

Te Nohonga Kaitiaki
Guidelines for Genomic
Research on Taonga Species
(with Background)



Front Cover Image:
Leaf cross-section of
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Flax) *Phormium tenax*

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Te Nohonga Kaitiaki Guidelines for Genomic Research on Taonga Species (with Background)

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Acknowledgements

Te Nohonga Kaitiaki refers to the role of kaitiaki and mana whenua in managing Māori interests in biological samples or genetic resources, and data relating to taonga species across the full spectrum of activities from sample collection to sample storage, from data curation to data sharing.

Genetic and genomic research on taonga species occurs for a variety of reasons supporting conservation efforts and contributing to breeding programmes. Kaitiaki need to be involved in decisions about future uses of the information and data generated from any of these projects to ensure mana whenua and/or Māori have the opportunity to benefit from the value created.

In preparing this document, Te Nohonga Kaitiaki research team wish to acknowledge the participants, stakeholders and mana whenua who contributed to the project and these guidelines.

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Table of Contents

04

Acknowledgements

05

Table of Contents

06

Glossary

09

Executive Summary

11

Te Nohonga
Kaitiaki Guidelines

31

Background to
the Guidelines

66

References

73

Appendix A: Te
Nohonga Kaitiaki
Engagement Checklist

79

Appendix B: List of
Guidelines for Genetic
Research with Māori

Glossary

Hapū	Subtribe
Hui	Meeting, gathering
Iwi	Tribe
Kaitiaki	Guardian, steward, caretaker
Kaitiakitanga	Guardianship, stewardship, caretakership
Kanohi ki te kanohi	Face-to-face, in person
Karakia	Prayer, invocation
Kaupapa	Subject, topic, policy, matter for discussion, plan, purpose
Kawa	Protocol
Mana	Authority, prestige, pride
Mana whenua	General authority exercised by an iwi, hapū or individual over a particular area of land
Manaakitanga	Support, hospitality, generosity
Mātauranga	Knowledge, wisdom
Mātauranga hou	New knowledge
Mauri	Life force, life essence
Ngā taonga katoa	All treasured things
Noa	Common, referring to a state of being that is not sacred
Pūtahitanga	Convergence, junction

Pūtaiao	Science
Raraunga	Data
Rohe	Geographical area
Taketake	Indigenous, native, original
Takiwā	District, territory, region
Tangata whenua	People of the land
Taonga	Anything of value, treasures
Tapu	Sacred, referring to a state of being that is sacred or restricted
Te Ao Māori	The Māori worldview or paradigm
Tika	Correct, true, just
Tikanga	The customary system of values and practices developed over time
Tino rangatiratanga	Sovereignty, self-determination, autonomy
Tuakana-teina	Literal meaning: elder and younger sibling. Used in reference to a relationship where one party is older, more knowledgeable and more experienced than the other. What is implied is a mentor-mentee relationship.
Wai	Water
Wāhi tapu	Sacred site(s)
Wairua	Spirit
Whakaaro	Thought(s), idea(s)
Whakapapa	Ancestry, genealogy, heritage
Whakawhānaungatanga	Relationship-building
Whānau	Family
Whānaungatanga	Kinship, relationship, connection

Tui



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Executive Summary

The *Te Nohonga Kaitiaki* guidelines apply to genomic research involving taonga species. Despite Te Tiriti o Waitangi affirming Māori rights over taonga, the application of these rights to biological samples and data has generally been overlooked within the sciences. The ease of access to genomic technologies has resulted in widespread proliferation of research, and increasing access for the scientific community as well as tertiary and secondary educational institutions. To date there has been little guidance in place to ensure that taonga species are being approached in a manner that upholds Treaty principles, or specific guidance on how this can be done effectively.

The Waitangi Tribunal has strongly recommended the protection of kaitiaki interests over taonga. International instruments such as The United Nations Declaration on the Rights of Indigenous People also affirm these rights. Moreover, documents such as the Convention on Biological Diversity and its supplementary document, the Nagoya Protocol, prescribe benefit-sharing arrangements to be set in place where traditional knowledge or biological resources have been used for profit (Secretariat of the Convention on Biological Diversity, 2010). While not all are yet endorsed by the New Zealand government, these international instruments bring a focus to the conservation of biodiversity, an important principle at the heart of kaitiakitanga.

Acknowledging that in order to:

- Honour the Treaty of Waitangi and affirm the mana of hapū and iwi,
- Support the role of kaitiaki over taonga species,
- Uphold a high standard of ethics,
- Comply with relevant domestic and international policy,
- Create and benefit from commercial and non-commercial opportunities,
- Continue to advance scientific innovation, and
- Give effect to conservation of genetic resources for future generations.

A multi-layered and integrative approach is required.

These guidelines provide a comprehensive framework for research positioned at the intersection of genomics, innovation and Te Ao Māori. The guidelines also highlight the considerations at different levels of a project, from inception to completion. An engagement checklist provides questions to inform the development of robust relationships with Māori. It is intended that these guidelines be considered a living, evolving document with the understanding that as technology advances, so too will the specific needs to be addressed.

Te Nohonga Kaitiaki Guidelines

13

Introduction

14

Purpose

16

Guiding Principles

Kia tau te wairua o te tangata

Kia pūmau te mana o te tangata

Kia hiki te mauri o te kaupapa

17

Operating Principles

He whakapapa tō te taonga

He mauri tō te taonga

He kaitiaki tō te taonga

18

Engaging with Māori

22

Engagement Framework

Levels of Responsibility

Project Level Responsiveness

Engagement/Communication:

Project Outcomes

Level of Involvement

Intellectual Contribution of Māori/Mana Whenua

Organisation Level Responsiveness

Sample/Data Access and Governance

Benefit Sharing

Capacity Building

Embedding Relationships

System Level Responsiveness

Research Networks and Consortia

International Agreements

Research Funding

End Users



Te Nohonga Kaitiaki Guidelines

Introduction

Research contributes to the broader developmental objectives of society. Ethics plays a specific role in guiding key behaviours, processes and methodologies used in research. Māori ethical frameworks recognise that all research in New Zealand is of interest to Māori and outline community expectations of appropriate behaviour in research to deliver the best outcomes for Māori (Atatoa-Carr et al., 2012; Beaton et al., 2017). This extends to research on taonga species. As such, all research that uses samples of taonga origin creates obligations on the part of institutions to act ethically and in good faith in relation to specific projects and future uses.

Genes are a basic unit of heredity and consist of a particular sequence of DNA located on a chromosome. Genetics is the study of genes and the molecular structure of genes, and is primarily concerned with their specific function and inheritance from one generation to another. A genome is the complete set of genetic information of an organism, including the spatial arrangement of that genetic information within a cell. The World Health Organization defines genomics as the study of genomes, which looks at the function of genes, as well as related techniques

(World Health Organization, 2004; World Health Organization, 2020). Genomics is broader in nature and encompasses all genes and their interrelationships in order to understand more fully their combined influence on the organism.

All research involving genetic resources for the purposes of conservation and ecology within Aotearoa is of value and interest to kaitiaki. Māori have expressed openness to working with genomic researchers where projects can help them meet their kaitiaki responsibilities alongside the use of mātauranga and more traditional interventions. Our engagements also identified a significant desire for mana whenua to understand the processes surrounding genomic research for the purposes of either mitigating inappropriate applications; or for the purposes of building knowledge or capacity while ensuring the integrity of taonga and mātauranga.

Purpose

The *Te Nohonga Kaitiaki Guidelines for Genomic Research on Taonga Species* have primarily been developed as a tool to assist in the planning and execution of genomic research in a manner that honours taonga, kaitiaki and mātauranga Māori. This document has also been designed with mana whenua in mind, noting that these guidelines may serve as a starting point for hapū and iwi to formulate specific guidance that is relevant to their own tikanga and mātauranga. The development of this document serves to enhance engagement and dialogue, and in line with the rangatiratanga of iwi, hapū and whānau, is not intended to be authoritative in nature. As such, the guidelines are named *Te Nohonga Kaitiaki*, or the place of guardians, recognising both the role of traditional guardians of taonga species and the responsibilities of institutional stewards.

This document was designed to further build on the guidance provided in Te Mata Ira Guidelines on Genomic Research with Māori, Te Ara Tika Guidelines for Māori Research Ethics and He Tangata Kei Tua Guidelines for Biobanking. (Hudson et al., 2010; Hudson et al., 2016a; Hudson et al., 2016b; Hudson et al., 2016c). *Te Nohonga Kaitiaki* guidelines were developed with a focus for the future and are oriented towards empowering iwi, hapū and whānau to navigate genomic innovation in Aotearoa. The guidelines aim to assist in formulating an approach to research that is consistent with the Crown's ever-emerging response to Wai 262, as well as address the growing need to come into compliance with

international practices consistent with the Nagoya Protocol.

The guidelines have been designed with a number of objectives. They are:

- To honour Te Tiriti o Waitangi/The Treaty of Waitangi,
- To affirm the rangatiratanga of kaitiaki over taonga species,
- To reiterate the mana of hapū and iwi,
- To support Māori data sovereignty over data generated from research,
- To address the need for benefit-sharing arrangements in compliance with the emerging global standard under the Nagoya Protocol,
- To establish practical guidance for institutions to conduct research in a manner that reflects cultural responsiveness and ethical science.

'Taonga species' refers broadly to any species or biota that are of value to Māori. The holistic nature of the Māori paradigm means that taonga species are viewed in the entirety of their living contexts. This means that taonga species can be viewed as both independent entities and as interdependent parts of complex ecosystems. This means that taonga can be viewed on macro and micro levels and thus can include bioactives, microbes, including bacteria, as well as species of flora, fauna and entire ecosystems. This is explained in more detail in the Cultural Foundation section of these guidelines.

Kaupapa Māori research has been defined as research by Māori, for Māori and with Māori (Smith, 2012). Although not all genomic research will necessarily fit within all of the parameters described here, the objectives and characteristics of furthering rangatiratanga and giving full recognition to Māori values and systems that are central to kaupapa Māori research remain key when dealing with taonga (Collier-Robinson et al., 2019; Pihama et al., 2002; Walker et al., 2006).

Genomics Aotearoa funded the development of the *Te Nohonga Kaitiaki* guidelines. The first round of consultation involved a review of literature as well as series of nationwide hui¹, presentations and wānanga² held between 2018 and 2019. These hui were attended by both science and community stakeholders, including representation from various government departments and Crown entities. Interviews with key informants were also carried out in a manner that captured the diverse nature of taonga species research and its potential applications. Eleven formal submissions were received in the first consultation round from a range of institutions and individuals³, and five further submissions were received in the second consultation round⁴.

¹ These initial hui were held in Auckland, Ngaruawaahia, Hamilton, Christchurch and Dunedin between June and November 2018, with a total of 193 participants.

² This overnight wānanga was held from 30th September to 1st October 2019 at the Waikato-Tainui Research College in Hopuhopu, Ngaruawaahia.

³ Submissions from institutions were received from the Genomics Aotearoa Kāhui Māori, Species Aotearoa, NIWA, The University of Auckland, Te Papa Atawhai, New Zealand's Biological Heritage Challenge, Manaaki Whenua Landcare Research and four individuals.

⁴ Submissions were received from Species Aotearoa, Manaaki Whenua Landcare Research and three individuals.

Guiding Principles

The guiding principles have been set in place to guide the thinking around genomic research. They speak primarily to the importance of how communities relate to the nature of the project.

In the absence of guidelines, falling back on guiding principles should inform good decision-making. The guiding principles in this document reflect those set out in the Te Mata Ira Guidelines.

Kia tau te wairua o te tangata

Wairua represents the spirit in which a taonga is shared and used. It encompasses the intentions, expectations and duties of care that are embedded in the use of the taonga. It requires a level of trust between traditional kaitiaki and the institutional stewards to whom the taonga is being entrusted for the purposes of the research.

‘**Kia tau te wairua o te tangata**’ sets the standard of comfort that communities should have with a given research project. The **level of comfort** may change over time and therefore it is important for researchers to maintain ongoing communication with mana whenua in order to keep mana whenua informed and engaged at every phase of the research.

