Whakatipu Rawa mā ngā uri
Whakatipu: Makirikiri
Aggregated Trust Case Study

Landcare Research
Manaaki Whenua

Whakatipu Rawa mā ngā Uri Whakatipu: Makirikiri Aggregated Trust Case Study

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Summary

Project and Client

- Manaaki Whenua Landcare Research, in collaboration with The University of Waikato, Lincoln University, Te Whare Wānanga o Awanuiarangi, Boffa Miskell, Te Rūnanga o Ngāi Tahu, Whakatōhea Māori Trust Board and Makirikiri Aggregated Trust, are developing an interface between Māori values and financial measures that will form the basis of a new economic decision-making framework for collective assets. This work is being funded through a Nga Pae o te Māramatanga contract (13RF14).

Objectives

- Develop an interface between Māori values and financial measures that will form the basis of a new economic decision-making framework for collective assets,
- Work with the commercial arms of iwi/hapū to help integrate indigenous corporate responsibility into a new collective decision-making framework, and
- Apply Māori values in investment decisions for collective assets.

Methods

- A collaborative process was initially established to work closely with the trustees of Makirikiri Aggregated Trust, and a series of workshops were carried out in order to identify, consider, and evaluate investment scenarios.
- A tikanga Māori assessment framework for decision-making was developed and applied. The structure and key components of the framework are:
    - Whakamāramatia Ngā Pou Herenga – Core Māori values and principles are defined and reflected in strategic plans
    - Whakamāramatia Ngā Huanga – Outcomes reflecting core Māori values and principles are identified
    - Whakamāramatia Ngā Uaratanga – Goals and objectives are established
    - Whakamāramatia Ngā Arotakenga – Developing a Māori cultural values assessment tool
- The tool NZFARM was applied over the Makirikiri Aggregated Trust lands – the primary intention of NZFARM is to help decision-makers assess the potential economic and environmental impacts of policy on regional land use. The model is parameterised to maximise rural income across a catchment, accounting for the environmental impacts of land use and land use changes. NZFARM currently tracks environmental outputs such as greenhouse gas (GHG) emissions from agriculture and forestry, forest carbon sequestration, water use and nutrient losses.
- Suitable investment scenarios were then assessed using a Māori cultural values assessment tool developed in conjunction with the trustees of Makirikiri Aggregated Trust. This cultural values assessment was carried out alongside NZFARM.

Results

- A series of workshops were carried out with trustees of Makirikiri Aggregated Trust to identify priorities and outcomes. This was followed by an assessment by the project team alongside the trustees. The benefits arising from three investment scenarios: (1) Sheep and Beef (S&B); (2) Optimised Sheep and Beef (Optimised S&B) and (3) Dairy, from a cultural values perspective were assessed. We found that the improvements in core values and principles like Kaitiakitanga and Whakatipu Rawa were relatively low compared to the existing use for each of the investment scenarios. However, in terms of Manaakitanga, the Optimised S&B investment scenario provides more opportunities for better connections between the farm, their beneficiaries, and the local community.
- When environmental mitigation practices were added to all scenarios (S&B, Optimised S&B and Dairy) the level of benefits obtained utilising the cultural values criteria improved (relative to the no-mitigation case). Benefits were more obvious for S&B, in particular for environmental related cultural values. Sheep and Beef with environmental mitigation is less likely to impact negatively on cultural values through increased nitrogen run-off into waterways in comparison to Dairy with environmental mitigation. Sheep and Beef with environmental mitigation potentially results in an improved habitat for taonga species like tuna (eels) and inanga (whitebait).
- We found that switching from the current operation that is primarily S&B to Dairy could increase average net farm revenue over the long term by about 70–87%. Doing so would also require initial capital improvements, which would result in Makirikiri taking on a significant amount of debt to make the conversion. The alternative – optimising the current S&B operation through continued pasture renewal and adjustment of the ratio of sheep and beef stock – could result in an increase in net revenue by about 25–43% per annum with little extra investment.
- Converting from S&B to Dairy could have a negative impact on water quality, particularly as nitrogen leaching from the farm could increase between 35% and 57%. Net greenhouse gas (GHG) livestock emissions (emissions less forest carbon sequestration) could also increase by 22–36% because of the increase in cows on the farm. Optimising S&B operations would increase N leaching by about 3–7%, while the increase in farm stock could increase net GHG emissions by 16–32%.

Conclusion

- A step-by-step process was used to discuss and evaluate investment scenarios utilising NZFARM and Māori cultural values. The tikanga Māori decision framework and its components is an example of a Māori evaluation process. Unique to this framework is the integration of Māori concepts (e.g. kaitiakitanga, whakatipu rawa, and manaakitanga) within a Māori collective asset management paradigm. There is potential to refine this framework and its components and further develop it for use by other iwi/hapū throughout Aotearoa. Our tikanga Māori decision framework can help managers of collective assets make progress towards outcomes that reflect equality of distribution, and mitigate or improve the social and environmental domains that are the receptors of the externalities created by our economic activities. Successful uptake of the framework would require a paradigm shift away from a business as usual approach. The challenge for Māori resource management is to use this type of framework to assess new investment opportunities alongside traditional business analyses such as cost-benefit or return on equity.

1 Introduction

Manaaki Whenua Landcare Research, in collaboration with The University of Waikato, Lincoln University, Te Whare Wānanga o Awanuiarangi, Boffa Miskell, Te Rūnanga o Ngāi Tahu, Whakatōhea Māori Trust Board, and Makirikiri Aggregated Trust, are developing an interface between Māori values and financial measures, which will form the basis of a new economic decision-making framework for collective assets. The funding for this project was provided by Nga Pae o te Māramatanga (13RF14).

