

# **Mātauranga Māori in the Mātauranga Māori Framework for Surveillance of Plant Pathogens**

## **A Literature Review**

Prepared for the Mātauranga Māori Framework for Surveillance Project Rōpū

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# Contents

<b>Summary</b> .....	<b>3</b>
<b>1. Introduction</b> .....	<b>4</b>
1.1 Research Approach .....	5
1.2 Research Limitations .....	5
<b>2. Mātauranga Māori</b> .....	<b>6</b>
2.1 Mātauranga Māori key concepts and definitions .....	8
<b>3. Literature Review</b> .....	<b>10</b>
3.1 The Māori worldview and environmental management approaches based on mātauranga Māori – key concepts, values and beliefs .....	10
3.1.1 The Natural World and Natural Resources: Māori Value Systems and Perspectives .....	10
3.1.2 Kaitiakitanga: A Definitive Introduction to the Holistic World View of the Māori .....	18
3.1.3 Building biocultural approaches into Aotearoa – New Zealand’s conservation future .....	25
3.2 Specific Mātauranga Māori Models or Frameworks for Environmental Management ..	31
3.2.1 A Tangata Whenua Perspective on Sustainability using the Mauri Model, Towards decision making balance with regard to our social, economic, environmental and cultural well-being .....	31
3.2.2 A Cultural Health Index for Streams and Waterways: A tool for nationwide use .....	34
3.2.3 Indigenous Māori knowledge and perspectives of ecosystems .....	38
3.2.4 An indigenous community-based monitoring system for assessing forest health in New Zealand .....	44
<b>4. Discussion</b> .....	<b>51</b>
<b>5. Conclusion and Recommendations</b> .....	<b>53</b>
<b>References</b> .....	<b>55</b>
<b>Appendices</b>	
Appendix A: A Genealogy of the Cosmos .....	57

## Summary

This report has been commissioned by Manaaki Whenua Landcare Research as part of the research programme 'Mātauranga Māori Framework for Surveillance (MMFS) of Plant Pathogens'. The programme is included within 'Ngā Rākau Taketake – Saving Our Iconic Trees from Kauri Dieback and Myrtle Rust' Tranche 2 Research Programmes, as part of the broader National Biological Heritage Challenge ('New Zealand's Biological Heritage | Ngā Koiora Tuku Iho').

The report is comprised of a literature review of mātauranga Māori focused literature. Seven literature pieces were reviewed, with selected literature falling in to one of two categories: (i) literature centred on key mātauranga Māori concepts, values and beliefs in relation to the natural environment; and (ii) mātauranga Māori based models and frameworks for application in environmental management and decision making. The purpose of the review was to contribute to the development of a mātauranga Māori framework for surveillance (MMFS) of plant pathogens, and to ensure no duplication of existing models or frameworks occurs.

Review findings supported the development of an MMFS and indicated no applicable models currently exist.

These recommendations are made in reference to development of the proposed framework:

1. The Māori worldview and its emphasis on whakapapa relationships with the natural world; an appreciation of the symbiosis of nature and our role within that symbiosis as 'teina' (the Tuakana-teina relationship); and demonstrated values of respect and reciprocity should comprise foundational elements of the proposed framework.
2. There are a multiplicity of mātauranga Māori concepts which underpin and inform behaviour, particularly in respect of the natural environment. The elucidation of core concepts that align with key (science based) surveillance measures are recommended as contributing to the framework base, with interweaving concepts guiding and informing framework application. Core concepts should be those concepts considered as generic; however, interweaving concepts should be flexible to allow for community specificity.
3. Mātauranga Māori related concepts, values and beliefs have evolved from a holistic view of the world as interconnected and interdependent. As such, the concepts themselves are often interconnected and interrelated and must be applied in the context from which they are derived. Care must therefore be taken to ensure that concepts, values and beliefs are understood by those utilising the framework, thereby ensuring the framework is applied in the appropriate manner.
4. The matching of ecological with social scales (as highlighted by Lyver et al. 2018) when addressing environmental problems is imperative. Hence, a Mātauranga Māori Framework for Surveillance must be supported by adequate resourcing that addresses the ecological scale of the problem whilst also supporting mana whenua, expressly hapū, engagement and ongoing involvement. Governance and institutional provision should therefore be positioned to support framework application in to the future.

## 1. Introduction

Protecting our biological heritage is of vital importance, with New Zealand's environmental, economic and cultural health dependent upon healthy and diverse ecosystems – for the tangible benefits they provide as well as significant intangible benefits, all of which contribute to improved health and wellbeing. Contemporary environmental problems that negatively impact our natural environment and associated biodiversity nevertheless appear increasingly common. In 2014 the Ministry of Business, Innovation and Employment (MBIE) established 'New Zealand's Biological Heritage | Ngā Koiora Tuku Iho' Challenge. The Challenge encourages scientists to collaborate across disciplines, institutions and borders in order to protect biodiversity, improve biosecurity, and enhance resilience to harmful pests, weeds and diseases (Biological Heritage 2020a). Included in this collaborative approach is an emphasis on exploring potential solutions held by Māori; solutions that are grounded within and guided by mātauranga Māori.

As noted by Royal (2009), mātauranga Māori often refers to “a distinctive way of doing certain things”, resulting in characteristic outcomes that are grounded in a Māori worldview. These outcomes emanate from the values and concepts of the worldview as well as the “lived experience of iwi, hapū and whānau” (p. 11). Like other indigenous cultures Māori have developed an advanced ethic of environmental care over time. This ethic is premised upon interconnectedness, interdependence, reciprocity and respect. Hence, despite the need for scientific based solutions the role of indigenous knowledge is also recognised as integral to solving environmental crises and to ongoing environmental care.

The Biological Heritage Challenge includes a strong focus on the protection of our iconic tree species from plant pathogens. 'Ngā Rākau Taketake – Saving Our Iconic Trees from Kauri Dieback and Myrtle Rust' consists of a number of research programmes aimed at protecting and restoring the historical and enduring connections Māori and other New Zealanders have with our kauri and myrtaceae trees (Biological Heritage 2020b). One of these programmes focuses upon the development of a mātauranga Māori based framework for surveillance (MMFS) of plant pathogens. Framework development utilises a trans-disciplinary approach with the resultant framework expected to inform future mātauranga Māori and science research investment priorities for biosecurity surveillance. The established framework will be applied and tested across kaitiaki-centric 'Biodiversity Management Areas', to determine future-fit and responsive surveillance that protects our natural biodiversity (Biological Heritage 2020b). As the name suggests, the framework will be grounded in and informed by mātauranga Māori, but will align with necessary science-based techniques to enable effective surveillance and detection that supports the 'proof of freedom' concept. Attaining 'proof of freedom' (or confidence in the absence of the targeted pathogen or disease) in a manner that is reinforced by mātauranga Māori will demonstrate the success of the framework, and will contribute to biosecurity and biodiversity management throughout New Zealand.

This literature review contributes to development of an MMFS. The review examines literature centred on mātauranga Māori concepts relating to the natural environment, and explores existing mātauranga Māori based models and frameworks for application in environmental management and decision making. The examination aims to ensure

duplication of existing models does not occur, and to observe whether existing literature is complementary to the potential framework.

### **1.1 Research Approach**

The approach undertaken for this report comprises a desk top review of literature relevant to mātauranga Māori, particularly within the context of environmental management and monitoring. The report includes four sections. The following section (Section 2) provides a general definition of mātauranga Māori; a summary table identifying mātauranga Māori key concepts and definitions is also included in this section. Section Three comprises reviewed literature according to two categories, these are: 'The Māori worldview and environmental management approaches based on mātauranga Māori – key concepts, values and beliefs' (Section 3.1); and 'Specific mātauranga Māori models or frameworks for environmental management' (Section 3.2). Discussion comments are included in Section 4, and Section 5 comprises concluding remarks and recommendations.

Information has been gathered from library and online search sources. Throughout the literature search no evidence was found of existing mātauranga Māori based models or frameworks directly applicable to plant pathogen surveillance and/or verification of the 'proof of freedom' model. A total of seven literature pieces are reviewed with literature presented in chronological order.

### **1.2 Research Limitations**

There is an extensive collection of literature focused on mātauranga Māori, from traditional/historical perspectives through to contemporary understandings and application within various settings (health, environment, education, economics). This report is limited to a review of literature deemed relevant to the development of an MMFS of plant pathogens. The selected literature is considered helpful in both informing the framework and in assisting the wider project group to gain an understanding of mātauranga Māori within the context of environmental management.

A vast array of international indigenous knowledge scholarship with parallels to mātauranga Māori also exists. However, due to scope and time limitations, international indigenous scholarship is excluded from this report. Similarly, whilst potentially informative, personal interviews also fall outside the scope of this report.

## 2. Mātauranga Māori

The term mātauranga Māori is a relatively modern concept. The word mātauranga derives from the root word 'mātau', the meaning of which is to "know, be acquainted with; understand; feel certain of" (Williams 1971). Similarly, 'mātauranga' is defined as "knowledge, wisdom, understanding, skill" (Moorfield 2020). The corresponding definition of 'mātauranga Māori' is "Māori knowledge – the body of knowledge originating from Māori ancestors, including the Māori world view and perspectives, Māori creativity and cultural practices" (Moorfield 2020). These definitions of mātauranga and mātauranga Māori offer concise meaning and allow for ease of comprehension. There are however many interpretations of mātauranga Māori that encompass much deeper and complex expressions and identify a number of important underlying concepts (Table 1).

Marsden (2003a) refers to mātauranga Māori, or Māori knowledge, as comprising both metaphysics and the theory of knowledge. In providing an explanation of mātauranga Māori, Marsden recounts the story of Tāne and his journey seeking the baskets of knowledge and Te Whare Wānanga (The House of Higher and Esoteric Learning), however does not describe further the specific meaning of mātauranga Māori. Hence, the reader must draw inferences through interpreting and understanding the story. This depiction of mātauranga Māori conveys a sense of deeper meaning, and an accompanying need for profound enquiry and understanding should one wish to comprehend the richness of the Māori knowledge base. When referring to "The Lore of the Wānanga" Marsden & Henare (1992) emphasise the important relationship between knowledge and wisdom, stating that "Knowledge is a thing of the head, an accumulation of facts", whereas "Wisdom is a thing of the heart. It has its own thought processes. It is there that knowledge is integrated for this is the centre of one's being" (p. 59).

In Royal's "Mātauranga Māori, An Introduction" (2009), the author includes a 17-page narrative entitled "Towards a Definition of Mātauranga Māori", further illustrating the complexity and holism of mātauranga Māori. To answer this definition Royal includes 12 different sections of writing, including (but not limited to) 'What is Mātauranga Māori?', 'The Totality of a Body of Knowledge', and 'Rediscovery of a New Creative Period'. Royal notes that past use of the term generally referred to two conventions – mātauranga Māori as an encompassing term – "the totality of Māori knowledge", or "knowledge derived from an atua Māori, possessed by a tohunga Māori", however, according to Royal mātauranga Māori is now commonly acknowledged as "Māori knowledge – distinctive knowledge created by Māori (usually) in history and arising from their living circumstances, their worldview and their experiences" (p. 22). Royal draws attention to the present reference to mātauranga Māori as a knowledge body and details the entirety of the term to incorporate uses and applications, such as gardening, fishing or navigation; types of knowledge and traditional concepts of knowledge and knowing, including tacit knowledge, implied knowledge, scientific knowledge and religious knowledge; as well as knowledge that encapsulates perspectives on various elements of existence, such as education, teaching and learning, and values and ethics (p. 33-34). Royal notes the increasing use of the term mātauranga Māori, and suggests this indicates a growing interest in the concept (p. 38).

Sadler's examination of 'Mātauranga Māori (Māori Epistemology)' (2007) considers mātauranga Māori through the Te Ao Mārama (the world of life and light, symbolising the Māori world view) paradigm, gaining understandings by analysing and interpreting the creation story using the mechanism of whakapapa. Sadler notes that:

Mātauranga Māori is a knowledge system or an epistemology that had its genesis in ancient Polynesia. It was taken to Aotearoa by the ancestors of the present day Māori where it was further developed by adapting to meet the people's needs as well as to be compatible with the change in environment that they were encountering. It was further refined over a period of about a thousand years and was advanced by the succeeding generations, who added further to the epistemology, into a culture, although having its roots embedded in Polynesia, that was unique, adaptable, and alive and flourished undisturbed until contact with Europeans was made in the 18<sup>th</sup> Century. Sadly, further development and enhancement was halted after encountering Pākehā and their knowledge system. (Sadler 2007, p. 34).

Despite the impact of colonisation and associated Western knowledge systems impeding its growth and evolution, Sadler emphasises the continually evolving and eternal nature of mātauranga Māori. In referring to migration from Polynesia and the transformation of knowledge and world view necessary to accommodate existence in a new environment, Sadler states that:

*Mātauranga Māori* was able to adapt and is able to change to suit the locale wherever Māori decided to reside. Whilst Māori resided in Polynesia, *Tangaroa* was the main influencing factor in their lives as theirs was a watery world and this is reflected in the importance that *Tangaroa* has in Polynesia even today. However with the translocation to Aotearoa the most influencing factor in their lives became *Te Wao-nui-ā-Tāne*. Thus the shift in emphasis from a water world to that of land and forests, so *Tāne* features more strongly replacing *Tangaroa*. (Sadler 2007, p. 35).

Sadler notes the belief that mātauranga Māori is unable to explain phenomena originating from non-Māori bases, and that it is fixed within a historical context. Conversely, Sadler suggests that mātauranga Māori is "ever evolving and never ending", and can therefore incorporate all new knowledge that Māori have acquired since the arrival of Pākehā (p. 34). Likewise, Royal states that:

Perhaps the most important issue facing Mātauranga Māori is the rediscovery and the reconstruction of the world view or the paradigm out of which it was created in pre European contact times, a paradigm that can be reapplied in contemporary circumstances in order to *discover* new Mātauranga Māori. (Royal 1999; as cited in Sadler 2007, p.34).

In slight contrast to the view that mātauranga Māori continually evolves in line with changing existence, in 'Mātauranga Māori as an Epistemology' Tau (2001) suggests that mātauranga Māori should be considered disparately from western knowledge systems and categories. Tau defines mātauranga Māori as "simply the epistemology of Māori – what it is that underpins and gives point and meaning to Māori knowledge" (p. 67-68). According to Tau, it

is inappropriate to develop Māori perspectives on Western knowledge categories due to the differing foundational base of mātauranga Māori resulting in the fitting of one knowledge system in to another.

