waterways Kete	
Tool name	Mauri of Waterways Kete and Framework
Designed by	Richard Jefferies and Nathan Kennedy
Available from	https://researchcommons.waikato.ac.nz/handle/10289/895
Digital version	No
Developed/in use since	2009
Variants	No

Overview

The Mauri of Waterways Kete and Framework is one of three kete, the other two being Mana Whenua and Wāhi Tapu. The kete and framework were developed within a wider international research programme, the Planning Under a Cooperative Mandate project. The focus for the Mauri of Waterways work was “to develop effective tools for use by RMA practitioners that reflect a kaupapa Māori perspective” (Jefferies and Kennedy, 2009c).

It was a multi-year project, the first stage of which was to develop a kaupapa Māori framework upon which kaupapa Māori outcome and indicator tools would be based (Kennedy and Jefferies, 2009b). This resulted in a “workable method for assessing by councils, iwi and Crown agencies environmental outcomes, including those resulting from statutory plan processes, from a Māori perspective” (Jefferies and Kennedy, 2009c).

The Mauri of Waterways Kete and Framework is primarily a framework and tool for assessing how well council plans and the implementation of those plans meet Māori expectations for environmental outcomes. The report authors describe the purposes of the research as:

1. interpreting anticipated environmental results (AERs) relating to Māori issues in district and regional plans;
2. evaluating a Māori view of the state of the environment, leading to the selection of indicators for relevant AERs (outcomes); and
3. assessing the effectiveness of the district plan in achieving its desired AERs (Jefferies and Kennedy, 2009c).

They envisaged that the product of the research would be to:

1. provide a framework and methods for Māori and councils to assess the achievement of AERs (outcomes) from a Māori perspective;
2. determine and explain differences between Māori and Council in AER; and
3. determine what will improve AER achievement for Māori (Jefferies and Kennedy, 2009c).

As such, the tool can help councils build a monitoring plan that assesses environmental trends not only for general improvement or decline, but also whether those changes are meeting iwi and hapū aspirations. Of note is that the Mauri of Waterways Kete assessment evaluates not only council actions and effects on mauri, but those of iwi, other agencies and the wider community. The entire research project was conducted according to kaupapa Māori principles; this in itself provides useful examples of appropriate approaches to Māori-based research.

How to use

There are multiple reports produced for the project, with Ngā Mahi: A Kaupapa Māori Outcomes and Indicators Kete PUCM Māori Report 2 (Jefferies and Kennedy, 2009b) providing the most detailed description on how to use the kete. Worksheets were developed for all three kete, with the following structure:

- Kaupapa: the overarching principle to which outcomes and indicators relate;
- Tikanga: the high-level principle or rule which must be 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 index has three to five indicators, and each of these in turn has up to seven measures.

The list of indices and indicators for the Mauri of Waterways Kete is shown in Figure 4-10, however given the full set of worksheets for this kete runs to 20 pages, only a sample of the assessment forms are shown. Figure 4-11 and Figure 4-12 show:

- Index 1: Extent to which Local Authorities Protect Mauri
- Indicator 3: Whether territorial local authorities act to protect mauri

- Measure 4: Territorial Local Authorities have a track record in the protection of mauri

and Figure 4-12 shows:

- Index 5: Physical evidence that mauri is protected
- Indicator 4: Characteristics of waterway inhabitants
- Measure 3: Health of fish present.

Figure 4-13 shows the penultimate page of the overall scoring form, to give readers an idea of how the tool works as a whole and the range of measures in the kete.

Contents of Kete 2 - Mauri of Water	
KAUPAPA:	MAURI
TIKANGA:	MAURI OF WATER
OUTCOME:	THE MAURI OF ALL WATERWAYS ARE IN OPTIMUM HEALTH
Index 1:	Extent to which local authorities protect mauri
Indicator One:	Whether respondent agrees that Local Authority actively protects mauri
Indicator Two:	Whether Territorial Local Authority documents contain provisions to protect mauri
Indicator Three:	Whether territorial local authorities act to protect mauri
Index 2:	Extent to which tangata whenua protect mauri
Indicator One:	Whether respondent agrees that tangata whenua actively protect mauri
Indicator Two:	Whether tangata whenua have management documents with provisions designed to protect mauri
Indicator Three:	Whether tangata whenua act to protect mauri
Index 3:	Extent to which other agencies protect mauri
Indicator One:	Whether respondent agrees that other Government agencies actively protect mauri
Indicator Two:	Whether agency takes measures to foster understanding of mauri
Indicator Three:	Whether agency has strategies designed to protect mauri
Index 4:	Extent to which actions of the wider community affect mauri
Indicator One:	Whether respondent agrees that actions of the wider community affect mauri
Indicator Two:	Extent to which individuals and groups are informed about mauri and how it should be protected
Indicator Three:	Whether individuals and groups take active measures to protect mauri
Index 5:	Physical evidence that mauri is protected
Indicator One:	Whether respondent agrees that mauri is protected
Indicator Two:	Characteristics of the water
Indicator Three:	Characteristics of the waterway and its immediate environment
Indicator Four:	Characteristics of waterway inhabitants.
Indicator Five:	Presence of potential human threats

FIGURE 4-10: THE CONTENTS, INCLUDING INDICES AND INDICATORS, FOR THE MAURI OF WATERWAYS KETE. SOURCE: JEFFERIES AND KENNEDY (2009B)

Measure 4. Territorial Local Authorities have a track record in the protection of mauri

Level	Description	Ideal	Actual
Level 5	A large number of Council activities contribute significantly toward the improvement of the mauri of waterways		
Level 4	Council activities have had a slightly positive effect on the mauri of waterways		
Level 3	Council activities have had a neutral effect on the health and protection of mauri		
Level 2	Council activities have had a slightly negative effect on the mauri of waterways		
Level 1	Evidence suggests that overall Council activities have a strongly negative effect on mauri		
Other / Comments			

FIGURE 4-11: INDEX 1, INDICATOR 3, MEASURE 4 FROM THE MAURI OF WATERWAYS KETE. SOURCE: JEFFERIES AND KENNEDY (2009B)

Measure 3. Health of fish present

Level	Description	Ideal	Actual
Level 5	All specimens are healthy		
Level 4	Very rarely unhealthy or dead fish found		
Level 3	Sometimes unhealthy or dead fish found – but in small numbers		
Level 2	Frequently unhealthy or dead fish found – increasing numbers		
Level 1	Unhealthy or dead specimens are common		
Other / Comments			

FIGURE 4-12: INDEX 5, INDICATOR 4, MEASURE 3 FROM THE MAURI OF WATERWAYS KETE. SOURCE: JEFFERIES AND KENNEDY (2009B)

Index 3: Extent to which other agencies protect mauri		
Indicator One: Whether respondent agrees that other Government agencies actively protect mauri		
	Indicator Score (Maximum Score = 5)	
Indicator Two: Whether agency takes measures to foster understanding of mauri		
	Indicator Score (Maximum Score = 5)	
Indicator Three: Whether agency has strategies designed to protect mauri		
	Indicator Score (Maximum Score = 5)	
Index 3 Score (Maximum Score = 15)		
Index 4: Extent to which actions of the wider community affect mauri		
Indicator One: Whether respondent agrees that actions of the wider community affect mauri		
	Indicator Score (Maximum Score = 5)	
Indicator Two: Extent to which individuals and groups are informed about mauri and how it should be protected		
	Indicator Score (Maximum Score = 5)	
Indicator Three: Whether individuals and groups take active measures to protect mauri		
	Indicator Score (Maximum Score = 5)	
Index 4 Score (Maximum Score = 15)		
Index 5: Physical evidence that mauri is protected		
Indicator One: Whether respondent agrees that mauri is protected		
	Indicator Score (Maximum Score = 5)	
Indicator Two: Characteristics of the water		
1	Water is safe to drink (Maximum score = 2)	
2	Water clear so that the stream bottom can be seen	
3	Absence of visible foam on the water surface	
4	Water has a natural taste (Maximum score = 2)	
5	Water has natural smell (Maximum score = 3)	
6	Water feels oily when rubbed between the fingers	
7	Sediment/slime absent on riverbed	

FIGURE 4-13: PENULTIMATE PAGE OF THE SCORING SHEET FROM THE MAURI OF WATERWAYS KETE. SOURCE: JEFFERIES AND KENNEDY (2009B)

Type of data collected

Assessments and evaluations of a range of measures affecting the mauri of a waterway

Designed for use by

Iwi and hapū, councils and Crown agencies

Places used

Trialled with Ngāti Maru in Hauraki, Ngāti Awa of Whakatāne, Bay of Plenty Regional Council and with the Matamata-Piako District Council.


Considerations

The three kete together – Mauri of Waterways, Mana Whenua and Wāhi Tapu – provide a comprehensive, well-researched, kaupapa-Māori framework for assessing a range of factors deeply important to iwi and hapū. While the framework is intentionally designed to be usable by iwi nationally, it is, as always, up to local iwi and hapū to determine whether this tool suits their needs.

References

Jefferies and Kennedy (2009c), Jefferies and Kennedy (2009a), Jefferies and Kennedy (2009b), (Kennedy and Jefferies, 2009a, Kennedy and Jefferies, 2009c)

4.10 Waikato River Catchment Report Card

Report Card	
Tool name	The Waikato River Catchment Report Card 2016
Designed by	Bruce Williamson (Diffuse Sources Limited), John Quinn (NIWA), Erica Williams (NIWA), Cheri van Schravendijk-Goodman (Waikato Raupatu River Trust). The framework was guided by an advisory rōpū comprising representatives from five Waikato River iwi.
Available from	https://waikatoriver.org.nz/wp-content/uploads/2016/04/TECHNICAL-SUMMARY-FINAL-MARCH-2016.pdf http://versite.co.nz/~2016/19099/ Waikato River Authority National Institute of Water & Atmospheric Research Ltd
Digital version	No
Developed/in use since	2016
Variants	Multiple

Overview

Report cards are a tool used internationally. Their purpose is to use available data to determine whether certain prescribed values are in a healthy state, and to present this in a summarised form. Report cards aim to 'engage stakeholders in environmental management by communicating information from a range of measures in a condensed, relevant and simple message' (Williamson et al., 2016). Report cards tend to have a strong focus on Western science measures, and are not considered a mātauranga Māori Tool per se.

The Waikato Report Card, however, does take available Western science data and analyse it from an iwi perspective, focusing on eight values that support Te Ture Whaimana, the Vision and Strategy for the Waikato River. These values, called taura³⁰, cover the cultural, social, environmental and economic health and wellbeing of the Waikato River catchment. The taura were plaited into a taura whiri, or woven cord, by the report card in order to communicate the state of the awa.

How to use

The report card process involves collecting all known and available data relevant to a catchment and presenting it in an accessible format. As described above, the Waikato River Report Card used taura to categorise all of this data. The report card developers describe the taura as ‘mega-value sets’. These sets and their subsets are outlined here:

Taura (= mega-value set)	A Healthy Waikato River Catchment (= value sub-sets)
Kai	Fisheries and kai (e.g., tuna, whitebait, kōura, ducks)
Water Quality	Water quality (e.g., clarity, nutrients)
Sites of Significance	Sites of significance (e.g., waahi tapu, place names, historic sites, puna)
Ecological Integrity	Ecology Biodiversity Physical character
Experience	Access Human health (e.g., contaminants) Contact recreation (e.g., <i>E.coli</i>) Rubbish Intergenerational response Information / enabling tools Education
Water Security	Water allocation / flow Efficiency and use Environmental flows, hydro ramping
Economics	Economics (e.g., GDP)
Effort	Effort in restoration (e.g., \$ invested)

The data gathered under each of these taura was assessed against specific indicators or by best professional judgement (BPJ) and given a grade of A to D, according to whether it met the following:

- A. Excellent – delivers in full on the Vision & Strategy for a healthy Waikato River
- B. Good – delivers in part on the Vision & Strategy for a healthy Waikato River
- C. Low – delivers on only some of the Vision & Strategy for a healthy Waikato River
- D. Poor – does not deliver on the Vision & Strategy for a healthy Waikato River

³⁰ rope

The indicators and BPJs for two of the taura are shown below, as examples. Examples of some of the other indicators in the remaining taura include physical access, median values for total nitrogen, microbiological quality (median readings for *Escherichia coli* at all flows and for the bathing season) and chlorophyll median and maximum values.

The Ecological Integrity Taura

The Ecological Integrity Taura captures the overall wellbeing and biodiversity of species in the catchment, and the health of the ecosystems that naturally support them.

Indicator Group	Indicators and/or Best Professional Judgement (BPJ)
Water quality and sediment	Dissolved oxygen, temperature, ammonia, dissolved As, sediment As, sediment Zn.
Riparian Condition	Riparian (native, exotic, buffer) vegetation, fencing and shade.
Habitat	Presence of native and exotic plants, periphyton, macrophytes, macroinvertebrates.
Fish	Native fish diversity, exotic fish diversity.
Connectivity	Fish passage (dams, culverts, flood gates, tide gates, pumps in the lower Waikato) and hydrology.