The objectives of the project are to:

- develop an interface between Māori values and financial measures that will form the basis of a new economic decision-making framework for collective assets
- work with the commercial arms of iwi/hapū to help integrate indigenous corporate responsibility into a new collective decision-making framework
- apply Māori values in investments decisions for collective assets.

The aim of this report is to explore how NZFARM (a computer-based economic-environmental model) and a tikanga Māori decision making framework can help inform investment decisions for farms particularly to improve kaitiakitanga of ecosystems (either terrestrial or freshwater), better social cohesiveness, and improve management of the asset base.

2 Background – Makirikiri Aggregated Trust

Makirikiri Aggregated Trust is constituted under the Te Ture Whenua Act. The land now managed by the Trust was part of the native reserve land that covered the majority of the Hastwell area, originally surveyed in 1907. Native reserve land was sold progressively to settlers and families of surveyors, under the Public Works Act 1882.

Sometime after 1907 the Crown, through Sir Apirana Ngata, established a dairy farm initiative that saw the 10 land blocks of Makirikiri (MKK) set up to supply cream to the local creamery. A community school was also established, which serviced not only Māori children but also children of the Scandinavian settlers who were primarily settled in North Road, on the southern side of the Opaki/Kaiparoro Rd.

When the creamery was later disestablished, milk and cream were sent to the milk factory in Mauriceville. The 10 MKK land blocks were then leased by either whanau of MKK or local Pākehā. In 2001, the MKK trustees applied to the Māori Land Court to amalgamate the 10 blocks into one entity, now referred to as Makirikiri Aggregated Trust.

The land was leased out until 16 January 2013, when MKK shareholders agreed it should be farmed directly by the Trust. They established a trading company (Te Hawera Ltd) to farm the lands unconstrained by the Te Ture Whenua Act. These new trustees have aspirations for a highly productive farm with mixed land use options, including sheep, beef, and dairy. The new trustees and management hope Makirikiri will eventually operate in the top 10 percent of farms in the district/country.

2.1 Farm overview

The property (Fig. 1) is approximately 535 ha in total, with an effective farming area of ~421 ha across a range of rock and soil types, mainly mudstones in the hills/rolling slopes, and alluvium and gravels in low terraces and floodplains. Approximately 76 ha are underlain by fertile mudstone. About 162 ha of the land is classified as arable; however, almost 50% of the total area is regarded as having a significant wetness limitation, restricting both its productive potential and the range of land uses that can be sustained over the long term; 26 ha are particularly wet or flood-prone. A large proportion (~50%) of the property is flat to undulating, almost 86 ha is rolling to strongly rolling slopes (16–22° hills), while the rest is classified as moderately steep hill country. Rolling to strongly rolling land on fertile mudstone is regarded as the most suitable land on the farm for development, such as intensive agricultural but non-arable use, as long as pugging and the slight risk of earthflow erosion are appropriately managed. The rest of the effectively farmed area is made up of 1) 86 ha of moderately steep hill country suitable for forestry or extensive agriculture, with suitable erosion control, and 2) 61 ha of steep land/shallow or stony soils that should ideally be retired from pastoral use, e.g. into forestry or reversion to mānuka/bush.

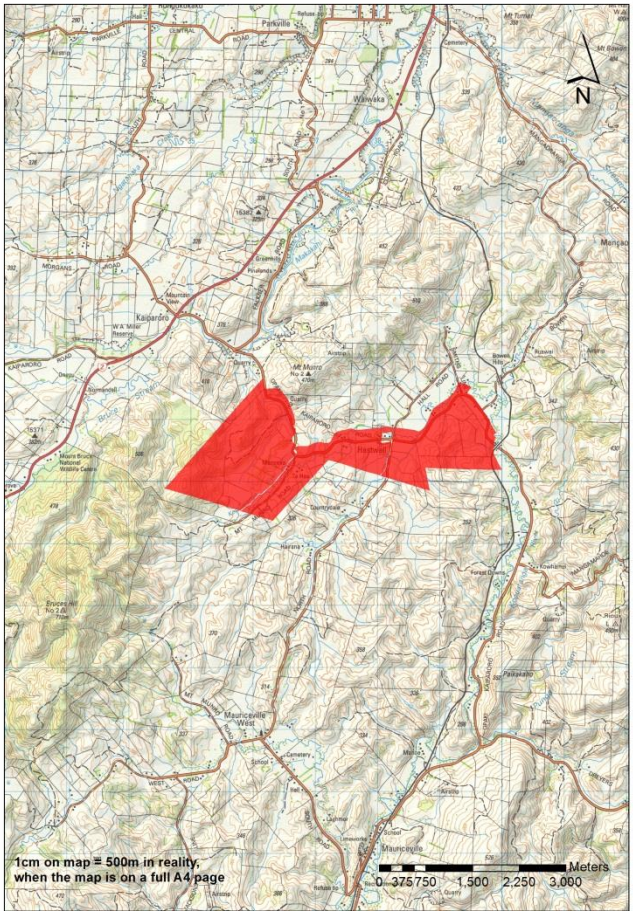

Figure 1 Location of Makirikiri Farm.

Makirikiri Farm is predominantly run as a fattening block for store lambs, hoggets, and yearling cattle, with stock from several owners grazed on the property. A small breeding programme involves crossing a terminal sire over the ewes to produce store lambs. There are about 7 ha of plantation forest on the farm, excluding trees on the site of the old Council landfill site.

3 Methods

A collaborative process was initially established to work closely with the trustees of Makirikiri Aggregated Trust and a series of workshops were carried out to identify, consider, and evaluate investment scenarios. A number of project meetings (4) and workshops (2) with the trustees and farm management took place at several locations; in environments in which the participants were comfortable (Mt Bruce Environmental Centre, Landcare Research, Palmerston North, and the Makirikiri Farm House). The meetings were a mixture of informal conversations with technical experts and formal presentations that included semi-structured questions. The four project steering group meetings provided direction to the research team and were an opportunity for the trustees to provide input into the research process.