Kia pūmau te mana o te tangata

Mana translates to power and authority and refers to the authoritative ability of kaitiaki to exercise their tino rangatiratanga.

‘**Kia pūmau te mana o te tangata**’ speaks to maintaining a **level of control** that enables kaitiaki to exercise their self-determination over their taonga. More specifically, it relates to the level of control that participants and communities have with regard to the research project.

Kia hiki te mauri o te kaupapa

As described earlier, mauri is a core concept that underpins the Māori paradigm. It is the essence of life and encapsulates ecosystemic balance and the biological integrity of life-sustaining systems and conditions.

‘**Kia hiki te mauri o te kaupapa**’ makes clear the importance of ensuring that the **integrity of systems** that contribute to research endeavours is enriched, or at the very least maintained throughout the course of the research.

Operating Principles

The operating principles are reflective of the nature and relationship of whānau, hapū and iwi with taonga. The operating principles provide clarity around how relationships with the taonga

are to be navigated when planning research and are of particular utility in the absence of applicable guidance.

He whakapapa tō te taonga

Taonga have relationships with people and place.

‘He whakapapa tō te taonga’ acknowledges the vast and extensive reaches of whakapapa that contribute to the unique history of a taonga and its state of being. In this sense, whakapapa is not exclusively tied to ancestry, but encompasses each connection that enriches it with relational identity. From this perspective, we view any taonga not only as a treasure or resource, but in the light of all relationships that have culminated in its existence. ‘He whakapapa tō te taonga’ describes the genealogical, social, ecological, spiritual and historical relationships that cumulatively shape the highly nuanced identity of a taonga.

He mauri tō te taonga

Taonga are essential components of the ecosystem.

‘He mauri tō te taonga’ encompasses the delicate interplay between all organisms, which in turn form the foundations of ecosystem balance. Mauri as it relates to genomic research speaks to the importance of the preservation of distinct populations, the preservation of biodiversity, the preservation of roles within ecosystems and the preservation of mātauranga. ‘He mauri tō te taonga’ is the acknowledgement that taonga are central to ecosystemic health.

He kaitiaki tō te taonga

Taonga are protected through intentional action.

As described throughout this document, one of the key underpinning aspects of Te Ao Māori is the taonga-kaitiaki relationship. ‘He kaitiaki tō te taonga’ speaks to the significance of this relationship and reinforces that taonga should be actively protected. It is an acknowledgement that whether through the self-determined actions of kaitiaki or the responsibility of institutional stewards, taonga are to be given due care and regard.

Engaging with Māori

An important part of conducting genomic research that involves taonga species is the need to engage with the right people. Māori have repeatedly expressed their desire to be involved in research conversations from the earliest stage possible. While whānau, hapū and iwi are able to identify appropriate connections between taonga and kaitiaki, the nature of this involvement may vary from case to case.

It should be noted that genomic research has a fraught and often controversial history for Māori and Indigenous communities. Many will assert their right to say NO, in line with the Aashukan Declaration (NZAIA, n.d.). Others will only participate if their cultural intellectual property rights, as reflected in the Mataatua Declaration, are upheld (The Mataatua Declaration on the Cultural and Intellectual Property Rights of Indigenous Peoples, 1993).

The responsibility to engage with an appropriate voice lies with the entity seeking engagement and this should begin at the earliest possible time. Before beginning consultation, it is important to apply careful thought regarding who is being consulted and whether they have the mana or authority to represent the interests of their community. It may also be wise to consider concurrent consultation. In some instances, individual iwi or hapū may opt to be represented by a rūnanga or iwi collective that may be better resourced or oriented, in order to represent their needs.

The following table summarises who researchers could engage with in the development of research projects. Though not an exhaustive list, it identifies where discussions may need to happen and where agreements might need to be made.

Through engagement with the appropriate people it is possible to develop research projects that enhance relationships based on good faith and mutual understanding (Te Arotūruki, 2009). Engaging with Māori in the design process enables:

- an acknowledgement of rangatiratanga status as Treaty partners
- an acknowledgement that mātauranga Māori can make an important contribution
- an acknowledgement that Māori have resources and capability to contribute; and
- an acknowledgement that for some issues Māori are better placed to develop the solutions (Te Arawhiti, 2018a; Te Arawhiti, 2018b).

Others examples of guidelines to support effective engagement include Bay of Plenty Regional Council (2011), Auckland Council (2016) and Waikato Regional Council (2017).

Who to engage with

Mana Whenua

Individual whānau or hapū	Engage with whānau and/or hapū that have exclusive and well-defined kaitiakitanga interests for a specific variant of a taonga species.
Rūnanga or an iwi entity	Engage with iwi to gain support for projects and to identify their kaitiakitanga interests in specific taonga species.
Mātauranga holders – Kaitiaki and Tohunga	Kaitiaki (guardians) have a responsibility to care for the taonga and will often be experts (tohunga) or hold expert knowledge (mātauranga) that can add value to projects.
Multiple iwi and/or multiple collective iwi entities	Multiple iwi may share kaitiakitanga responsibilities for certain taonga species, and instances such as this should involve engagement with all interested parties.

Māori

Māori researchers	Māori researchers with expertise in the project or whakapapa to iwi within the rohe.
Māori networks and liaisons	Māori networks with an interest in the project or Māori liaisons affiliated with relevant organisations.
Māori commercial and non-commercial entities	Māori commercial entities may have an interest in ascertaining the novelty or bioactivity of a certain taonga species in order to develop commercial enterprises based on the authenticity or provenance of the taonga, or to prevent non-Māori and off-shore entities from doing the same.

Freshwater Kōura (crayfish)
collected from Lake Rotoiti
sitting in bracken fern.

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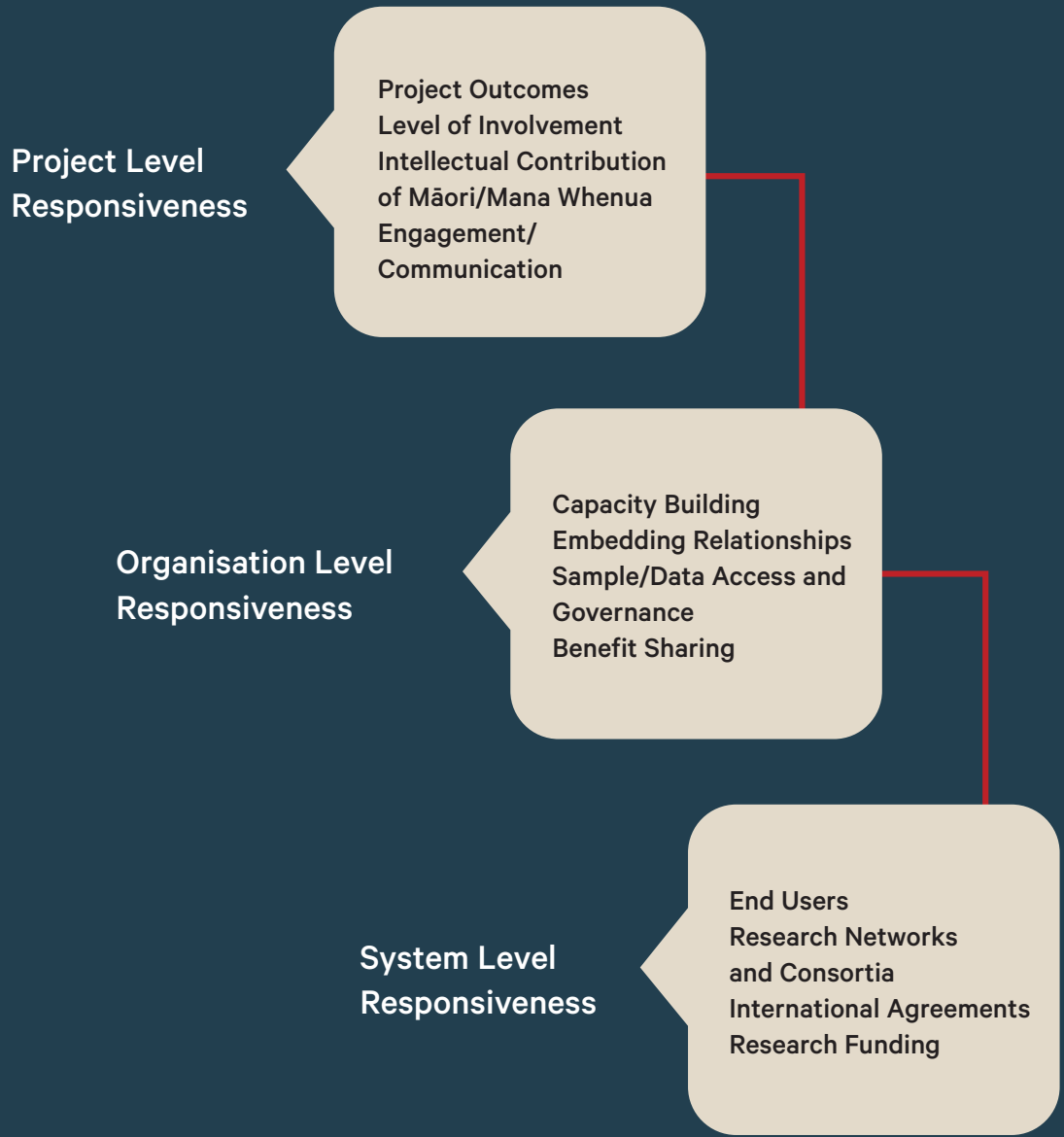
Engagement Framework

Levels of Responsibility

The question of ‘what constitutes good engagement’ is challenging from the outset. While Māori have expressed views of being ‘over consulted’, what has also been expressed is a keen desire to be involved and engaged with early in a manner that is both comprehensive and meaningful. One of the limitations of Crown-imposed requirements for consultation embedded in policy is that engagement with Māori has become more about procedural compliance than an opportunity to build mana-enhancing relationships as a foundation for a project.

The Te Nohonga Kaitiaki Engagement Framework has been developed to illustrate the considerations that lay the foundation for effective engagement. Satisfactory engagement is not one-dimensional and comprises different levels of responsiveness, with each level encompassing its own considerations. The various levels illustrated have been highlighted to bring attention to the nuances involved in planning research involving Māori and their taonga.

The Te Nohonga Kaitiaki Engagement framework outlines effective engagement with Māori across three levels of responsiveness; at the Project Level, the Organisation Level and Systems Level. Each level of responsiveness is detailed in following pages.



Project Level Responsiveness

Project Level Responsiveness encompasses issues that are directly relevant to the project itself.

The four main aspects as indicated previously include:

- Whether good engagement and communication practices have been set in place
- Whether project outcomes are mutually beneficial and understood
- An understanding of involvement for all parties involved
- How the intellectual contribution of Māori and mana whenua will be recognised.

Useful questions can include the following:

Engagement/Communication:

- When should engagement occur?
- How is engagement conducted?
- Is there an adequate level of cultural understanding prior to engagement?
- Is there an adequate level of understanding of the Treaty prior to engagement?
- What are the parameters of consent or denial?
- Will kaitiaki have the resources made available to them to be fully informed about the project and what it aims to achieve?
- Who absorbs the cost of engagement?

Project Outcomes

- What are the intended project outcomes?
- Who benefits from these outcomes?

- What are the potential benefits to Māori?
- What are the potential risks?
- Have there been conversations with Māori to establish what their long term vision and priorities may be?
- Is there an alignment of desired outcomes from this project?
- What efforts have been made to ensure all parties have a mutual understanding of those outcomes?
- Is there a future vision for collaboration?

Level of Involvement

- What are the roles and responsibilities for kaitiaki within this collaboration?
- What expectations do Māori have of researchers?
- What expectations do researchers have of Māori?
- Are roles, responsibilities and expectations practicable?
- What is the level of project resourcing?

Intellectual Contribution of Māori/Mana Whenua

- What is the level of understanding in relation to mātauranga Māori?
- Is there an understanding of Māori approaches to protecting their mātauranga and taonga?
- How has mātauranga Māori strengthened research?
- How can the project support/substantiate/confirm mātauranga Māori?