The Kai Taura

The Kai Taura covers information about species harvested by tangata whenua and the wider community.

Indicator Group	Indicators and/or Best Professional Judgement (BPJ)
Tuna	Recruitment, relative abundance, condition.
Whitebait	Recruitment, abundance.
Kāeo / Kākahi	Relative abundance, condition, size distribution.
Kōura	Relative abundance, distribution.
Piharau	Recruitment, relative abundance, size composition.

Trout	Recruitment, relative abundance, size composition, condition.
Waterfowl	Relative abundance, regulations, diversity of available species.

The assessments were applied at 17 sites throughout the catchment, with an overall grade given to the entire catchment, as shown in Figure 4-14:

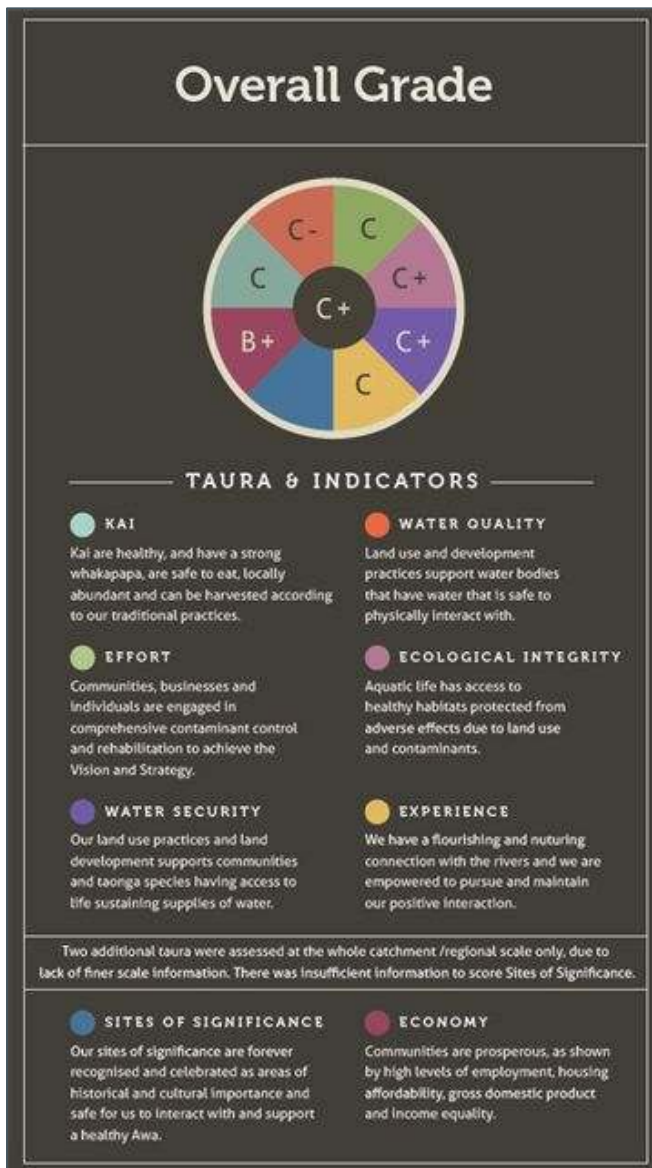


FIGURE 4-14: OVERALL CATCHMENT GRADE

Type of data collected

Data included available information (e.g. from regional council and Western science monitoring programmes) and the best professional judgements of personnel who have worked in the catchment for many years (including staff from Waikato Regional Council, Fish and Game and NIWA). It did not involve collecting new, kaupapa Māori-based data.

Designed for use by

The report card approach is generally designed for use by technicians and Western scientists, to make information available to iwi and the public.

Places used

Waikato River catchment.

Considerations

While this tool is useful for communicating the state of the awa back to iwi, hapū and river communities, it does not, as such, collect data from a mātauranga Māori perspective.

References

Williamson et al. (2016)

4.11 State of the Takiwā

State of the Takiwā	
Tool name	Takiwā 3.0
Designed by	Craig Pauling (Te Rūnanga o Ngāi Tahu, Boffa Miskell), Barry Mattingly (Environmental Science and Research New Zealand) in collaboration with MfE, Manaaki Whenua Landcare Research, NIWA, Evirolink, Southern Community Labs, Environment Southland, and Environment Canterbury. Further development was undertaken by Dr Chris Hepburn (University of Otago), Nigel Scott, Dr Daniel Pritchard and Iain Gover (all from Te Rūnanga o Ngāi Tahu).
Available from	Archival material for the Takiwā tool is available from Ngāi Tahu on https://www.takiwa.org.nz . This page also has some digital support tools, such as an R-package. The Takiwā project is now continuing only as an internal Ngāi Tahu project.
Digital version	No. The Takiwā database was digital, but the field forms were paper-based and there is no app to enter data in the field.
Developed/in use since	The monitoring plan was first in use in 2005 but has since been archived by Te Rūnanga o Ngāi Tahu.
Variants	Yes – marine. See https://dpritchard.ocpu.io/ntstatR/www/statm.html .

Overview

State of the Takiwā was an environmental monitoring approach that integrated Māori cultural values and Western science measures. State of the Takiwā was developed by Te Runanga o Ngāi Tahu as part of their 'Ki Uta Ki Tai – Mountains to the Sea Natural Resource Management' framework. It incorporated a specially designed database and print centre and so that Ngāi Tahu could develop its own monitoring and reporting programme.

The primary aim of the Takiwā database was to collect and store data and make information available to tāngata whenua to help them identify and quantify the current or changing quality of a particular site, and to be able to report this data in an easy, clear and repeatable way.

The Takiwā tool provided a diagnostic tool for identifying issues (and sites) of concern to iwi and allowed for remedial action to be prioritised, implemented and monitored for performance over time.

How to use

Takiwā Site Assessment Module

The State of the Takiwā monitoring forms could be printed directly from the database to gather information about sites and store and report data from the field. Takiwā monitoring recorded observations and assessments by tāngata whenua for a particular site using three main forms:

1. The Site Definition form (e.g. names, site location, special features, heritage/site significance and historical information, with GPS reference);
2. A Visit Details form that recorded visit-specific aspects (e.g. date and time, photographic references); and
3. A Site Assessment form, which was completed by individual members.

In order to grade and compare sites and visits, index calculations were included within the database. This involved ranking site health using a sliding scale of 1 to 5 (1 for worst and 5 for best) for:

- overall health/state of the site;
- levels of modification/change at the site;
- suitability of the site for harvesting mahinga kai;
- access issues;
- amount of pressure from external factors;
- presence, abundance and diversity of taonga bird, plant and fish species, and other culturally significant resources as well as pest and weed species; and
- willingness to return to the site for harvesting mahinga kai.

These questions served to give an indicative score or grade for the overall health of the site (the Health Index Score). The second part of the Site Assessment form included the

Species Abundance Index where a weighting was given to relative abundance (few/some/many), and within which details from the Cultural Health Index for waterways (CHI), Stream Health Monitoring and Assessment Kit (SHMAK), electric fishing surveys and *E. coli* testing could also be included.

Data Management and Interpretation

The Takiwā database gave tāngata whenua the ability to manage the data gathered in a way that was appropriate to them. It included a data transfer module that allowed for the centralised storage of data. This in turn enabled regional and national collection, analysis and reporting of cultural monitoring data. The transfer module worked by allowing users to export and import selected data. If an agency wanted access to any data held within Takiwā they would first need to get the approval of tāngata whenua.

Takiwā Reporting Functions

Tāngata whenua could use the Takiwā tool to analyse and report on monitoring activities and interpret their own data through a printable query and reporting function. This was possible through a 'print centre' that offered a range of different reports for sites, visits and questionnaires. These reports could also be exported to Word or Excel to assist in report writing and graphic representations of the data.

Type of data collected

The data collection included Takiwā site assessments and monitoring, *E. coli* water testing, CHI (site status, mahinga kai, cultural stream health and overall CHI), SHMAK assessments and electric fishing surveys.

Designed for use by

The State of Takiwā tool was developed for Ngāi Tahu to monitor environmental health in their rohe.

Places used

Throughout the South Island:

- 12 sites in the Waiau River catchment for a pilot study
- 100 sites in 20 catchments to test and refine the method and develop a report on the health of freshwater resources of Te Waipounamu from a cultural perspective
- Te Waihora/Lake Ellesmere
- O Tu Wharekai/The Ashburton Lakes
- the Avon-Heathcote Estuary and Catchment and
- the Ruataniwha/Cam River.

Considerations


There was a substantial amount of work involved in establishing the State of the Takiwā tool. Although it has been archived, it provides a valuable resource to iwi throughout the country as to what is possible for monitoring and reporting. Other iwi may wish to

investigate establishing versions in their own areas. It also provides a valuable model for how mātauranga Māori-based data can be protected by iwi, for iwi.

References

Pauling (2010), Pauling et al. (2007), Pauling et al. (2005), Pauling (2003), Te Rūnanga o Ngāi Tahu (2001), Pauling (2004)

4.12 Mātauranga Māori Knowledge Networks

Knowledge Networks	
Tool name	Mātauranga Māori Knowledge Networks
Designed by	Antoine Coffin (Te Onewa Consultants) with support from Jacqueline Henry (Waikato Regional Council) and John Quinn (NIWA).
Available from	https://www.waikatoregion.govt.nz/assets/PageFiles/40444/3504062.pdf
Digital version	No
Developed/in use since	2015
Variants	No

Overview

Mātauranga Māori Knowledge Networks examines factors affecting river quality from a Māori perspective. As a project, it was designed to support the Technical Leaders Group who in turn assisted the Collaborative Stakeholder Group deliberating on the Healthy Rivers Plan Change to the Waikato Regional Plan. The project identified key subject areas for monitoring freshwater from a Māori point of view as:

- swimming in rivers (kaukau),
- mahinga kai/hauanga kai species, and
- special characteristics of rivers from a river iwi perspective.

The research identified two interconnected perspectives for Waikato River iwi. The first is that “the river, stream or lake is an entity in itself that includes the land, the water, the rocks, the air, the living plants and animals, and the spiritual dimension of place”. The second related to the qualities of the water. These two things were inseparable. The Mātauranga Māori Knowledge Networks approach can be used as a model for iwi and councils wishing to research important aspects for freshwater monitoring locally.

How to use

The approach used in this project was to conduct a literature review, undertake hui with individual river iwi, and run a one-day, catchment-wide River Iwi Mātauranga workshop. The research identified that swimming is important as more than just a recreational pass-time, but that it provided connections to place and continuation of iwi mātauranga. Factors affecting swimming were identified, and included: poor water quality (faecal bacteria and low clarity), algal blooms, access, low flows, weeds, bank erosion, pest fish, sediment build up and more. These were used to develop attributes from a river iwi perspective (Table 4-6). This process could be used to construct a monitoring programme for swimming that includes mātauranga Māori, and meets iwi aspirations around what aspects are monitored. The same process was undertaken for mahinga kai and special characteristics, resulting in suggested attributes and measures of those attributes for both of those aspects as well.

TABLE 4-6: SUGGESTED ATTRIBUTES, STATES AND NARRATIVES RELATING TO SWIMMING FOR THE WAIPĀ AND WAIKATO RIVERS, FROM A RIVER IWI PERSPECTIVE. SOURCE: COFFIN (2015)

Attribute	Attribute State	Attribute Narrative
Waitemata (water clarity)	Swimmers can see the bottom of the swimming place.	To be reassured it is safe and familiar.
Te Rere (flows)	The historic flow of the water, speed and quantity.	
Paemakariri (temperature)	Historic temperature of swimming places in rivers and lakes.	Rivers and lakes would have cooler temperatures (than oceans and swimming pools for example).
Waipara (settled sediment and periphyton)	Sediment < 2 cm, periphyton < 20% cover.	The feel of the bottom of the swimming place with the feet is a consistent test of swimmability for River Iwi.
Haumaru (safety)	The presence of debris and unseen rocks in the waterbody that is a hazard to human health.	
Mātauranga ki ngā waikaukau	The knowledge and traditions related to	

	swimming in particular places are held by current generations.	
Pareparenga o te wai (riparian margin)	Vegetation, stability and access of river or lake bank.	The river margin provides access and its physical characteristics influence acceptability for swimming.
Ara ki te wai (access)	The ability to access the swimming place from a public reserve, road or walkway.	Vegetation, fencing or structures may prevent or discourage access to a swimming place.

Designed for use by

Iwi, in conjunction with researchers and regional councils.