Tau acknowledges whakapapa as the foundational framework of Māori epistemology and emphasises the significance of language in understanding mātauranga Māori. While noting that a strong language understanding is necessary to fully comprehend mātauranga Māori, Tau cautions that language should not be viewed as only “a written text to be studied, separated from the culture to which it relates”, but language or words are rather “symbols of thought” that may be conveyed in other forms (p. 68). Whilst highlighting the role of language in understanding mātauranga Māori Tau states “there is little point in knowing a language without knowing the interconnections the language has with the community’s perception of the world” (p. 68).

Durie (2005) affirms that mātauranga Māori “recognises the interrelatedness of all things, draws on observations from the natural environment, and is imbued with a life force (mauri) and a spirituality (tapu)”. Durie notes that mātauranga Māori is often appreciated for its traditional qualities, however, also emphasises its creative and inventive dimensions. Durie acknowledges the potential for indigenous knowledge to “be applied to modern times in parallel with other knowledge systems”, though expresses reservations about “whether it can also be applied in conjunction with other systems” (p. 138).

Mead (2016) states that “‘mātauranga Māori’ encompasses all branches of Māori knowledge, past, present and still developing”, and further notes “mātauranga Māori is not like an archive of information but rather is like a tool for thinking, organising information, considering the ethics of knowledge, the appropriateness of it all and informing us about our world and our place in it” (p. 337-338).

The aforementioned accounts denote mātauranga Māori as encapsulating various forms of knowledge and knowing, and including metaphysical and epistemological aspects. Worldview and whakapapa feature prominently, particularly creation genealogy but (human) ancestral whakapapa also plays a significant role in the evolution and intergenerational transmission of mātauranga Māori. As demonstrated by the views of Tau (2001) and Durie (2005) in comparison with other understandings, some incongruence exists on the appropriateness of applying mātauranga Māori with other knowledge bases. This variance in opinion serves as cautionary for all those working in the area of mātauranga Māori and science, or other knowledge systems external to mātauranga Māori.

## **2.1 Mātauranga Māori key concepts and definitions**

The following table comprises key concepts related to mātauranga Māori and a Māori worldview. The concepts are drawn from the reviewed literature. Accompanying definitions are sourced from the Te Aka Online Māori Dictionary (Moorfield 2020), indicated by (1); where these definitions do not reflect the deeper understanding of the term an alternative meaning is provided, indicated by (2).



**Table 1. Mātauranga Māori – Key Concepts and Definitions**

(Note: (1) – indicates Te Aka Online Māori dictionary definition; (2) – indicates in-depth definition from alternative source)

Mauri	(1) Life principle, life force, vital essence, special nature, a material symbol of a life principle.
Ora	(1) To be alive, well, safe, cured, recovered, healthy, fit, healed.
Mana	(1) Prestige, authority, control, power, influence, spiritual power, charisma - <i>mana</i> is a supernatural force in a person, place or object. <i>Mana</i> goes hand in hand with <i>tapu</i> , one affecting the other.
Tapu	(1) Sacred, prohibited, restricted, set apart, forbidden, under <i>atua</i> protection - a supernatural condition. A person, place or thing is dedicated to an <i>atua</i> and is thus removed from the sphere of the profane and put into the sphere of the sacred.
Papatūānuku	(1) Earth, Earth mother and wife of Rangi-nui - all living things originate from them.
Ranginui	(1) <i>Atua</i> of the sky and husband of Papa-tū-ā-nuku, from which union originate all living things.
Te Ao Marama	(2) “a world of light and opening... symbolises a rich diversity of life, resources, and biodiversity” (Harmsworth 2004; as cited in Harmsworth & Awatere 2013, p. 276).
Atua	(1) Ancestor with continuing influence, god, deity. Many Māori trace their ancestry from <i>atua</i> in their <i>whakapapa</i> and they are regarded as ancestors with influence over particular domains.
Whakapapa	(1) Genealogy, genealogical table, lineage, descent. It is central to all Māori institutions.
Wānanga	(1) To meet and discuss, deliberate, consider; tribal knowledge, lore, learning - important traditional cultural, religious, historical, genealogical and philosophical knowledge.
Kaupapa	(2) “Kaupapa is derived from two words, <i>kau</i> and <i>papa</i> , in this context ‘kau’ means ‘to appear for the first time, to come into view’, to ‘disclose’: ‘Papa’ means ground or foundation. Hence kaupapa means ground rules, first principles, general principles.” (Marsden & Henare 1992, p. 17)
Tikanga	(2) “method, plan, reason, custom, the right way of doing things” (Marsden & Henare 1992, p. 17).
Whenua	(1) Land, placenta, afterbirth.
Tuakana-teina	(2) “a reciprocal learning relationship between older and younger persons” (Lyver et al. 2018, p.12).
Utu (Tau utuutu)	(1) Reciprocity - an important concept concerned with the maintenance of balance and harmony in relationships between individuals and groups and order within Māori society.
Wairua	(1) Spirit, soul - spirit of a person which exists beyond death. It is the non-physical spirit, distinct from the body and the <i>mauri</i> .
Ahikāroa	(1) Burning fires of occupation, title to land through occupation by a group, generally over a long period of time. The group is able, through the use of <i>whakapapa</i> , to trace back to primary ancestors who lived on the land.
Taonga tuku iho	(1) Heirloom, something handed down, cultural property, heritage.
Tohunga	(1) Skilled person, chosen expert, priest, healer - a person chosen by the agent of an <i>atua</i> and the tribe as a leader in a particular field because of signs indicating talent for a particular vocation.
Mōhio	(1) to know, understand, realise, comprehend, recognise; knowledge, wisdom, clever person, knowledgeable person, expert.
Rāhui	(1) To put in place a temporary ritual prohibition, closed season, ban, reserve - traditionally a <i>rāhui</i> was placed on an area, resource or stretch of water as a conservation measure or as a means of social and political control.
Kawa	(1) <i>karakia</i> (ritual chants) and customs for the opening of new houses, canoes and other events. (2) “liturgical action”. It is applied to the way in which the progressive steps of a religious ritual is ordered.”; “the ritual approach to all things” (Marsden 1988).
Kaitiaki/Kaitiakitanga	(1) <i>Kaitiaki</i> : trustee, minder, guard, custodian, guardian, caregiver, keeper, steward. <i>Kaitiakitanga</i> : guardianship, stewardship, trusteeship.
Tangata whenua	(1) Local people, hosts, indigenous people - people born of the whenua, i.e. of the placenta and of the land where the people's ancestors have lived and where their placenta are buried.
Mana whenua	(1) Territorial rights, power from the land, authority over land or territory. The tribe's history and legends are based in the lands they have occupied over generations and the land provides the sustenance for the people and to provide hospitality for guests.
Manaaki	(1) To support, take care of, give hospitality to, protect, look out for - show respect, generosity and care for others.
Hapū/iwi	(1) Kinship group, clan, tribe, subtribe - section of a large kinship group and the primary political unit in traditional Māori society. It consisted of a number of <i>whānau</i> sharing descent from a common ancestor. A number of related <i>hapū</i> usually shared adjacent territories forming a looser tribal federation ( <i>iwi</i> ).
Whanaungatanga	(1) Relationship, kinship, sense of family connection - a relationship through shared experiences and working together which provides people with a sense of belonging. It develops as a result of kinship rights and obligations, which also serve to strengthen each member of the kin group.
Rangatiratanga	(1) Chieftainship, right to exercise authority, chiefly autonomy, sovereignty, self-determination, self-management

### **3. Literature Review**

This section presents the reviewed literature in two groupings. Section 3.1 comprises a review of three literature pieces that encompass the Māori world view and associated concepts as related to the natural environment. Section 3.2 reviews four literature pieces pertaining to specific mātauranga-Māori based models or frameworks for application within the environment. All reviewed literature is predicated upon a foundation of mātauranga Māori.

#### **3.1 The Māori worldview and environmental management approaches based on mātauranga Māori – key concepts, values and beliefs**

Literature is reviewed in chronological order. ‘The Natural World and Natural Resources: Māori Value Systems and Perspectives’ by Marsden, and ‘Kaitiakitanga: A Definitive Introduction to the Holistic World View of the Māori’ by Marsden & Henare were written some decades ago (1988 and 1992 respectively), prior to and closely following the introduction of the Resource Management Act 1991. Both literature pieces provided formative text for environmental management practice and theory over the succeeding years. In addition, recent literature by Lyver et al. (2018), ‘Building biocultural approaches into Aotearoa – New Zealand’s conservation future’ is reviewed. Lyver et al. also emphasise the holistic Māori worldview in relation to environmental care, and further identify key concepts considered to inform the development and application of said biocultural approaches.

##### ***3.1.1 The Natural World and Natural Resources: Māori Value Systems and Perspectives (Marsden 1988)***

This paper by Marsden was written as part of a Ministry for the Environment working paper focussed on Resource Management Law Reform. As a contributor to the paper, the author was tasked with defining and providing an account of the Māori view of the natural world, the relationship between Māori and resources, and the relevance and applicability of traditional measures employed by Māori in the use and management of resources in the present and for the future (p.26). Marsden’s account has contributed valuable narrative to the field of natural resource management over previous decades and offers foundational text in relation to a Māori world view and its place in informing and guiding resource management in Aotearoa New Zealand. In providing an explanation of the Māori world view the author discusses philosophy and metaphysics; science and values; the Māori world view and world of symbol; culture; values (Māori, spiritual, social, and material); the natural order, including mauri, Papatūānuku, and Papa’s consciousness; and the relevance and applicability of traditional measures; amongst other subjects.

The author begins discussion with reference to philosophy and metaphysics, noting that philosophy seeks to answer the fundamental questions of “What is the nature of reality, the nature of right and wrong and the grounds of valid belief?” The author identifies metaphysics as answering the question of ‘what is the nature of reality’; ethics as encompassing ‘the nature of right and wrong’; and epistemology as representing the grounds of valid belief.

Marsden explains metaphysics as relating to first principles, “especially those dealing with knowing and existence or being” and submits “as we think we live, and how we live is a pretty good indication of how we think”. Marsden therefore defines a man’s metaphysics as “the sum total of the beliefs out of which develop the basic convictions and assumptions by which he directs and guides his life” (p. 27).

In contrast with philosophy and metaphysics, the author describes science and technology as producing ‘know how’ though often in the absence of ‘know why’. According to Marsden, education has focussed most of its efforts upon ‘know how’, however, without attention to ‘know why’ or to metaphysics, hence education does not offer “an integrated and well-rounded system” (p. 27). Marsden states that such a system must include and convey ideas of value, noting that “values are more than mere formulae and dogma”, but are tools through which we view and make sense of the world.

Accordingly, a Māori view of the world encapsulates “a series of interconnected realms separated by aeons of time from which there eventually emerged the Natural World” (p. 31). As highlighted by the author, the ancient Māori seers created and relied upon the world of symbol to depict different stages of the evolutionary process. These symbols informed the way in which they could interpret and understand the various worlds, “and grasp what they perceived as ultimate reality”, with symbolic representation intentionally positioned in expressive forms such as stories, art, proverbs, ritual and ceremony (p. 31). Marsden notes that just as whakapapa tables show successive lines of descent, similarly, every living organism in the natural world has resulted from a previous sequence of events.

**Table 2.** Genealogy of Creation (Marsden 1988, p. 31)

<i>Io taketake</i> , creator, root-cause
Void Abyss Night
Shoot Taproot Laterals Rhizome Hair root
Seeking Pursuit Extension Expansion Energy
Primordial Memory, Deep Mind
Sub-conscious wisdom
Seed word Breath of Life
Shape Form
Time Space
Heaven Earth (The Natural World)

Marsden explains Ultimate Reality for Māori:

- That ultimate reality is *wairua*-spirit
- The Universe is 'Process'
- *Io TakeTake*, is First Cause, Ground of Being, Creator and genesis of the cosmic process.
- Spirit is ubiquitous, imminent in the total process; upholding/sustaining/replenishing/regenerating all things by its *hau* or *mauri* (Breath of Life-principle).
- As a corollary of the above, the All is One and interlocked together.
- Man is both human and divine an integral part both of the cosmic process and of the natural order.
- The Māori approach to life is holistic. There is no sharp division between culture, society and their institutions.  
(Marsden 1988, p. 33).

As highlighted by Marsden, this narrative affirms the holistic approach that allows Māori to avoid divorcing the secular and the spiritual, the segregation of one institution from another, and adopting fragmentary approaches to problem and conflict resolution. Importantly, the author notes that the use of a piecemeal or fragmentary approach addresses the symptoms of a problem, as opposed to the actual causes. Solutions may therefore be short-lived and incomplete as problems are misinterpreted or overlooked altogether. Marsden states that "political legislation is particularly prone to this weakness since it is based on the adversarial system and often decisions are based upon what is expedient" (p. 33). However, a holistic approach emphasises "harmonisation, integration and reconciliation of the various elements of the situation" (p. 33).

Marsden points to culture, with particular reference to 'Māoritanga', as the manner in which Māori perceive and respond to life (as opposed to the way that other ethnic groups do), and denotes culture as "the most powerful imprinting medium in the patterning processes of the individual" (p. 34). Hence, Marsden suggests that "despite cultural erosion and genocide as imposed by colonialist processes tangata whenua has never totally surrendered the core beliefs and value systems of their culture" (p. 34).

In examining Māori values, the author notes there is no specific Māori term for the word value. Marsden also notes there is no real differentiation between spiritual, socio-cultural and socio-economic values; this is evidenced in the following example.

With his holistic view of the Universe the Māori idea of value is incorporated into the inclusive holistic term 'taonga' – a treasure, something precious; hence an object of good or value. The object or end valued may be tangible or intangible; material or spiritual. *Taonga*, e.g. a *mere pounamu* – greenstone *mere* is so regarded for its utilitarian, cultural, social or simply its aesthetic value.

- utilitarian; as a weapon
- historico – social; as an heirloom of historical association with people and events.

- cultural and social; as a tangible symbol to seal a peace pact, or an alliance between tribes; or to commemorate an important social occasion or event.
  - spiritually, to denote the 'mana' of those ancestors who wielded it with distinction.
- Taonga then, denote the 'end' or 'good', which are desired for themselves, as values. In this context of Taonga as value, the whole range of cultural elements bequeathed by their forebears to their descendants as legacy or birth-right are classified as:

*Ngā taonga a ngā tūpuna* – ancestral treasures

*Taonga tuku iho* – treasures bequeathed

*Ohaaki a ngā tūpuna* – guidelines, maxims of the ancestors

These taonga refer to the cultural tradition, lore, history; corpus of knowledge etc, with which the descendants can identify and which provide them with their identity, self-esteem and dignity; that which provides them with psychological security. (Marsden 1988, p. 38).