Level of
Involvement



Intellectual
Contribution of
Māori/Mana Whenua

Project Level
Responsiveness



Taonga Species

Project Outcomes



Engagement/
Communication

Organisation Level Responsiveness

Organisation Level Responsiveness speaks to the organisation's roles and responsibilities in navigating the 'how' of the project.

This level of responsiveness covers the following four aspects:

- Data access and governance of data has been considered
- A plan for fair and equitable benefit sharing
- Consideration of capacity-building aspirations and mechanisms
- Relationships established in good faith.

Useful questions can include the following:

Sample/Data Access and Governance

- Are there any legal or moral requirements for data from research to be made public or shared with a third party?
- Where are data derived from and is there any secondary usage of data?
- What are the data access protocols?
- Who gets to design data access protocols?
- How does that process take place?
- Are Māori involved in decisions about access and use of new data?
- How will samples be obtained?
- What are the protocols around sample management?
- Are Māori involved in the decisions about sample management?

Benefit Sharing

- What benefit-sharing processes are in place?
- Has thought been given to new knowledge that may emerge from the project?
- What entity gets to benefit from new knowledge?
- What, if any, IP rights are there over the knowledge generated and how was this negotiated?
- Are there agreements or mechanisms in place that allow for sharing of benefit in relation to any potential new knowledge that may emerge from research?
- How are original agreements maintained if 'parties' change or are terminated?

Capacity Building

- What initiatives support scientists to better understand Te Ao Māori?
- What initiatives support Māori to better understand Science?
- Are there any absorptive capacities (human, technical, relational – kaupapa, mātauranga, tikanga) built into the project?

Embedding Relationships

- How are Māori involved in making decisions in the project?
- Is Māori input valued?
- Is open communication supported on both ends?

Benefit Sharing



Capacity Building

Organisation Level
Responsiveness



Taonga Species

Sample/Data Access
and Governance



Embedding
Relationships

System Level Responsiveness

System Level Responsiveness pertains to aspects external to the project that are beyond the scope of the organisation. These aspects can include the national and international legal parameters of the research, or the extent to which the research can be disseminated. System Level Responsiveness is important to be aware of at the project and organisation levels in order to mitigate any potential limitations that the project may have as a result.

The four aspects to be taken into account include:

- Research Networks and Consortia
- National Policies and International Agreements
- Research Funding and Publications
- End Uses and End Users.

Useful questions can include the following:

Research Networks and Consortia

- What interests will other networks and consortia have in data generated from the project?

International Agreements

- What effect does domestic policy have on the project?
- What international agreements have an impact on the project?
- How do international agreements affect the project?

Research Funding

- What funding opportunities may arise from this project for follow-on projects?
- Do the opportunities for funding come with conditions that may conflict with kaitiaki values?

End Users

- What is the end use of the project?
- Is there foreseeable potential for other uses from the outputs of this project?
- Do the foreseeable potential uses align with the values and aspirations of kaitiaki?
- Are there foreseeable uses that may harm kaitiaki, their values or their aspirations?
- Has there been consideration of the potential unforeseen future uses that may arise from the project?
- Who are the primary end users of the project?
- Who are the potential secondary users of the project?

Research Funding



End Users

System Level
Responsiveness



Taonga Species



International
Agreements



Research Networks
and Consortia

Background to the Guidelines

33

Genomic Research

34

Māori Interests in Genomic Research

Te Tiriti o Waitangi/The Treaty of Waitangi
The Wai 262 Claim
Te Pae Tawhiti

40

International Agreements and Indigenous Interests in Genomic Research

The Mataatua Declaration
The United Nations Declaration on the Rights of Indigenous Peoples
Convention on Biological Diversity
The Nagoya Protocol

42

Taonga and Taonga Species

44

Cultural Foundation

45

Cultural Logics

48

Taonga and Genomic Research

Mauri
Whakapapa
Mana (in relation to taonga)
Wairua (in relation to taonga)
Tapu
Kaitiakitanga
Taonga Species

54

Taonga Relationships Table

56


Kaitiakitanga

Control over Indigenous Data

60

Pathways for Innovation

Moving up the Value Chain
Key Issues
Capacity and Capability
End-to-End Investment
Intellectual Property Recognition and Protection
Commercial Agreements
Ongoing Engagement



A scanning electron microscope image of a thermophilic bacterium, *Chthonomonas calidirosea*. The bacterium optimally grows at 65 °C in geothermally heated soils in Aotearoa NZ. Each bacterial cell is approximately 2/1000th of a mm in length (2 μm). In this image the stringy material surrounding the cells is a mixture of carbohydrates and proteins excreted by the cells.

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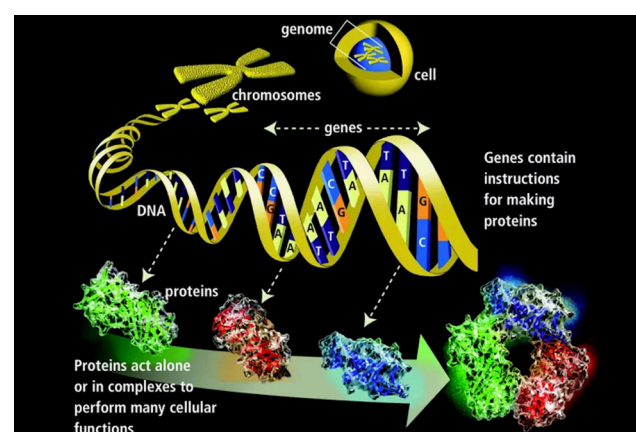
Background to the Guidelines Context

Genomic Research

Genetic and genomic research comprise a research continuum that uses gene technology to examine the nature of living things. Genes, in the simplest of terms, can be considered the most basic unit of heredity. More specifically, a gene is a sequence of DNA that codes for the synthesis of RNA and subsequently of proteins. These proteins may either play a role in the biochemical processes necessary in the functioning of the living organism, or yield more direct phenotypic⁵ effects (Portin & Wilkins, 2017). Genetics is the study of genes and the molecular structure of genes, and is generally concerned with heredity. A genome is the complete set of genetic information of an organism, including the spatial arrangement of that genetic information within a cell. The World Health Organization defines genomics as the study of genomes, which looks at the function of genes, as well as related techniques (World Health

Organization, 2004; World Health Organization, 2020). As mentioned earlier in the document, genomics is broader in nature than genetics and encompasses all genes and their interrelationships in order to understand more fully their combined influence on the organism⁶.

DNA Molecule of life



Office of Biological and Environmental Research of the
U.S. Department of Energy Office of Science, n.d.

⁵ A phenotype represents the observable characteristics or physical traits of an organism.

⁶ As an example of the distinction between genetic and genomic research, a population genetics study of a native species using microsatellite markers would not necessarily be considered a 'genomic' project, however, a whole-genome sequencing or transcriptome (gene expression) study would be. Presumably any study for which molecular information is utilised (even more broadly for biochemical analyses) would likewise be considered as such.

Māori Interests in Genomic Research

- The Treaty of Waitangi guarantees tino rangatiratanga over all taonga.
- Taonga species include all Indigenous flora and fauna.
- The Waitangi Tribunal affirmed, in the Ko Aotearoa Tēnei report (Waitangi Tribunal, 2011), that genetic material of taonga species falls within the purview of kaitiakitanga, and therefore, any research in relation to taonga species and its genetic material is of interest to Māori.
- Tino rangatiratanga entitles Māori to decision-making authority, rights to participation, rights of protection and rights to the wellbeing of taonga.
- Kaitiaki are to have their mātauranga recognised as well as their interests in its use.
- Kaitiaki are also entitled to the reasonable control over the use of their mātauranga.

Māori interest in genomic research is reflective of the development of tino rangatiratanga over taonga. As specific rights have been carved out over time, the interests Māori have in genomic research have also become more and more clear-cut. This section summarises the most significant documents that shape the tangible interests in genomic research that Māori have.

Te Tiriti o Waitangi/The Treaty of Waitangi

Te Tiriti o Waitangi – the Treaty of Waitangi is New Zealand’s founding constitutional document and as such, is a contemporary living

document. It holds immense significance not only in establishing relations between the Crown and Māori but also New Zealand’s identity as a bicultural nation (Orange, 2015).

The Treaty of Waitangi was signed between the British Crown and rangatira of Māori hapū across Aotearoa. This document was made available in both English and Māori texts; the English Treaty of Waitangi (the Treaty) and the Māori Tiriti o Waitangi (te Tiriti). The Treaty of Waitangi has been criticised for its many inconsistencies with its Māori counterpart. Article 2 of the Tiriti guarantees Māori tino rangatiratanga over lands, forests, fisheries and “ngā taonga katoa”. The Treaty describes “ngā taonga katoa” as “all treasured things”. Though the significance of taonga was acknowledged with its inclusion in the Treaty, the journey of taonga through New Zealand’s evolving body of legislative understanding has historically subjected the concept to misunderstandings, and oversimplifications in law. This has caused the Crown’s view of taonga to fall far short of Māori expectations, with definitions often being at odds with each other. This raises a greater question of compatibility between the Western legal system, which operates on specificity and consistency, and the Māori worldview that honours the subjective and philosophical diversity in different iwi and hapū.

The Treaty of Waitangi Act 1975 instructs the Crown to adhere to Treaty principles. These

principles subsequently emerged from the Lands case (*New Zealand Māori Council v Attorney-General*, 1987) comprising:

- Partnership including good faith and cooperation
- The Crown duty of active protection
- Participation underscored by the Crown's right to govern, qualified by respect for tino rangatiratanga.

The right to development has emerged from these principles⁷. Just as Māori have an interest in taonga and new uses for taonga, they also have an interest in new knowledge and discoveries pertaining to taonga.

The Wai 262 Claim

The Waitangi Tribunal's 262nd report summarised one of the largest and most complex claims in the Tribunal's history. Covering flora, fauna and artistic expressions of every kind, the claim sought to recognise and give effect to the second part of Article 2 of the Treaty of Waitangi, in which iwi and hapū were guaranteed tino rangatiratanga over "ngā taonga katoa".

In the claim, the claimants maintained that the Crown had denied Māori the full exercise of their tino rangatiratanga over their taonga; in particular, natural resources including Indigenous flora and fauna. The claimants also sought recognition of their tino rangatiratanga over the full breadth of their taonga as assured within the Treaty. This included such things as, but was not limited to: *Mātauranga, whakairo, wāhi tapu, biodiversity, genetics, Māori symbols and designs and their use and*

development and associated Indigenous, cultural and customary rights in relation to such taonga (Waitangi Tribunal, 2011).

According to the claim, tino rangatiratanga entitled Māori to such things as:

- Decision-making authority over conservational and proprietary interests in natural resources including Indigenous flora and fauna;
- The right to participate in and benefit from existing and future technological advances in relation to the breeding, genetic manipulation and other processes relevant to the use of taonga that include Indigenous flora and fauna;
- The right to participate in and benefit from existing and future development and commercial use of taonga including Indigenous flora and fauna;
- The right to protect, enhance and transmit the cultural, medicinal and spiritual knowledge and concepts found in the life cycles of Indigenous flora and fauna; and
- A right to environmental wellbeing dependent upon the nurturing and wise use of Indigenous flora and fauna.

The Tribunal favoured the flexible concept of tino rangatiratanga above that of the rigid concept of undisturbed possession. The Tribunal considered that the principle of tino rangatiratanga made allowance for the recognition and protection of the kaitiaki relationship with taonga species and mātauranga Māori.

⁷ *New Zealand Māori Council v Attorney-General (1987)*, commonly referred to as the 'Lands' or the 'SOE case' was the seminal case that articulated the Treaty principles, modeled a wide interpretation of the Treaty in law, and helped facilitate the development of Crown-Māori relations.

In respect of mātauranga Māori, the Tribunal concluded that kaitiaki have three rights:

1. The right to proper recognition (what constitutes proper recognition would vary depending on a range of factors)
2. The right to a reasonable degree of control over the use of mātauranga Māori
3. The proper recognition of the interests of kaitiaki for any commercial use of mātauranga Māori.

As Wai262 relates to taonga species relationships, it also states that the meaning and purpose of those relationships are defined within mātauranga Māori, noting that “no two iwi, hapū, or whānau will have the same mātauranga or the same kōrero about a particular taonga species” (Waitangi Tribunal, 2011).