Places used

Waikato and Waipā River catchments

Type of data collected

Hui notes, interviews, information from available literature


Considerations

This is not a ‘tool’ as such, but provides useful examples of how a monitoring programme might be collaboratively developed between iwi and council. Furthermore, the research involved collecting sensitive information, and how this was protected and managed could prove a helpful model for other situations. The same considerations apply here as for other approaches, in terms of iwi and hapū retaining the decision-making power on whether this method would suit local needs.

References

Coffin (2015)

4.13 Significance assessment method

Significance assessment method	
Tool name	Significance assessment method for tangata whenua river values.
Designed by	Gail Tipa (Tipa & Associates)
Available from	Tipa (2010)
Digital version	No
Developed/in use since	2010
Variants	No

Overview

The significance assessment method provides guidance on how to apply the RiVAS approach to assess iwi and hapū river values. RiVAS (Hughey and Booth, 2012) is a standardised method to help resource managers grade rivers by relative importance for different uses. The significance assessment method discussed here is based on four overarching principles from the Māori world view: Te Wairua, Māoritanga, Kaitiakitanga and Mahinga Kai. The four overarching principles and concepts are accompanied by a set of attributes. These are used to help measure significance from a cultural perspective.

The significance assessment method was applied in Murihiku with the Iwi Resource Management Plan for the Murihiku region Te Tangi a Tauria as its starting point.

How to use

There are two main steps when using the Significance Assessment Method:

- Developing the assessment criteria – this involves identifying all attributes, selecting the primary attributes, and identifying and applying indicators for those attributes. Indicators must be quantifiable, or able to be assessed by an expert panel

- Determining the significance – this involves evaluating scores given to indicators against significance thresholds, determining the overall significance of the river from the combined indicator scores, and outlining any factors that can't be quantified.

Development of the assessment criteria

In the Murihiku project, a comprehensive list of 64 initial attributes was developed. This included matters such as taonga pounamu, takiwā, marae and koha under the Māoritanga category, rangatiratanga, mauri, and ki uta ki tai under the Wairua category, kaumātua, uri, waipuna and mana whenua under the Kaitiakitanga category, and nohoanga and tauranga ika under the Mahinga kai category. A final list of attributes was selected from this comprehensive list. In order to be considered a primary attribute, attributes had to be:

- able to be used to distinguish between catchments and sub-catchments;
- able to be described by physical features of a catchment;
- able to be assessed by a quantifiable indicator; and
- related to something tangible.

An iterative process of refinement concluded with the development of the following key attributes and indicators for assessment of Murihiku river values.

Attribute	Indicators for the attribute
Ngā Takiwā o ngā awa	Variable flow
	Source protected
	Connections to groundwater/surface water
	Continuous flow source to sea
	Natural river mouth
	Ecosystem integrity
	Passage/movement of sediment
	Mostly native/little or no invasive species
Wai	Character of different water bodies protected
	Continued utility of different water bodies
	Connections – riparian to water
	Quality of waters in different water bodies protected

Settlements	Nohoanga, kaika, marae have a safe water supply
Mahinga kai	Presence of mahinga kai species – known sites
	Healthy condition of target species and fit for use
	Passage throughout catchment
	Abundance populations of target species
Wāhi ingoa	Place names as indicators of condition of awa
Access	Satisfactory physical access for tangata whenua

Determining the significance

The attributes and indicators were then placed into a wider framework that allowed for the overall significance assessment to be undertaken. The framework is a four-part, eight step process of which the indicators are the final step (Table 4-7). Scores are given at steps 2 – 8, and an average of these determines the overall ranking for that river. Scores of 1.0 – 1.5 indicate lesser significance, 1.51 – 2.5 indicate moderate significance, and 2.51 – 3.0 higher significance.

TABLE 4-7: THE FOUR-PART FRAMEWORK FOR A SIGNIFICANCE ASSESSMENT METHOD TO APPLY THE RIVAS APPROACH TO IWI AND HAPŪ VALUES. SOURCE: TIPA (2010).

Preparation – identify wahi tapu and taonga	Step 1: Define river segments
	Step 2: Identify wāhi tapu/wāhi taonga
Part A – Assessment of taonga	Step 3: Assign significance of river/reach
	Step 4: Assess condition
	Step 5: Assess reversibility/potential for restoration
	Step 6: Assess risk based on known threats
Part B – Assessment of use	Step 7: Assess as being fit for cultural use
Part C – Assessment of indicators of attributes	Step 8: Apply indicators to assess health of river system.

Type of data collected

Recordings and transcripts, maps, photographs and diagrams, lists of reaches and wāhi taonga, species data, record and assessment sheets, and various other notes, planning papers and reports.

Designed for use by

Iwi and researchers or natural resource managers, in conjunction.

Places used

Murihiku

Considerations

The developer of the method notes that there are issues inherent in the approach, in that it may conflict with the Māori worldview. Participants in the Murihiku study raised concerns around the very concept of ranking rivers, stating that all waters are important and of high significance, and therefore a method of ranking is not required. This is likely to ring true for many iwi. As such, the method may not be acceptable or relevant to some, or even many, iwi and hapū. Decisions on using this approach need to rest with iwi and hapū.

References

Tipa (2010)

4.14 Tools, methods and frameworks not covered

Some tools, methods and frameworks were not able to be summarised as part of this report, due to time constraints. A list of these is provided in Table 4-8.

TABLE 4-8: OTHER TOOLS, METHODS AND FRAMEWORKS CONNECTED WITH MONITORING FRESHWATER FROM AN IWI AND HAPŪ PERSPECTIVE

Name or article title	Reference
Waiora, Wai Māori, Waitai, Waikino, Waimate: Māori perceptions of water and the environment	Douglas (1984)
The Waikōura Framework: a bicultural systems model for management of Lake Rotorua	Wilson-Rooy (2018)
Murihiku Cultural Water Classification System	Kitson et al. (2018)
Toreparu wetland assessment approach	Robb (2014)
Kaitiaki Tools	https://www.niwa.co.nz/freshwater/management-tools/water-quality-tools/kaitiaki-tools
Impacts of Bioaccumulative Contaminants in the Te Waihora Catchment on Mahinga Kai Gatherers: Data Report and Risk Assessment	Stewart et al. (2014)
Ngā Waihotanga Iho: Iwi Estuarine Monitoring Toolkit	Rickard and Swales (2009a), Rickard and Swales (2009b)
How the use of rāhui for protecting taonga has evolved over time	Maxwell and Penetito (2007)
Whakarongotai o te Moana, Whakarongotai o te Wā: Kaitiaki Information and Monitoring Framework Project Report	Baker (2018)

5 Indicators – range and commonalities

It is useful to compare attributes across the tools, to determine which aspects are common across the tools. This gives some indication as to matters iwi and hapū most often see as important in assessing freshwater from a kaupapa Māori perspective. Comparison across the tools also allows iwi and hapū to quickly look up whether a particular tool might cover the areas they are interested in monitoring, and therefore provides useful information for decision-making.

Table 5-1 provides an overview of the various indicators and attributes used in the tools, frameworks and methods included in this report. It allows a quick comparison of the range of indicators across the approaches, and those most commonly included in kaupapa Māori-based assessments. The far-right column shows how many times an indicator is used across the various tools, with colour coding of the highest to lowest number of times it appears (dark blue is high occurrence, blue is medium occurrence, and light blue is lower occurrence). Most of the tools described in this report are designed to be easily customised to local iwi and hapū priorities and needs, so it is important to remember that the indicators and attributes summarised in this table are indicative of current variants only, and that the tools themselves are generally very adaptable. Having said that, the table is useful for:

- Understanding which indicators are most commonly determined by iwi and hapū as important to assess
- Assisting iwi and hapū to decide between different tools and determine which might best suit their needs.

The reader will note that the most common aspects included as indicators in kaupapa Māori assessments covered in this report were:

- Mauri
- Iwi health and well-being
- Tikanga and cultural practices
- Sites of significance
- Fish and mahinga kai species presence/absence
- Species abundance
- Species health
- Food safety
- Access
- Availability of mahinga kai (links with species abundance above)
- Landscape-level habitat and catchment land use
- Riparian habitat and
- Water quality parameters (clarity, pH, temperature, dissolved oxygen etc)

These indicators come from five key areas: meta-physical aspects, cultural and social aspects, species information, mahinga kai aspects, and ecology, water quality and habitat aspects. This illustrates that monitoring plans that include mātauranga Māori

will need to cover a broad range of matters in order to meet iwi and hapū aspirations and understandings around what is important for monitoring.

Policy and Planning Committee - Kaupapa Maori Freshwater Assessments report and Wai Maori working group

TABLE 5-1: THE OCCURANCE OF ATTRIBUTES AND INDICATORS ACROSS VARIOUS KAUPAPA MĀORI ASSESSMENT TOOLS, METHODS AND APPROACHES. IN THE FAR RIGHT COLUMN, DARK BLUE INDICATES HIGH OCCURRENCE, BLUE IS MEDIUM OCCURRENCE, AND LIGHT BLUE IS LOWER OCCURRENCE

Attribute or Indicator	Tool	Taonga Species Monitoring	Cultural Health Index (original version)	Mauri compass	Mauri model/Mauri-o-meter/Ngāti Mākino Model	Cultural Flow Preference Study	Wai Ora Wai Māori	Cultural Mapping - Rangitaane o Manawatu case study	National Monitoring Approaches and Indicators of Wetlands	Mauri of Waterways Kete	Waikato River Catchment Report Cards	State of the Takiwā	Mātauranga Māori Knowledge Networks	Significance Assessment Method	Number of tools using this attribute or indicator
Meta-physical aspects	Mauri			yes	yes	yes, but not as a direct measure	yes	yes	yes	yes			yes	yes	9
	Wairua and spiritual practices			yes	can do	yes	yes	yes					yes	yes	7
Unique aspects of the waterbody	Voice				can do	yes		yes					yes	implied	5
	Smell				can do		yes	yes					yes		4
	Special character				can do	yes					yes		yes	yes	5
Cultural and social aspects	Iwi health and well-being	yes, as an inherent element		yes	can do	yes	yes	yes		yes			yes	yes	9
	Tikanga and cultural practices	yes, as an inherent element	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	yes	12
	Sites of significance	yes	yes		can do	yes	yes	yes	yes		yes	yes	yes	yes	11
	Significance of place or catchment		yes		can do	yes		yes			yes	yes	yes	yes	8
	Gut feeling about a place				can do	yes		yes							3
Species aspects	Stream insect measures			yes	can do			yes		yes					4
	Fish and mahinga kai species presence/absence	yes	yes	implied	can do	yes		yes	yes	yes	yes	yes	yes	yes	11
	Abundance (links with Mahinga Kai - Availability)	yes		yes	can do	yes	yes	yes	yes	yes	yes	yes	yes	yes	12

Policy and Planning Committee - Kaupapa Maori Freshwater Assessments report and Wai Maori working group

Attribute or indicator	Tool	Taonga Species Monitoring	Cultural Health Index (original version)	Mauri compass	Mauri model/Mauri-o-meter/Ngāti Mākino Model	Cultural Flow Preference Study	Wai Ora Wai Māori	Cultural Mapping - Rangitaane o Manawatu case study	National Monitoring Approaches and Indicators of Wetlands	Mauri of Waterways Kete	Waikato River Catchment Report Cards	State of the Takiwā	Mātauranga Māori Knowledge Networks	Significance Assessment Method	Number of tools using this attribute or indicator
	Growth rates	yes		yes							yes	yes		yes	5
	Species health	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	12
	Invasive/exotic species				can do		yes	yes	yes		yes	yes	yes	yes	8
Mahinga kai	Food safety	yes		yes	yes	yes	yes	yes	yes (implied)	yes	yes	yes	yes	yes	12
	Water safety			yes	yes	yes		yes			yes		yes		6
	Access	yes	yes		can do	yes	yes	yes			yes	yes	yes	yes	10
	Availability (links with Species aspects - Abundance)	yes	yes	yes	can do	yes	yes	yes	yes		yes	yes	yes	yes	12
Ecology, water quality and habitat	Landscape-level habitat/catchment land use	Depends on the study	yes	yes	can do	yes	yes	yes	yes		yes	yes	yes	yes	12
	Riparian habitat	Depends on the study	yes	yes	can do		yes - implied	yes	yes (in wetland context)		yes	yes	yes	yes	11
	Water quality parameters e.g. clarity, pH, temperature, dissolved oxygen	Depends on the study	yes	yes	can do			yes		yes	yes		yes	implied	9
	Sediment issues	Depends on the study	yes		can do	yes		yes, including gravel extraction issues			yes		yes	yes	8
	Algae and plant issues	Depends on the study	yes		can do			yes			yes	yes	yes	implied	8
	overall degree of modification or health		yes			yes	yes				yes	yes	yes	implied	7
	habitat variability		yes		can do			yes		yes	yes				5

Policy and Planning Committee - Kaupapa Maori Freshwater Assessments report and Wai Maori working group

Attribute or Indicator	Tool	Taonga Species Monitoring	Cultural Health Index (original version)	Mauri compass	Mauri model/Mauri-o-meter/Ngāti Mākino Model	Cultural Flow Preference Study	Wai Ora Wai Māori	Cultural Mapping - Rangitaane o Manawatu case study	National Monitoring Approaches and Indicators of Wetlands	Mauri of Waterways Kete	Waikato River Catchment Report Cards	State of the Takiwā	Mātauranga Māori Knowledge Networks	Significance Assessment Method	Number of tools using this attribute or indicator
Water quantity						yes				yes	yes		yes		4
Hydrology and geomorphology	Degree of hydrological modification				can do				yes			yes	yes		4
	Channel modification		yes		can do									yes	3
	Continuity of flow from source to sea				can do	yes				yes	yes			yes	5
Pollution	Sources of pollution				yes				yes	yes	yes				4
Potential for restoration				yes	can do	yes		yes			yes	can do		yes	7
Risk to site, waterbody or catchment					can do	yes		yes			yes			yes	5
Other								birdlife, ngahere taonga, rongoā			contact recreation, inter-generational response, navigation, fish passage	willingness to return to the site.	swimming (kaukau), ability to exercise rangatiratanga, fish passage	tauranga waka	5

6 Case studies

CASE STUDY:

Kanakana





Waikawa Whānau member Maddison Leith holding a kanakana caught during research into her kanakana population in the Waikawa River.