A step-by-step process was used to discuss and evaluate investment scenarios utilising Māori cultural values and NZFARM. It consisted of the following key steps:

Step 1: Involved the development of a project steering group that had representation from trustees, Ministry of Primary Industries (MPI) and farm beneficiaries. To ensure positive involvement from participants, this step required relationship management on the part of Landcare Research. To support this step an appropriate internal communications plan was established.

Step 2: A presentation on existing tools and data sets by Crown Research Institutes (CRIs) to trustees, including Soils (Land Resource Information (LRI) and S Map), Climate (CLI-Flow and Virtual Climate data), and Hydrological (REC-river environment classification).

Step 3: Development of a tikanga Māori framework for decision-making. The project team met with trustees to hear their aspirations for their whenua and applied those aspirations to a tikanga Māori framework for decision-making. Development of the framework and its components was carried out by the project team, and feedback from the trustees helped refine the framework. Core values identified were Whakatipu Rawa, Manaakitanga, and Kaitiakitanga, as well as a number of sub-priorities.

Step 4: Desktop Assessment was carried out by the CRIs using a number of data sets (LRI, S Map, CLI-Flow, Virtual Climate data, and REC) at a regional level that provided high level data useful for both the farm as a whole and for its surrounding environs. The assessment was also useful for benchmarking the potential impact of land management activities on the overall catchment. This type of broad assessment provided some high level direction in terms of land management and investment. From a farm-scale perspective more detailed information is required.

Step 5: Report back to trustees and wider beneficiaries at the Makirikiri Aggregated Trust AGM.

Step 6: An on-site assessment identified issues on the management of the farm within policy constraints, e.g. the national freshwater reforms, and within biophysical

constraints, including the availability of quality soil and water. Farm production constraints were also identified. This step involved the research team in a detailed on-farm assessment of land forms, biodiversity, and ecosystems, e.g. wetlands, conservation areas, erosion management, erosion prone areas, soil health and water quality, opportunities for enhanced environmental management, e.g. fencing off wetlands, planting riparian margins.

Step 7: Update presented to trustees and wider beneficiaries at quarterly meeting.

Step 8: A series of hui with trustees to identify investment scenarios and parameters for assessment by NZFARM and a Māori cultural values assessment tool. A meeting with the farm manager and trustees helped develop their capability and understanding of the biophysical attributes of the farm. This happened as the trustees became more interested in the economic and cultural assessments.

Step 9: Identification of investment scenarios by the project team, trustees, and farm manager. An assessment of the opportunities was carried out and a series of maps with specific environmental management plans – riparian fencing, riparian planting areas, potential forestry types, etc. – were developed. These maps helped inform policy modelling by identifying the economic and environmental risks and opportunities along with mitigation strategies. A cultural values assessment tool using technical data and experts to assess the opportunities and risks at a farm-scale level was also carried out.

Step 10: Final report back to trustees and wider beneficiaries.

3.1 Developing a Tikanga Māori Framework for Decision-Making

Mātauranga Māori can inform all aspects of policy and strategic planning for collective assets. It is essential to create a robust, consistent, and replicable process to support the engagement of iwi/hapū/beneficiaries in the management, decision-making, planning, and policy development for collective assets. This ensures tāngata whenua values and interests are identified and reflected in planning and management of collective assets from the outcome setting through to the goal setting and evaluation stages.

A planning process based on tikanga Māori underpins the framework developed by this study for integrated decision making of Māori land (see Fig. 2). This process follows work in the resource management planning area (Tāmaki Regional Mana Whenua Forum 2007; Jefferies & Kennedy 2009; Awatere & Harmsworth 2012; Awatere et al. 2013; Harmsworth & Awatere 2013) but can be readily applied to Māori asset development because it is grounded in kaupapa Māori ideology. The process consists of the following components:

- Whakamāramatia Ngā Pou Herenga – Core Māori values and principles are defined and reflected in strategic plans
- Whakamāramatia Ngā Huanga –Outcomes reflecting core Māori values and principles are identified
- Whakamāramatia Ngā Uaratanga –Goals and objectives are established
- Whakamāramatia Ngā Arotakenga – Developing a Māori cultural values assessment tool