The *Te Nohonga Kaitiaki* guidelines were developed with the principal understanding that each hapū and iwi have unique mātauranga and therefore, unique relationships with their taonga species. As such, these guidelines were designed not to be authoritative, but to provide a basis for further engagement and dialogue.

Te Pae Tawhiti

On 29 August 2019, Te Puni Kōkiri released Te Pae Tawhiti, a proposed approach to addressing the Wai 262 report (Te Puni Kōkiri, 2019). Te Pae Tawhiti is a work programme that entails a whole-of-government approach in addressing the issues raised in the report. The plan is broad in scope and involves the participation of a wide range of government departments. The proposed plan establishes three workstreams and their corresponding ministerial working groups. The workstreams are summarised below:

Kete 1: Taonga works and mātauranga Māori

Kete 2: Taonga species and mātauranga Māori

Kete 3: Kawenata aorere/kaupapa aorere

Of greatest interest to this document is the proposed approach to dealing with taonga species and mātauranga Māori. The document adopts the Waitangi Tribunal’s definition of taonga species, being “the species over which whānau, hapū or iwi claim kaitiakitanga (guardianship) obligations, and whose basis, history and content are set out in mātauranga Māori” (Waitangi Tribunal, 2011). The document frames taonga within considerations of kaitiakitanga as well as the treaty principles of protection and partnership, and poses

Kete 1: Taonga works me te Mātauranga Māori

What is the scope of this Kete?

Some of the options for future collaborative work between Māori and the Crown in Kete 1 might include:

a) Kaitiakitanga

How can we better enable kaitiaki to more fully exercise kaitiakitanga over taonga works and mātauranga Māori?

b) Protection

Should there be a new legal framework to protect taonga works and mātauranga Māori? What should it look like?

c) Partnership

How should we make decisions affecting taonga works and mātauranga Māori in New Zealand and who should make them?

d) Stewardship

How should the Crown manage taonga works and mātauranga Māori it holds? How should the Crown approach Māori data stewardship and governance issues? How can the Crown better

manage its metadata to enable access to the mātauranga Māori it holds?

What are the existing work programmes that sit within this Kete?

The Government has so far identified the following workstreams as being likely to involve issues related to those considered in Ko Aotearoa Tēnei in Kete 1 (Taonga Works me te Mātauranga Māori):

- a) The review of the Copyright Act 1994
- b) The review of the Haka Ka Mate Attribution Act 2014
- c) Government data stewardship and Māori data governance
- d) The review of the Statistics Act 1975
- e) National Archival and Library Institutions (NALI) Ministerial Group
- f) Government Digital Strategy
- g) Refresh of Tau Mai Te Reo
- h) Review of the Te Ture mō Te Reo Māori Act 2016
- i) Māori Media Sector Shift

questions around how each of those principles can be enacted and enhanced.

Also of relevance is Kete 3, which covers the relationships that create the setting within which taonga species are to be dealt with.

Kete 3 demonstrates the importance of establishing meaningful relationships and considers Māori interests at an international level, Māori engagement and the representation of Māori in international forums.

Kete 2: Taonga species me te Mātauranga Māori

What is the scope of this Kete?

Some of the options for future collaborative work between Māori and the Crown in Kete 2 might include:

a) Kaitiakitanga

How can we better enable kaitiaki to more fully exercise kaitiakitanga over taonga species and mātauranga Māori?

b) Protection

How should we protect taonga species and mātauranga Māori?
How might better information systems about taonga species and mātauranga Māori be developed?

c) Partnership

How should we make decisions affecting taonga species and mātauranga Māori in New Zealand and who should make them?
How we might transition Māori-Crown engagement on taonga species and mātauranga Māori from a transactional, issue-by-issue approach to a relationship-based model?

What are the existing work programmes that sit within this Kete?

The Government has so far identified the following workstreams as being likely to involve issues related to those considered in Ko Aotearoa Tēnei in Kete 2 (Taonga Species me te Mātauranga Māori):

- Development of a new national biodiversity strategy
- Responding to the Supreme Court's decision in Ngāi Tai ki Tāmaki

- Tribal Trust v Minister of Conservation
- c) Improving access to cultural materials
- d) Comprehensive review of the resource management system
- e) Essential freshwater
- f) Developing a National Policy Statement on Indigenous Biodiversity
- g) Zero Carbon Bill
- h) Emissions Trading Scheme
- i) Mātauranga Māori when presented as evidence in a decision-making hearing
- j) Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
- k) Three Waters Review
- l) Review of the Plant Variety Rights Act 1987
- m) Consideration of whether there should be a 'disclosure of origin' requirement in the patent system
- n) Development of a Resource Strategy
- o) Review of the Crown Minerals Act 1991
- p) Health Services and Outcomes Inquiry Kaupapa Inquiry (Wai 2575)
- q) Māori Health Action Plan
- r) Fisheries Change Programme
- s) Review of the Biosecurity Act 1993
- t) Forestry Strategy

Kete 3: Kawenata Aorere/Kaupapa Aorere

What is the scope of this Kete?

The proposed focus for Kete 3 (Kawenata Aorere / Kaupapa Aorere) is:

a) Māori interests at international level

How should the Crown work with Māori to identify Māori interests and the nature and strength of those interests when negotiating international instruments and participating in international forums?

b) Engaging with Māori

How should Government agencies engage with Māori when representing New Zealand?

c) Māori representation

How Māori should be represented in international forums?

What are the existing work programmes that sit within this Kete?

In Kete 3 existing, recent and upcoming Government workstreams of particular relevance include:

- Implementation of the 2001 Strategy for Engagement with Māori on International Treaties
- The development of the Māori Crown Engagement Framework and Guidelines led by Te Arawhiti
- The development of a Trade for All agenda. One of the Trade for All agenda's key principles is "the creation of a genuine conversation with the public and key stakeholders around the future direction of New Zealand's trade policy; this will include consultation with

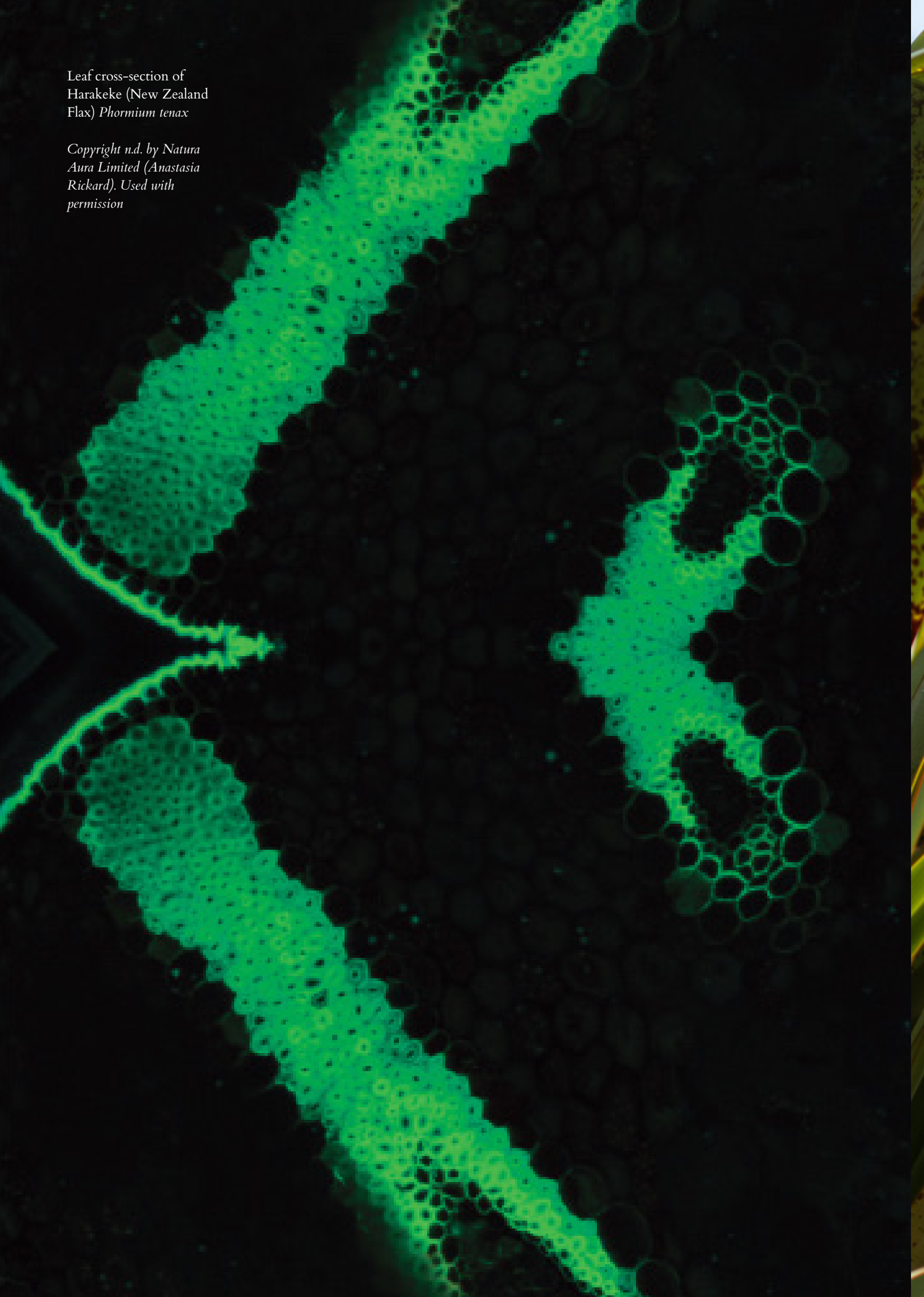
Māori, consistent with their role as a Treaty partner".

As set out above, this kete is primarily focused on the Crown relationship with Māori in the area of international instruments. To provide further context, the following are examples of existing or potential future international instruments and related kaupapa on which the Crown is currently engaging with Māori and will need to be mindful of the issues raised in the Wai 262 claim and Ko Aotearoa Tēnei:

- New Zealand's development of a plan on the United Nations Declaration on the Rights of Indigenous Peoples
- World Intellectual Property Organisation negotiations in the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore
- New Zealand's participation in the United Nations Permanent Forum
- Convention on Biological Diversity
- United Nations Agreement on Biodiversity Beyond National Jurisdiction negotiations
- UNFCCC/Paris Agreement/climate change negotiations
- E-Commerce negotiations at the World Trade Organization
- Digital Economic Partnership Agreement (DEPA) negotiations with Chile and Singapore
- Various free trade agreements and related work

Leaf cross-section of
Harakeke (New Zealand
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International Agreements and Indigenous Interests in Genomic Research

- The Mataatua Declaration recognised that Indigenous peoples are the exclusive owners of their intellectual property.
- This was again affirmed by The United Nations' Declaration on the Rights of Indigenous Peoples (UNDRIP) (United Nations General Assembly, 2007).
- The Nagoya Protocol lays the foundation for the emerging global standard, as member states are to encourage non-member states to comply with the Protocol in order to collaborate.
- Use of genetic material is subject to the requirement for fair and equitable sharing of benefit (Secretariat of the Convention on Biological Diversity, 2002).
- The Nagoya Protocol does not formally apply to digital sequences; however, benefit sharing is expected by Indigenous communities as a demonstration of good faith.

Approaches to the recognition and protection of traditional knowledge through intellectual property rights have largely laid the foundations for Indigenous interests in genomic research. These rights have been articulated through a range of both binding and non-binding international instruments to which New Zealand has displayed varying levels of commitment.

The Mataatua Declaration

The Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous

Peoples (1993) was developed to affirm a number of Indigenous rights including the right to self determination. In exercising that right, Indigenous communities must be recognised as the exclusive owners of their cultural and intellectual property. The document carried many of the same themes as the Wai 262 claim, discussing a range of Indigenous intellectual property rights in relation to Indigenous knowledge, biodiversity, biotechnology and traditional environmental management, to name only a few. The declaration was signed by Indigenous representatives from fourteen countries, and was largely a precursor to the United Nations Declaration on the Rights of Indigenous Peoples.