6.1 Taonga species monitoring – Kanakana in the Waikawa³¹

All information discussed in this section is sourced from Waikawa Whānau reports (Kitson et al., 2012, Kitson, 2017, Kitson et al., 2010).

WHY UNDERTAKE TAONGA SPECIES MONITORING?

Taonga species monitoring covers a number of different approaches, addressing different needs for different whānau, hapū and iwi. One common factor in taonga species monitoring across the country, however, is a desire amongst iwi members to understand what is happening to species that are important locally, how healthy the populations are and what the outlook for these species is in the future. This arises out of a drive to protect tikanga and mātauranga around these species, and to ensure that uri whakatupu are able to eat these species in the same way as our tupuna did. It is akin to the drive to protect our reo and tikanga, as the ability to harvest and serve these taonga species is an indicator of the health of our waters, our iwi and ourselves.

For Te Rūnanga o Awarua and Waikawa Whānau in Murihiku, the focus for taonga species monitoring is kanakana, or lamprey (*Geotria australis*), as kanakana are a taonga species to Ngāi Tahu. Those within the iwi with the knowledge of and responsibility for the kanakana harvest were deeply concerned about declines in

³¹ Although the primary report author is from Te Āti Hau-nui-ā-Pāpārangī and would usually use the term *piharau*, kanakana is used for this case study as this is the word used by the whānau undertaking the work.

kanakana numbers. This prompted the instigation of a research programme to look at the Waikawa kanakana population.

WHAT ARE SOME OF THE ASPECTS INVESTIGATED?

The first research undertaken by the Waikawa Whānau investigated kanakana abundance, with experienced harvester Vincent Leith doing a total of 78 visual counts of kanakana numbers at Mangai Piri in the Waikawa River for an hour per night between July and October 2009. These counts were compared with rainfall, flow, and moon phase (Figure 6-1). The whānau also documented important indicators of a kanakana run.

The 2009 season was poor for kanakana, making the analysis of results difficult for the whānau. Vincent Leith observed that the low abundance was due to low water levels in the river preventing kanakana migrating upstream. Based on the harvester's knowledge of kanakana behaviour, the whānau also determined that counts would be better undertaken during the daily peak in the run – in this case in the early hours of the morning, as opposed to in the evening.

The research identified that iwi mātauranga indicators of kanakana runs are:

- rainfall and freshes – runs usually occur during rain or increased flow
- koau (shags) presence – koau hang around the river to catch kanakana
- dark nights – kanakana are more likely to run in dark moon phases
- fish colour – the blue of kanakana freshly returned from sea
- other tohu, such as water temperature and quality.

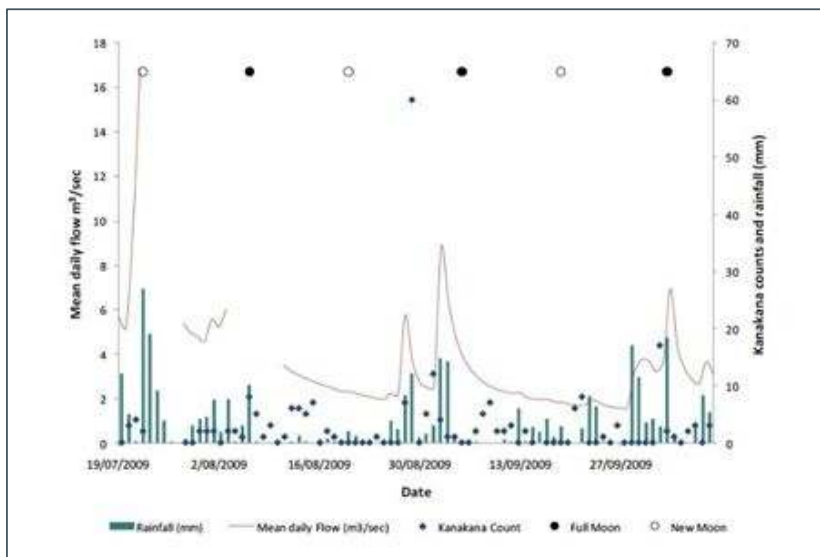


FIGURE 6-1: KANAKANA COUNTS, MEAN DAILY FLOW (M3/SEC), RAINFALL (MM) AND MOON PHASE OVER THE 2009 MONITORING PERIOD IN THE WAIKAWA RIVER. SOURCE: KITSON ET AL. (2010).

ANALYSIS

Following on from this research, the whānau wanted to test the relationship between the visual counts and fish numbers in the river. To do this, they used a DIDSON (Dual-Frequency Identification Sonar) acoustic camera. These cameras can detect fish at night and in low visibility water conditions.

Harvester Vincent Leith undertook seven, hour-long visual counts, this time in September 2010. Whānau set up the DIDSON to run continuously for 11 days during the same period. Water level, temperature, turbidity and conductivity were also measured, and of these level and temperature were later used in modelling.

Some practical matters made analysis difficult. For example, higher flows just prior to the beginning of the experiment triggered a kanakana run, and then there were no large runs during the monitoring period. The distance between DIDSON site and the count site created a lag, with a difference in numbers at the two sites meaning the first night of observations had to be discarded. The nightly monitoring was hard on the observer and led to fatigue. And lastly, it was difficult to find a site suitable to install the DIDSON.

Despite these challenges, the research found a good correlation between the different count methods (Figure 6-2). The whānau also found that water level, time of day and water temperature had strong relationships to the DIDSON counts, but not strong enough results to say when in particular monitoring should occur, other than dusk and dawn ought to be avoided.

The whānau concluded there are pros and cons to both methods. The DIDSON can provide continuous monitoring, but it is limited as to where it can be physically set up, is expensive (both in hireage and staff time) and requires more time to process the data. Harvest techniques are easy to analyse and support the continuation of key cultural activities such as mahinga kai, but may result in abundance overestimates (considering harvests occur during peak runs) or underestimates (if numbers are too high to count).

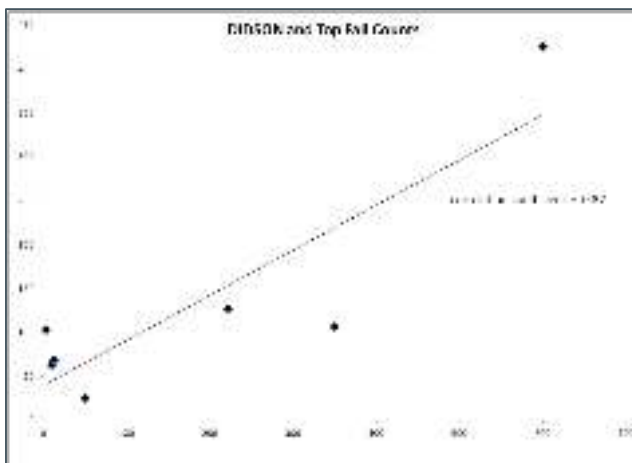


FIGURE 6-2: RELATIONSHIP BETWEEN THE OBSERVER COUNTS AND DIDSON COUNTS OF KANAKANA ON THE WAIKAWA RIVER BETWEEN 2ND AND 10TH SEPTEMBER 2010. SOURCE: J. KITSON ET AL. (2012).

In addition, the whānau completed a literature review to evaluate the suitability of different harvest techniques for use in monitoring. Considering health and safety, efficiency, and usability across a range of flows, they determined that the methods most suitable for adaption to monitoring are visual counts (hand picking of rocks method) and use of hinaki/fyke nets.

WHERE TO NOW FOR TAONGA SPECIES MONITORING IN WAIKAWA?

Te Rūnanga o Awarua and the Waikawa whānau have now launched another research project, in conjunction with NIWA and Kitson Consulting, to investigate habitat for maturing adult kanakana and where they choose to spawn, as well as habitat used by larval kanakana. To do this, they are tracking kanakana movements in the Waikawa using PIT tags, and undertaking pheromone sampling. This work is underway and results will be written up in the near future. However, the research undertaken to date is only some of what the whānau want to explore. Future research questions the whānau are looking at are:

- how well the DIDSON camera and the visual counts work in high flows
- how traditional harvest methods, particularly netting and manual collection, can be used as indices of kanakana abundance
- research on mātauranga and historical information on kanakana abundance, to compare with current abundance data
- distribution of kanakana in the wider Waikawa catchment.

COMMON FACTORS AND LEARNINGS FROM THIS CASE STUDY

- Taonga species monitoring relies heavily on the availability of iwi members with mātauranga of the species, its habitat needs and behaviours, and harvest practices for that species. This makes it even more pertinent to support and care for iwi members with this knowledge.
- Having iwi members with a background in science is helpful in planning research and analysing taonga species monitoring data.
- Taonga species monitoring is about utilising any and all methods that whānau determine appropriate, to answer questions that are important to whānau, about species that are important to whānau. It is whānau-driven for whānau purposes, and helps to ensure continuity of Māori practices for future generations.
- As with all experimental work, there are pros and cons to different methods, and the choice of method depends on the desired outcome.

CASE STUDY:
**Mauri
Compass**



Ian Ruru undertaking a tuna survey as part of the Mauri Compass investigations.

6.2 Mauri Compass study in the Waipaoa River

WHY UNDERTAKE AN ASSESSMENT WITH THE MAURI COMPASS?

As with iwi across the motu, the state of the mauri is very important to Tairāwhiti tangata whenua. Notably, mauri is a compulsory value in the Tairāwhiti Resource Management Plan (freshwater). Te Aitanga a Māhaki iwi members were concerned about the mauri of their awa, the Waipaoa River, as well the status of tuna locally. To investigate these matters, they undertook an eel survey in 2008, and again in 2018, looking at 18 sites near the 12 marae of Te Aitanga a Māhaki. The surveys looked at growth (using otoliths), abundance (using unbaited fyke nets and electrofishing), health (using tuna condition), and how 'normal' the tuna were.

The Mauri Compass was then used to document the state of the mauri in the Waipaoa, and compare the changes between the two survey periods. The Mauri Compass offers a statistically robust means of assessing changes to a range of parameters important to iwi and hapū. It also allows for a visual presentation of data that provides the viewer with a quick and easy understanding of current state across a range of factors.

WHAT DID THEY FIND?

In the 10 year period between the two sampling events, Te Aitanga a Māhaki found a substantial and significant decrease across 10 of the 12 attributes that comprise the Mauri Compass (Figure 6-3 and Figure 6-4). For three attributes (Mahinga Kai, Eel Speices, and Eel Growth Rates) the decline was as high as 75%. Mahinga Kai and the four eel attributes were scored at the lowest value available, '1'. These poor scores are the result of a 90% decline in the number of eels caught during the field studies, from 955 in 2008 down to only 91 in 2018 (Figure 6-5). This decline, in turn, has reduced the connection tangata whenua have with the Waipaoa, reflected in a 33% decrease in the score for the Tangata Whenua attribute. The Wairua attribute remains static at '2' and can only improve if human sewage and mortuary waste is removed from the waterways. The Habitat, Biodiversity, Water Biology (Biohazards) and Water Chemistry (Chemical hazards) attributes have all declined, likely resulting in the detrimental decline of the quantity and quality of eels observed in the river.



FIGURE 6-3: THE TWO MAURI COMPASS DASHBOARDS CLEARLY SHOW THE STARK DECLINE IN THE MAURI OF THE WAIPAQA RIVER BETWEEN 2008 AND 2018.