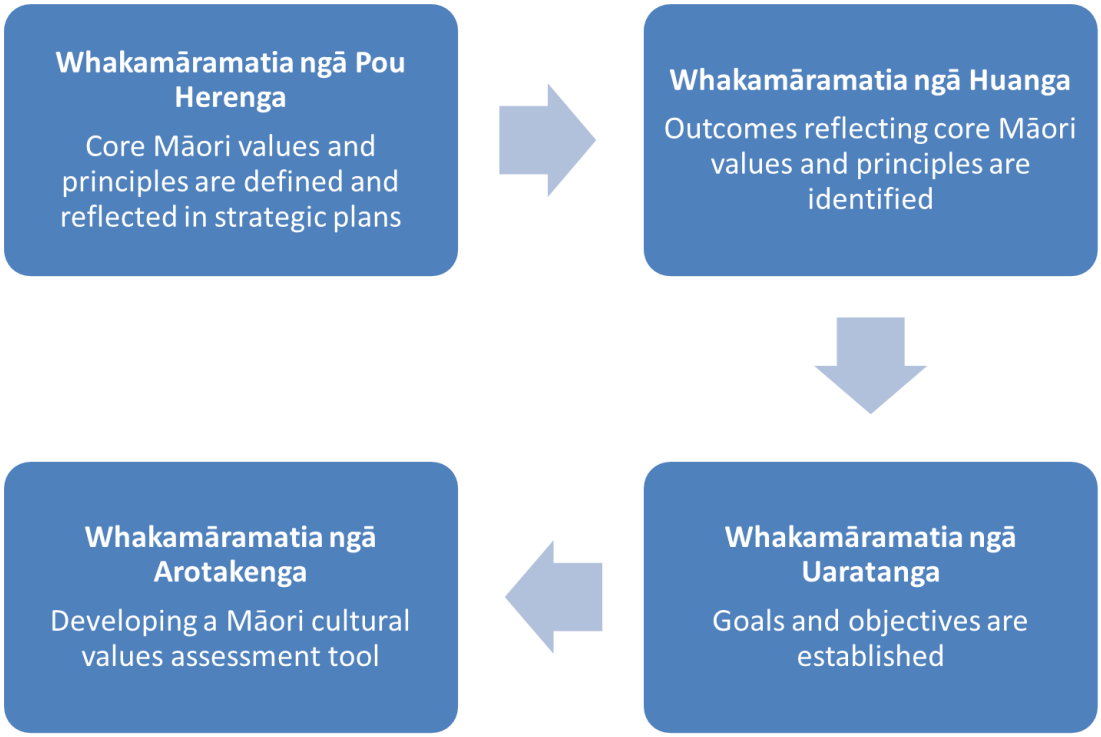

Figure 2 A tikanga Māori based framework for decision-making.

Tikanga is undertaking something the correct or right way. It is often described as customary protocols, values, and traditions that establish behavioural or procedural guidelines for daily life and interaction in Māori culture. Founded on mātauranga Māori – experience and learning handed down through generations – tikanga is based on logic and common sense associated with a Māori worldview and belief system (Mead 2003). It provides the basis for Māori lore. It is often specific to iwi/hapū/marae and is integral to developing kawa (protocols and procedures). Tikanga frameworks therefore often provide correct procedures, guidelines or a correct process of steps, as shown in the following sections (Awatere et al. 2013).

Whakamāramatia ngā Pou Herenga: Core Māori values are defined and reflected in strategic planning

Māori values, derived from the traditional belief system, are part of the wider Māori knowledge system, and can be defined as instruments through which Māori make sense of, experience, and interpret the environment. Māori values can be represented in many forms:

- in the environment as places or sites of significance; the basis for recognising Māori treasures (taonga), such as iconic flora and fauna species, significant biodiversity, mahinga kai and environmental issues

- in the language; through relationships between people or organisations; and the intrinsic cultural basis for controlling or modifying human behaviour, forming the principles and ethics by which we live and advance.

Three core Māori values and principles (Ngā Pou Herenga) were identified with Trustees of Makirikiri Aggregated Trust as:

- *Kaitiakitanga* – Māori sustainable resource management (not the same as guardianship as there is an element of active use based on whakapapa and the ability of securing an access and use right to the resource).
- *Manaakitanga* – reflects reciprocity of actions to: the environment, the wider community, to iwi/hapū, and other people.
- *Whakatipu Rawa* – concerned with growing the asset base, retention of Māori owned resources, and effective use of these resources for beneficiaries and future generations.

These principles align with but are not proxies for economic, social, and environmental well-being. They represent alternative ideologies for well-being, are used in natural resource management planning, and have been adapted here for collective asset management (Harmsworth 1997; Tāmaki Regional Mana Whenua Forum 2007; Jefferies & Kennedy 2009; Rolleston & Awatere 2009; Awatere et al. 2012). There is potential for including Wairuatanga (spiritual well-being), where narrative descriptions are provided alongside the modelling to provide further explanation or to support the outcomes from the modelling.

Whakamāramatia ngā Huanga: Outcomes reflecting core Māori values and principles are identified

It is critical to define the desired outcomes with trustees and beneficiaries of collective assets. An emerging definition for a Māori-defined outcome is "A desired or agreed end point, goal, vision, often within some time-frame – can be a Māori whakatauki (proverb)". Two examples include:

> Kei te ora te wai, kei te ora te whenua, kei te ora te tangata
>
> *When the water is healthy, the land and the people are healthy (nourished)*
>
> (Whakatauki from the Honourable Pita Sharples at the Iwi Māori National Summit on Freshwater Management, (2009)).

> Ki te ngaro te reo Māori, ki te ngaro ngā whenua Māori, ka ngaro te mana Māori
>
> *Without the language, without prestige and without land, Māoritanga will cease to exist. These three – language, prestige and land – are the life of Māoritanga.*
>
> (Ihaka 1957).

Outcomes that have been used in this project were identified with the trustees of Makirikiri Aggregated Trust and informed by core Māori values and principles reviewed in our environmental monitoring work (see Awatere et al. 2013). These outcomes are not the definitive set of outcomes for iwi/hapū but can be used as a starting point for further development. Outcomes should also be context specific and link back to the core Māori values and principles that were identified in step 1.

He Pou Herenga (Guiding Principle): Kaitiakitanga

He Wawata (Outcome): The mauri of the whenua is maintained or improved through Kaitiakitanga

He Pou Herenga (Guiding Principle): Manaakitanga

He Wawata (Outcome): Our activities respect the environment, our hapū/iwi and wider community

He Pou Herenga (Guiding Principle): Whakatipu Rawa

He Wawata (Outcome): The asset base is grown for future generations

Whakamāramatia ngā Uaratanga: Goals and objectives are established

Effective goals and objectives ought to be measurable and contained within a certain timeframe. Development of goals and objectives should also involve the beneficiaries of collective assets alongside trustees. This process reflects a more collaborative process for asset management and ensures the ideals and principles of beneficiaries are reflected in strategic planning. Some examples of objectives from the natural resource management area but can readily be adapted for collective asset management are (Harmsworth & Awatere 2012):

1. To restore/sustain/enhance the mauri of freshwater ecosystems in ways that enable provision for the social, cultural, and economic well-being of Māori
2. To protect, manage, and enhance cultural sites and areas of cultural importance (e.g. wāhi tapu, wāhi taonga, mahinga kai).