The United Nations Declaration on the Rights of Indigenous Peoples

The United Nations Declaration on the Rights of Indigenous Peoples was signed in 2007 and is a comprehensive document that affirms the rights of Indigenous peoples over a wide range of issues. UNDRIP sets standards for the recognition, protection and promotion of Indigenous intellectual property rights on both individual and collective levels.

The declaration serves as a robust elaboration of previously established international human rights laws as applied to Indigenous intellectual property.

New Zealand was not initially a signatory, but later came on board in 2010.

Convention on Biological Diversity

The Convention on Biological Diversity (CBD) covers three broad objectives:

1. The conservation of biological diversity
2. The sustainable use of the components of biological diversity
3. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

New Zealand is a party to the convention, having ratified it in 1993 (Convention on Biological Diversity, 1992).

The Nagoya Protocol

The Nagoya Protocol is a supplementary agreement to the Convention on Biological Diversity. It covers the fair and equitable sharing of benefits arising from the utilisation of genetic resources. New Zealand is not a signatory to the agreement due to the overriding importance of the Treaty of Waitangi in domestic affairs (Scheele, 2015).

There are three primary obligations set out in the Protocol.

- First, the contracting parties may regulate access to biological materials (“genetic resources”) originating from their territories. States that choose to do so, are called “provider countries”.
- Second, these provider countries may also require that “benefits” from using the biological materials are fairly shared with them. Together, these requirements are known as access and benefit sharing (“ABS”) rules.
- Third, all contracting parties must monitor the use of biological material on their territory to ensure that companies comply with the ABS rules where the material originated (Secretariat of the Convention on Biological Diversity, 2010).

Nagoya not only encourages collaboration and cooperation between parties, but also sets a requirement that parties to the agreement encourage non-parties to adhere to the Protocol. This means that despite not being a party, New Zealand will, to some extent, be forced to comply with the Protocol in order to participate fully in the international community, and likewise participate in global scientific and economic activities relating to genomic resources.

The objective of the Nagoya Protocol is the “fair and equitable sharing of the benefits arising from the utilization of genetic resources...” (Secretariat of the Convention on Biological Diversity, 2010). Benefit sharing under the Protocol can only arise when genetic resources are utilised⁸. It is important to note that while there is no requirement in the Nagoya Protocol to share benefits arising from the utilisation of genomic data, Indigenous researchers advocate for the acknowledgement of Indigenous rights to genomic data to build trust, enhance accountability and improve equity (Caron et al., 2020; Hudson et al., 2020).

Also of note is that many commercialising agencies globally prefer to work with Nations that are a party to the Nagoya Protocol, as provenance for use of genetic resources is available and recognised internationally. This is important considering the financial risk of working on material where intellectual property (IP) ‘ownership’ is silent or vague (Evans-Illidge & Battershill, 2007). At this point in time, the Nagoya Protocol does not formally apply to digital sequence information; however, Indigenous communities have an expectation that any value generated from genomic data also be subject to benefit-sharing arrangements (Ambler et al., 2020; Hudson et al., 2020). Moreover, Indigenous peoples are formulating ethical frameworks for genomic research to ensure the rights and interests in their taonga species are protected (Garrison et al., 2019).

⁸ Utilisation is defined in the Nagoya Protocol as the “conduct of research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology as defined in Article 2 of the Convention” (Secretariat of the Convention on Biological Diversity, 2010).

Taonga and Taonga Species

Taonga are defined as anything that is of value to Māori. The term entered New Zealand’s legal landscape upon the nation’s founding in the second article of the Treaty of Waitangi. The Treaty describes “ngā taonga katoa” as “all treasured things”. Though the significance of taonga as a concept was acknowledged with its inclusion in the Treaty, the concept of taonga within New Zealand’s evolving body of legislative understanding has historically subjected the concept to misunderstandings and oversimplifications in law, resulting in the Crown’s view of taonga falling far short of Māori expectations, with definitions often being at odds with each other. This speaks to a greater question of compatibility between the Western legal system that operates on specificity and consistency, and the Māori worldview that honours the subjective and philosophical diversity across different iwi and hapū.

Taonga species emerged in legislation with the Ngai Tahu Claims Settlement Act. The Act vests the proprietary rights over a specific list of taonga species, and therefore, their sequences and data, in Ngai Tahu⁹. Not all taonga species are or can be protected under legislation. Many iwi

settlements do not necessarily include a definitive list of taonga, and may or may not have their own mechanisms for taonga species protection, such as legal personhood as in the case of the Whanganui River and Te Urewera. The majority of taonga species fall outside the scope of these kinds of statutory regimes. *Te Nohonga Kaitiaki* guidelines intend to fill that gap.

In *Te Pae Tawhiti*, Te Puni Kōkiri adopts the Waitangi Tribunal’s definition of taonga species as being any flora and fauna for which iwi, hapū and whānau claim they have kaitiaki responsibilities (Waitangi Tribunal, 2011; Te Puni Kōkiri, 2019). It also states that the meaning and purpose of those relationships are defined within mātauranga Māori, noting that “no two iwi, hapū or whānau will have the same mātauranga or the same kōrero about a particular taonga species” (Waitangi Tribunal, 2011). The *Te Nohonga Kaitiaki* guidelines were developed with the principal understanding that each hapū and iwi have unique mātauranga and therefore, unique relationships with their taonga species.

The term ‘Taonga’ has been discussed across a diverse range of legal topics from constitutional

⁹ Good faith also assures that all native flora and fauna within Ngai Tahu takiwā whether on the list or not, should encourage engagement.

law to Māori land law, as well as other areas such as resource management and family law. The legal definitions applied to taonga have been constructed for those particular contexts and are not necessarily reflective of what is understood by the lay person. The differences between the legal definition and the understanding of taonga held by Māori creates vastly different expectations in

terms of what rights and interests may encompass and how they can be enacted. These guidelines have been developed to be responsive to the legal understandings of taonga and to inform readers of the ethical standards that fall outside the parameters defined in law; noting the significance of the relationship between legal position, ethical expectations and research practices.

Hot spring ecosystem.



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Cultural Foundation

The importance of the Treaty of Waitangi can be seen in every aspect of national policy. Within the context of research, the mechanism that seeks to best honour these obligations is Vision Mātauranga. Vision Mātauranga aims to enhance the value of research through the collaborative integration of mātauranga into contemporary scientific processes. Immense value lies in the

distinctiveness of research obtained through the synthesis of Indigenous knowledge and Western knowledge systems (Rauika Māngai, 2020). The key to unlocking this potential is understanding what the main concerns may be for all parties involved. Some of the main issues that both mana whenua and researchers face in the planning and execution of research are outlined below.

Mana Whenua	Researchers
Expectation of consultation	Confusion as to who to consult with and how.
What do mutually beneficial relationships look like?	Level of consultation may be unknown or misunderstood.
Meaningful involvement of kaitiaki in the project	How might mātauranga enhance the project?
Mutual understanding between parties	Mutual understanding between parties.
Protection of Māori rights and interests	The challenge of understanding and incorporating priorities of kaitiaki.
Control over samples and data	Recognition of existing intellectual property and sharing of new intellectual property.
Rights to fair and equitable benefit sharing	Recognition of existing intellectual property and sharing of new intellectual property.
Ongoing communication and feedback	Expectation of maintaining relationships.

Weta in the Pureora Forest.



*A. Pearson, 2018
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Cultural Logics

Cultural worldviews have an embedded logic that prioritises specific values. Māori ground their thinking about genomic research and data using a range of culturally significant reference points (Hudson et al., 2016d; Hudson et al., 2019). Though these values are distinct in nature, the Māori worldview is rooted in the conceptual relationality of all things within Te Ao Māori being connected. The cultural foundation outlines key concepts that inform Māori understandings of genomics and how they apply in the context of genomic research. Having an appreciation of these values and incorporating them has been shown to enrich research (Collier-Robinson et al., 2019).

Tikanga, which includes the practical ways in which matters are approached, is flexible and

dynamic, subject to the context in question. The values that inform tikanga, from a cultural perspective, remain the same. In order to have a full appreciation and grasp of the subject at hand, it is important to understand the values that feed into taonga and taonga species as a whole.

Within the context of genomic research, the main underlying concepts identified by participants in our project as being important were:

- Taonga,
- Mauri, and
- Kaitiakitanga.

Each of these concepts encapsulate moral parameters that should be understood when engaging with Māori groups.

The following table presents some of the more prominent ideas that emerged from discussions throughout the course of our engagements. Through wānanga, participants were able to identify different facets of concepts and values that

connect to the context of genomic research and Te Ao Māori. These aspects have been outlined in order to frame the principles that should guide the scientific community in conducting research.

Taonga	Mauri	Kaitiakitanga
A taonga is something treasured, has value or potential value to iwi/Māori.	Preservation of distinct populations.	Sustainability of Taonga: Mauri enhances environments.
Taonga can be both tangible and intangible.	Preservation of biodiversity.	Sustainability as Taonga: Whakapapa maintains relationships.
Taonga species can comprise both Indigenous species/biota and introduced species.	Preservation of role within ecosystem.	Sustainability for Taonga: Mana realises aspirations – rawa.
Taonga assessment – POU Provenance, Opportunity, Utility.	Preservation of mātauranga.	Sustainability of Taongatanga: Kaitiaki responsibilities: Taonga are protected; Wairua/Tapu are maintained.
Biota are taonga. Bioactives are taonga.	The microbiome is a part of the mauri of a taonga.	Taonga can be used for commercial purposes only if it doesn't affect its sustainability as a cultural taonga.

Frameworks, Publications and Values

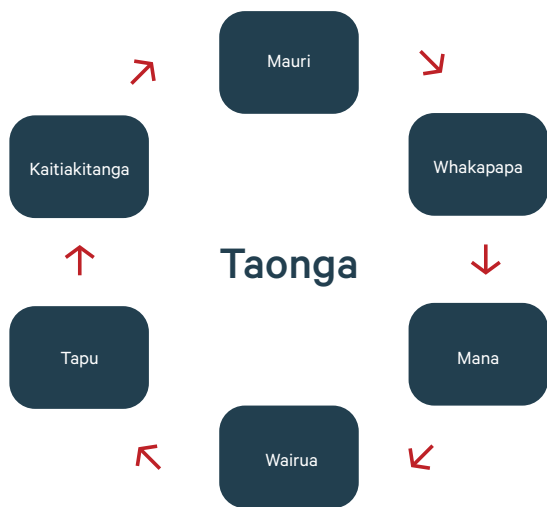
The table below outlines how whakapapa, mauri, kaitiakitanga and mana have informed the basis of Māori ethical approaches to genes, genomes and biotechnology in various publications and frameworks.

Year	Framework/Publication	Whakapapa	Mauri	Kaitiakitanga	Mana
1998	Koru of Māori ethics (Henare, 1998)	•	•	•	•
2004	Te pā harakeke o te tangata (Bioethics Council, 2004)	•	•		•
2005	The obfuscation of tikanga in the GM debate (Hutchings & Reynolds, 2005)	•	•	•	
2005	Walking backwards into the future: Māori views on genetically modified organisms (Roberts, 2005)	•	•		•
2006	Establishing a Māori Ethical Framework for Genetic Research with Māori (Henaghan & Tipene-Matua, 2007)				•
2007	Biotechnology: the language of multiple views on Māori communities (Te Momo, 2007)	•	•	•	
2008	Te Arotūruki (Wilcox et al., 2008)	•	•		•
2011	Wai262 (Waitangi Tribunal, 2011)	•	•	•	
2016	Incorporating Māori perspectives into decision-making protocol (Environmental Protection Authority, 2016)		•	•	•
2016	He Tangata Kei Tua (Hudson et al., 2016a)	•	•	•	•
2016	Te Mata Ira (Hudson et al., 2016b)	•	•	•	•
2017	Tikanga Māori (Mead, 2016)	•	•		

Taonga and Genomic Research

The Māori worldview is composed of values that are interconnected and overlap in many ways. Within the context of genomic research, taonga is rooted in and connected to a number of values, including mauri, whakapapa, mana, wairua, tapu and kaitiakitanga. Just as with any other concept in Te Ao Māori, these values are both deeply interconnected and distinct in nature. In this sense, taonga is:

- A reflection of mauri;
- A recognition of whakapapa;
- An acknowledgement of mana;
- An affirmation of wairua;
- An application of tapu, and
- An assertion of kaitiakitanga.