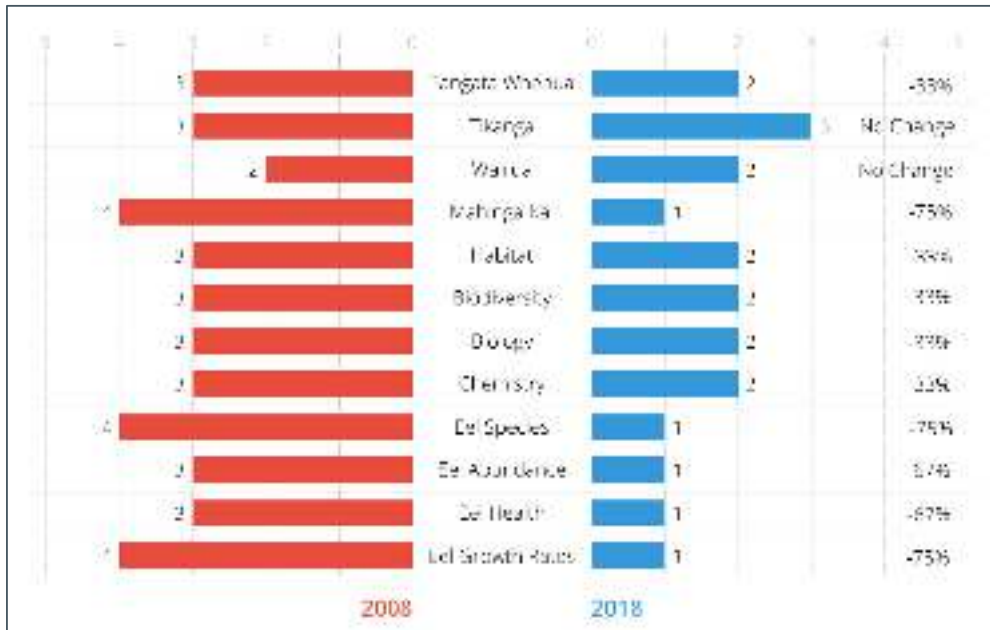


FIGURE 6-4: PERCENTAGE CHANGE IN MAURI COMPASS ATTRIBUTE SCORES FOR THE WAIPAEOA RIVER BETWEEN 2008 AND 2018. SOURCE: IAN RURU

WHAT HAPPENED WITH THE RESULTS?

Te Aitanga a Māhaki were deeply concerned about these results, and have used the Mauri Compass to support their call for a ban on commercial eel fishing in the Waipaoa River until catches are back to their 2008 baseline levels. Ian Ruru’s late father Bill Ruru, who led the original 2008 survey, often joked that he was sick of the sight of eels as a child because it was their staple diet growing up at Waituhi. He pointed out that in less than one generation, those traditions, tikanga (practices) and mātauranga (knowledge) had been lost. Ian Ruru says of the decline: “In 2008 we caught 353 longfins — but only 12 [in 2018]. For shortfins the numbers were 602, now down to 79. The implications for sustaining our 12 marae are huge.”

The Mauri Compass is also providing Te Aitanga a Māhaki with a way forward, giving direction to the iwi about where to focus restoration efforts. As Ian Ruru states, “To stop the decline, Te Aitanga a Māhaki need to rebuild their eel stocks, improve the habitat and water quality and renew their traditions and connection with the Waipaoa. Only then will the mauri of the Waipaoa begin to thrive again.” The iwi also aims to build numbers of tangata kaitiaki who will continue to monitor and intervene in the decline of the mauri of the Waipaoa. Ian Ruru says that primary school, intermediate, high school and diploma level programmes have worked well to build the capacity of Māhaki, and should continue.

The collaborative design process for the Mauri Compass led to other benefits. “The partnership between Te Aitanga a Māhaki and the Gisborne District Council has historically been strained, but tangible improvements through collaborative tools such as

the Mauri Compass bode well for a unified approach to improve the state of the Waipaoa environment and its communities,” says Ian.

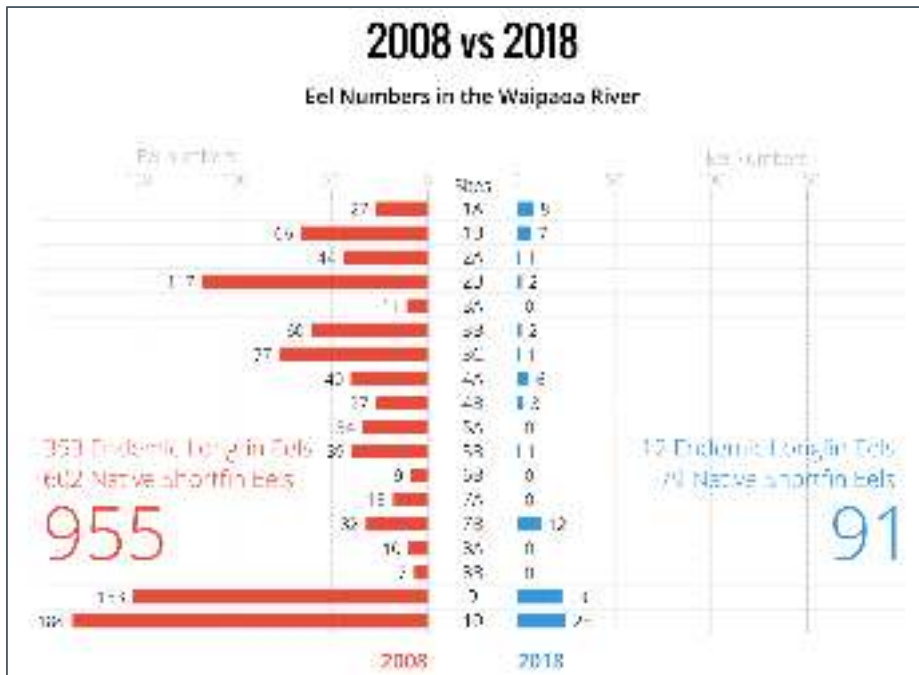



FIGURE 6-5: COMPARISON OF TUNA CATCH IN THE WAIPAOA RIVER IN 2008 AND 2018, SHOWING AN OVERALL DECLINE FROM 955 EELS CAUGHT IN 2008 TO JUST 91 IN 2018. SOURCE: IAN RURU

WHERE TO NEXT FOR THE MAURI COMPASS?

The Mauri Compass is currently being used in a number of situations across Te Tairāwhiti, including state of the environment reporting for the Waipaoa River, guidance for a landfill remediation at Te Pā o Kahu and assessing impacts on the surrounding waterways, and assessing effects on the mauri of the Makauri Aquifer from a recharge trial. Gisborne District Council is also using it to assess compliance with a condition in their wastewater consent, which is, “to improve the mauri and water quality of Tūranganui a Kiwa”. It can be used in both marine and freshwater environments, and is adaptable to a range of projects and circumstances.

COMMON FACTORS AND LEARNINGS FROM THIS CASE STUDY

The Mauri Compass provides a statistically robust and visually accessible assessment of important aspects of the mauri of a waterbody. It can readily be employed to demonstrate changes in the state of a waterbody across time. It is based on species that are important to iwi and hapū, and could be adapted for species other than tuna in other areas, as appropriate. It utilizes tools from both Western and Māori knowledge systems and answers questions that are important to iwi and hapū, making that data usable for environmental advocacy, management and restoration.

<p>CASE STUDY: Tokiāhuru</p>	
	<p><i>The Tokiāhuru Stream, looking upstream, before the intake diverts water through to the Tongariro Power Scheme</i></p>

6.3 The Tokiāhuru cultural flow preference study

Information discussed in this section is sourced from Ngāti Rangī Trust, including the report produced for this work (Hayes et al., 2014). Public information, including a short documentary about the project, can be found at <http://www.ngatirangi.com/nrtgenesis-energy-agreed-flows.aspx>

WHY UNDERTAKE A CULTURAL FLOW PREFERENCE STUDY?

Flow-setting in Aotearoa often uses the Instream Flow Incremental Methodology, or IFIM. This method, however, does not provide information on cultural values relating to flow, such as which flows are necessary for mahinga kai activities, or which flows give an ancestral river its voice back.

On the south-eastern side of Ruapehu lies the Eastern Diversion of the Tongariro Power Scheme. Until recently, this scheme diverted the entire flow of 26 tributaries of the Whangaehu River, for roughly 95% of the year. The diverted waters travelled through 22 intake structures, into an aqueduct and on to Moawhango Dam. From there they flowed north through to the Tongariro, on to Taupō and into the Waikato. They were not returned to the Whangaehu catchment.

After lengthy court battles, in 2010 Ngāti Rangī and Genesis Energy signed a relationship agreement that (amongst other things) sought to determine 'Agreed Flows' for four of the diverted waterbodies. The remaining waterbodies would still be subject to the original diversion regime.

Agreed flows would cover all aspects of the rivers' requirements – cultural, ecological and spiritual – and would be worked out in good faith between the parties. In order to do this, the joint relationship group decided a method for quantifying cultural flow needs was required, to sit alongside any estimates of flow needs formulated from IFIM

assessments. Consequently, Ngāti Rangī Trust and Genesis Energy asked Gail Tipa to conduct a cultural flow preference study for the first of the four rivers, the Tokiāhuru.

WHAT WAS INVESTIGATED?

The first step in the process was to understand the cultural kōrero, values and uses around the Tokiāhuru and the wider catchment. Interviews were conducted with iwi members to capture this kōrero, using recordings and sketches on maps. This information was used to create a set of assessment questions that were specific to the awa and to the iwi, reflecting the matters of importance to Ngāti Rangī (Figure 6-6). The questions covered three categories – Cultural use, Hauora and cultural landscape, and Wai, and were ranked on a Likert scale of 1-7.

Following this, kaumātua and iwi members conducted field assessments of varying flows, from 82 L/s (which is 53% of the mean annual low flow of 156 L/s) through to a full flow of 143 L/s. Assessments were conducted at three different sites over four consecutive days. The assessment team were unaware of what flow level they were evaluating, as this was controlled by Genesis Energy hydrologists at the intake site, upstream of assessment sites.

SITENAME _____ DATE _____	
For each attribute listed below you are to decide whether or not you are satisfied that today's flow is sufficient to protect that attribute. You are also to decide how significant each attribute is at this particular site. You are to assign a 1-7 rating	
1	little or no satisfaction
4	moderate satisfaction
7	very satisfied
ATTRIBUTE	SATISFACTION THAT FLOW PROTECTS THE ATTRIBUTE
Flow will enable use of the site for kai gathering	1 2 3 4 5 6 7
Flow will keep the riverbank vegetation watered	1 2 3 4 5 6 7
Flow will provide a range of habitats instream and along the riverbank	1 2 3 4 5 6 7
Flow will protect kai species in and around this site	1 2 3 4 5 6 7
Flow will enable fish to move throughout the catchment	1 2 3 4 5 6 7
Flow will help populations of kai species to re-establish and be abundant throughout the catchment	1 2 3 4 5 6 7
Flow will keep sands and gravels moving through the system	1 2 3 4 5 6 7
Flow will keep riparian wetlands, springs, or tributaries connected to the mainstem	1 2 3 4 5 6 7
Flow will create features that are important e.g. eddies, pools etc.	1 2 3 4 5 6 7
Flow will enable cultural use of connected wetlands, springs & tributaries	1 2 3 4 5 6 7
Flow contributes to a good feeling about this site	1 2 3 4 5 6 7
Flow enables whānau to be proud of this site	1 2 3 4 5 6 7
Flow will maintain a link between this site and other cultural sites downstream	1 2 3 4 5 6 7
Flow will protect features important in tribal stories, waiata etc.	1 2 3 4 5 6 7
Flow will return the voice of the river	1 2 3 4 5 6 7
Overall—are you satisfied with the flow you are seeing today?	1 2 3 4 5 6 7

FIGURE 6-6: FORM USED IN THE NGĀTI RANGI TOKIĀHURU CULTURAL FLOW PREFERENCE STUDY

CHALLENGING FACTORS FOR THE TOKIĀHURU SITUATION

The Tokiāhuru assessments differ from other cultural flow preference studies for a number of reasons. The intake and affected stream reach is located in the Karioi Forest, which is a production forest with limited access for iwi members. Flows also had to be specifically released by Genesis for assessment. As such, only four days of assessments were able to be undertaken. For other cultural flow preference studies, whānau members had unimpeded site access and undertook numerous assessments across a longer time period, and through different seasons.

For the Tokiāhuru, this also meant only summer flows were assessed (and even these were below average summer flows), and no flood flows were evaluated. The lack of access over a long period also impacted on iwi connections to the area, with past uses not practiced for many years and knowledge of past uses restricted to a few iwi members only. Furthermore, the Tokiāhuru was, at the time, subject to a take that left the riverbed completely dewatered. This affected the underlying river environment, with some flow potentially being lost to the dry ground.

WHAT HAPPENED WITH THE DATA?