The above narrative illustrates the interrelationship between different values and how they are integrated within Māori culture. Marsden notes the evolving nature of cultural metaphysics over generations, with successive generations adding their respective knowledge and experience. As highlighted by Marsden, the customs and traditions of past generations, grounded in their beliefs and understandings of “the nature of ultimate reality, of the universe, and of man are the foundation stones upon which the mores, standards and values of the culture are founded” (p. 39). Marsden notes further, it is these mores, standards and values that comprise the body of the cultural metaphysics.

In relation to the Natural Order, Marsden refers to Mauri, Papatūānuku and Papa's Consciousness. The author explains the presence of mauri within all creation:

*Mauri* – the life-force which generates, regenerates and upholds creation. It is the bonding element that knits all the diverse elements within the Universal 'Procession' giving creation its unity in diversity. It is the bonding element that holds the fabric of the universe together. (Marsden 1988, p. 44).

The similarities (and distinctions) between 'mauri' and 'hau', mauri-ora and hau-ora are also explained:

A synonym for mauri in certain contexts is 'hau' (breath). 'Hau-ora' – 'the breath of life' is the agent or source by and from which mauri (life-principle) is mediated to objects both animate and inanimate. *Mauri-ora* and *hau-ora* as applied to animate objects are synonymous. Mauri without the qualifying adjective 'Ora' (life) is applied to inanimate objects; whilst hau is applied only to animate life. (Marsden 1988, p. 44).

Therefore, “mauri was a force or energy mediated by hauora – the breath of the spirit of life. Mauri-ora was the life-force (mauri) transformed into life-principle by the infusion of life itself” (p. 44).

The term Papatūānuku, commonly known as Earth Mother, is defined as “Land from beyond the veil; or originating from the realm beyond the world of sense-perception” (p. 44). As stated by Marsden, Papatūānuku represents the embodied form of whenua (the natural earth), who along with Rangi (the Sky Father) created the departmental gods and humankind. The departmental gods were of a lesser order tasked with controlling the elements – winds, forest, oceans etc.

Papatūānuku’s children live and function in a symbiotic relationship. From unicellular through to more complex multicellular organisms each species depends upon other species as well as its own, to provide the basic biological needs for existence. The different species contribute to the welfare of other species and together they help to sustain the biological functions of their primeval mother, herself a living organism. They also facilitate the processes of ingestion, digestion and waste disposal... they cover her and clothe her to protect her from the ravages of her fierce son, *Tāwhiri* the Storm-bringer. She nourishes them, they nourish her. (Marsden 1988, p. 45).

Marsden emphasises that our relationship with Papatūānuku confers certain responsibilities including, being the conscious mind of Papatūānuku, and acting to enhance and maintain related life-giving capacity; treating Papatūānuku with love and respect; and realising that we are not owners or possessors of the Earth, but rather recipients and therefore carers. However, as acknowledged by the author “we waste, exploit, denude and pollute the earth” (p. 46). Marsden therefore advocates a new sense of awareness and attitudes in order to reverse this misuse and the mindset that encourages these destructive behaviours, noting the need for “a radical departure from the modern concept of man as the centre of the universe towards an awareness that man’s destiny is intimately bound up with the destiny of the earth” (p. 46). In terms of legislation and its ability to accommodate spiritual values, Marsden expresses doubt that this is possible, stating “The letter kills. It is the spirit that gives life.” (p. 47). Nevertheless, Marsden considers intensive and sustained education may result in changing attitudes that support the principles (including spiritual values) which sit behind resource management legislation.

The author affirms the role of Māori traditional measures in addressing resource management and environmental problems, specifically kawa (in relation to ecosystems), and rāhui and mauri. Kawa signifies a “ritual approach to all things” (p. 48). According to Marsden, a range of attitudes, ideas and cultural perspectives support the institution of kawa including:

A sense of reverence for life, of the fitting and proper way of treating things, an awareness of the spiritual essence, of the wana (aura of splendour, the glory) that radiates from all animate life and a sense of their numinal qualities. (Marsden 1988, p. 48).

As noted by Marsden, an awareness of these insights precludes “extravagant and prodigious wastage, exploitation, pillaging, despoliation, destruction, denudation and pollution of our environment” (p. 48). Traditionally, the undertaking of any group activity or expedition would necessitate the appropriate kawa (in the form of ritual prayer or similar action) be conducted

at the start, during, and at the end of the activity. Marsden indicates this allowed time to reflect upon the purpose and outcomes of a particular activity or excursion, the responsibilities involved and the personal discipline needed to achieve the anticipated outcomes. Marsden notes that these practices are still observed by tangata whenua, however, expresses scepticism regarding the adoption and feasibility of these practices within Pākehā culture. Nevertheless, the author states that “Kawa can and may provide the means by which the balance and harmony within the ecosystem may be sustained” (p. 49).

The author refers to the purpose of rāhui in conjunction with the concept of mauri, denoting the relationship between them. According to Marsden, rāhui fulfilled two key functions – to conserve or replenish a resource whereby an imposed rāhui (or ban) over a particular area would prevent harvesting of resources within defined boundaries; or rāhui were imposed over areas where drowning or accidental death had occurred, this was considered proper and demonstrated respect and care for the deceased and their whānau as well as allowing time for the tapu associated with death to be removed by the natural elements.

Marsden emphasises the important role of the concept of mauri in the institution of rāhui, noting the relationship between rāhui and mauri is based on the following principles:

- The cosmic process as designed by the creator is a movement from the ‘lower’ to ‘higher’, from potential to authentic being. There is therefore a meaning and purpose inherent within it. That final purpose is yet to be fulfilled.
- Mauri as life-force is the energy within creation which impels the cosmic process onwards towards fulfilment. The processes within the physical universe are therefore ‘pro-life’ and the law of self-regeneration latent within creation will, if not interfered with, tend towards healing and harmonising the eco-systems and biological functions within Mother Earth.
- We have seen that in the movement from lower to higher each stage of the process occupies aeons of time and when it has achieved its ‘omega’ point it makes a giant leap forward and a radical departure occurs at the time of transition like a bud bursting into bloom.
- Since the transformation occurs at the apex of each stage; namely, its high-test point of achievement, then the next stage has to do with the transformation of the conscious into the ‘super-conscious’ – from *Whakaaro* to *Wānanga*. (Marsden 1988, p. 49-50).

Note: see Appendix A ‘A Genealogy of Creation’ for whakapapa showing ‘*Whakaaro* to *Wānanga*’

Marsden further states:

From the Māori point of view, that transition and transformation will result in the perfect comprehension of the higher spiritual laws ever sought by the ancient seers (tohunga) to enable mankind to flow in union with the universal process and thereby become fully creative. This is man’s transition from the purely human into *atuatanga*

(divinity) whose manifestation has already become evident in the lives of the saints and seers of various peoples and religions.

This *atuatanga* will mean the perfect blend and union of mind and spirit in which the gift of *matakite* (enlightenment) will allow man to exercise mana (authority, power) responsibly in perfect wisdom and freedom. Thus will he creatively lift up and transform creation itself. (Marsden 1988, p. 50).

Thus, Marsden reveals that *rāhui* in this context indicates a dual function that mankind must exercise as stewards responsible for the environment:

- a. To prohibit exploitation, denudation, degeneration and pollution of the environment and its resources beyond the point of no return where the latent 'pro-life' processes within the biological functions and ecosystems of Papatūānuku collapse.
- b. That man, as the conscious mind of Papatūānuku, aids the pro-life processes of recovery and regeneration by focussing the mauri of particular species within that area. The means of accomplishing this was the task of the *tohunga* who by his knowledge and art drew forth the mauri of the universe and concentrated it within a stone or some other object which was then secretly placed within the area – forest, sea, river. From this source, the aura of the mauri would radiate outwards both to the environment and more specifically to the particular species for which it was intended. Thus mauri created benevolent conditions within the environment to harmonise the processes within earth's ecosystems and aid the regeneration process. (Marsden 1988, p. 50).

In summary, Marsden accentuates the relationship of Māoridom with the universe as one where man is accountable for the way in which he treats the natural world and resources, and where human wellbeing is integrally linked with the wellbeing of the earth. As noted by Marsden, this is in contrast to the western view of the world which considers "the universe is physical and material and that man is autonomous and answerable only to himself. There is no real restriction on his actions except that which is self-imposed or that imposed by his society which may hold differing value judgements" (p. 51). Marsden laments the commodification of the natural world and resources, however notes that this attitude is being increasingly challenged within New Zealand, by both Māoridom and Pākehā Conservationists alike.

"Only a metaphysic that provides an integrative element across the whole spectrum of life, which produces a holistic approach to life, can unify its diverse elements and allow us to achieve a balance and harmony conducive to life abundant" (p. 53).

### **Summary comments**

Marsden has provided a richly descriptive account of Māori value systems and perspectives relative to the natural world and natural resources. Although written to inform resource



management law reform, the literature is seminal text for all those who seek knowledge and understanding of the Māori world view, as it pertains to environmental care and management. Despite the lack of specific reference to “mātauranga Māori” within the text, the extensive explanation of metaphysics and related principles provides important insights and understanding. When attempting to incorporate Māori cultural values and perspectives (or mātauranga Māori) into environmental frameworks it is imperative that the underpinning world view is clearly understood. Confusion or misinterpretation of foundational cultural aspects may result in incorrect application, thereby potentially rendering efforts ineffective or disadvantageous.

The holistic worldview described by Marsden informs approaches that are interconnected and unified, as opposed to fragmentary and disparate. The aligning of the ‘know how’ of science versus the ‘know why’ of metaphysics depicts the complementary approach being utilised within this work. Hence Marsden’s narrative lends support to the proposed framework, including the desire of the MMFS Kaitiaki Rōpū to develop a holistic framework that is capable of moving beyond surveillance/detection to include future biosecurity monitoring and management, as well as broader biodiversity assessment and restoration. Thus, the MMFS offers an initial step toward a more holistic mātauranga Māori based platform. A broader approach avoids the situation of only addressing symptoms, but rather seeks to address causes.

This paper by Marsden in its entirety supports the development of an MMFS of plant pathogens, however, aspects for specific attention are:

- The primacy of mauri as “the life-force which generates, regenerates and upholds creation”
- The importance of understanding the concept of mauri as it relates to rāhui and the underpinning principles of that relationship; particularly the transformation from Whakaaro to Wānanga (conscious to super-conscious)
- An appreciation of the dual function of rāhui – to prevent exploitation and degradation of the environment beyond the point of no return; and as the conscious mind of Papatūānuku aiding pro-life processes of recovery and regeneration
- Demonstrated values of respect and reciprocity, based on whakapapa relationships with the natural world and with each other; recognition of the symbiosis of nature and our role within that symbiosis
- The embedding of kawa as an overarching guide throughout framework development and implementation; “kawa can and may provide the means by which the balance and harmony within the ecosystem may be sustained”
- The descriptive example of interrelating values as they apply to Taonga; this example aptly depicts the relationship Māori hold with our taonga species that are susceptible to plant pathogens

### **3.1.2 Kaitiakitanga: A Definitive Introduction to the Holistic World View of the Māori (Marsden & Henare 1992)**

Cultures pattern perceptions of reality into conceptualisations of what they perceive reality to be; of what is to be regarded as actual, probable, possible or impossible. These conceptualisations form what is termed the ‘world view’ of a culture. The World view is the central systematisation of conceptions of reality to which members of its culture assent and from which stems their value system. The world view lies at the very heart of the culture, touching, interacting with and strongly influencing every aspect of the culture. (Marsden & Henare 1992, p. 56).

In this paper Marsden & Henare provide the reader with an explanation of the traditional narrative and understandings that inform and guide a Māori world view. The explanation presented by the authors responded to the introduction of the Resource Management Act 1991. As noted by the authors, despite provisions within the Act for ‘the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga’ (section 6(e)); reference to Kaitiakitanga (section 7(a)); and the requirement that all persons exercising functions and powers under the Resource Management Act take into account the principles of the Treaty of Waitangi (section 8); tribal groups were concerned that their perspective may be misunderstood or ignored by local authorities. Hence, the authors have provided an in-depth portrayal of “the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wahi tapu and other taonga”, with particular emphasis on “Kaitiakitanga” (p. 55). The paper enlightens and informs the reader of the founding aspects of a Māori worldview, before linking those aspects with the practice of kaitiakitanga.

Marsden & Henare highlight the important role of ‘myths and legends’ in shaping the Māori world view, suggesting that the Māori holistic view of the universe is in fact based upon myths and legends. Notwithstanding the modern-day dismissal of these narratives as the imaginings of an inferior society, the authors note that this assumption could not be further from the truth. According to Marsden & Henare, myth and legend in the Māori cultural context “were deliberate constructs employed by the ancient seers and sages to encapsulate and condense into easily assimilable forms their view of the World, of ultimate reality and the relationship between the Creator, the universe and man” (p. 56).

The authors describe the legend of Tāne ascending to the uppermost heaven in order to obtain the three baskets of knowledge. As highlighted by the authors, shallow interpretation of the legend’s meaning may consider it to be nothing more than story-telling for children. However, Marsden & Henare note that sacred knowledge and wisdom were not meant for public consumption (for tūtūā, the ‘common herd’), due to fears such sacred lore may be misused. Wisdoms encoded in the story of Tane and the baskets of knowledge (and other stories) were therefore only shared with selected persons that were considered appropriate to hold sacred knowledge. The authors recount an incident that in their view reflects the seriousness of imparting sacred or specialised knowledge to tūtūā.

After the war, when I returned to the Wananga I was questioned by the elders of the Wananga about my war experiences. In the course of my sharing our experiences I mentioned the atom bomb. One of the elders who had of course heard of the atom bomb asked me to explain the difference between an atom bomb and an explosive bomb. I took the word '*hihiri*' which in Maoridom means '*pure energy*'. Here I recalled Einstein's concept of the real world behind the natural world as being comprised of '*rhythmical patterns of pure energy*', and said to him that this was essentially the same concept. He then exclaimed "Do you mean to tell me that the Pakeha scientists (tohunga Pakeha) have managed to rend the fabric (*Kahu*) of the universe?" I said "Yes" "I suppose they shared their knowledge with the tutuaa (politicians)?" "Yes" "But do they know how to sew (tuitui) it back together again?" "No!" "That's the trouble with sharing such 'tapu' knowledge. Tutuaa will always abuse it." (Marsden & Henare 1992, p. 57).