The objectives that were developed alongside the trustees of Makirikiri Aggregated Trust,[1] reflect the core Māori values and principles from step 1 of the tikanga Māori decision-making framework and include:

Kaitiakitanga: The mauri of Makirikiri whenua is enhanced by 2019,

Manaakitanga: The mauri of Rangitāne o Wairarapa and the wider community is enhanced by 2019, and

[1] At the time of this study, these objectives require sign-off from the beneficiaries of Makirikiri Aggregated Trust.

Whakatipu Rawa: The asset base of Makirikiri grows by 2019 and there is an equitable distribution of dividends to current and future beneficiaries.

Using mauri (life-force principle) as a measure for Māori well-being is not new and has been utilised in previous studies in natural resource management (Tipa & Teirney 2003; Morgan 2007; Harmsworth & Tipa 2009). For the purposes of collective asset management, mauri is a culturally appropriate measure of well-being. The following section will outline the indicators that were used for this study to measure progress towards the objectives that ultimately link back to the three core Māori values and principles: Kaitiakitanga, Manaakitanga and Whakatipu Rawa.

Whakamāramatia ngā Arotakenga – Developing a Māori cultural values assessment tool

Step 4 is the stage at which Māori cultural values assessment, tools, and methods are developed and implemented. This section provides an overview of the processes for developing a Māori cultural values assessment tool for assessing investment scenarios. Using a cultural values assessment tool, each investment option was assessed from the perspective of Ngā Pou Herenga (Core Values and Principles). A cultural values assessment tool can be used to measure and assess the benefits of investment scenarios. An assessment tool helps the assessor(s) of any investment (e.g. trustees of a Māori land incorporation or trust) evaluate any investment or activity against Ngā Pou Herenga (Core Values and Principles). These core Māori values, principles and criteria/indicators for measurement are described next along with a statement for how they could assess an investment:

He Pou Herenga (Guiding Principle): Kaitiakitanga

Mahinga kai: The mauri (life-force principle) of food-gathering areas. How well does the investment provide for traditional food-gathering areas?

Ngā Wai Tipuna: The mauri of culturally significant waterways. How well does the investment enhance the mauri of significant waterways?

Wāhi tapu/taonga: The mauri of culturally significant sites. How well does the investment enhance the mauri of culturally significant sites? and

Ngā Otaota Māori: The mauri of culturally significant plants. How well does the investment enhance the mauri of native flora and fauna?

He Pou Herenga (Guiding Principle): Manaakitanga

Whanaungatanga: Community connectedness. How well does the investment provide work and business environments and practices that are uniquely iwi/hapū based, and places where iwi/hapū and manuhiri alike are welcome, encouraged, and proud to be involved?

- Iwi/hapū outcomes – The mauri of the iwi/hapū is enhanced
- Whānau hapori – The mauri of the wider community is enhanced.

Education: Mātauranga Māori is enhanced. How well does the investment provide for education opportunities with iwi/hapū beneficiaries and the wider community? and

Partnerships: Inter-iwi and intra-community commercial relationships are maintained. How well does the investment provide for opportunities to work with other iwi/hapū and the wider community?

He Pou Herenga (Guiding Principle): Whakatipu Rawa

Intergenerational investment: Distribution amongst members and future generations. How well does the investment provide for equitable shared benefits across generations?

Sustainable return: To generate a sustainable return for shareholders. How well does the investment provide for a sustainable return for shareholders?

Labour FTEs: Labour Full Time Equivalents are enhanced. How well does the investment provide for full-time equivalent employees from iwi/hapū and the wider community?

Mauri (life-force principle) was a considerable part of the assessment criteria for the goals and objectives. This study utilises the same methods for assessing mauri that were developed by earlier studies (Tipa & Teirney 2003; Morgan 2007; Harmsworth & Tipa 2009). Qualitative rankings such as low, medium and high were assigned for each mauri based criteria. For the purposes of Māori collective asset management, mauri is a culturally appropriate measure of well-being because it is derived from kaupapa Māori ideology. Likewise, qualitative rankings (low, medium, and high) were assigned to other criteria like: intergenerational investment, sustainable return, labour FTEs, education goals, and partnerships.

As the type of evaluation required is qualitative and based on subjective assessment, assessment of each attribute requires determination of the relative size or degree of difference between the value judgements of each assessor. The Likert-type scale would be appropriate in this case because it converts subjective assessment into relative scores. However, it can be difficult to aggregate quantitative measures based on subjectivity and values judgement. This can be overcome to some degree by achieving consistency in standards, particularly in the way each proposal is measured and evaluated. This relies on improving the skills and experience of each assessor and promoting professional standards. If such a process and evaluation system were adopted, each assessor could use a scoring system, such as that based on the Likert-type scale (low = 1, medium = 2, high = 3), which gives rating categories. Each investment can then be assessed against key principles to indicate which elements of the investment are seen positively or negatively from a Māori perspective.

It is also possible to explore the development of an index or aggregation of indicators for each sub-category from the assessment tool based on Ngā Pou Herenga (Guiding Principles), e.g. a Kaitiakitanga index, a Manaakitanga index and a Whakatipu Rawa index. Aggregation of measures provides a useful way for summarising information and for benchmarking the performance or non-performance of an investment in relation to a core value. For example, the maximum aggregate performance score for an investment based on the Kaitiakitanga index with 4 sub-categories would be 12 (with 3 being assigned to a ranking of "high"). Alternatively, a mid-range performance score would be 8 (with 2 being assigned to a ranking of "medium") and a minimum performance score would be 4 (with 1 being assigned to a ranking of "low").