Tipa & Associates analysed the data to produce tables of averaged scores for each attribute at each flow level, as well as aggregated scores across the categories (see Table 6-1 and Table 6-2 for examples) which were grouped into bands (Table 6-3).

TABLE 6-1: AVERAGED SCORES FOR ATTRIBUTES AT THE 'ACCESS 31' SITE IN A CULTURAL FLOW PREFERENCE STUDY FOR THE TOKIĀHURU STREAM, ACROSS DIFFERENT FLOWS.

Attribute	Day 1 17 Feb	Day 2 18 Feb	Day 3 19 Feb	Day 4 20 Feb
Flow will enable use of the site for kai gathering	1.7	2.5	2.2	2.5
Flow will keep the riverbank vegetation watered	1.6	2.4	1.8	2
Flow will provide a range of habitats instream and along the riverbank	2.2	3.3	2.6	3.1
Flow will protect kai species in and around this site	1.8	2.9	2.1	2.7
Flow will enable fish to move throughout the catchment	1.9	3.3	2.3	2.6
Flow will help populations of kai species to re-establish and be abundant throughout the catchment	1.8	2.9	2.4	2.8
Flow will keep sands and gravels moving through the system	2.0	3.6	2.6	2.8
Flow will keep riparian wetlands, springs, or tributaries connected to the mainstem	1.9	2.4	2.1	2.7
Flow will create features that are important e.g. eddies, pools etc.	2.1	3.4	2.7	2.9
Flow will enable cultural use of connected wetlands, springs and tributaries	1.5	2.8	2.3	2.4
Flow contributes to a good feeling about this site	1.8	3.2	2.7	2.9
Flow enables whānau to be proud of this site	1.75	2.8	2.2	2.8
Flow will maintain a link between this site and other cultural sites downstream	2.4	3.8	2.3	3.0
Flow will protect features important in tribal stories, waiata ¹⁴ etc.	2.2	2.5	2.3	2.3
Flow will return the voice of the river	2.3	3.4	2.7	3.1
Actual flow	39.6	84.7	40.8	56.1
Percent flow at intake	30%	59%	50%	48%

TABLE 6-2: AGGREGATE SCORES ACROSS THREE CATEGORIES AT ONE SITE FOR THE NGĀTI RANGI TOKIĀHURU CULTURAL FLOW PREFERENCE STUDY. NOTE THE FLOW IS ACTUAL FLOW AT THE SITE, WHICH DIFFERS FROM THE FLOW RELEASED AT THE INTAKE DUE TO LOSS TO GROUNDWATER.

Date	Wai	Use, including kai gathering	Landscape and well-being	Flow l/s
17.02.14	1.55	1.57	1.48	11.1 l/s
18.02.14	3.15	2.70	3.76	81.8 l/s
19.02.14	2.3	2.32	2.46	29.3 l/s
20.02.14	2.95	2.77	2.84	57.9 l/s

TABLE 6-3: BANDS FOR AVERAGED SCORES IN A CULTURAL FLOW PREFERENCE STUDY FOR THE TOKIĀHURU STREAM

Attribute score	Colour code	Preference
< 1.50	Red	Very dissatisfied
1.51–2.5	Orange	Dissatisfied
2.51–3.5	Yellow	Slightly dissatisfied
3.51–4.5	Light Green	OK
> 4.51	Dark Green	Satisfied

Importance-performance analyses were also produced to determine which attributes were most important to Ngāti Rangī, and how well these were catered for by the various flows (Figure 6-7). Overall, there was fairly low satisfaction with the flows available, although the ratings increased with increased flow. In the aggregate scores, only one flow received an ‘ok’ rating, and that was given to on the day of the full flow release.

The Ngāti Rangī and Genesis Energy relationship group used this information in a decision-making matrix that also utilised an IFIM study for the Tokiāhuru and a report on sediment dynamics in the reach. Together, this matrix covered cultural, spiritual and ecological values for the affected area and helped the group determine a suggested flow for the river that could be discussed with the iwi rūnanga and the governance boards of both organisations. Of note is that, in this instance, the flow levels required for the Tokiāhuru using the cultural flow preference study and the IFIM were reasonably aligned.

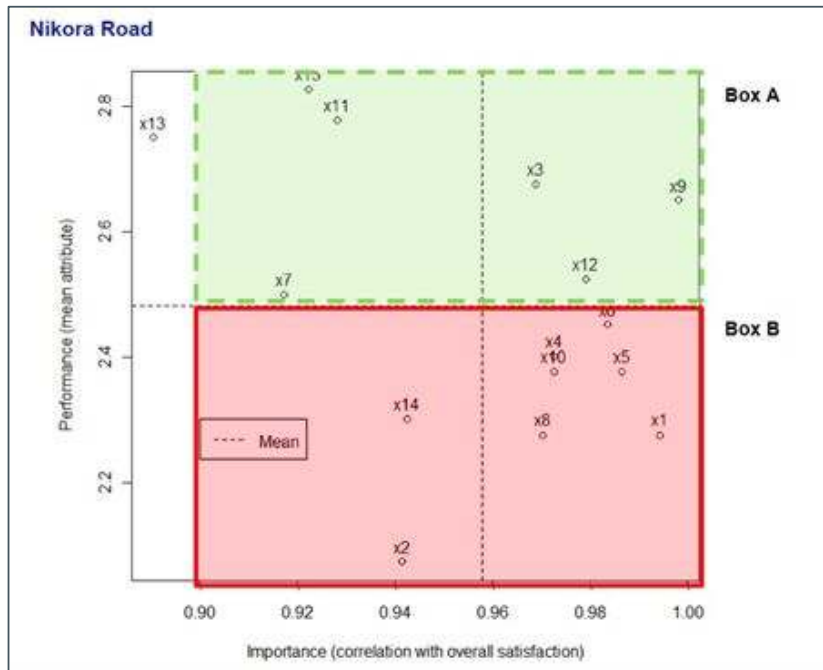


FIGURE 6-7: EXAMPLE OF AN IMPORTANCE-PERFORMANCE GRAPH FOR ATTRIBUTES IN A CULTURAL FLOW PREFERENCE STUDY FOR THE TOKIĀHURU STREAM. THE NUMBERS REPRESENT INDIVIDUAL ATTRIBUTES. PERFORMANCE IS CALCULATED ON MEAN SCORE AND IMPORTANCE BY CORRELATION BETWEEN ATTRIBUTE

WHERE TO NOW?

The Ngāti Rangi and Genesis Energy relationship group were aware there were uncertainties to the flow regime they were establishing, particularly around flow variability, periphyton build up and sediment starvation. As such, a monitoring programme was established to assess these aspects. Information from that monitoring has fed into the design of the flow assessments for two of the remaining three waterbodies. (The fourth has logistical issues yet to be resolved).

COMMON FACTORS AND LEARNINGS FROM THIS CASE STUDY

- Specific information, values and uses about waterbodies can be used to create site-specific and tangata whenua-specific assessments for a waterbody.
- These assessments provide data on a flow regime’s ability to satisfy cultural needs and preferences and are complementary to information available through other modelling tools such as the IFIM.
- Access to sites allows (or affects) the transmission of knowledge.
- Cultural flow preferences studies can be used either as a mechanism to set flow regimes, or as an ongoing monitoring tool to assess iwi, hapū and whānau satisfaction with established flow regimes. Long term use of the tool would be likely to identify issues such as the need for flushing flows or sediment effects such as bed armouring.



6.4 Cultural mapping – Rangitaane o Manawatu

Information in this section was sourced from internal Rangitaane o Manawatu documents, which were used with permission.

WHY CULTURAL MAPPING?

Cultural mapping takes iwi kōrero and mātauranga, some of which is at risk of being lost, and transcribes it into a visual, digital form, captured in a database. It is important for recording iwi connections to place. Cultural mapping can provide both iwi and non-iwi (such as councils) with an easily understandable visual account of iwi relationships with, activities in and use of an area. Rangitaane o Manawatu undertook a comprehensive mapping project that not only documented iwi connections to place, but categorised these, assessed them according to current condition, threats and scope for restoration, and used this to determine a monitoring programme for their rohe.

WHAT APPROACH WAS TAKEN?

Rangitaane utilized all available sources to provide information for their mapping exercise. This included:

- Treaty of Waitangi Research Reports
- Office of Treaty Settlements Site Visits
- Local Government Archaeological reports
- Surveyors maps
- Native Land Court Records
- Ethnologists Records
- Waiata and Oral interviews

Historic maps were added to ArcGIS, a digital mapping and analysis tool. This allowed the project lead, Jonathan Procter, to digitise the information contained in the historic maps (see case study title photo).

WHAT WAS FOUND?

Once digitised, the sites were categorised by type and subtype (Figure 6-8), based on categories developed by Harmsworth (1997), for example:

Category	Example Sub-categories
Natural sites	Bush, clearing, dune, fossil forest, hill
Structures	Canoe mooring, kāinga, occupied location, urupā, whare
Natural resources	Cultivation, eel weir, karaka grove, kumara pits
Archaeological sites	Archaeological sites, burial caves, burials, middens

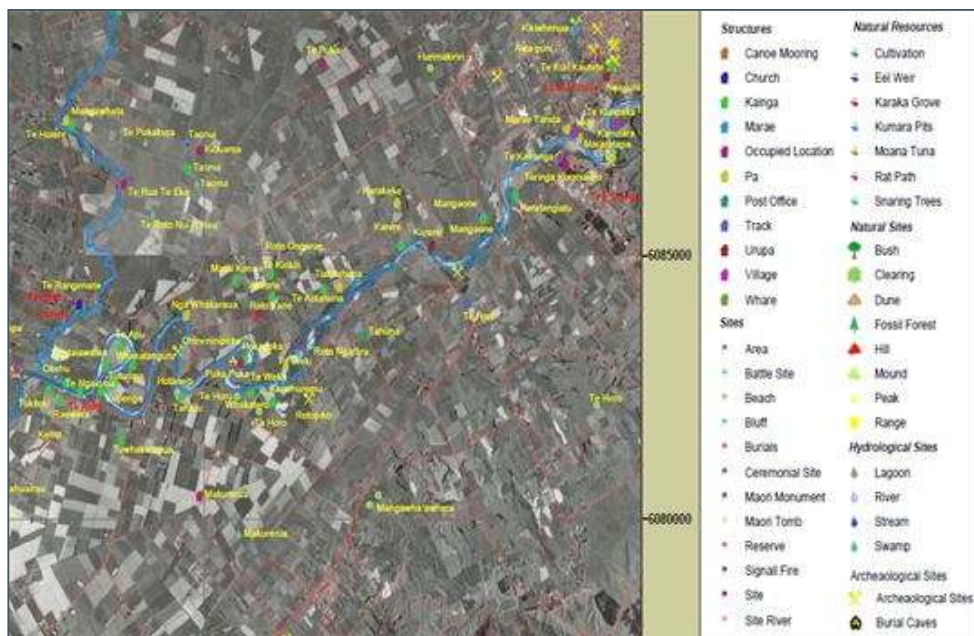


FIGURE 6-8: SCREEN SHOT SHOWING RANGITAANE O MANAWATU MAPPED SITES AND THEIR CATEGORIES AND SUB-CATEGORIES

Each site contains details such as a description, relevant documentation such as archaeological site visit forms, and photographs, where available. This resulted in an extensive amount of information collated in the one place. Once digitised and categorised, the information was used to create maps showing areas of high iwi connection to place (Figure 6-9).

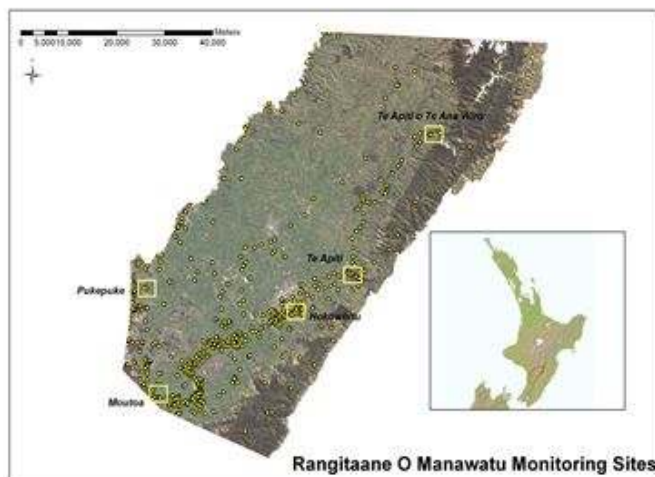


FIGURE 6-9: RANGITAANE O MANAWATU MONITORING SITES (YELLOW SQUARES). YELLOW DOTS ARE CULTURAL SITES.

Other work around the Rangitaane o Manawatu mapping project included utilising the information as part of Waitangi Tribunal Claims process and resource consent processes. Those aspects are not within the scope of this case study.

MAPPING AND MONITORING

The last step in this project was to determine a monitoring programme for the Rangitaane o Manawatu rohe, along with restoration and management priorities.