The authors explain the Worlds of Māori cosmogony by referring to 'The Lore of the Wananga' and 'The Baskets of Knowledge'. In terms of 'The Lore of the Wananga', Marsden & Henare note that the legend of Tāne's ascent into the heavens contained the sanctions, protocols and guidelines upon which Wānanga were to be conducted, and also determined the focus of teaching. The authors state that on its own 'Wānanga' can be defined as "(to) discuss, debate, impart knowledge". However, in creation whakapapa 'Te Whe' (sound) is associated with Wānanga, and subsequently alters the meaning to wisdom (p. 5). The authors acknowledge the differences between knowledge and wisdom, stating that "Knowledge is a thing of the head, an accumulation of facts", whereas "Wisdom is a thing of the heart. It has its own thought processes. It is there that knowledge is integrated for this is the centre of one's being" (p. 59).

Marsden & Henare highlight the use of ritual acts within the Wānanga to illuminate important truths, describing the symbolic swallowing of the stones Hukatai (sea foam) and Rehutai (sea spray). Hukatai, the white coloured stone, was 'swallowed' upon entering the Wānanga to symbolise the student entering a quest for knowledge (mātauranga); Rehutai, the red coloured stone, was 'swallowed' upon graduating from the Wānanga to represent the transformation of knowledge to wisdom. As depicted by the authors:

Hukatai (sea foam) and Rehutai (seaspray) are metaphors taken from a canoe *en passage* on the sea. The sea foam or wake generated by the canoe in motion symbolises the pursuit of knowledge as an accumulation of facts picked up along the way. Of itself, such facts constitute an unorganised set of ideas unrelated to his centre.

The centre is where he must create for himself an orderly system of ideas about himself and the world in order to regulate the direction of his life. If he has faced up to the ultimate questions posed by life, his own centre no longer remains in a vacuum which continues to ingest any new idea that seeps into it. The swallowing of Rehutai is the answer to the problem.

Rehutai depicts a canoe heading into the sunrise. As the sea foam is thrown up by the bow, the rays of the sun piercing the foam creates a rainbow effect as you peer through it. By meditation in the heart, the centre of one's being, illumination comes suddenly in a moment of time, and the unorganised sets of ideas suddenly gel together to form an integrated whole in which the tensions and contradictions are resolved. Knowledge is transformed into wisdom. This is essentially a spiritual experience. Illumination is from above, a revelation gift from God. When it occurs, it acts as a catalyst integrating knowledge to produce Wisdom. (Marsden & Henare 1992, p. 59).

In referring to 'The Baskets of Knowledge' the authors provide the reader with both literal and deeper symbolic interpretations of the three baskets of knowledge – Tua-Uri, Aro-Nui, and Tua-Atea. According to Marsden & Henare, the three baskets explain the three-world view held by Māori. With regard to 'Tua-Uri', the literal meaning is noted as 'beyond in the world of darkness', and further described as being "the seed bed of creation"; "the world where the cosmic processes originated and continue to operate as a complex series of rhythmical patterns of energy to uphold, sustain and replenish the energies and life of the natural world". The authors characterise Tua-Uri as "the real world of the complex series of rhythmical patterns of energy which operate behind this world of sense perception" (p. 60).

Te Aro-Nui is literally defined as 'that before us'. The authors note that Te Aro-Nui "is the natural world around us as apprehended by the senses" (p. 61). As stated by the authors, similarly to other societies Māori were able to observe natural cycles and draw inferences and conclusions about cause and effect, this knowledge and lore was subsequently incorporated into the general knowledge body for intergenerational transmission. Marsden & Henare note that the use of whakapapa as a tool for conveying knowledge was prevalent within Māori culture.

Every class and species of things had their own genealogy. This was a handy method for classifying different families and species of flora and fauna, of the order in which processes occurred and the order in which intricate and prolonged activities or ceremonies should be conducted etc. (Marsden & Henare 1992, p. 61).

The basket of Te Ao Tua-Atea refers to the world 'beyond space and time'. The authors write of Tua-Atea:

This is the eternal realm which was before Tua-Uri and towards which the universal process is tending. The worlds both of Tua-Uri and Aro-nui are part of the cosmic process. And if the universe is process it is more akin to life, mind and spirit which are obviously processes. Therefore the world of sense perception, the natural world around us is unlikely to be ultimate reality. For the Māori, Tua-Atea the transcendent eternal world of the spirit is ultimate reality. (Marsden & Henare 1992, p. 62).

Marsden & Henare further extend the worlds of the three baskets with the addition of the world of symbol. The authors identify the world of symbol as being an intentional creation of the human mind, noting that the mind forms symbols to signify and explain some other perceived reality.

Words, formulae, art forms, ritualistic ceremonies, legend, myth etc are created by the human mind as maps, models, prototypes and paradigms by which the mind can grasp, understand and reconcile the worlds of sense perception, of the real world behind that, and the world of spirit. (Marsden & Henare 1992, p. 62).

As stated by the authors, knowledge dissemination in certain sects of society may be undertaken in a concealed manner, using methods or symbolism only known to the specific membership, for example within professional, religious or academic groups. In this way knowledge is protected or kept from the general public, or from those lacking the ability to understand the methods or symbols used to convey the knowledge. Alternatively, the authors note the existence of symbols created by and for the general public. The authors emphasise however that such symbols must resemble the reality or situation they are intended for, in order for the society or group to accept and endorse them. As noted by the authors “Only then are they incorporated into the corpus of that culture’s general knowledge and become part of that culture’s traditions and customs” (p. 62).

Marsden & Henare’s depiction of Māori myths and legends affirms the stories as carefully constructed symbols, used to represent “some other perceived reality” (p. 62). The authors point to myths and legends as delivering a detailed system of visual narratives that offer a framework “into which the basic elements of the realities perceived, may be set in summary form” (p. 63). The narratives were easily committed to memory and provided a marker for which further and perhaps more obscure details could be added successively and reconstructed to identify constituent elements of the knowledge. As well as assisting with ease of recollection, myths and legends disguised the deeper meaning from the uninitiated, thus protecting “the integrity of such sacred lore, and its abuse and misuse” (p. 63). Furthermore, the authors note that because of their connection to the pantheon of gods, myth and legend “provided the sanctions by which Kaupapa (first principles) were authorised and out of which Tikanga – custom could flow and be validated” (p. 63). Through their explanation of Māori cosmogony, Marsden & Henare have revealed a world view that perceives the different worlds as part of an interrelated whole. As acknowledged by the authors, this is the foundation for the holistic approach Māori have in relation to their environment.

This holistic approach manifests today in the practice of kaitiakitanga. Kaitiakitanga originates from the term ‘tiaki’, meaning “to guard, keep, to look after, nurse, care, protect, conserve” (Moorfield 2020). The addition of the prefix ‘kai’ signifies some form of action or human agency, hence a ‘kaitiaki’ is a guardian, keeper, carer, protector, conservator. Further addition of the suffix ‘tanga’ denotes kaitiakitanga as guardianship, caring, protecting, or conservation. Within the Resource Management Act (1991) kaitiakitanga is defined as guardianship and/or stewardship. The authors note the use of stewardship in relation to kaitiakitanga may be problematic, due to the original English meaning of stewardship being ‘to guard someone else’s property’, hence, stewardship may imply a “master-servant relationship” (p. 67). Moreover, in traditional times Māori were unfamiliar with the idea of property ownership. As stated by the authors, apart from the ownership of personal items,

such as garments or weapons, “all other use of land, waters, forests, fisheries, was a communal and/or tribal right” (p. 67).

In their explanation of the practice of kaitiakitanga and its supporting concepts, the authors outline the role of Spiritual Guardians; the importance of Papatūānuku; Earth’s consciousness (or perhaps more aptly referred to as Man’s consciousness); Tikanga Tiaki, or Guardianship Customs; Rāhui and Mauri; and Kawa.

The ancient ones (tawhito), the spiritual sons and daughters of Rangi and Papa were the ‘Kaitiaki’ or guardians. Tane was the Kaitiaki of the forest; Tangaroa of the sea; Rongo of herbs and root crops; Hine Nui Te Po of the portals of death and so on. Different tawhito had oversight of the various departments of nature. And whilst man could harvest those resources they were duty bound to thank and propitiate the guardians of those resources. Thus the Maori made ritual acts of propitiation before embarking upon hunting, fishing, digging root crops, cutting down trees and other pursuits of a similar nature. (Marsden & Henare 1992, p. 67).

The authors note the application of ‘Kaupapa’ (first principles) from myths and legends related to Papatūānuku and her children, with Māori considering their relationship with Papatūānuku and her resources as integral to the natural order. This contrasts with the view of the Earth held by Western culture, where “there is a disjunction between the material and spiritual, between the secular and sacred” (p. 68). As highlighted by the authors, this detachment can be attributed to the capitalist system and its commodification and exploitation of land, resources, and people. Conversely, the intimate relationship Māori maintained with the Earth is reflected in the term ‘Whenua’, which is used for both earth and placenta. “This is a constant reminder that we are of the earth and therefore earthy, and born out of the placenta and therefore human” (p. 68). The authors emphasise that all life is nourished upon the breast of Papatūānuku.

Papatuanuku is a living organism with her own biological systems and functions. She provides a network of support systems for all her children who live and function in a symbiotic relationship. The different species and genera contribute to the welfare of other species and also help to sustain the biological functions of Mother Earth both in their life and death. Her children facilitate the processes of ingestion, digestion, and excretion. (Marsden & Henare 1992, p. 68).

With reference to Earth’s consciousness, Marsden & Henare acknowledge man as the conscious mind of Papatūānuku and accord him responsibility for sustaining earth’s life support systems. However, the authors note the adverse consequences of abandoning first principles (Kaupapa) and treating Papatūānuku and the natural world as a commodity to be exploited, “then there is no avoiding the abuse and misuse of the earth” (p. 69). Thus, “out of the perceptions and concepts derived from the first principles emerged the tikanga or customs instituted to protect and conserve the resources of Mother Earth” (p. 69). Māori introduced the custom of rāhui, “a prohibition or ban instituted to protect resources” (p. 69). The authors highlight the interchangeable use of rāhui and tapu to signify a ‘ban’ being in place; rāhui defined the boundaries within which the tapu (or ban) was enforced. As stated

by the authors, the meaning of tapu as “‘sacred or set apart’ denoted that a ban was in force over that area” (p. 69).

According to Marsden & Henare, “To aid the process of regeneration, a mauri stone would be placed in the area accompanied by appropriate ritual and prayer” (p. 70).

*Mauri Ora* is a life-force. All animate and other forms of life such as plants and trees owe their continued existence and health to mauri. When the mauri is strong fauna and flora flourish. When it is depleted and weak those forms of life become sickly and weak. (Marsden & Henare 1992, p. 70).

The authors confirm the importance of Kawa (ritual or liturgical action) in relation to rāhui, noting the requirement for careful attention as disruption to a ritual chant or excluding a necessary part of traditional ceremony was viewed as ominous. The authors state that implementation of rāhui was usually the responsibility of the tohunga (“an expert in reading the signs that pointed to the depletion of resources in different areas of the tribal territory”) who would impose rāhui in consultation with the Rangatira (chief) and/or tribal elders (p. 70).

The tohunga would then conduct the appropriate ritual which invoked the aid of the appropriate departmental god; and then he would take a talisman stone and by his prayers concentrate the life force of the birds, fish or whatever in that stone and plant the mauri stone within the area encompassed by the rāhui, or on a fishing ground, or wherever the situation warranted it. (Marsden & Henare 1992, p. 70).

As stated by the authors, rāhui was intended to prevent exploitation, depletion or degeneration of natural resources and the environment, particularly where interrelated biological and ecological processes may breakdown. Within a modern-day context the implementation of rāhui in the management and control of resources and the environment is supported (guaranteed) under Article Two of the Treaty of Waitangi. Marsden & Henare note that “Under the institution of rāhui, tangatawhenua has the right to control the access of other people and their own tribal members to the resource and the use of that resource” (p. 71).

The author’s concluding remarks relate their hopes that the paper offers a view that is further examined in developing bicultural alternatives “in order that all may benefit from the bounty that Mother Earth has so richly bestowed upon this nation” (p. 72).

### **Summary comments**

Marsden & Henare have provided readers with a comprehensive explanation of the Māori world view, illustrating its holistic nature and how this holism informs and guides the practice of kaitiakitanga and associated customs. This holistic worldview is evidenced by the authors’ description of the ‘three worldview’, as represented by the ‘three baskets of knowledge’ (Tua Uri – beyond the world of darkness/the seed bed of creation; Te Aro Nui – the natural world before us; and Tua Atea – the world beyond space and time/the eternal realm). Similarly, the relationship between knowledge and wisdom, as highlighted by the symbolic swallowing of

the stones Hukatai and Rehutai, also point to the holism of Māori beliefs. The relationship between knowledge and wisdom is perceived as complementary – without wisdom knowledge is merely “an accumulation of facts” – such knowledge may therefore be considered useless without the wisdom needed to correctly apply it. Further, the authors note the transformation of knowledge to wisdom as a spiritual experience, hence emphasising the importance of the metaphysical realm when acquiring and applying knowledge. Within the context of developing an MMFS of plant pathogens, it is important that the influence of metaphysical relationships is appreciated and understood.

As with the previous literature piece, this text has informed and influenced environmental understanding and practice within Aotearoa over past decades. Likewise, despite the lack of direct reference to “mātauranga Māori”, all facets of the literature support the foundation and application of mātauranga Māori, particularly in relation to environmental management and protection. Marsden and Henare affirm the significance of kaupapa or first principles derived from myths and legends which place the relationship of Māori with Papatūānuku and the natural world as essential to maintaining natural order, in a respectful and reciprocal manner. Although the authors note the contrast with a Western view of the natural world, this project to develop an MMFS demonstrates the willingness and integrity of diverse stakeholder groups to create a collaboration based on the importance of kaupapa, or first principles.

All elements of Marsden & Henare’s paper offer valuable contributions to the development of an MMFS of plant pathogens, aspects for particular consideration include:

- The incorporation of a world view that considers different worlds (i.e. metaphysical and natural/physical; or cultural, economic, environmental and social) as part of an interrelated whole; the foundation for the holistic approach Māori have in relation to their environment
- The role of spiritual guardians and the need to undertake ritual acts of propitiation when undertaking activities within or related to the natural environment
- The recognition and use of whakapapa as a tool for conveying knowledge
- The use of rāhui to protect the natural environment and interrelated processes, acknowledging both the physical and metaphysical nature, and the importance of kawa in relation to rāhui
- The cautionary around knowledge possession – knowledge may not be fully understood by those without the wisdom (or tools) to comprehend it; this supports the need for care and respect within our collaborative engagement
- Fulfilling the authors’ hopes for developing bicultural blends “in order that all may benefit from the bounty that Mother Earth has so richly bestowed upon this nation” (Marsden & Henare 1992, p. 72).
- The importance of protecting and safeguarding sacred knowledge due to the fear such sacred lore may be misused (data protection and security).