Care should be taken with relying too much on quantitative measures. The purpose of these measures is to promote dialogue between trustees and beneficiaries through the explicit

recognition of core Māori values and principles in the decision-making process for collective assets. Narrative comment can further enhance the quantitative assessment through the addition of contextual information to provide decision-makers with a more holistic data set. There is a rich historical and spiritual narrative that can add value to the decision-making process. The intent of making explicit measures considering mauri will hopefully engender further dialogue about the potential impact a collective asset investment may have on the overall and holistic well-being of the beneficiaries.

Below are examples of the application of this 4 step tikanga Māori based decision-making framework to Makirikiri, together with some sample long-term goals and measures/indicators. The following sections summarise the measures for each of the three core Māori values and principles: Kaitiakitanga, Manaakitanga and Whakatipu Rawa.

3.1.1 He Tauira: Kaitiakitanga

This example describes how the principle of kaitiakitanga (sustainable resource management) can be applied to strategic planning for a collective asset and how progress towards long term goals can be measured.

He Pou Herenga (Guiding Principle): Kaitiakitanga

He Wawata (Outcome): The mauri of the whenua is maintained or improved through Kaitiakitanga

Uaratanga (Long term goal): The mauri of Makirikiri whenua is enhanced by 2019

Table 1 Kaitiakitanga Evaluation Criteria and Indicators

Indicator	Description	Variable
Wāhi tapu/taonga *Significant sites*	The mauri of significant sites	Low/medium/high
Mahinga kai *Food-gathering areas*	The mauri of food-gathering areas	Low/medium/high
Nga otaota Māori *Indigenous biodiversity*	The mauri of culturally significant plants	Low/medium/high
Ngā wai tipuna *Significant waterways*	The mauri of culturally significant waterways is enhanced	Low/medium/high

3.1.2 He Tauira: Manaakitanga

This example describes how the principle of manaakitanga (care for the environment, care for the people) can be applied to strategic planning for a collective asset and how progress towards long term goals can be measured.

- *He Pou Herenga (Guiding Principle):* Manaakitanga

- *He Wawata (Outcome):* Our activities respect the environment, our hapū/iwi and wider community
- *Uaratanga (Long term goal):* The mauri of Makirikiri hapū/iwi and wider community is enhanced by 2019

Table 2 Manaakitanga Evaluation Criteria and Indicators

Indicator	Description	Variable
Education goals	Mātauranga Māori is enhanced	Low/medium/high
Whanaungatanga *Iwi/hapū outcomes* *Whānau Hapori outcomes*	Mauri of the iwi/hapū is enhanced, Mauri of the wider community is enhanced	Low/medium/high
Partnerships	Inter-iwi and intra-community commercial relationships are maintained	Low/medium/high

3.1.3 He Tauira: Whakatipu Rawa

This example describes how the principle of whakatipu rawa (growing the asset base) can be applied to strategic planning for a collective asset and how progress towards long term goals can be measured.

- *He Pou Herenga (Guiding Principle):* Whakatipu Rawa
- *He Wawata (Outcome):* The asset base is grown for future generations
- *Uaratanga (Long-term goal):* The asset base of Makirikiri grows by 2019 and there is an equitable distribution of dividends to current and future beneficiaries

Table 3 Whakatipu Rawa Evaluation Criteria and Indicators

Indicator	Description	Variable
Intergenerational Equity	Equitable distribution amongst beneficiaries and future generations	Low/medium/high
Labour Full Time Equivalents	A balanced approach for managing labour	Low/medium/high
Sustainable Return	Long-term management of assets	Low/medium/high

3.2 New Zealand Forest and Agriculture Regional Model (NZFARM)

Landcare Research has recently developed the New Zealand Forest and Agriculture Regional Model (NZFARM). The primary intention of NZFARM is to help decision-makers assess the potential economic and environmental impacts of policy on regional land use. The model is parameterised to maximise rural income across a catchment, accounting for the environmental impacts of land use and land use changes. NZFARM currently tracks environmental outputs such as greenhouse gas (GHG) emissions from agriculture and forestry, forest carbon sequestration, water use, and nutrient and pesticide losses (Daigneault et al. 2012).

NZFARM is a comparative-static, partial equilibrium model of regional New Zealand land use that maximizes rural income across a catchment, accounting for the environmental impacts of land use and land use changes. The model allows adjustments in regional land management subject to the availability of land and farm inputs (e.g. water), and environmental constraints (e.g. GHG or nutrient loading caps). Key components of NZFARM include:

- Land use/enterprises
    - Pastoral: Dairy, sheep, beef, deer
    - Arable: Wheat, barley, maize
    - Horticultural: Potatoes, grapes, berryfruit
    - Forestry: Pine, eucalyptus, native
    - Other: Scrub and Department of Conservation Land
- Environmental outputs
    - Nutrients: Nitrogen and Phosphorous
    - GHGs for farm and forest activities
    - Water use
    - Endogenous farm practices
    - Change enterprise or land use
    - Adjust fertilizer and stocking rates
    - Add dairy feed pad or apply DCDs
    - Enrol stand in forest carbon sequestration programme

NZFARM has been used to assess the changes in land use, farm management, and environmental outputs for the following policy scenarios:

- Increase in water storage from capital improvement projects
- Proposed caps on nitrogen and phosphorous loads
- Implementation of NZ-ETS on the forest sector
- Implementation of NZ-ETS on the agriculture sector
- Regional afforestation schemes
- Implementation of new farm technology and best management practices
- Increases in farm input costs and/or output prices

3.3 Investment scenarios

The following investment scenarios were identified by the trustees of Makirikiri:

1. Status quo, Sheep and Beef (S&B) with average stock units (SU)

2. Optimised Sheep and Beef along with pasture renewal and sustainable mitigation options
3. Mandatory Dairy practice and sustainable mitigation options.