Stage one of this process was to determine monitoring sites. Rangitaane o Manawatu prioritised sites based on:

- historical value – was the site used in the past, and how (e.g. kāinga, bird-trapping site)
- current value – is it currently able to be used, or is it in another use, e.g. a paddock, alienated land, and
- future value – will Rangitaane be able to use it in future (e.g. might it come back under Treaty settlement).

Using this process, they arrived at five priority sites for monitoring (Figure 6-9)

Stage two involved assessing each of the five monitoring sites to determine what aspects to monitor. To do this, Rangitaane o Manawatu staff visited each site and conducted a pre-monitoring assessment, building on the knowledge of past uses from the GIS mapping work. Eight categories were assessed (Table 6-4). For example, in the vegetation category, at a site once used for harvesting tōtara logs for waka, staff determined firstly whether any bush remained to be monitored, then whether any tōtara of a size suitable for waka building were present. An assessment of risks to the site was made, for example evaluating surrounding land use and pest levels. The significance of each category for that site was determined based on past and present use, and priority

was a judgement based on future potential and the other scores gained under Assessment and Significance. **Stage three** involved using this table to decide what values and matters to monitor at each site (Table 6-5). Monitoring was conducted under atua realms.

For **stage four**, Rangitaane o Manawatu adapted Gail Tipa and Laurel Teirney's Cultural Health Index to apply to all atua, covering the aspects they had decided to monitor at the pre-monitoring assessment (Table 6-6 and Table 6-7). At **stage five**, monthly monitoring was undertaken, and **stage six** involved analysing, graphing and mapping the data from the monitoring. The result, when collated, was a ranking of where each monitoring site sat across all the atua domains, on a 'good-bad' scale (Figure 6-10), on a monthly basis.

TABLE 6-4: ASSESSMENT OF RANGITAANE O MANAWTŪ MONITORING SITE, MOUTOA/TE PEHU, AS AN EXAMPLE OF THE MATTERS EVALUATED

Main attribute/value categories	Presence/absence in catchment/river	Assessment			Significance		Priority
		Current condition	Risk	Ability to restore	Existing value (high, moderate, low)	Historically (high, moderate, low)	
	Y/N						1 = low 5 = High (1-5)
1. Vegetation	Y Harakeke	3	4	y	high	high	5
2. Animals, birds, fish, insects, other	Y Tuna/Mudfish	3	4	y	moderate	moderate	5
3. Whenua, land, soil	Y Wetland/Organic	2	4	y	moderate	high	4
4. Water	Y Wetland	2	3	y	high	moderate	4
5. Air	Not considered						
6. Wāhi taonga, Special places	Y	1	2	y	high	high	4
7. Wāhi tapu, Sacred sites	y	1	2	y	high	moderate	4
8. Wairua, Metaphysical	y	3	3	y	moderate	moderate	4

TABLE 6-5: VALUES AND MATTERS TO BE MONITORED AT TWO OF THE FIVE RANGITAANE O MANAWATU IWI MONITORING SITES, DETERMINED AFTER A PRE-MONITORING ASSESSMENT OF CURRENT CONDITION, RISK, ABILITY TO RESTORE, SIGNIFICANCE AND PRIORITY.

	Site	
	Moutoa/Te Pehu	Te Apiti Te Ana O Whiro/Takapari
Values to be monitored	Pa/Kainga Mahinga kai Kauhanga riri Pa Tuna Wai Repo/roto Tuna Inanga Whānaungatanga Ahuwhenua Awa Harakeke	Pā/kāinga Mahinga kai Kauhanga riri Wai Tuna Awa Ara Mauri Wairua Urupā
Iwi-determined monitoring programme	Wetland condition through the presence of and health of tuna and ika Water levels of roto Presence of tidal ika species Condition of harakeke using transects Condition of repo using transects Roto water condition Cultural Health Index	Transects of native forest Bird counts through transects of DOC reserve forests Presence of Taonga species (kōura, ika) Photos of past Kainga sites Gravel bed monitoring presence of Jasperite boulders Water/River Cultural Health Index

TABLE 6-6: THE ADAPTED CULTURAL HEALTH INDEX USED BY RANGITAANE O MANAWATU TO MONITOR IMPORTANT SITES.

Name of Waterway:	Landholder: DoC, Public, Private, Other
Catchment:	Adjacent landuse (circle as appropriate):
Site Number:	<ol style="list-style-type: none"> 1. Pasture 2. Horticulture 3. Native 4. Exotic forest 5. Scrub 6. Residential

		7. Commercial		
		8. Industrial		
		9. Recreational		
Date:		Site Status: A Traditional B Non Traditional		
Time:		Mahinga Kai: 1 Present 2 Absent		
Coordinates:		Future: 1 Will return to manage 2 Wouldn't return		
Name:				
TANGAROA	Rating 1-5	Rating 1-5	Rating 1-5	Comments
1. Riverbank Condition				
2. Sediment on Riverbed				
3. Water Clarity				
4. Water Flow				
5. Water Quality				
6. Shape and Form of River				
7. Insect Life (method, no. & species)				
8. Fish (method, no. & species)				
TANE MAHUTA	Rating 1-5	Rating 1-5	Rating 1-5	Comments
9. Riparian Vegetation				
10. Catchment Vegetation				
11. Bird Life (method, no. & species)				
12. Ngahere/Taonga				

13. Pest plants/animals				
HAUMIA TIKETIKE and RONGO MATANE				
14. Mahinga Kai (no. & species)				
15. Rongoa (no. & species)				
TUMATAUENGA	Rating 1-5	Rating 1-5	Rating 1-5	Comments
16. Use of River				
17. Use of River Margins				
18. Access to River				
19. Cultural Site	(Yes/No) Type			
TAWHIRI MĀTEA	Rating 1-5	Rating 1-5	Rating 1-5	Comments
20. Smell of River				
21. Weather				
OVERALL HEALTH – ORA	Rating 1-5	Rating 1-5	Rating 2-5	Comments
22. Feeling in puku				

TABLE 6-7: EXAMPLES OF NOTES FOR RANGITAANE O MANAWATU ASSESSORS USING THE ADAPTED CULTURAL HEALTH INDEX TO MONITOR IMPORTANT SITES. THESE COVER TWO ATUA, WHEREAS SIX WERE INCLUDED IN THE FULL ASSESSMENT

TANE MAHUTA	
9. Riparian Vegetation	<p>Q ~ Is there vegetation present within 20m of a stream or 50m of a river. And does it shade the waterway?</p> <p>1 ~ Little or no riparian vegetation – neither exotic or native</p> <p>5 ~ Complete cover of mainly native vegetation</p>

10. Catchment Vegetation	Q ~ What is the mix of Pasture, Horticulture, Native, Exotic Forestry, Other? 1 ~ Only one or two types of exotic vegetation 5 ~ Wide variety of native or native/exotic vegetation
11. Bird Life (Manu)	Outline sampling method i.e. Observation over sampling time i.e. Observation over 10 minutes. Note species and relative numbers. Is the bird song weak or strong?
12. Ngahere Taonga	Note main plant species. Are there opportunities for timber, fruit, or fibre harvest? Are trees seeding? Do plants have special characteristics/properties? Do areas include rocks/stone that has been used for cultural use? e.g. pakohe (argillite).
13. Pest plants/animals	Note species and negative effects. Has any control taken place? If so has it been successful?
HAUMIA/RONGO	
14. Mahinga Kai	Note plant, animal, fish, bird species. Are they harvestable both in quality and quantity?
15. Rongoā	Note plant species. Are they harvestable both in quality and quantity?

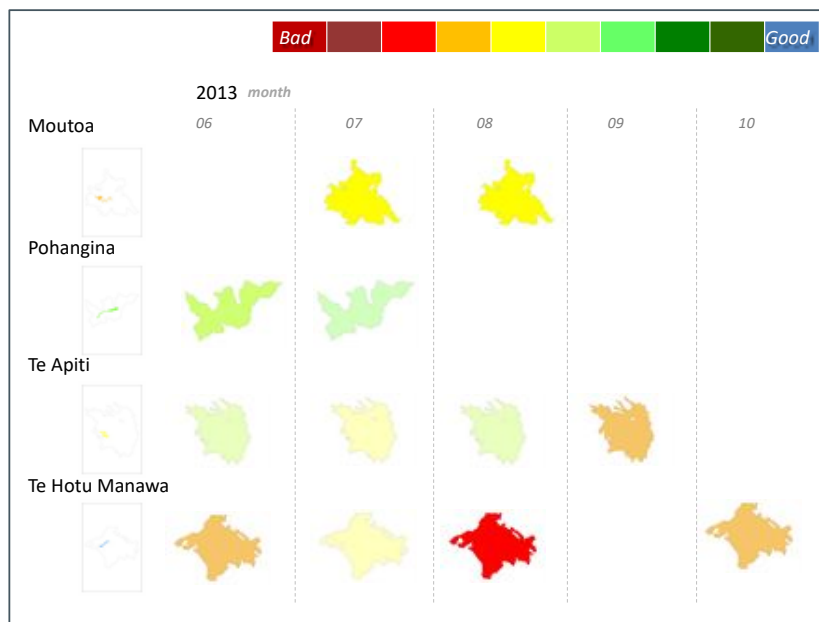


FIGURE 6-10: MONTHLY MONITORING RESULTS COMBINING DATA FROM SIX ATUA DOMAINS AT RANGITAANE O MANAWATU MONITORING SITES

HOW DOES THIS APPLY TO FRESHWATER MONITORING, THE NPS-FM, AND REQUIREMENTS ON COUNCILS?

The Rangitaane o Manawatu mapping and cultural monitoring project is designed to help the iwi answer monitoring questions that are important to them, about places that are important to them. It outlines clearly what matters the iwi have determined need to be monitored, and is ideal for providing the council in this rohe with the direction and information they need to meet their obligations under the NPS-FM around including mātauranga Māori in monitoring plans, in conjunction with Rangitaane o Manawatu as the project designers and owners of the intellectual property.

The monitoring design covers a vast range of parameters across all atua domains. This is a clear demonstration that for iwi, 'freshwater monitoring' often includes a number of parameters that traditional council monitoring may have considered beyond scope. This may help councils understand the perspective that iwi bring to the table when discussing and determining monitoring programmes.

7 Use of kaupapa Māori tools, frameworks and methods by region

A survey of regional councils and territorial authorities sought to capture information on which tools, frameworks and methods are being used or have been used in which regions. The survey focused on tools that councils themselves are using with iwi partners. As such, the results do not necessarily capture instances where iwi are using tools and councils are unaware of that work, however, where possible data was added in to augment the survey responses. This information is presented in Figure 7-1.

The most widely used and adapted tool was the Cultural Health Index, with 12 out of 16 regions reporting its use. The CHI is closely followed by cultural mapping, which is known to be used in 11 of the 16 regions. The Māori environmental performance indicators for wetland condition and trend is widespread, but does not seem to be used greatly since its development. Taonga species monitoring is relatively common, with half of all regions undertaking some form of individual species monitoring.

The Waikato and Bay of Plenty regions used the widest range of tools. This is possibly a reflection of the number of research institutes who are involved in kaupapa Māori tool development that are located in or nearby these areas, such as The University of Waikato, NIWA and Manaaki Whenua. It may be helpful for research institutions to actively pursue relationships with iwi in more remote areas of the country, in order to support local development of tools, frameworks and methods in those areas too.



FIGURE 7-1: THE USE OF KAUPAPA MĀORI MONITORING TOOLS, FRAMEWORKS AND METHODS BY REGION

8 Conclusions and recommendations

8.1 Conclusions

There are a range of tools, frameworks and methods available to iwi and hapū, and their council partners. These range from decision-making tools, to digitally-based assessments, to mapping approaches for understanding and recording cultural knowledge, preferences and monitoring requirements, to research around important species, through to kaupapa Māori assessments of the state and health of a waterbody. Most of these tools, frameworks and methods are able to be adapted to suit local priorities, preferences and protocols. Many are inter-related. The various approaches can be used in tandem to meet different aspects of kaupapa Māori-based monitoring needs. Given the developments in recent years and the resourcing now being put into mātauranga Māori-based assessment approaches, it is likely that even more tools, frameworks and methods will become available in the near future.

8.2 Recommendations

The authors would like to make the following recommendations regarding this report and its contents:

8.2.1 Distribute report to iwi partners

Although this report is primarily produced as a means for regional councils to understand what kaupapa Māori assessment tools, methods and approaches currently exist, iwi and hapū may also find the information useful. There are numerous demands on the time and resources of iwi and hapū, and the luxury of researching all existing approaches to cultural monitoring is not one available to many tāngata whenua. It is hoped that this report will short-cut that process for iwi and hapū, and provide a useful overview of the cultural monitoring options they may wish to explore. It is recommended that councils provide copies to iwi partners in their regions.