### ***3.1.3 Building biocultural approaches into Aotearoa – New Zealand’s conservation future (Lyver et al. 2018)***

This examination undertaken by Lyver et al. offers examples of “Māori cultural constructs, mechanisms, legislative warrants and customary (traditional and contemporary) interventions fundamental to the development and delivery of biocultural approaches within NZ’s future conservation system” (p. 1). The authors recognise the importance of the indigenous contribution to conservation, that is, perspectives and knowledge which value the human-environment relationship. Further, the authors suggest the advantages of biocultural approaches include better environmental decision-making at the local level and supporting the re-building of a ‘tuakana-teina’ relationship between society and the environment. The author’s stated objective is “to explore how biocultural approaches in conservation better support the relationships tangata whenua have with their local environments, and contribute to reversing the decline of biodiversity” (p. 3). The study also examines “the roles of local institutions in delivering biocultural approaches, the importance of matching social and ecological scales, and how biocultural approaches could assist with a broader societal re-evaluation of the human-nature relationship” (p. 3).

A number of cultural constructs are presented by the authors as relevant to both the development and understanding of biocultural approaches. A total of 10 core concepts/constructs are identified, including ahikāroa, kaitiakitanga, mahinga kai, mana, manaakitanga, mauri, taonga tuku iho, tapu, wairua, and whakapapa (Table 3). The significant role of whakapapa in connecting people with their environment, both physical and meta-physical aspects, as well as conferring tangata whenua with mana over species and/or habitat is acknowledged. Notably, the concept of mauri is recognised as representing the relationships and responsibilities between physical and meta-physical aspects of the environment, including the quality or condition of those relationships. The authors state that mauri represents “the interconnectedness and appropriate sequential order of elements within whakapapa” (p. 6).

The authors propose the additional concepts of tūrangawaewae (in association with ahikāroa), mātauranga, whāngai mokopuna and te whakaora reo, as interweaving with core concepts and therefore also key within biocultural approaches. According to Lyver et al., these additional concepts are fundamental to the practices of manaakitanga (care and respect for others), matemateāone and mahi tahi (commitment to community caring and togetherness and working together, respectively), and to achieving oranga (wellbeing) and whānau ora (family wellness). The authors note that these practices (along with the aforementioned concepts) “are vital mechanisms for the practice and reinforcement of customary lore and processes, the transfer of knowledge, monitoring forest health and maintaining community interaction and resilience” (Lyver et al. 2018, p. 6). As such the authors advocate the “enhancement and protection” of these constructs as relevant components of biocultural approaches within (and for) conservation.

**Table 3.** “Examples of te ao Māori (Māori worldview) constructs that underpin biocultural approaches (revised from Norton et al. 2016; Lyver et al. 2017; Timoti et al. 2017)” (Lyver et al. 2018, p. 7).

Te ao Maori constructs	Definition
Ahikāroa	<i>Ahikāroa</i> translates as the maintenance of your long burning fires of occupation, which refers to the continuous undisturbed occupation of a place by a group over a long timeframe. The construct relates to a binding connection to place and ancestral homeland. Ahikāroa is fundamental to the implementation of local environmental governance institutions, and the right to make decisions locally. It is also integrally linked to the concept of <i>tūrangawaewae</i> which refers to having a place to stand on your ancestral homeland.
Kaitiakitanga	<i>Kaitiakitanga</i> relates to guardianship obligations and responsibilities that engage <i>kawa</i> (customs and protocols), <i>tikanga</i> (cultural correct procedures and practices) and <i>ture</i> (societal guidelines) for the purpose of protecting, restoring and using the environment. Kaitiakitanga relates to the exercise of authority and action over a particular place or environment in accordance with <i>kawa</i> , <i>tikanga</i> , and <i>ture</i> including tools like <i>rāhui</i> (temporary prohibitions).
Mahinga kai	<i>Mahinga kai</i> relates to the acquisition of traditional foods and places for sourcing food and resources, but importantly it links <i>tangata whenua</i> (original people of the land) to place, identity, <i>tūpuna</i> (ancestors), <i>whānau</i> (family), <i>mātauranga</i> (Māori traditional knowledge), <i>taonga</i> (e.g., biodiversity such as <i>titi</i> , <i>Puffinus griseus</i> and <i>Rakiura</i> ; <i>kererū</i> , <i>Hemiphaga novaezealandiae</i> and <i>Tūhoe</i> ), and expectations.
Mana	<i>Mana</i> is the authority and prestige that is derived from within <i>whakapapa</i> (genealogy – defined further below) and the relationships that exist through this sequential order. Mana can be assigned in varying degrees to a person, object or entity. Virtually every aspect of an activity has a link with the maintenance and enhancement of mana. The notion of mana can be inherited and provides a person with an unbroken link to their past, as well as connecting them to their future. It was also recognised that mana could be earned and acquired by an individual or grouping of people throughout the course of their lives.
Manaakitanga	<i>Manaakitanga</i> relates to the principle of reciprocity, respect, act of hosting, or looking after and respecting people. It includes concepts such <i>matematedone</i> (practice of camaraderie, bonding and staying connected within and between communities) and <i>mahi tahi</i> (working together as a community). The health of the environment influences the ability and capacity of whānau and communities to provide and offer manaakitanga.
Mauri	<i>Mauri</i> is the essential quality and vitality of a being or entity (life essence). Mauri describes the representativeness and condition of the relationships and responsibilities between elements of whakapapa. Mauri also denotes the interconnectedness and appropriate sequential order of elements within whakapapa.
Taonga tuku iho	<i>Taonga tuku iho</i> relates to cultural heritage and the intergenerational transfer of knowledge and practice. It includes concepts such as <i>kōrero tawhito</i> which relates to the history and memories of land and people including knowledge of land, dwellings of <i>taniwha</i> and <i>kaitiaki</i> (guardians), <i>waahi tapu</i> (sacred sites) including <i>urupā</i> (burial grounds), traditional harvesting sites, knowledge of people, transfer of land, stories held within the creation of natural world, cosmological concepts, and moral direction or guidance. <i>Mātauranga</i> and <i>māramatanga</i> refers to Māori knowledge and wisdom respectively, which together represent a unique Indigenous way of knowing and processing and interpreting information. <i>Te ahurea o te reo</i> refers to the ‘living’ of the Māori language, and the need for people to be engaged with a healthy and functional environment to grow and evolve the language. <i>Whakaheke kōrero</i> refers to the inter-generational transfer of knowledge and wisdom. <i>Whāngai mokopuna</i> is about the guidance of elders to the younger generations. Central to these themes is the ‘ <i>tuakana-teina</i> ’ relationship (a reciprocal learning relationship between older and younger persons) which emphasises the reciprocity between humans and nature.
Tapu	<i>Tapu</i> is something that is set apart, sacred, or forbidden with an untouchable quality. It can be described as having innate qualities drawing those from its origins within whakapapa. The designation of tapu places animate or inanimate objects under restriction, therefore often imbuing those objects with mana or a greater level of reverence. The function of tapu was to provide boundaries and protect the mana and mauri of a place, object, time, species, person or people. Tapu is a value that is pivotal for understanding and exercising wairua.
Wairua	<i>Wairua</i> is used to speak of the spiritual essence and characteristics pertaining to the spirit of an individual. It is the soul carried within a person which is released upon death. Wairua refers to the qualitative relationships that connect individuals to self, to others, to the environment, and to the past, present and future. It can be the way an individual seeks and expresses meaning and purpose.
Whakapapa	<i>Whakapapa</i> can be broadly interpreted as genealogy, however it relates more specifically to a sequential system that portrays the interconnectedness between all elements of the natural and super-natural realms. It refers to the tangible and intangible genealogical connections, relationships, and linkages between the natural environment and the cosmological domain. Whakapapa connects individuals with their <i>tūpuna</i> and defines their obligations to their environment.

Beyond development and understanding of biocultural approaches the authors point to further constructs that are important in the delivery of a biocultural conservation system. These include tino rangatiratanga and mana motuhake (self-determination, self-government), kaitiakitanga, tūrangawaewae, mātauranga, and whanaungatanga (inter-relationships arising from kinship rights and obligations). The authors note these constructs provide mechanisms for implementing biocultural approaches in a manner that connects communities (iwi, hapū and whānau), and assists multi-level institutional relationships, knowledge sharing and decision-making. According to Lyver et al. a biocultural conservation approach also supports a 'systems approach', emphasising the value of human agency, reciprocal relationships with nature, the linking of people to place, and working within a knowledge-practice-belief complex (Janzen 1988; Stephenson et al. 2014; Gadgil et al. 1993; Berkes et al. 2000; as cited in Lyver et al. 2018, p. 8). Thus, tribal representatives (elders, kaitiaki, tangata tiaki/local guardians) "draw their mandate and directionality from their presence on the land and relationship with the environment" (p. 8).

Responsibilities of tangata tiaki could include identifying biocultural priorities for their region based on community constructs; the protection and restoration of flora and fauna; the monitoring and reporting of regional abundance and the state of local ecosystems; elucidating customary management interventions; delivering solutions and tools for management action; engaging the community; and supporting mechanisms for learning and the inter-generational transfer of knowledge. (Lyver et al. 2018, p. 8).

The authors note that a biocultural conservation approach would affirm the use of kaitiakitanga-based interventions as responses or solutions to environmental issues.

Within the kaitiakitanga system, the influence of kawa, tikanga and ture (societal guidelines) range from: (i) preparing the individual mentally, physically and spiritually for interaction with the land, fauna and flora; (ii) to the customary mechanisms for conservation (e.g. tapu; rāhui – temporary closure and prohibitions; taiāpure – coastal water space of special significance to tangata whenua; muru – social deterrent; mātaītai – customary fishing reserves which exclude commercial fishing); and (iii) to specific behaviours. (Lyver et al. 2018, p. 10).

Within delivery of the biocultural approach, the authors stress the importance of governance arrangements that support engagement of local institutions and indigenous peoples in biodiversity and land management, stating that these institutions "are fundamental to providing the context for which Indigenous worldview representations, values and knowledge systems can be conveyed and interpreted as they relate to the local community and environment" (p. 10). The authors further note the capacity of local institutions to assist "social learning relating to the perception of environmental change; the formulation, education and delivery of interventions and responses to that change; the use of both customary and science-based tools and methodologies, and the equitable sharing of benefits" (Gavin et al. 2015; as cited in Lyver et al. 2018, p. 11). However, the authors state that "effective enactment of biocultural approaches and benefit-sharing" relies on the conferring of authority and resources in the wider community, "not just in community leaders and

executives.” Accordingly, Lyver et al. emphasise the need for collaborations “that deliver place-based collective action, considered decision-making, outcomes for communities, and equitable benefit-sharing” (p. 12).

As part of biocultural approaches to conservation the authors advocate a re-evaluation of the human-nature relationship. The authors note the strong interrelationships that exist between indigenous cultures and the natural environment, “with elements of the environment deeply ingrained within value-belief systems, identities and cultural expressions such as customs and protocols, stories, songs, dreaming, and association with place” (Berkes 2012; Gould et al. 2014; Pert et al. 2015; Walsh et al. 2013; Timoti et al. 2017; as cited in Lyver et al. 2018, p. 12). The concept of reciprocity between humans and nature is recognised as fundamental to indigenous beliefs and approaches (Caillon et al. 2017; as cited in Lyver et al. 2018, p.12). As noted by the authors, reciprocity is manifest within Māoridom and is evidenced in the concept of ‘tuakana-teina’. This concept commonly refers to the reciprocal learning relationship between older and younger persons, however ‘tuakana-teina’ also denotes the interconnection between humans and nature – a reciprocal and respectful relationship whereby nature exists as the elder entity. The contribution of holistic indigenous philosophies is acknowledged as becoming increasingly significant in informing the way communities view themselves within the landscape, including their perceptions of the human-nature relationship (Folke et al. 2011; Diaz et al. 2018; as cited in Lyver et al. 2018).

Contrary to the indigenous-centred human-nature relationship, Lyver et al. note the adverse impacts to biocultural approaches posed by the conservation paradox. As identified by the authors, biodiversity decline and ecosystem degradation challenges the capacity of communities to uphold and advance their biocultural approaches. The authors note the exclusion of indigenous peoples from their landscapes and associated flora and fauna due to protectionist land classifications and conservation policies to address biodiversity decline. In addition, the movement of people from their traditional lands to urban centres further affects the strength of the human-nature relationship within indigenous communities. According to Lyver et al., these factors may damage both cultural and biological diversity beyond repair, with separation from their environment posing significant socio-ecological risk to indigenous peoples (through the loss of identity and knowledge), as well as having negative consequence to mainstream conservation objectives. The authors therefore advocate that “a new biocultural-centred space offers an opportunity for greater solidarity, common ground and greater cooperation between indigenous peoples, state governments, and the wider stakeholder groups and institutions” (Lyver et al. 2018, p. 13).

In achieving a biocultural-centred space the authors also reflect upon the need to match appropriate ecological and social scales, noting potential issues where incongruence exists “between the scale of management and the scale(s) of the ecological processes being managed” (Cumming et al. 2006; as cited in Lyver et al. 2018, p. 13). The authors point to problems for indigenous peoples when attempting to apply interventions in environments where influencing biophysical and anthropogenic factors are beyond their control, citing an example of the NZ lamprey, whereby land conversion and hydro-electric dams considerably impact spawning sites and migration routes. Lyver et al. therefore note the importance of

recognising these issues to ensure biocultural outcomes are realised. Additionally, the authors emphasise that the mismatch of scales may undermine local activities, particularly where power asymmetries exist to the detriment of indigenous peoples/local community. A biocultural approach is anticipated to include “actions, interventions and responses delivered at spatial (e.g. local, national, or international) and time (e.g. seasonal, annual, inter-generational) scales at which the objective requires, or the problem arises” (p. 13).

The authors also convey the value of societal awareness of biocultural approaches.

While Māori have a constitutional right guaranteed under the Treaty of Waitangi to apply their kaitiakitanga, it is important that wider society observe and have confidence that tangata whenua are monitoring the state of the environment and operating in a sustainable way. This will remove the basis for sections of society that may criticise or make uninformed judgements about the kaitiakitanga interventions of tangata whenua. (Lyver et al. 2018 p. 13).

In order to foster public support and understanding for biocultural approaches it is therefore necessary for participants to engage with the general public, keeping them informed of activities and efforts at the local (or applicable) level.