Mauri

Mauri is a foundational concept underpinning the Māori worldview. It can be described as the ‘essence of life’ and can be applied to both animate and inanimate objects. Maintaining the mauri can be thought of as maintaining the biological integrity of an organism or system. Likewise, enhancing the mauri of an organism can be thought of as enhancing its wellbeing, pointing to the biological integrity of an organism within the context of its environment.

Taonga must be viewed as taonga in its entirety. In this sense, mauri extends to all biological components of the taonga, including its microbiome and bioactivity.

Ensuring that mauri is maintained or enhanced improves the level of trust between researchers and Māori. This can be done by ensuring that the project is sustainable and prioritises the wellbeing of a taonga and its natural environment. Mauri may also be maintained or enhanced through supporting kaitiaki in building capacity to develop in all areas of kaitiakitanga.

Whakapapa

Whakapapa is a key reference point for Māori when discussing taonga species. Mead described whakapapa as the societal component of genes (Mead, 2016). The term, as described by Mead, establishes basic social components of whānau,

hapū and iwi, and forms the basis of Māori identity.

The Māori worldview is predicated on the interrelationality of all that is in nature, and whakapapa is what gives rise to these relationships. Whakapapa establishes the reciprocal relationship of taonga and kaitiakitanga, and as such, whakapapa is a prerequisite for taonga.

Beyond whakapapa in the literal sense, is whānaungatanga, which can be described as relationality or kinship. Whānaungatanga can be thought of as the ties of kinship that connect us all together. It enables research to take place through the building and maintaining of meaningful partnerships that allow for mutually beneficial collaborations and in turn, give effect to Māori self-determined aspirations (Collier-Robinson et al., 2019).

This means that meaningful relationships are not limited to having a vertical whakapapa as their basis, and opens the door for relationships based on horizontal associations with the environment. This is also why key introduced species, by virtue of their relationship with the whenua and with Māori, can be regarded as taonga.

Mana (in relation to taonga)

As discussed earlier, kaitiakitanga describes the reciprocal relationship in which taonga creates or provides value, and where kaitiaki in turn, have duties to maintain the taonga. Mana, in this sense, refers to authority or power, which is representative of the weight of those duties.

Mana is inherent in all living things and is closely tied to the concept of tapu. Both affect each other. The greater the significance of a taonga, the greater the mana and the greater the tapu of the taonga in question, and therefore the greater the level of control necessary to care for or maintain the taonga.

Maintaining the mana of a taonga throughout any project is imperative. Researchers should be open and willing to comply with any protocols and conditions determined by Māori during the engagement process in order to uphold the mana of the taonga.

Just as each taonga possesses mana, the duties of kaitiakitanga are also imbued with mana. A prominent example of this is mana whenua, the general authority of a group of people over an area of land. This term is also employed as a reference to the individuals/groups that exercise this authority. It should be noted that ‘mana whenua’ in and of itself is not a traditional term and emerged in the 19th century as an attempt to translate the English legal concept of ownership into a Māori frame of reference. Where ‘mana whenua’ has been used in this document, it is done so with the intent to illustrate the mana of the relationship between kaitiaki and taonga, and not to point to Western, reductionist notions of ownership.

Wairua (in relation to taonga)

Wairua is a core philosophical concept that pervades all aspects of Māori society and is a central element of other cultural protocols. It refers to the spiritual dimension of the Māori worldview, and is a key component of wellbeing (Durie, 1998).

The wairua of a taonga in this context also includes the intention for which permission to research the taonga is given. Respecting the wairua of a taonga in this sense means ensuring that Māori understand the purpose of the research and that the access or permissions granted are respected. It also means that researchers conduct themselves with integrity, meaning that the taonga and any data generated are used strictly for the purposes agreed to by Māori.

Tapu

Tapu refers to the sacred nature of an object that implies the object must be actively protected or managed. As stated above, tapu goes hand in hand with mana. Where a taonga possesses a high level of cultural significance, both its tapu and mana are also high. Taonga that are highly regarded and are considered highly tapu require a deeper level of engagement and may be subject to special protocols or considerations in order to honour the taonga and treat it in accordance with its importance. These would be determined by kaitiaki in accordance with their tikanga and level of comfort.

Kaitiakitanga

Kaitiakitanga is the implicit duty to care for and manage taonga. The relationship between taonga and kaitiaki is reciprocal. Where the taonga provides value, kaitiaki maintain and care for the taonga. Kaitiakitanga can be thought of as caretakership, guardianship or stewardship.

Kaitiakitanga manifests itself in many ways. No longer does it rest solely with those tending to the wellbeing of the organism itself. Kaitiakitanga can mean maintaining administrative aspects of the taonga.

The role of kaitiaki can be determined through whakapapa, level of relevant experience or any number of other factors. Researchers must do their due diligence to ensure that they approach the correct kaitiaki or representatives who have the authority and mandate to make decisions on behalf of kaitiaki.

Northern kōura
(*Paranephrops planifrons*)
berried female with
spermatophore from
Lake Rotoiti.

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Taonga Species

All living things within Te Ao Māori can be considered taonga species. More specifically, this description refers to any Indigenous biota present in Aotearoa prior to European contact. The recognition of taonga species doesn't exclusively lie in the species as a whole, but extends to all parts that comprise it as well as the biological systems external to the taonga that support it. This also includes knowledge that is both discovered and yet to be discovered.

The nature of a taonga largely relies on the following factors:

- Provenance – whether a taonga is native, or possesses a discernable whakapapa of Māori origin;
- Opportunity – whether a taonga supports the aspirations of Māori for the future of their people, culture, whenua;
- Utility – the extent of the usage of the taonga: whether its utility is exhausted after a single use or whether it can be used multiple times. (Hudson et al., 2017)

As such, the definition of taonga species extends to, but is not limited to:

Indigenous Species

Any flora or fauna native to or present in Aotearoa prior to European contact. Taonga species can include any Indigenous flora and fauna existing within the Māori paradigm, including both living and non-living species. An example is the

interest in Indigenous specimens in natural history collections in both NZ and overseas institutions. Regardless of the age or quality of Indigenous specimens, whether they are from extant or extinct species, they are still taonga species.

Introduced Species

Flora and fauna introduced to Aotearoa post-European contact that hold a special significance to Māori. The whakapapa in this instance is one made to the whenua by virtue of being on it and participating in the native ecosystem. For example, this may include pine trees, which in many Māori communities constitute the main source of employment and income.

Indigenous Biota

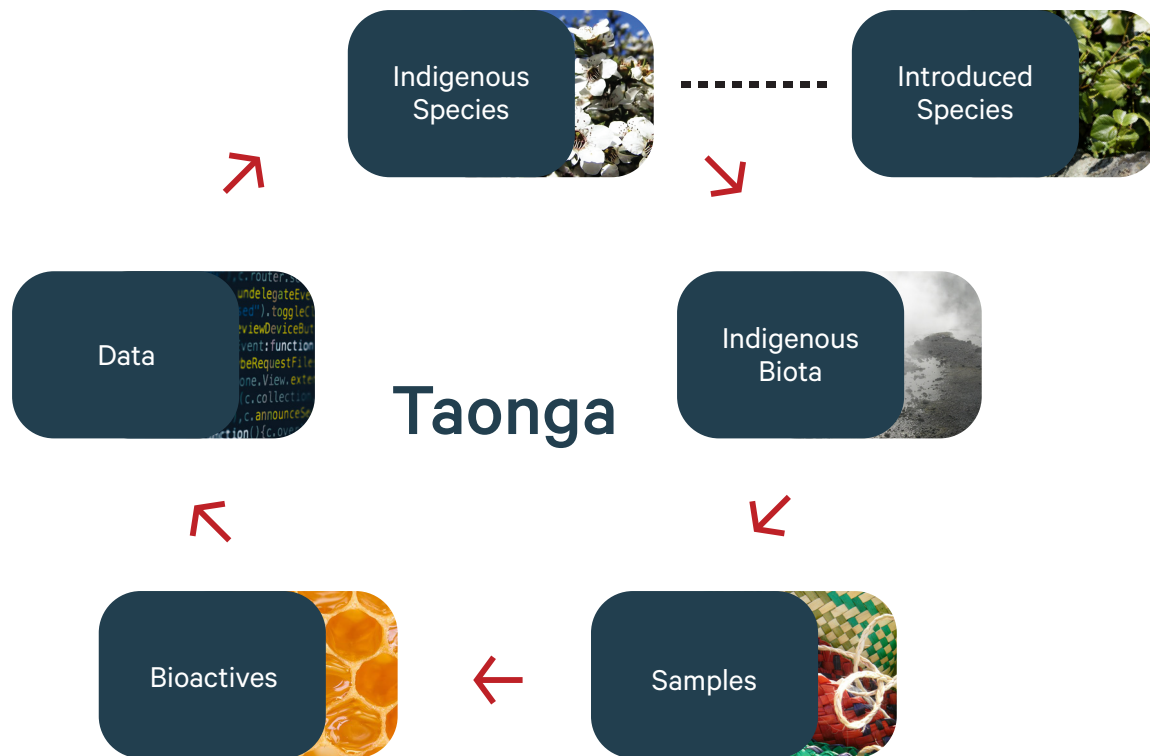
Any living matter or organism that broadly includes flora, fauna, fungi and bacteria. All play a role in the natural ecosystem in Aotearoa, and therefore an important part of the Māori natural world. This can include, for example, live bacteria found in Māori fermented foods such as toroi.

Samples

All samples that are collected from any of the taonga listed here are also taonga.

Bioactives

All parts of taonga species, including the bioactive components and biochemical processes of taonga species, are taonga. Many aspects of mātauranga Māori utilise the bioactive components and



biochemical processes of taonga species in various cultural practices such as healing, for example. Irrespective of whether the bioactives in Indigenous taonga species were or were not known by Māori, they are taonga. This includes the bioactive components in mānuka honey, for example.

Data

Any data generated from taonga species and samples are taonga in and of themselves. This includes any future discoveries or new knowledge that may result from taonga data.

Taonga Relationships Table

Having such a wide definition of taonga species creates uncertainty about how these guidelines can be applied, and to what. Through our engagements, it became increasingly clear that taonga species include every living thing of importance to Māori. There is a difference between a philosophical understanding of taonga in relation to species and a practical application of kaitiakitanga in relation to taonga. While we recognise and have regard for the mana and mauri of all aspects of the environment, we also prioritise specific species that have special significance to and relationships with our communities.

The relationship with taonga can be enhanced through: provenance – our historical relationship with the species; opportunity – our future relationship with the species; or utility – the range of current uses of the species. Provenance, opportunity and utility are factors that comprise the POU assessment and emerged as a way to conceptualise taonga as the term applies to new and abstract applications, such as data (Hudson et al., 2017).

The POU assessment comprises three questions that assess the nature of taonga relationships:

Provenance: Does the taonga originate from a Māori source?

Opportunity: How does the taonga support Māori aspirations?

Utility: Can the taonga have multiple uses?

The following table summarises the characteristics of taonga relationships between independent taonga and interdependent taonga within complex ecosystems. These relationships can be contestable; however, it should be up to iwi to decide how they view taonga for themselves.

Taonga Relationship	Nature of Relationship	Rights that arise from interest	Example
Provenance	Any prized or valued thing or concept that exists within Te Ao Māori.	Right to maintain the wellbeing of the resource in the environment.	Restoration and maintenance of native habitats to support and replenish taonga species.
Opportunity	The taonga supports Māori aspirations for their future, or the future of their whenua.	Right and access to fully participate in commercial activity. Right to build capacity.	Profits for commercial activity involving taonga are reinvested in the community to create further access and opportunity for kaitiaki.
Utility	‘Taonga is as taonga is used’. The utility of a taonga may determine the extent of management required for particular taonga. Can value only be derived from a single use before the resource is exhausted? Can other types of value be derived from the taonga in perpetuity?	Intellectual Property rights are recognised and protected. This extends to sharing benefits from any new knowledge that may emerge from taonga data.	Future uses of data whether commercial or non-commercial acknowledges the original permissioning kaitiaki.