8.2.2 Test the appetite for a national iwi-run database

One difficulty facing iwi and hapū is capacity, both in resourcing and in technical expertise to administer databases and GIS systems. One potential solution to this is to create a national database for cultural monitoring information, supported with government resourcing. Tools like Takiwā, the Wai Ora Wai Māori app and the Mauri Compass all had or have digital systems already created that could fill this need, or go towards filling this need. Alternatively, a new, purpose-built database could be designed. Constructing any such database to easily integrate with platforms such as LAWA (Land, Air, Water Aotearoa) would enable outputs from cultural monitoring to be afforded the same status and accessibility as other monitoring data, in situations where iwi and hapū desire for that information to be available publicly.

Decisions around what content was included in the database would need to be made by iwi and hapū, in particular to avoid a situation where particular approaches were

determined centrally to be 'the' way to do mātauranga Māori-based monitoring. Ideally, a database that was able to incorporate a range of tools and methods would be best, enabling iwi to select, use and input only the data they wish to incorporate.

Protection for intellectual property would, obviously, also need to be incorporated into any such national database, in order to safeguard local mātauranga and the intellectual property of the tools' creators. There may be limited appetite amongst iwi for the database to be administered by a government agency; an iwi-run database may receive greater support. The concept of a national, iwi-run database for cultural monitoring information should be floated with iwi and hapū, to test whether it would meet tāngata whenua needs, and whether there is a desire for such a system.

8.2.3 Wānanga

As stated throughout this report, in order for mātauranga Māori to be included in monitoring plans, there are a number of considerations that need to be deliberated upon and discussed between councils and iwi and hapū. Some of these include:

- the suitability or otherwise of various tools and methods for particular rohe and iwi or hapū
- the role of councils in supporting the use of mātauranga Māori in council monitoring plans
- the role of iwi and hapū in undertaking kaupapa Māori assessments of the environment
- resourcing and capacity issues
- matters of intellectual property and
- the protection of sensitive information.

Wānanga to discuss these issues would be helpful. We suggest hearing from a range of people as part of the wānanga, including experts in intellectual property law (and particularly Māori intellectual property law), experts on kaupapa Māori assessment tools (such as the various developers of the tools in this report), and iwi members currently undertaking kaupapa Māori-based research (both those working alongside councils and those undertaking monitoring and research for their own purposes, needs and aspirations). It may be useful to also hear from iwi authorities, to understand the wider governance context and iwi perspectives.

8.2.4 Research with iwi partners

Since the appearance of the first cultural monitoring tools in the early 2000s, there has been minimal inclusion of mātauranga Māori methods in council monitoring programmes. There are several possible reasons for this, including those outlined in Section 1:

- Overcoming historical tension and conflict
- Lack of capacity and resourcing, for both parties
- Difficulty getting 'buy-in' for institutional change

- Uncertainty about who to engage with
- Internal politics
- Lack of capability/capacity to understand Māori values
- Lack of capability/capacity to implement Māori values

Conducting research into 1) the difficulties councils face in including mātauranga Māori in their monitoring processes, 2) the barriers iwi and hapū encounter in their efforts to have mātauranga included, and 3) the solutions to those issues would provide a useful pathway forward. It would assist councils in fulfilling their NPS-FM obligations, and help iwi and hapū to meet their aspirations around recognition of mātauranga Māori, tikanga, and Māori perspectives in monitoring and research programmes.

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Agenda Memorandum

Date 19 March 2019



**Memorandum to
Chairperson and Members
Policy and Planning Meeting**

**Subject: National Environmental Standards for
Plantation Forestry in Taranaki-
implementation update and slash
management**

Approved by: AD McLay, Director – Resource Management
BG Chamberlain, Chief Executive

Document: 2220763

Purpose

The purpose of this memorandum is to advise the Committee of the monitoring and enforcement activities undertaken to date for the National Environmental Standards for Plantation Forestry (NES-PF) and the requirements for slash management under the NES-PF. Interest had been shown at the previous meeting around slash management and monitoring and enforcement undertaken to date to avoid the problems experienced in Gisborne.

Executive summary

The National Environmental Standards for Plantation Forestry was introduced on 1 May 2018 by the Ministry for Primary Industries and are intended to provide a nationally consistent set of regulations to manage the environmental effects of plantation forestry activities. It contains 106 regulations and applies to forested areas above one hectare.

In the majority of cases, the regulations override the various council Resource Management Act plan provisions for forestry, including the Regional Fresh Water Plan for Taranaki and the Regional Soil Plan.

New Zealand has 1.7 million hectares of plantation forestry. Taranaki has 1.6 percent of this (29,000 hectares) and about 15,000 ha could be harvested in the next 6 years, depending on log prices.

The Taranaki Regional Council has created a new position (Forestry Lead), in the Compliance Section, to undertake the necessary monitoring inspections and enforcement, where required, under the Council's Enforcement Policy (2017).

Slash management from pruning and harvesting activities is addressed in the NES-PF and monitored by the Council.

To date under the NES-PF 100 inspections have been undertaken, two abatement notices issued and eleven inspection notices requiring relatively minor and eleven inspection notices requiring work to be undertaken. No infringement notices have been issued or prosecutions initiated.

Prior to the NES-PF the Council had issued abatement notices and infringement notices to those in non-compliance with stormwater from earthworks activity consents (e.g. tracking, skid sites).

Recommendations

That the Taranaki Regional Council:

1. receives this memorandum;
2. notes the Council has a professional relationship in place with the forestry sector;
3. notes compliance with the NES-PF has been high; and
4. notes the Council is participating in a review of the NES-PF.

Background

An agenda memorandum and power point presentation on the NES-PF was presented to the 17 July 2018 meeting.

The Ministry for Primary Industries and the Ministry for the Environment developed the National Environmental Standard jointly. It was gazetted in August 2017 with a delay in commencement to 1 May 2018 to enable councils and foresters to understand their responsibilities under the regulations and put in place processes to meet these responsibilities.

Foresters and councils have been supported in this process through a series of regional workshops. More than 600 foresters and council representatives throughout New Zealand attended these. A workshop was held in May in Stratford and attended by about 40 people. Those present recognised the need for appropriate regulation of the activity under the NES-PF and for there to be a consistent regulatory approach for all operators to ensure high standards and minimal adverse environmental effects.

The National Environmental Standards for Plantation Forestry will be reviewed in 12 months to ensure they are being successfully implemented. The standards are based on existing good practice for the forestry industry and include risk assessment tools developed to manage the environmental impacts from forestry, covering issues of erosion, wilding pines and fish spawning. The benefits of these tools are that the restrictions on forestry activities are related to the environmental risk rather than the forestry operation.

In the past, the Council has undertaken some monitoring inspections on consented forestry activities, associated with earthworks, and enforcement action has been undertaken as required when non-compliances have been found. As the level of harvesting is increasing in the region it is appropriate to increase regulation.

The NES-PF addresses the full forestry lifecycle under eight activities:

- Afforestation
- Pruning and thinning to waste
- Earthworks
- River crossings
- Forest quarrying
- Harvesting
- Mechanical land preparation
- Replanting.

Each of these activities will either require a consent or fall into the permitted activity category. The consents can be treated as controlled or restricted discretionary. Regardless of which category the activity falls into, the Taranaki Regional Council requires notification of the activity along with supporting information including Erosion Susceptibility, wilding tree risk calculation etc.

plantations are spread throughout eastern Taranaki with large areas in the Tangahoe and Waitotora catchments.

Inspections will be undertaken by the Council on both permitted activities and consented activities.

The NES-PF allows the Council to recover the cost of monitoring permitted forestry activities.

Discussion

The Council has established a professional relationship with the forestry sector over the years through monitoring and enforcing resource consents issued for earthworks activities. This has continued with the implementation of the NES-PF.

Under the NES-PF and the employment of additional staff more inspections have been completed, with pre, during and post forestry inspections taking place where required. One hundred inspections have been undertaken, two abatement notices issued and eleven inspection notices issued requiring relatively minor work to be undertaken. No infringement notices have been issued or prosecutions initiated. Compliance rates to date have been high.

Prior to the NES-PF the Council had issued abatement notices and infringement notices to those in non-compliance with stormwater from earthworks activity consents (e.g. tracking, skid sites).

The focus of the monitoring has been on how logging sites are decommissioned, for example all tracks left with correct drainage and sediment controls, skid sites having slash pulled back from the edges and drainage installed. Emphasis has been placed on ensuring slash is not left in waterways.

Under the NES-PF slash must not be:

- a) placed onto unstable land;
- b) deposited into a water body or onto land that would be covered by water during a 5 % AEP (20 year flood). There is an exclusion clause if this would be unsafe;
- c) placed at the edge of landing sites to cause the collapse of slash piles;

- d) from pruning activities deposited into a water body, onto the land that would be covered by water during a 5% AEP event, or into coastal water. There is an exclusion clause if this would be unsafe

These requirements are set out in Regulations 20 and 69 of the NES-PF.

Slash left on a hill side from the felling/ recovering of trees is generally an acceptable practice as in most cases it is actually beneficial due to the protection that the slash offers from the erosive effects on freshly exposed soil. The only exception is when slash poses a risk of mobilising or reaching a waterbody but normally the work and tracking involved in removing this slash from inaccessible hillsides poses a higher environmental and safety risk than leaving it in place.

Comparatively for Taranaki we are a relatively low risk compared to somewhere like Gisborne whose forestry land is predominantly on very large steep faces with deep seated erosion prone soils. Our biggest risk is large catchments like the Waitotara. For most of inland Taranaki like east of Stratford, a large rainfall event would likely only effect the immediate downstream property from the forestry block and not make it any further, unless there were landslides/ debris dams where impacts could be greater.

Given the differences in catchment characteristics, forestry cover and harvesting, the issues with slash management experienced in Gisborne are unlikely to occur in Taranaki. There is also more regulation of activities in Taranaki than there was in Gisborne.

There will be little the Council could do with an extreme rainfall event that occurs between harvesting and forest reestablishment as there may be slope failure, and debris entering waterways (causing debris dams and great impacts when these fail) and debris/slash being captured by water above the 20 year flood level in the NES-PF. However, the Council will do everything it can under the NES and RMA to minimise environmental impacts. The NES also controls where you can plant trees with setbacks from neighbours, rivers, lakes and wetlands so in the future slash will be less prone to being captured by high flow events.

District Councils require notification of works under the NES-PF similar to the Regional Council. District Councils have responsibilities with issues such as planting near boundaries where neighbouring properties may be affected with issues such as shading, similarly alongside public roads. There are also setbacks for afforestation for papakainga and an urban area. District councils tend to be complaint driven, rather than having comprehensive monitoring programmes in place like this Council.

MPI has commenced a review of the NES-PF that the Council will participate in. Monitoring the environmental outcomes of the NES-PF is part of the review. The review is using, as an environmental surrogate, compliance with the NES-PF provisions. Monitoring the environmental outcomes of the NES-PF would be a complex, expensive and challenging exercise and could only be based on longterm records from suitable catchments. Large parts of a catchment would need to be in forestry to potentially be able to show any environmental outcomes. As noted above forestry in Taranaki is wide spread with concentrated areas in the upper Tangahoe and Waitotora catchments.

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual Plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the *Local Government Act 2002*, the *Resource Management Act 1991* and the *Local Government Official Information and Meetings Act 1987*.

Iwi considerations

This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the *Local Government Act 2002*) as outlined in the adopted long-term plan and/or annual plan. Similarly, iwi involvement in adopted work programmes has been recognised in the preparation of this memorandum.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Whakataka te hau

Karakia to open and close meetings

Whakataka te hau ki te uru	Cease the winds from the west
Whakataka te hau ki tonga	Cease the winds from the south
Kia mākinakina ki uta	Let the breeze blow over the land
Kia mātaratara ki tai	Let the breeze blow over the ocean
Kia hī ake ana te atakura	Let the red-tipped dawn come with a sharpened air
He tio, he huka, he hauhu	A touch of frost, a promise of glorious day
Tūturu o whiti whakamaua kia tina.	Let there be certainty
Tina!	Secure it!
Hui ē! Tāiki ē!	Draw together! Affirm!

Nau mai e ngā hua

Karakia for kai

Nau mai e ngā hua	Welcome the gifts of food
o te wao	from the sacred forests
o te ngakina	from the cultivated gardens
o te wai tai	from the sea
o te wai Māori	from the fresh waters
Nā Tāne	The food of Tāne
Nā Rongo	of Rongo
Nā Tangaroa	of Tangaroa
Nā Maru	of Maru
Ko Ranginui e tū iho nei	I acknowledge Ranginui above and
Ko Papatūānuku e takoto ake nei	Papatūānuku below
Tūturu o whiti whakamaua kia	Let there be certainty
tina	Secure it!
Tina! Hui e! Taiki e!	Draw together! Affirm!