The authors conclude:

Biocultural approaches encourage the revaluation of our relationship with the environment; reanimate our materialistic perspective of the natural world; and reassess methods for responding to its pressures (Tyler 1993). It can also help to resolve power imbalances between governments and Indigenous peoples, provide more beneficial ways of interacting with the environment, rebuild society’s relationship with the natural world, and work towards reversing declines in biological and cultural diversity. (Lyver et al. 2018, p. 14).

### ***Summary comments***

This study by Lyver et al. wholly supports the basis and work being undertaken in the development of an MMFS of plant pathogens, that is, a biocultural approach which values and promotes the human-environment relationship in a way that differs from general conservation attitudes and practices. The focus on the re-building of a tuakana-teina relationship and the role of institutions in delivering biocultural approaches also encompass significant elements of the work to develop an MMFS. Additionally, core constructs (and associated constructs) identified by the authors affirm specific concepts expected to underpin an MMFS of plant pathogens.

The authors advocate the ability of biocultural approaches to conservation as also supporting a ‘systems approach’ which appreciates the value of human agency, reciprocity with nature, connecting people with place and working within a ‘knowledge-practice-belief’ complex. It is anticipated that an MMFS of plant pathogens will not only act as a surveillance/detection model, but may also deliver a platform that is analogous with such a systems approach.

However, as emphasised by Lyver et al., it is important that governance and institutional arrangements support the active engagement of indigenous peoples and local community in the successful delivery of biocultural approaches, including the conferring of authority and resources in the wider community. As noted by Lyver et al., there is a need for collaborations “that deliver place-based collective action, considered decision-making, outcomes for communities, and equitable benefit-sharing.”

Points from this literature of particular relevance to an MMFS of plant pathogens include:

- The identification of core constructs/concepts that provide a foundational base, as well as the opportunity to interweave concepts which assist in informing and guiding successful implementation
- The importance of re-evaluating the human-nature relationship, particularly the emphasis on reciprocal relationships within the concept of tuakana-teina
- The need to ensure ecological and social scales are appropriately matched and thus avoiding incongruence “between the scale of management and the scale(s) of the ecological processes being managed”
- Acknowledging and allowing for adverse impacts (past and potential) posed by the conservation paradox (i.e. exclusion of indigenous peoples from their landscapes affecting the strength of the human-nature relationship)

### **3.2 Specific mātauranga Māori models or frameworks for environmental management**

Literature is reviewed in chronological order and includes, 'A Tangata Whenua Perspective on Sustainability using the Mauri Model, Towards decision making balance with regard to our social, economic, environmental and cultural well-being' by Morgan (2004); 'A Cultural Health Index for Streams and Waterways: A tool for nationwide use' by Tipa & Tierney (2006); 'Indigenous Māori knowledge and perspectives of ecosystems' by Harmsworth & Awatere (2013); and 'An indigenous community-based monitoring system for assessing forest health in New Zealand' by Lyver et al. (2017).

#### ***3.2.1 A Tangata Whenua Perspective on Sustainability using the Mauri Model, Towards decision making balance with regard to our social, economic, environmental and cultural well-being (Morgan 2004)***

In this paper the author offers an in-depth description of the concept of mauri and illustrates how mauri underpins the 'Mauri Model', a decision-making tool that promotes sustainable and holistic resource management practice. Morgan applies the Mauri Model to contemporary examples of stormwater and wastewater management issues, particularly in regard to engineering options or solutions. The author uses Waiariki (the Rotorua Lakes) to illustrate the beliefs and practices of the tangata whenua of Te Arawa in relation to their environment. Morgan states that "the loss and erosion of indigenous knowledge through lack of use or relevance, and the isolation from its origins in the physical environment is a huge threat to the cultural identity of hapū" (p.2).

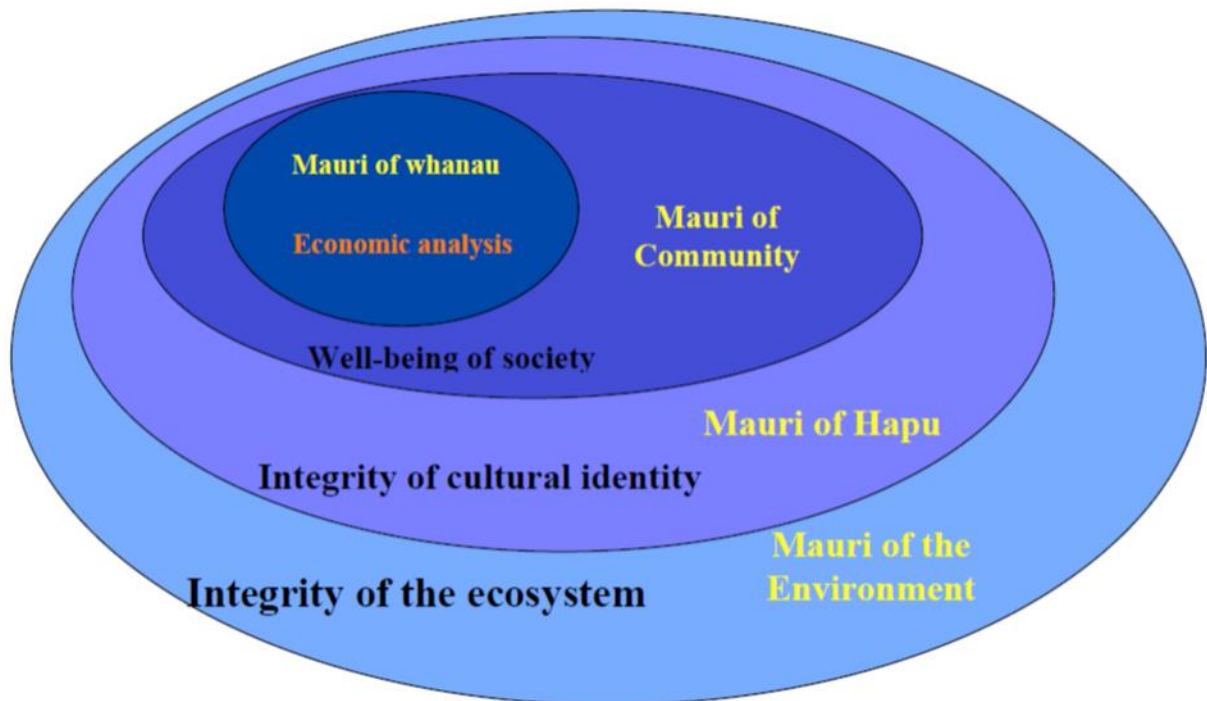
The concept of mauri is central to Tangata Whenua belief regarding the environment. Mauri is the binding force between the physical and the spiritual aspects. When the mauri is totally extinguished, this is associated with death. Mauri is the essence that has been passed from Ranginui (Sky father) and Papatuanuku (Earth mother) to their progeny Tane mahuta (deity of the forests), Tangaroa (deity of the oceans) ma (and others), and down to all living things through whakapapa (genealogy) in the Maori notion of creation. Mauri is considered to be the essence or life force that provides life to all living things. Water also has mauri. The concept is central also in the context that whaikorero (speech making) is often begun with the phrase Tihei Mauri Ora. This is literally interpreted as the 'sneeze of life'. (Morgan 2004, p.5)

Morgan recognises the importance of mauri with regards to whakapapa, acknowledging that the inter-relatedness of all living things is founded upon mauri: "The linkages between all living things within the ecosystem are based on the whakapapa or genealogies of creation. This established the basis for the holistic view of the environment and our ecosystem held by the Tangata Whenua" (p.5).

The author notes the concept of mauri was included in the Resource Management Bill, though did not advance through to legislation due to the belief that the New Zealand legal system was unable to deal with the concept at that time. As stated by Morgan, *The mauri of*

*ecosystems* included in the Resource Management Bill was replaced with *Intrinsic values of ecosystems* (Part II Section 7 (d)) in the Resource Management Act 1991.

The Mauri Model is based on four criteria – social, economic, environmental and cultural wellbeing, and provides a sustainability measure using the concept of mauri. The four criteria are signified by four circles that define the impacts on the mauri of the whānau (economic), the community (social), the hapū (cultural), and the ecosystem (environment); the four circles represent the interactive nature and elements of the ecosystem.



**Figure 1.** Diagrammatic representation of the Mauri Model (Morgan 2004, p.7)

Users of the Mauri Model are able to select and assign a weighting to each element before allocating scores. Tangata Whenua appraisal using the model focuses on whether the identified option is viewed as enhancing, diminishing, or neutral for the mauri of the element or aspect being considered. Within the model each aspect is rated from 4 (being the highest rating) to 0 (the lowest rating). An assigned rating of 4 indicates a viable practice that is viewed as mauri enhancing and thus sustainable, whereas a rating of 0 indicates the practice is significantly diminishing to mauri and thus unsustainable; a rating of 2 is considered neutral.

Morgan notes that “as mauri is a measure of the life force in a particular living thing, then how the mauri is effected is a direct indication of the long-term viability and hence sustainability of a particular option from the Tangata Whenua perspective” (p.6). Morgan therefore advocates the Mauri Model as a model “that places the juxtaposed paradigms of municipal engineering and Tangata Whenua on a level playing field, and allows identification of the issues that are most contentious” as well as identifying “the issues upon which the two



paradigms are in agreement” (p.4). The author notes that resource management policy and engineering design solutions may be consistent, however, options are heavily influenced by a practitioner background. Morgan advocates for a model that can identify and explain the different priorities (in this case planning and engineering) that have been developed by practitioners with a dissimilar cultural background to the Tangata Whenua. The author promotes the use of the Mauri Model as a tool to realise the potential contribution of Tangata Whenua and to deliver balanced solutions in terms of social, economic, environmental and cultural wellbeing.

### ***Summary comments***

The Mauri Model comprises aspects which make it quite distinct from an MMFS of plant pathogens, not least of which is the model’s use and status as a broad measure of sustainability. Additionally, the Mauri Model has generally been applied in the area of water management decision-making, particularly when assessing technologically viable solutions from the perspective of cultural acceptability. Though there are discrete differences with the Mauri Model in the context of a framework for surveillance of plant pathogens, foundational and other aspects are appropriate for consideration within the development of the MMFS. These aspects include a model that:

- Is based on the concept of mauri and reflects the importance of whakapapa connections
- Is holistic and incorporates criteria important for sustainability, in a manner that demonstrates the interactive nature of the ecosystem (and society)
- Can be represented diagrammatically in a visually appealing way, so is therefore easily comprehended by tangata whenua and the wider community
- Allows for the expression of mana whenua values within a framework that is widely accepted as valid

### **3.2.2 A Cultural Health Index for Streams and Waterways: A tool for nationwide use (Tipa & Tierney 2006)**

The Cultural Health Index (CHI) for Streams and Waterways was developed in 2006 by Tipa & Tierney as a way of enabling iwi to assess the health of waterways within their rohe. The CHI is an applied model that prioritises the values and beliefs of iwi, whilst also facilitating important communication and working relationships with water managers. The Index was initially developed from stream health evaluations undertaken by assessment teams on the Taieri and Kakaunui Rivers (Tipa 1999), and was further refined on the Hakatere and Tukituki Rivers (Tipa & Tierney 2006). The authors note a high level of agreement existed between the four assessment teams, leading to the development of the CHI as a generic index tool. According to Tipa & Tierney “this generic CHI can be used confidently by any iwi at sites on streams of any size or river type” (p.1).

The CHI is comprised of three sections – site status, mahinga kai, and cultural stream health. Site status identifies the significance of the site to tangata whenua, both from a traditional perspective and within a contemporary context. The Mahinga kai and Cultural stream health sections both utilise a scoring system, this system ranges from 1 – 5 and reflects health ranging from a score of 1 for ‘poor health’, through to a score of 5 for ‘very healthy’.

Mahinga kai assessments are based on the number of mahinga kai species present at the site; the number of species of traditional importance that are still present; whether the site and resources of the site are accessible to tangata whenua; and whether tangata whenua would return to the site in the future. The authors state that “examining the health of mahinga kai recognises that mauri is tangibly represented by the physical characteristics of a freshwater resource, including the indigenous flora and fauna, the fitness for cultural usage and its productive capacity” (p.1).

Cultural stream health is assessed using eight indicators, including water quality, water clarity, flow and habitat variety, catchment land use, riparian vegetation, riverbed condition/sediment, use of riparian margin and channel modification. Tipa & Tierney state that these indicators allow objective and accurate reflections of tangata whenua evaluations of overall stream health (p.2). The three section components (site status, mahinga kai, and cultural stream health) are then brought together to provide an overall CHI score.

Applying the CHI involves an assessment team comprising mana whenua representation (iwi, hapū or rūnanga) completing a visual inspection of the selected stream site. As highlighted by the authors, the CHI can be used for a number of purposes, including identification and prioritisation of stream health problems; assessing remedial actions for restoring or enhancing stream health; and monitoring of stream sites or whole of catchment monitoring. The authors note the capacity for the CHI to provide water managers (and others) with an understanding of Māori perspectives and values in relation to stream and river health, allowing these perspectives to then be incorporated into decision making. The values recognised within the CHI are listed below, including how each value may be responded to by tangata whenua when using the tool.

**Whakapapa:** the Cultural Health Index uses traditional knowledge (without disclosing it) and recognises interactions between, and the significance of, different parts of an ecosystem (e.g. relationship between physical characteristics and the mahinga kai species present, or between individual physical characteristics of a waterbody such as water flow, water quality catchment and riparian condition).

**Mauri:** the three components of the Cultural Health Index collectively represent a means by which Māori will measure the present health of the river in a holistic manner, thus enabling them to assess the extent to which contemporary resource management protects the mauri of the resource.

**Wahi tapu and wahi taonga:** sites that are assessed will be chosen by those individuals mandated as kaitiaki because the sites are significant due to their tapu or taonga status.

**Rangatiratanga:** application of the Cultural Health Index by tangata whenua and use of the data collected formally recognises the rights of iwi to land, water and other natural resources within their tribal areas – including rights to access, use and manage resources.

**Mahinga kai:** the mahinga kai measure reflects the need to protect the diversity and abundance of species necessary for the cultural well-being of tangata whenua as well as the need to safeguard the ability of tangata whenua to gather and use these resources, thus enabling the transference of cultural values and practices between generations.

**Taonga:** the three components of the Cultural Health Index collectively recognise the intrinsic and the amenity values of resources and the fundamental management principle – protection of the mauri of taonga.

**Kaitiaki:** when applying the Cultural Health Index, Māori will be fulfilling their intergenerational responsibilities to protect taonga for future generations.