The NZFARM modelling parameters for each option follow:

Option 1 – Status Quo S&B Parameters

- No new blocks
- Average stock units
- No land use change
- FARMAX (a decision support tool for pastoral farmers) figures
    - Use of drysdale rates for revenue potential on non-restored pasture
    - S:B ratio is 80:20

Option 2 – Optimised management of S&B parameters

- No new blocks (land purchase)
- Pasture renewal continues at same rate as 2013 to 2015 average until all pasture is renewed
- Fertiliser capital investment
- Stock units go up from average to potential on renewed areas
- Switch S:B ratio from 80:20 to 60:40

Option 3 – Dairy + S&B parameters

- Purchase of new land block
- Remaining pasture for S&B
- Pasture renewal with same rates as Option 1
- Mandatory dairy practice/mitigation (as below)

A number of sustainable mitigation practice options were identified and modelled by NZFARM. These mitigation practices were implemented as a bundle to Options 2 and 3:

1. Riparian fencing (sheep or cow proof fence, planting and weed control)
2. Wetland restoration (earthworks, fencing, planting and weed control)
3. Afforestation of small area in northwest corner of farm (carbon sequestration)

A number of mandatory dairy practice/mitigation options were identified and modelled by NZFARM. These mitigation practices were implemented as a bundle to Option 3:

1. Effluent pond

2. Nutrient management plan
3. Mandatory fencing of riparian zones
4. Best practice track design
5. Water efficiency (i.e. use from bore)
6. Bridges and culverts

For the Dairy with environmental mitigation scenario, we assume that the farm must undertake the following good management practices:

1. Effluent pond size calculator
2. Overseer nutrient management plan
3. Mandatory fencing of riparian zones
4. Best practice track design
5. Water efficiency (i.e. use from bore)
6. Bridges and culverts

4 Results

4.1 Assessing the investment scenarios using a Māori cultural values assessment tool

The natural environment is critical to the culture, identity, and well-being of Māori, a relationship that has been developed and fostered over centuries of occupation, close interaction, and interdependence with the natural resources of their rohe (Harmsworth & Awatere 2013). Assessments of the investment scenarios described in section 3.3 were assessed against Ngā Pou Herenga (Māori core values and principles) that are a reflection of the relationship between Māori and their taonga (treasured possessions).

Utilising the measures developed in section 3.1, Table 4 below provides a graphical representation of the level of values for each Pou Herenga assessed against a series of criteria. These Pou Herenga were identified by the trustees of Makirikiri Aggregated Trust to help them make informed investment decisions concerning their collective assets. The criteria for assessment are reflective of Ngā Pou Herenga. These criteria were identified during a series of workshops with trustees of Makirikiri Aggregated Trust. The darker shaded squares represent a relatively high level of benefit from the investment scenario while the lighter shaded square represents a relatively low level of benefits from the investment scenario (using a scale from low = 1, to medium = 2, to high = 3).

The cultural values assessment tool assessed each investment scenario (Sheep and Beef (S&B), Optimised Sheep and Beef, Dairy, Optimised Sheep and Beef with environmental mitigation and Dairy with environmental mitigation), from a Māori perspective. We found that the improvements in core values and principles like Kaitiakitanga and Whakatipu Rawa were relatively low for each of the investment scenarios. However, in terms of Manaakitanga, the Optimised S&B investment scenario provides relatively more opportunities compared to the existing use for better connections between the farm, their beneficiaries, and the local community. These opportunities are realised through initiatives such as open days with beneficiaries and visits by the local kura kaupapa school to learn more about farming practices.

When environmental mitigation was added to all scenarios (S&B, Optimised S&B and Dairy) the level of benefits obtained utilising the cultural values criteria improved (relative to the no-mitigation case). Benefits were more obvious for S&B, in particular for environmental-related cultural values. Sheep and Beef with environmental mitigation is less likely to impact negatively on cultural values through increased nitrogen run-off into waterways in comparison to Dairy with environmental mitigation. Sheep and Beef with environmental mitigation results in an improved habitat for taonga species like tuna (eels) and inanga (whitebait). Furthermore, planting riparian zones with indigenous vegetation provides opportunities for beneficiaries to access sites for rongoā (medicines) and mahinga kai (food-gathering). Access by tangata kaitiaki (sustainable resource managers) to these potential sites (mahinga kai and mahinga rongoā) is less likely to impact negatively on stock for S&B in comparison to Dairy due to the intensive nature of managing stock on a dairy farm.

While these mitigation efforts improved the cultural values outcomes, there is an additional cost associated with taking some land out of production, fencing, native planting, and weed control. These costs need to be weighed up against the long term benefits from managing the farm in a more sustainable manner consistent with Ngā Pou Herenga.

In terms of Whakatipu Rawa, the benefits from investment in environmental mitigation bode well for future generations. The long-term benefits of improved water quality and enhanced terrestrial ecosystems are more likely to be realised by future generations. Riparian planting and management along with improved effluent management systems and greater environmental education opportunities are also more likely to generate more FTEs.

Table 4 Cultural Values Assessment Tool

Criteria		1 Sheep and Beef	2 Optimised Sheep and Beef	3 Irrigated Dairy	2 & Environment mitigation	3 & Environment mitigation
Kaitiakitanga	Mahinga Kai					
	Ngā Wai Tipuna					
	Wāhi Tapu/Taonga					
	Ngā Otaota Māori					
Manaakitanga	Whanaungatanga					
	Education					
	Partnerships					
Whakatipu Rawa	Integenerational Investment					
	Labour FTEs					

Key

LOW MEDIUM HIGH

4.2 NZFARM Assessment

We found that switching from the current operation that is primarily S&B to Dairy could increase average net farm revenue over the long term by about 70–87%. Doing so would also require initial capital improvements, which would result in Makirikiri taking on a significant amount of debt to make the conversion. The alternative – optimising the current S&B operation through continued pasture renewal and adjustment of the ratio of sheep and beef stock – could result in an increase in net revenue by about 25–43% per annum with little extra investment. The results of the economic assessment are presented in Table 5.