Kaitiakitanga

- Kaitiakitanga is multidimensional and dynamic;
- There are different roles/responsibilities for kaitiaki with different skills/expertise;
- There are different rights that exist according to each relationship;
- There are instances where certain projects have affirmed these rights for kaitiaki; and
- There are different mechanisms available for enactment on each level

Taonga in the context of genomic research means more than the resource itself. What can be considered taonga consists of the resource, the mātauranga around the resource, the samples taken for research, and the data generated. Each aspect of taonga is different in nature, and each may require a specific set of knowledge and skills for its maintenance and protection. It is logical that all of the knowledge, skills or experience in the varying aspects of kaitiakitanga may not necessarily rest with one person or group of people, but can be a collaborative demonstration of kaitiakitanga. In the context of genomic research involving taonga species, this reflects the importance of the role of traditional guardians and the new responsibilities of institutional stewards. Kaitiakitanga in this sense

requires positive relationships between Māori communities and researchers.

The following table illustrates mechanisms that can be used in the context of genomic research that enhance Indigenous aspirations for sustainability that align with sustainable outcomes for the environment, greater control over use of data and samples, and greater participation in decision-making. These outcomes are consistent with Māori data sovereignty (Kukutai, 2016), cultural intellectual property rights, the Nagoya Protocol and Wai 262.

Kaitiaki Relationship	Nature of Relationship	Rights	Mechanisms	Case Study Examples
Te Taonga	The primary relationship with the taonga species.	The resource is maintained.	Conservation on efforts. Habitat restoration.	The University of Canterbury are assessing the adaptive potential of kēkēwai (freshwater crayfish) and kōwaro (Canterbury mudfish). The aim is to build genetically healthy populations that are resilient to climate change.
He maramara pūtaiao	Samples taken from the taonga for analysis.	Kaitiaki have the right to determine how the samples are to be managed.	Material transfer agreement.	The mānuka project undertaken by Plant and Food Research illustrated a concerted effort to ensure samples were managed as ethically 'tika' as possible. Samples that were sent offshore for analysis were anonymised, and destroyed once the analysis was done.
Mātauranga taketake	The traditional body of Indigenous knowledge that surrounds the taonga in all its contexts and uses.	Kaitiaki have the right to preserve the integrity of their mātauranga in research should be acknowledged according to the terms agreed upon by kaitiaki.	Research agreements on use of mātauranga. Traditional knowledge labels.	The kākāpō 125+ project aimed to ensure the traditional kaitiaki were appropriately acknowledged. Guardians involved would be named with their contributions described. All published academic works would properly acknowledge and detail kaitiaki contribution as foreground descriptions rather than background.
Te raraunga pūtaiao	The data compiled from the research. This may be available for future use.	Reasonable access, privacy, permissions, attribution and provenance.	Biocultural labels. Data transfer agreements.	The same mānuka project mentioned above ensured that strict access protocols were put in place to protect the moral and commercial interests of their Māori partners.
Mātauranga hōu	Any new knowledge or discovery generated from research.	Kaitiaki are entitled to share in benefits from new knowledge.	Data agreements. Research agreements. Publishing protocols. Intellectual property agreements.	Across the kānuka and kina research projects, Hikurangi Bioactives Limited Partnership (HBLP) share intellectual property rights from the projects, affirming tino rangatiratanga and HBLP's contribution.

Kea



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Control over Indigenous Data

An emerging issue for Māori communities and researchers alike is developing an approach to kaitiakitanga oriented towards embodying tino rangatiratanga over taonga species against an ever evolving technological and regulatory backdrop. Data are taonga and should be used ethically to enhance the wellbeing of Māori people, language and culture (Te Mana Raraunga, 2016). Whakapapa synthesises and layers contemporary, historical and mythological aspects of bioheritage, and as such, genomic data obtained from taonga species are also taonga (Collier-Robinson et al., 2019).

An approach to data access and benefit-sharing must be one that affirms and supports the self-determined aspirations of Māori. Te Mana Raraunga have developed Māori Data Sovereignty principles that support best practice in regards to Māori data (Te Mana Raraunga, 2016). They also developed an audit tool for organisations to assess their practices around Māori data¹⁰. These resources in combination with quality engagement helps establish a robust approach to managing Māori genomic data.

The Global Indigenous Data Alliance developed the CARE Principles for Indigenous Data Governance¹¹. CARE is an acronym for four primary principles identified as central to Indigenous governance; Collective Benefit, Authority to Control, Responsibility and Ethics (Global Indigenous Data Alliance, 2018). The CARE principles were developed to be complementary to other data-centric models such as the FAIR principles (Findable, Accessible, Interoperable, Reusable) with the goal stewards

and other users of Indigenous data would 'Be FAIR and CARE' (Carroll et al., 2020, Carroll et al., 2021; Wilkinson et al., 2016).

Labelling systems have also been developed as mechanisms to assure the most appropriate management of Indigenous data. Traditional knowledge (TK) labels were developed as a means whereby cultural authority and governance over Indigenous collections and data could be repositioned (Anderson & Christen, 2013). TK labels, which have been developed and customised by Indigenous communities, exist as digital tags in the infrastructure of content management systems in archives and data repositories. The 20 tags offer additional information that informs user understanding about how data should be accessed, shared, governed, circulated and curated. Similarly, Biocultural (BC) labels have been developed as a way to express the conditions for access and use of data by non-Indigenous stewards. As a new initiative the BC labels are currently composed of 10 labels that specify the intended uses of data and conditions surrounding their permissioning (Ambler et al., 2020; Anderson & Hudson, 2020). Labels can also be used to recognise Indigenous interests on products and can be oriented towards the protection of both biological and cultural diversity (Swiderska et al., 2016).

¹⁰ The audit tool can be found at: <https://www.temanararaunga.Māori.nz/tutohinga>

¹¹ The CARE Principles can be found at: <https://www.gida-global.org/care>

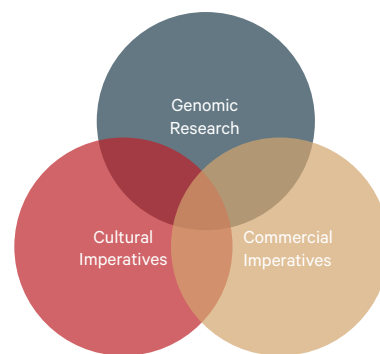
Pathways for Innovation

One of the key findings that emerged both in the literature as well as from our engaging with others was the desire from Māori to understand the pathways for innovation in order to either participate in commercial activity, or mitigate potential commercial activity. This highlighted the importance for mana whenua to understand the potential pathways to innovation in genomic research, particularly where commercial applications are becoming more common.

Māori enterprise development is an exercise of the inherent right and capacity of Māori to develop culturally, socially and economically (Garrison et al., 2019). Māori enterprise development encompasses Māori entrepreneurship, innovation and commercialisation and is a fundamental part of the growing Māori economy. A large part of the Māori economy is growing Māori human and cultural capability through education and employment, maintaining mātauranga Māori, and developing community-based enterprise from which Māori entrepreneurship and innovation emerge.

In 2017, the Māori economy was valued at an estimated \$50 billion, and with increased wealth in the Asia-Pacific region, this figure is quickly growing (Chapman Tripp, 2017). This increasingly significant part of the New Zealand economy has roughly 50% of its asset base in the primary and agricultural industries. Despite the ever-growing Māori economy, within

commercialisation of science and research there is a marked lack of support orientated towards Māori.



The interplay between commercial, culture and scientific needs within a Māori innovation ecosystem

These guidelines not only aim to provide guidance in navigating projects in a culturally sound manner, but provide a basis for the early stages of a Māori innovation ecosystem. The previous figure illustrates the forces at play when approaching Māori enterprise, with the centre representing the best approach to successful enterprise. The convergence of these elements represents a confluence or joining place (e.g. the meeting point of two rivers), and here can represent the dynamic interaction of cultural, commercial and scientific needs operating in pursuit of Māori wellbeing and potentiality at whānau, hapū and iwi levels. There are different drivers in each sphere, but the focus for Māori is orienting them toward a broader purpose – collective wellbeing (spiritual, cultural, environmental and economic). These are further broken down into key issues in the following table.

Key issues facing Māori when considering the development commercial enterprises

Intersection between commercial and cultural interests	Addressing the overlapping interests of commercial entities, Māori collaborators and mana whenua.
Capacity & Capability	Technical (science), operational (organisation), financial (project).
End-to-End Investment	Resourcing across the research and commercialisation phases.
Intellectual Property Definitions	Different approaches for the Indigenous knowledge and stopping misappropriation.
Commercial Agreements	Ensuring agreements deliver fair and equitable benefits.
Ongoing Engagement	Between commercial partners and with interest groups.

Small Geothermal Geyser in the Waimangu Volcanic Valley



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Moving up the Value Chain

One of the major issues confronting Māori in their approach to enterprise is ‘Moving up the value chain’; in other words, transforming mātauranga from a concept to commercial reality. Māori engage in commercial activity not only with the objective of generating wealth or overcoming disadvantage, but also to maintain, enhance and demonstrate tino rangatiratanga. There is no one size fits all model of partnership. In exemplifying the principle of good faith, a range of enterprise ownership models are to be explored. A variety of options allow for greater opportunity to capitalise on the most advantageous options that align with the self-determined aspirations of kaitiaki.

Intersection between Commercial and Cultural Interests

Traditional Māori approaches to IP are markedly different to Western scientific approaches. The rights of mana whenua who are involved with developing a novel scientific or technological enterprise may not align to those within iwi or hapū that are not involved but are kaitiaki of mātauranga that is being utilised. Successful enterprise in this instance means finding te pūtahitanga that satisfies the needs of cultural, commercial and scientific endeavours, which requires on-going engagement and probable concessions. Successful collaboration, benefit sharing and recognition of mātauranga holders may be additional ways to overcome differences.

Capacity and Capability

Capacity and capability are underpinning features of tino rangatiratanga. Investing in capacity building shifts the focus beyond benefit sharing to a power sharing dynamic seated more deeply in the tino rangatiratanga of whānau, hapū and iwi (Garrison et al., 2019). It is important the approach to capacity building is forward-looking and encompasses technical, operational as well as the self-determined aspirations of the mana whenua involved.

There are a number of ways capacity building can take shape. Keeping mana whenua meaningfully involved can be challenging if there is a lack of skills and expertise to do so. Good partnering looks at overcoming barriers to cultivating skills, and expertise. In addition, it requires the resources necessary for whānau, hapū and iwi to exercise their tino rangatiratanga in a manner consistent with their respective values. Where a project requires technical, operational and financial expertise, kaitiaki should have the option to be able to participate in the management of their taonga. Commercial partners must consider how this can be facilitated by the project and in accordance with the desires of kaitiaki.

Bioturbation patterns
generated by kākahi
Echyridella menziesi
moving through silica sand.



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End-to-End Investment

End-to-end investment plays a pivotal role in creating equitable outcomes and it is important that kaitiaki are involved across all discussions. Adequate resourcing across the research and commercialisation phases demonstrates the intention to partner in good faith. It is important that resourcing is not limited to just the research phase. End-to-end investment means funding spans engagement, research as well as commercialisation phases of the project from inception to completion.

Intellectual Property Recognition and Protection

One of the major challenges is how intellectual property is to be acknowledged, especially where new knowledge is derived (Sterling et al., 2021a). Noting that mātauranga hōu, or new knowledge is a foreseeable result of working on the basis of preexisting mātauranga, it is important to take an approach that acknowledges this. Hikurangi Enterprises provides an example of the types of conversations communities might want to have around intellectual property and taonga species (Whare & Hikurangi Enterprises, 2021). Conversations around how intellectual proprietary interests are to be acknowledged in a manner that is consistent with the Treaty right to development are imperative to partnering with Māori in good faith. Approaches to discussions about maintaining control over mātauranga Māori and genomic data may require the use of both legal and extra-legal mechanisms (Sterling et al., 2021b).