**Tikanga Māori:** the three components of the Cultural Health Index comprise indicators that Māori have confirmed are those used by Māori to monitor the state of freshwater resources. (Tipa et al. 2002; as cited in Tipa & Tierney 2006, p.20).

In developing the CHI the author's intention was "to develop an evaluative tool that was grounded in the beliefs and values of Māori" (p.20, para 1). However, the authors note particular issues around the inclusion of Māori values within the CHI. These included whether resource management agencies will recognise and appreciate Māori values in a manner consistent with the weighting given to scientific values; how a Māori perspective on freshwater management will be acknowledged by said agencies; whether the value of Māori intergenerational knowledge to resource management will be recognised appropriately; and whether use of the tool will actually result in favourable environmental outcomes.

As stated by the authors "collaborative management is seen by Māori as a means of recognising *different* perspectives and benefiting from the *complementarity* of different value

systems” (p.22). According to Tipa & Tierney the CHI offers a “potentially powerful diagnostic tool which can assist in the prioritisation of remedial actions once issues of concern to iwi are identified” (p.26). Applying the CHI through field assessments provides data which allows these issues of concern to be identified.

In conclusion the authors state that:

The index allows whānau/hapū/iwi to monitor the health of a stream or catchment of their choosing. Guidelines have been prepared that outline how to identify which areas need monitoring, how to set the programme up and how to collect data and analyse it so that changes are identified and remedial actions can be taken to restore or enhance the site. The CHI can also be used to monitor changes after restorative work has been carried out on a site. (Tipa & Tierney 2006, p.26).

### ***Summary comments***

The Cultural Health Index for Streams and Waterways provides tangata whenua with a useful tool when engaging in freshwater management issues and decision making. The Index is grounded in Māori beliefs and values and can be applied generically, in terms of tangata whenua use (ie. across different iwi/hapū) as well as for use in different freshwater environments. Despite this generic application, as a diagnostic tool the CHI still allows for iwi/hapū specificity, thereby providing mana whenua with a mechanism that identifies cultural and environmental aspects of importance to their individual hapū/iwi. For resource management agencies, the tool assists in providing clear and concise assessments that reflect not only a tangata whenua perspective, but more importantly a mana whenua perspective. This avoids the universal approach which perceives Māori/tangata whenua as a collective group with parallel views and aspirations. Whilst this universal perspective may be applied to a Māori worldview and associated values, it does not acknowledge the plurality and diversity of hapū throughout Aotearoa.

As with the Mauri Model developed by Morgan (2004), the CHI for Streams and Waterways is not directly applicable within the context of an MMFS of plant pathogens. The Index provides a broad and useful tool for assessment, monitoring and management of freshwater. Conversely, the development of a framework for surveillance for plant pathogens will require more specific elements in order to address pathogen detection/surveillance. As suggested with the Mauri Model, there are however underpinning aspects of the CHI tool that are suitable for consideration and insertion within an MMFS. These aspects include a tool/model that:

- Is based on Māori beliefs and values, specifically values of whakapapa, mauri, wāhi tapu and wāhi taonga, rangatiratanga, mahinga kai, taonga, kaitiaki, tikanga Māori
- Includes necessary scientific parameters for assessment; parameters are incorporated in a complementary manner, ensuring cultural elements maintain integrity

- Provides an effective tool for the expression of mana whenua values in natural resource management and decision making, assisting in communication of these values to non-Māori participants/agencies
- Is appropriate for varied application, including as an initial assessment tool; for ongoing monitoring; and/or for monitoring and assessment following restorative action
- Is a generic tool that is easily applied to different sites, and is easily adapted to reflect different priorities of various hapū/iwi

### **3.2.3 Indigenous Māori knowledge and perspectives of ecosystems (Harmsworth & Awatere 2013)**

Indigenous Māori have an intricate, holistic and interconnected relationship with the natural world and its resources, with a rich knowledge base – mātauranga Māori – developed over thousands of years and dating back to life in Polynesia and trans-Pacific migrations. This ancestral traditional bond links indigenous Māori to ecosystems and governs how they see and understand ecosystems and ecosystem services. There is no single Māori word or translation for ecosystem or ecosystem services, but mātauranga Māori (Māori knowledge), te reo Māori (Māori language) and whakapapa (ancestral lineage) are used together to unlock the indigenous perspective and understand what an ecosystem is, and its components and functional units. (Harmsworth & Awatere 2013, p.274).

In this paper Harmsworth & Awatere offer a comprehensive analysis of the Māori world view and associated values and perspectives that inform Māori relationships with the environment. The authors highlight the interdependent relationships that exist between Māori well-being and ecosystems and ecosystem services, and note the similarities between the holistic nature of Māori thinking with interdisciplinary mainstream science and other contemporary disciplines such as sustainability and ecological economics. A complementary Māori-based model is presented that differentiates ‘cultural values’ from ‘cultural services’, and applies cultural values across the entire ecosystem services framework. The following review of Harmsworth & Awatere focusses upon parts of the literature considered specifically relevant to the development of an MMFS of plant pathogens, and therefore does not review aspects related to general Māori aspirations or the Māori Economy.

Māori creation beliefs and whakapapa relationships with earth and sky (Papatūānuku and Ranginui) place significant responsibility and obligation upon Māori to sustain and maintain community well-being, environmental as well as human. According to Harmsworth & Awatere, this context provides Māori with an understanding of ecosystems and ecosystem services, and of scientific and ecological terms, concepts and knowledge forms. The authors note the important role of Māori language and oral tradition in the realisation of this understanding (Wehi et al. 2009; as cited in Harmsworth & Awatere 2013), stating that for Māori “an understanding of ecosystems begins with Māori language translation and whakapapa” (p.275).

As is widely recognised, Harmsworth & Awatere refer to mātauranga Māori as the basis for the Māori world view and as encompassing all aspects of knowledge. The authors refer to traditional and contemporary explanations of mātauranga Māori, citing Marsden’s definition of mātauranga Māori in a traditional context as “the knowledge, comprehension or understanding of everything visible or invisible that exists across the universe” (1988; as cited in Harmsworth & Awatere 2013), and also acknowledging the more recent growth of mātauranga Māori to incorporate multiple elements of indigenous knowledge (historical and contemporary knowledge, perspectives and approaches) that are complementary to scientific knowledge (p.275). Mātauranga Māori provides the foundation for traditional Māori beliefs, from which Māori values are derived (Henare 1988, 2001; Marsden 1988; Marsden & Henare

1992; Barlow 1993; Harmsworth 1997; Mead 2003; as cited in Harmsworth & Awatere 2013, p. 275). Thus, the significance of Māori values in fulfilling responsibilities and relationships Māori have with their environment and in influencing decision making is highlighted. According to Harmsworth & Awatere:

Māori values can therefore be translated into, and provide a basis for, what is valued, (e.g. a geographic reference or spatio-temporal context of that value), and the information required to establish what is significant and how to prioritise values (i.e. among natural resources, soils, significant cultural sites, significant biodiversity habitats and species, iconic cultural plant and animal species). (Harmsworth & Awatere 2013, p. 275)

Within the paper the authors identify important Māori values to include:

tikanga (customary practice, values, protocols); whakapapa (ancestral lineage, genealogical connections, relationships, links to ecosystems); tino rangatiratanga (self-determination); mana whenua (authority over land and resources); whānaungatanga (family connections); kaitiakitanga (environmental guardianship); manaakitanga (acts of giving and caring for); whakakotahitanga (consensus, respect for individual differences and participatory inclusion for decision-making); arohatanga (the notion of care, respect, love, compassion); wairuatanga (a spiritual dimension). (Harmsworth & Awatere 2013, p. 275).

From these underpinning values, Harmsworth & Awatere list key environmental concepts which they suggest form the foundation for Māori views in relation to assessing and understanding ecosystems. These key concepts (with associated explanations) are shown below:

**Whakapapa** – connection, lineage, or genealogy between humans and ecosystems and all flora and fauna. Māori seek to understand the total environment or whole system and its connections through whakapapa, not just a part of these systems, and their perspective today is holistic and integrated

**Kaitiakitanga** – stewardship or guardianship of the environment, an active rather than passive relationship (Marsden and Henare 1992; Roberts et al. 1995)

**Mana** – having authority or control over the management of natural resources

**Ki uta ki tai** – a whole-of-landscape approach, understanding and managing interconnected resources and ecosystems from the mountains to the sea (the Māori concept of integrated catchment management)

**Taonga tuku iho** – intergenerational protection of highly valued taonga, passed on from one generation to the next, in a caring and respectful manner

**Te Ao Turoa** – intergenerational concept of resource sustainability

**Mauri** – an internal energy or life force derived from whakapapa, an essential essence or element sustaining all forms of life. Mauri provides life and energy to all living

things, and is the binding force that links the physical to the spiritual worlds (e.g. wairua). It denotes a health and spirit, which permeates through all living and non-living things. All plants, animals, water and soil possess mauri. Damage or contamination to the environment is therefore damage to or loss of mauri

**Ritenga** – the area of customs, protocols and laws that regulate actions and behaviour related to the physical environment and people. Ritenga includes concepts such as tapu, rahui, and noa, which were practical rules to sustain the well-being of people, communities and natural resources. Everything was balanced between regulated and de-regulated states, where tapu was sacred, rahui was restricted, and noa was relaxed or unrestricted access

**Wairua, Wairuatanga** – the spiritual dimension, a spiritual energy and dimension as a concept for Māori well-being (Harmsworth & Awatere 2013, p. 275-276).

Harmsworth & Awatere draw comparisons between Māori perspectives of ecosystems and the definition of an ecosystem as an interactive and functional unit (comprising living communities and the non-living environment), as well as the view ‘that people are integral parts of ecosystems’ (supported by the Millennium Ecosystem Assessment). As noted by the authors, Māori consider themselves “part of ecosystems rather than separated from ecosystems” (p. 276). This is displayed in the notions of manaaki whenua – caring for the land, and manaaki tangata – caring for people, concepts which further demonstrate the interdependent and reciprocal relationships Māori maintain with their environment.

The authors also emphasise the concepts of Te Ao Mārama, Te Ao Tūroa and taonga tuku iho as central to a Māori view of ecosystems. Te Ao Mārama originates from Māori creation whakapapa and refers to the world of light and life. Harmsworth & Awatere state that Te Ao Mārama “explains the range of life forms that exist, connected through whakapapa – plants, animals, birds, fish, microorganisms, the genes they contain, and the ecosystems they form.” Along with Te Ao Tūroa and taonga tuku iho, the authors suggest these terms “convey knowledge about existence itself and reiterate the interconnection between human beings and the environment” (p. 276). Furthermore, the role of traditional knowledge and the concepts of whakapapa, mana and kaitiakitanga, as well as the spiritual elements of tapu, mauri and wairua, in understanding ecosystems and ecosystem services is noted.

The concepts discussed in this paper are fundamental to informing a Māori view of ecosystems. Expectedly, the authors suggest that in order to gain an appreciation of Māori (iwi/hapū) perspectives of ecosystems it is important to have an understanding of the Māori worldview and Māori concepts. From within this worldview a platform exists for the development of Māori conceptual models related to ecosystems and the environment. The authors accordingly examine three such models that are based on a combination of mātauranga Māori, traditional concepts, and scientific knowledge, providing Māori with assessment and monitoring tools that reflect their values and perspectives through recording changes in the environment/ecosystems. These models include the Cultural Health Index (for Streams and Waterways), Māori wetland indicators and the Mauri Assessment model. Harmsworth & Awatere note that the Cultural Health Index is accepted and applied by many



Māori groups; Māori wetland indicators offer an important approach that supports wetland restoration and ecosystem enhancement; and the Mauri Assessment model provides a useful framework for assessments that link ecosystems with human well-being (p. 276). As well as ecosystem and environment focussed models the authors examine Māori models of well-being focussed upon human health (Whare Tapa Wha, Te Wheke and Ngā Pou Mana). Such models are also based on Māori traditional knowledge and understandings and correspondingly demonstrate the relationship between Māori well-being and the natural environment.

The authors progress to ecosystem services and state that “an assessment of ecosystem services provides the connection between environmental issues and people” (p. 281), and highlight differing opinion on whether ecosystem services are determined as benefits or as values. The authors offer the view of Chan, who notes that:

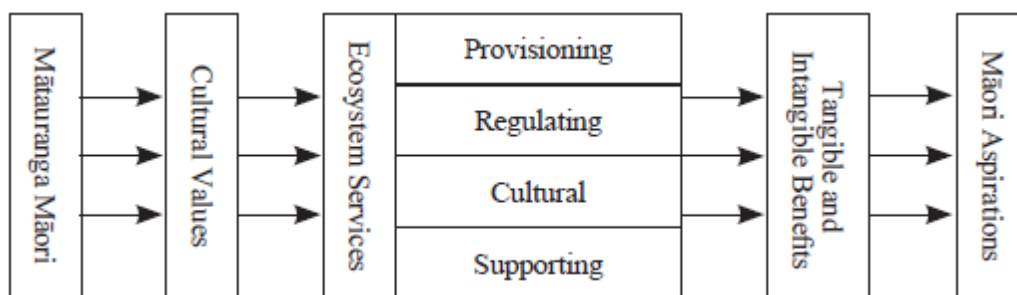
“services are the production of benefits (where benefits can take the form of activities), which are of value to people and accordingly (p. 9) defined ‘cultural services’ inclusively as ‘ecosystems’ contributions to the non-material benefits (e.g. capabilities and experiences that arise from human-ecosystem relationships).” (2012b; as cited in Harmsworth & Awatere 2013, p. 281)

According to Harmsworth & Awatere, Māori would consider that values link to both direct and indirect benefits, with some values linking directly to cultural services. The authors note the significance of reciprocity or tau utu utu, particularly in relation to the nature of kaitiakitanga – whereby humans caring for the environment/ecosystems results in reciprocated benefits to humans. However, as suggested by Chan et al., the ongoing emphasis on an economic worldview may have excluded other social perspectives, particularly where “values do not fit naturally into the ES approach” (2012b; as cited in Harmsworth & Awatere 2013, p. 281-282). The authors note the view of Dymond et al., that a broader world view of values and ecosystems would allow progression to a more unified and integrated framework for future ecosystem management (2012; as cited in Harmsworth & Awatere 2013, p.282), and suggest a more encompassing view is compatible with the Māori world view of humans and ecosystems interconnected through whakapapa.

The authors emphasise that a Māori framework for ecosystem services would recognise ‘cultural values’ to include both material and non-material values (for example customary or spiritual values). According to Harmsworth & Awatere, this would provide a framework that appropriately categorises all values associated with the multidimensional goals and aspirations of iwi and hapū. The authors note that “multiple dimensions together connect economic, social, environmental, cultural, and political aspirations and goals, provide for and strengthen human well-being, and produce an indigenous planning base, alongside mainstream Western perspectives and knowledge” (p. 282).