Table 5 Total annual Makirikiri economic and production outputs (Note: relative figures only)

Scenario	Area	Net Revenue	Milk	Lambs	Wool	Beef	Timber
	Ha	*$*	*kg*	*kg*	*Kg*	*Kg*	*m3*
Sheep & Beef	5	$60	0	50	8	20	10
Optimised S&B	5	$80	0	60	14	50	10
Dairy	6	$100	10	30	3	10	10
Sheep & Beef + Mitigation	5	$50	0	50	8	20	10
Optimised S&B + Mitigation	5	$70	0	60	13	45	10
Dairy + Mitigation	6	$90	9	25	33	10	10

Converting from S&B to Dairy could have a negative impact on water quality, particularly as nitrogen leaching from the farm could increase between 35% and 57%. Net greenhouse gas (GHG) livestock emissions (emissions less forest carbon sequestration) could also rise by 22–36% because of the increase in cows on the farm. Optimising S&B operations would increase N leaching by about 3–7%, while the increase in farm stock could increase net GHG emissions by 16–32%. The estimated environmental outputs for the six scenarios are listed in Table 6.

Table 6 Total annual Makirikiri environmental outputs (Note: relative figures only)

Scenario	N Leach	P Leach	Total GHG	Forest Carbon Sequestration	Net GHG	Water Yield	Soil Erosion
	Kg	*kg*	*tonnes*	*tonnes*	*tonnes*	*mm*	*Tonnes*
Sheep & Beef	10.5	11.5	10.5	4	7	3	12.5
Optimised S&B	11	12.5	14	4	14	3	12.5
Dairy	17	10.5	14	4	14	3	14
Sheep & Beef + Mitigation	10	11	10	5	5	3	12
Optimised S&B + Mitigation	10.5	12	12	5	9	3	12
Dairy + Mitigation	14	10	14	5	9.5	4	13.5
% Change from Sheep & Beef							
Sheep & Beef	0%	0%	0%	0%	0%	0%	0%
Optimised S&B	7%	7%	22%	0%	32%	0%	0%
Dairy	57%	-17%	24%	0%	36%	1%	12%
Sheep & Beef + Mitigation	-4%	-4%	-4%	18%	-14%	-4%	-4%
Optimised S&B + Mitigation	3%	3%	17%	18%	16%	-4%	-4%
Dairy + Mitigation	35%	-19%	21%	18%	22%	9%	9%

4.3 He Korero Whakatūpato – Limitations

A sound understanding of Māori values and principles is fundamental to being able to understand the importance of those values and how they might influence decision making for collective assets. A lack of understanding of Māori values and principles can be caused by colonisation and land alienation resulting in a lack of strong Māori cultural identity among some trustees, along with the disconnection between trustees/beneficiaries and the very whenua they are managing. If there is a lack of strong Māori cultural identity and a lack of connection and lived experiences to an area among participants, then the promotion and application of a decision-making tool for collective assets based on Māori values and principles will be fraught with problems. Likewise, if there is a lack of direction, strategically or operationally, the ability to apply Māori values and principles to decisions will be problematic. It is also problematic to seek to promote a consideration of investment scenarios utilising criteria other than financial ones.

This issue may be mitigated through the introduction of an education component before or during a workshop to brief participants and further explain/clarify those values within the context of land management. This process will most likely take longer than a 1-hour workshop and ought to involve a hīkoi – a reconnecting exercise back to the whenua – otherwise participants will turn to what they know and understand, which are usually financial priorities.

In a nation with a strong focus on economic growth as a measure of progress towards well-being, the validity of cultural values in determining such progress towards whānau, hapū and iwi well-being will be questioned. There is acceptability among some that Māori cultural priorities are acceptable as long as they do not impact negatively on financial returns and that

a market-based, trickle-down approach is the most efficient way for allocating resources. There is, however, little evidence to suggest the best approach to take for efficiently managing collective assets is market based.

To achieve long-term goals based on cultural values and principles, a more informed approach to investment decisions is required – one that explicitly considers cultural values in the decision making process. We have identified a set of attributes for an effective cultural values assessment tool:

- Based on mātauranga Māori (Māori knowledge) theory and philosophy
- An holistic approach towards Māori well-being
- Mixed data measures:
  - Qualitative/Metaphysical, e.g. narrative korero on values and aspirations
  - Quantitative/Biophysical, e.g. level of well-being or mauri
- Context specific measures – Iwi/hapū specific.

5 Conclusion

A step-by-step process was used to discuss and evaluate investment scenarios utilising NZFARM and Māori cultural values. The tikanga Māori decision framework and its components is an example of a Māori evaluation process. Unique to this framework is the integration of Māori concepts (e.g. *Kaitiakitanga, Whakatipu Rawa,* and *Manaakitanga*) within a Māori collective asset management paradigm. This is another example of how Mātauranga Māori can be incorporated and used for investment decisions. There is potential to refine this framework and its components and develop it further for use by other iwi/hapū throughout Aotearoa. Our tikanga Māori decision framework can help managers of collective assets make progress towards outcomes that reflect equality of distribution, and mitigate or improve the social and environmental domains that are the receptors of the externalities created by our economic activities. Successful uptake of the framework would require a paradigm shift away from a business as usual approach. The challenge for Māori resource management is to use this type of framework to assess new investment opportunities alongside traditional business analyses such as cost-benefit or return on equity.

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