Commercial Agreements

Commercial agreements should be oriented to delivering fair and equitable benefit. As stated above, priority is to be placed on moving

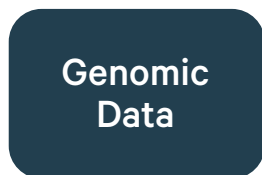
up the value chain and exploring various ownership models where Māori are appropriately acknowledged in accordance with their self-determined aspirations.

Ongoing Engagement

Whakawhānaungatanga (relationship building), as mentioned earlier, is imperative for researchers looking to engage meaningfully with Māori. It denotes the relationship is built on a foundation that is greater than a mere job to be done. Maintaining relationships through ongoing engagement not only exemplifies the integrity of the relationship but enhances the value of the research, offering researchers an understanding of the full scope of the narrative surrounding taonga species and subtleties are often overlooked by Western scientific practice (Collier-Robinson et al., 2019).

Background Intellectual Property

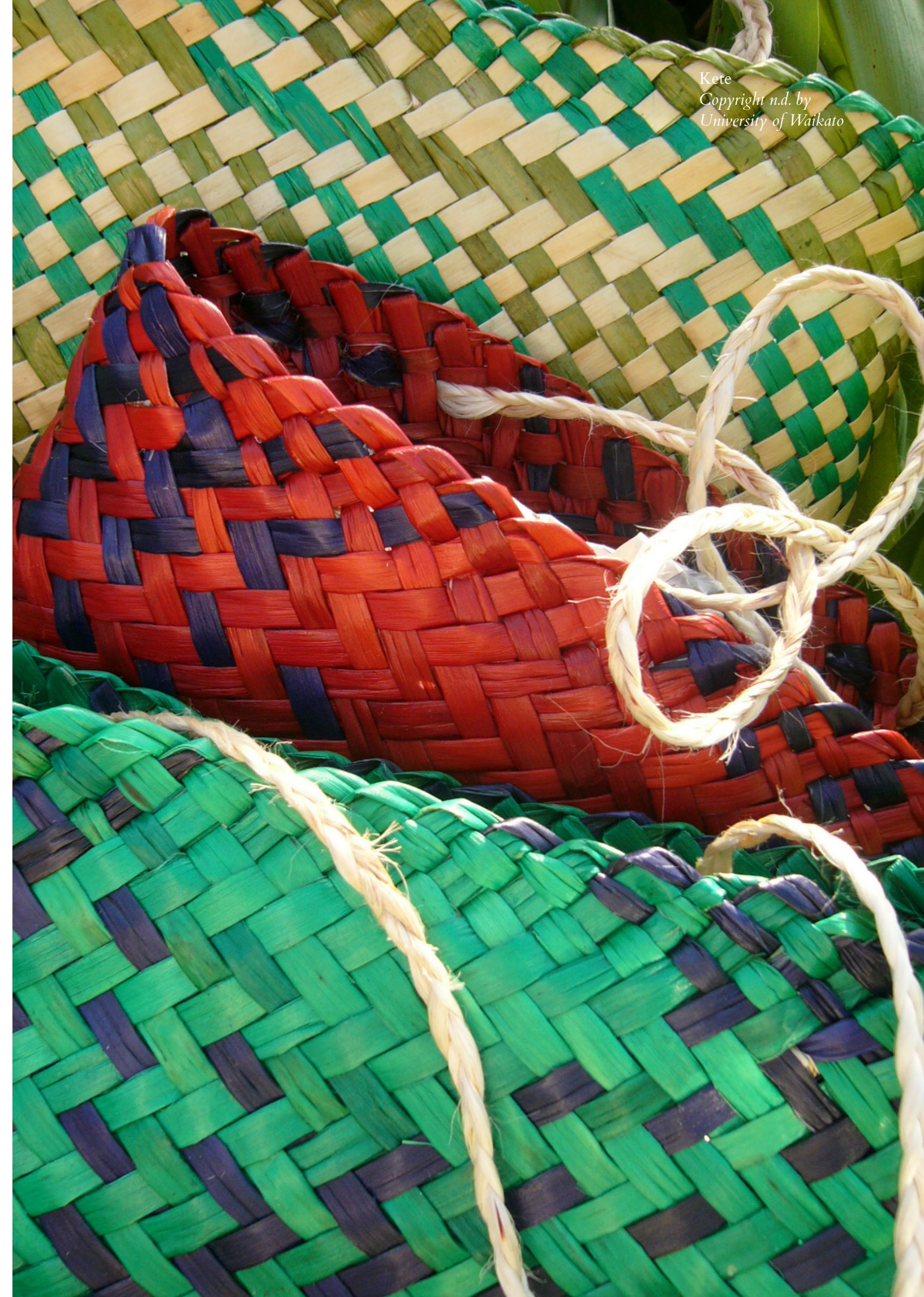
Recognition of preexisting mātauranga



Foreground Intellectual Property

Sharing of new intellectual property benefits where new mātauranga is found

Kete
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Appendix A: Te Nohonga Kaitiaki Engagement Checklist

Appendix A: Te Nohonga Kaitiaki Engagement Checklist

This checklist includes considerations relating to the appropriate parties to engage with when planning research, and also the issues to be considered as they relate to the levels

of responsiveness, as outlined earlier in this document. These considerations work together to form a preferable standard of engagement in undertaking research around taonga species.

Engaging with Māori		Yes / No?
Engaging the correct people	Are there multiple parties that may have overlapping kaitiaki interests?	
	Do the representatives that have been engaged have the mandate or support of their whānau, hapū or iwi?	
Who has been engaged with?		

Project Level Responsiveness		Completed?
Engagement & Communication	Adequate engagement resourcing – Engaging party should absorb cost of engagement.	
	Engagement is conducted early on in project timeframe.	
	Engagement is conducted face to face (kanohi ki te kanohi).	
Level of Involvement	Scope of project and understanding of level of collaboration: Understand what roles and responsibilities will be within collaboration. Level of project resourcing.	
Intellectual Contribution of Mana Whenua / Māori	Understanding of: Mātauranga Māori Māori approaches to IP rights and Taonga Mātauranga Māori is used to strengthen research Mātauranga Māori will play a critical part in the future of New Zealand.	
Project Outcomes	Mutual understanding of the project and project outcomes.	
	Demonstrating of benefits to both parties.	
	Future vision of collaboration.	
	Ensure project builds capacity into mana whenua.	

Organisational Responsiveness		Completed?
Sample/Data Access and Governance	Has there been thought given to where data is derived from?	
	Is there a protocol around publications?	
	Have protocols around data access and sample management been considered?	
Benefit Sharing	<p>Rights to intellectual property are well defined.</p> <p>Opportunities for benefit sharing have been thoroughly discussed and implemented.</p>	
Capacity Building	Consideration given to absorptive capacities (human, technical, relational – kaupapa, mātauranga, tikanga).	
Embedding Relationships	<p>Have structural relationships been established?</p> <p>There is a commitment to these relationships being maintained in good faith.</p>	

System Level Responsiveness		Have these issues been addressed?
End Users	<p>This includes participants and stakeholder engagement that may have unique or competing views on the topic.</p> <p>Have potential end users and stakeholder participants been identified?</p> <p>The amount and type of stakeholder engagement will vary depending on the project and topic.</p>	
Research Funding	<p>The funding opportunities will vary depending on the project and topic.</p>	
International Agreements	<p>Has consideration been given to the international agreements that may impact on Māori?</p> <p>Recognition is to be given to Māori as per normal expected processes.</p>	
Research Networks & Consortia	<p>It will vary depending on the project and topic.</p>	

Appendix B: List of Guidelines for Genetic Research with Māori

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On the following pages is a list of key guidelines that address use of genomic material in research with Māori.

Guideline	Description	Link
Guidelines for Researchers on Health Research Involving Māori	These guidelines were developed to assist researchers in establishing research practices which ensure that the research outcomes further the improvement of Māori health and wellbeing while the research process maintains or enhances mana Māori.	https://gateway.hrc.govt.nz/funding/Guidelines_for_researchers_on_health_research_involving_Mori.pdf
Te Ara Tika	‘Outlines a framework for addressing Māori ethical issues within the context of decision-making by ethics committee members. It draws on a foundation of tikanga Māori (Māori protocols and practices) and will be useful for researchers, ethics committee members and those who engage in consultation or advice about Māori ethical issues from a local, regional, national and/or international perspective.’	http://www.hrc.govt.nz/news-and-publications/publications/te-ara-tika-guidelines-m%C4%81ori-research-ethics-framework-researcher
Te Arotūruki	Developed by a team of Māori researchers and community members in response to GE challenges. A multistep process to ensure effective engagement and maximise potential.	http://www.dabhand.co.nz/taip/index.html

Te Mata Ira	Developed primarily for application in medical genomics area. Cultural framework and logic based on experiences of Māori communities.	http://www.waikato.ac.nz/_data/assets/pdf_file/0018/321534/Te-Mata-Ira-Genome-Research-Guidelines.pdf
He Tāngata Kei Tua	Framework developed for biobanking/tissue banking.	https://www.waikato.ac.nz/_data/assets/pdf_file/0019/321535/He-Tangata-Kei-Tua-Biobanking-Guidelines.pdf
EPA	Resources developed to support HSNO-required consultation processes.	https://www.epa.govt.nz/applications-and-permits/engaging-with-Māori/
Mātaatua Declaration	Mātaatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples.	https://www.wipo.int/export/sites/www/tk/en/databases/creative_heritage/docs/matataatua.pdf
Vision Mātauranga	A Guide to Vision Mātauranga: Lessons from Māori Voices in the New Zealand Science Sector.	https://www.buildingbetter.nz/publications/Rauika_Mangai_A_guide-to-Vision_Matauranga.pdf
Consultation with Māori	Research consultation with Māori (Otago University policies).	http://www.otago.ac.nz/research/Māoriconsultation/
Aashukan Declaration	Declaration on engagement for Impact Assessments with Indigenous Peoples.	https://www.nzaia.org.nz/indigenouspeoples.html
CARE Principles	CARE Principles for Indigenous Data Governance.	https://www.gida-global.org/care
Māori Data Sovereignty Principles	Te Mana Raraunga Principles for Māori Data Sovereignty.	https://www.temanararaunga.maori.nz/nga-rauemi

the fact that the β function is not a function of the coupling constants alone, but also of the dimensionality of space-time, d . The β function is given by

$$\beta(g) = -\epsilon g + \beta(g), \quad (1.1)$$

where $\epsilon = d - 4$ is the dimensionality of space-time minus four, and $\beta(g)$ is the beta function of the coupling constant g .

The beta function is a function of the coupling constant g and the dimensionality of space-time, d . The beta function is given by

$$\beta(g) = -\epsilon g + \beta(g), \quad (1.2)$$

where $\epsilon = d - 4$ is the dimensionality of space-time minus four, and $\beta(g)$ is the beta function of the coupling constant g .

The beta function is a function of the coupling constant g and the dimensionality of space-time, d . The beta function is given by

$$\beta(g) = -\epsilon g + \beta(g), \quad (1.3)$$

where $\epsilon = d - 4$ is the dimensionality of space-time minus four, and $\beta(g)$ is the beta function of the coupling constant g .

The beta function is a function of the coupling constant g and the dimensionality of space-time, d . The beta function is given by

$$\beta(g) = -\epsilon g + \beta(g), \quad (1.4)$$

where $\epsilon = d - 4$ is the dimensionality of space-time minus four, and $\beta(g)$ is the beta function of the coupling constant g .

The beta function is a function of the coupling constant g and the dimensionality of space-time, d . The beta function is given by

$$\beta(g) = -\epsilon g + \beta(g), \quad (1.5)$$

where $\epsilon = d - 4$ is the dimensionality of space-time minus four, and $\beta(g)$ is the beta function of the coupling constant g .

The beta function is a function of the coupling constant g and the dimensionality of space-time, d . The beta function is given by

$$\beta(g) = -\epsilon g + \beta(g), \quad (1.6)$$

where $\epsilon = d - 4$ is the dimensionality of space-time minus four, and $\beta(g)$ is the beta function of the coupling constant g .

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