Hence the authors advocate the sharing of resource management responsibilities between government and iwi/hapū, and support a mixed-methods approach which locates ecosystem services within a framework that utilises a range of tools, based equally on mātauranga Māori and Western knowledge. The model proposed by the authors (Figure 2) positions cultural

values as an integral component underpinning all ecosystem services, ensuring cultural values are not considered as only intangible (or non-use) values. Moreover, the authors suggest that rather than categorising intangible values as ‘non-use’, Māori would prefer such values were defined as “non-monetary” (versus monetary). This is evidenced through the inclusion of ‘cultural services’ within the ecosystem services component of the model with ‘cultural services’ indicating a significant category that is predominantly based on “‘non-material’ ‘less tangible’ values” (p. 284). In conclusion, the authors state that “Māori wish to use these ecosystem approaches and frameworks to increase participation and inclusion in decision-making, and to achieve multidimensional aspirational goals and desired indigenous outcomes” (p.284). The model proposed by Harmsworth & Awatere is shown below.



**Figure 2.** A Māori Ecosystem Services Framework (Harmsworth & Awatere 2013, p.284)

### **Summary comments**

Within this literature a comprehensive analysis of the Māori worldview and its underpinning values in relation to ecosystems management is presented. Mātauranga Māori and associated cultural values provide the platform for the proposed Māori Ecosystem Services Framework, thereby demonstrating the important role of Māori knowledge and beliefs in the management of ecosystem health and well-being. As with the previous models reviewed (Mauri Model; Cultural Health Index for Streams and Waterways), Harmsworth & Awatere’s Māori Ecosystem Services Framework offers a broad-based framework that may be applied generically, with specific tailoring to suit the needs of respective iwi/hapū users. Similarly, the framework also assists resource management agencies and non-Māori groups by offering a planning and decision-making tool that reflects Māori perspectives and values.

Although the Māori Ecosystem Services Framework has a much broader focus than that required for a surveillance tool/framework for plant pathogens, the mātauranga Māori foundation of the Māori Ecosystem Services Framework strongly aligns with the proposed MMFS of plant pathogens. Likewise, with previously reviewed models, the development of a framework for surveillance of plant pathogens will require more specific elements to address pathogen detection/surveillance. However, complementary features include a model/framework that:

- Is underpinned by mātauranga Māori and Māori cultural values and recognises important whakapapa relationships and the link between human and environmental health and well-being
- Is developed and applied in a manner that acknowledges complementarities and alignments between science and mātauranga Māori
- Provides a mechanism for tangata whenua to identify 'what' is valued and 'how' it is valued, in order to fulfil iwi/hapū aspirations
- Offers a broad scope suitable for use beyond detection/surveillance of plant pathogens

### ***3.2.4 An indigenous community-based monitoring system for assessing forest health in New Zealand (Lyver et al. 2017)***

This study undertaken by Lyver et al. sought to “develop a Māori community-based monitoring system that primarily tracks the health of a forest ecosystem but also community well-being” (p. 3). In working with the Tūhoe Tuawhenua community of Ruatāhuna, in the Te Urewera region of the North Island, the authors identified community-based indicators and metrics used by the community to monitor both forest health and community well-being. A total of nine culturally relevant themes were determined, with indicators and metrics for assessing each indicator aligned to an identified theme. Within the themes, indicators and metrics were aligned with field survey and interview-based monitoring approaches. The authors deemed the use of a field-based approach as an appropriate method for assessing and understanding forest health where regular forest use has declined over time, though an interview-based approach was more suitable when attempting to evaluate forest indicators over extended timeframes (months, seasons or years) or when evaluating indicators associated with community well-being. The authors noted that “the alignment of some community-based indicators with scientific-based measures would enrich and deepen knowledge about the state of biodiversity, broaden the relevance of monitoring and reporting within indigenous communities, and help to mitigate issues of shifting baselines” (Lyver et al. 2017, p. 2).

As highlighted by Lyver et al., biodiversity monitoring using indigenous or cultural-based indicators affords local communities the opportunity to participate in biodiversity protection and restoration efforts. The use of such indicators can also help to identify and understand environmental conditions, changes, and trajectories, and may assist in identifying causal relationships (Tengo et al. 2014; as cited in Lyver et al. 2017). However, the authors noted the differences that exist between survey approaches and indicators of relevance to Māori communities, as opposed to scientific monitoring systems. Community-based indicators are therefore important in creating opportunities for communities to undertake environmental monitoring in a manner that they understand and is applicable to them.

In developing the community-based monitoring system for forest health the authors carried out a series of in-depth interviews with forest users over a 10-year period (2004 – 2014). The process consisted of three rounds of interviews, each with a specific focus – mātauranga o te kereru (a cultural keystone species); mātauranga o te Tuawhenua (traditional knowledge of the Tuawhenua); and mātauranga o te taiao (traditional knowledge of the natural environment). Information collected from the interviews provided insight in to how the community interacted with the forest environment, as well as how the community interpreted and quantified landscape and biological changes and trends. The authors used this information to identify community indicators, along with how the indicators could be used to inform tribal decision-making and forest management. The authors did however note that development of a biodiversity monitoring approach also needed to consider how declining forest use by the community could influence observation of certain indicators and the way in which patterns were understood (p.4).

The culturally relevant themes established through the interview process considered both a scientific and a Tuawhenua worldview. The themes included: procurement of food (mahinga kai); natural productivity (hua o te whenua); nature of water (āhua o te wai); nature of land (āhua o te whenua); nature of the forest (āhua o te ngahere); long burning fires of occupation of land and place (ahikaaroa); spiritual dimension (taha wairua); physical health (taha kikokiko); and mental health (taha hinengaro) (p. 9 – 12). Cultural/community-based indicators were categorised according to the respective themes and each indicator was subsequently assigned to one of the two monitoring approaches (a field survey or interview-based approach). Indicators were prioritised through community feedback and verification was also sought through workshop delivery back to the Tuawhenua community (interview participants and elders).

A selected theme (nature of the forest – āhua o te ngahere) with community-based/cultural indicators and associated monitoring approaches is displayed in Table 4. Following Table 4, Table 5 includes the same theme and indicators, along with associated metrics for the potential field survey approach.



**Table 5.** A selected theme ‘Nature of the forest-Āhua o te ngahere’, indicators and associated metrics contained within a potential field survey approach to monitoring forest health and condition in New Zealand; from “An indigenous community-based monitoring system for assessing forest health in New Zealand” (Lyver et al. 2017)

Culturally-relevant theme	Indicators	Metrics for assessing indicators
Nature of the forest (Āhua o te ngahere)	Appearance, beauty, health and condition of the forest	<ol style="list-style-type: none"> <li>1. Beautiful/lush/pristine/thriving/flourishing/whole</li> <li>2. Beautiful but rereke (changed)/patchy/ragged/scruffy</li> <li>3. Barren/bereft/broken/diminished/lonely/withered</li> <li>4. Dead</li> <li>5. Unknown</li> </ol>
	The shape and layering of emergent forest canopy	<ol style="list-style-type: none"> <li>1. Beautiful/full canopy</li> <li>2. Canopy uneven/canopy patchy</li> <li>3. Prolific gaps in canopy/canopy broken and dead</li> <li>4. Unknown</li> </ol>
	The colour of the forest canopy	<ol style="list-style-type: none"> <li>1. Glossy dark green</li> <li>2. Olive green with patches of dark green</li> <li>3. Olive green with shades of lighter greens and yellow</li> <li>4. Grey and brown</li> <li>5. Brown and dry</li> <li>6. Unknown</li> </ol>
	The language or sound of forest	<ol style="list-style-type: none"> <li>1. Loud and noisy/full diversity of sounds</li> <li>2. Still lively and active but less forceful</li> <li>3. Muffled/quiet/little sound</li> <li>4. Dead silent/no noise</li> <li>5. Unknown</li> </ol>
	The abundance of saplings in the forest	<ol style="list-style-type: none"> <li>1. A lot/crowded/dense thickets</li> <li>2. Plentiful/heaps/quite a few</li> <li>3. Not many/sparse/scattered/isolated poles/nothing (Kore)</li> <li>4. Absolutely nothing (Tino kore nei)</li> <li>5. Unknown</li> </ol>
	The abundance of seedlings in the forest	<ol style="list-style-type: none"> <li>1. A lot/crowded/carpet of seedlings</li> <li>2. Plentiful/heaps/common</li> <li>3. Not many/sparse/scattered/isolated plants/nothing (Kore)</li> <li>4. Absolutely nothing (Tino kore nei)/forest floor bare</li> <li>5. Unknown</li> </ol>
	The amount of vegetation browse and damage (by deer and livestock) in the forest	<ol style="list-style-type: none"> <li>1. Forest understory thick and impenetrable/no damage or browse</li> <li>2. Forest understory dense in places/quite thick/some browse and damage</li> <li>3. Forest understory sparse/quite a bit of damage/vegetation trampled</li> <li>4. Forest understory bare and eaten out/vegetation absent/easy to walk through</li> <li>5. Unknown</li> </ol>
	The amount of possum sign (possum dung, bite marks and scratchings on trees) in the forest	<ol style="list-style-type: none"> <li>1. A lot</li> <li>2. Common/quite a bit</li> <li>3. Nothing (Kore)/not much</li> <li>4. Absolutely nothing (Tino kore nei)</li> <li>5. Unknown</li> </ol>
	Amount of vegetation cover (e.g., ferns, seedlings) on the forest floor	<ol style="list-style-type: none"> <li>1. Carpet of vegetation/wide range of species present/thick and luxurious/soft underfoot/little leaf litter exposed</li> <li>2. Pretty good vegetation cover/reasonable range of species present/ground still soft underfoot in places/patches of leaf litter</li> <li>3. Not much vegetation cover/few different species present/ground feels firmer/much leaf litter covering large areas</li> <li>4. Forest floor bare and open/ground feels hard and compact/leaf litter covering all of forest floor</li> <li>5. Unknown</li> </ol>

The authors acknowledged the overlapping of some indicators with national biodiversity measures, such as the abundance of birds, however, also noted the importance (and difference) of the approach in giving recognition to “the use of biota, a strong interdependence of people and the environment, and a spiritual component” (p. 17). As highlighted by the authors, reciprocal human-biodiversity relationships are key ontological principles for indigenous and hunting cultures throughout the world (Kendrick et al. 2005, Nadasdy 2007, Sangha et al. 2011; as cited in Lyver et al. 2017, p. 23). Accordingly, the authors examined the value of the different approaches (indigenous and scientific), particularly the benefit of extending science-based biodiversity monitoring systems to include contributions from indigenous communities.

For the Tuawhenua community, the authors emphasised the integral links between health of the forest ecosystem and the underlying principles of kaitiakitanga – environmental guardianship or stewardship, manaakitanga – caring for visitors, and whakawhanaungatanga – interrelatedness within the natural and spiritual worlds. The authors also noted that the concept of *matemateaone*, referring to the strength of community spirit and commitment to others, was viewed as an indicator and informed the degree to which these principles were observed and practiced. The sharing of resources contributes to strengthened relationships and community unity, however changing behaviours such as decreasing interaction with the forest environment accompanied by increasing dependency on purchased foods, may negatively affect the strength and integrity of *matemateaone* as an indicator (p. 23).

With regards to indicator application, the authors proposed dual application of field survey and interview-based indicators as the more effective method for understanding socio-ecological health and integrity, noting that utilisation of both monitoring approaches with indicators from all of the identified themes provides a full assessment of forest and community health. The authors recognised that not all indicators can be measured through a survey approach, for example those relating to traditional ways of knowing. According to the authors this further emphasises the advantages of a dual field survey and interview-based approach (p. 24).

As stated by Lyver et al., indigenous communities generally ‘manage’ and ‘monitor’ their environment at a localised (or catchment) level, in a manner accordant with their values and priorities. The authors suggest that this challenges the application of indicators across multiple communities and landscapes and the ability to make predictions about the broader (national) state of biological and community well-being. As opposed to a science-based monitoring system, the authors note that indicator diversity across different communities and regions make data comparisons and wider biodiversity assessments more difficult. However, despite the existence of varying indicator consistency across communities and sites, Lyver et al. highlight the need for practitioners to balance variability from diverse spatially-specific indicators and indicator comparability across communities, with the usefulness of aggregated indicators for broader environmental/biodiversity assessment and/or the community’s relationship with it (p. 25).

In conclusion the authors suggest that “the ideal monitoring system is one where community members can report on biodiversity based on their ‘undisturbed’ routines” (p. 26), although



noting that where community resource use or time spent on the land has diminished, a field survey approach that includes indicators identified by community elders or experts offers an alternative method for monitoring environmental health. The authors state that such a field approach would need elders or experts to go out on their lands, so as to provide their understandings of biodiversity, with elder involvement providing the advantage of memory recall, thereby enabling comparisons to be made with past ecological baselines or forest health. Alternatively, community training to recognise and measure indicators in their different states using prescribed metrics, delivered by elders and/or resource users offers a potential alternative. As suggested by Lyver et al., the application of a complementary approach comprising an indigenous community-based monitoring system along with a scientific-based approach is likely to be highly informative over time (p. 26).

### ***Summary comments***

The approach developed by Lyver et al. is supported by extensive research and analysis undertaken with the Tuawhenua people of Ruatāhuna over a 10-year period. The resulting approach comprises a comprehensive system of culturally-based themes, with associated indicators and metrics of relevance to the Tuawhenua community, thus reflecting their relationships with the forest and within the community. The complementary nature of the proposed system is upheld by an underlying Māori worldview that informs the overall approach, but is also evidenced in the selection of suitable themes and indicators, with indicator determination involving analysis from both a Tuawhenua and a scientific perspective. Likewise, the use of both field survey and interview-based monitoring methods further reflects complementarity of the approach/system, allowing a broader assessment, particularly when attempting to identify substantive qualitative aspects and/or spatial-temporal variation within the forest environment.

As with previous models/frameworks reviewed (the Mauri Model developed by Morgan; Cultural Health Index for Streams and Waterways by Tipa & Tierney; and a Māori Ecosystems Services Framework by Harmsworth & Awatere), the approach presented by Lyver et al. is somewhat applicable to a framework for biological detection and surveillance. Foundational elements of the model support a potential MMFS of plant pathogens with the proposed system underpinned by a (Māori) worldview that acknowledges the interconnected relationships between forest health and community well-being. Additionally, the approach used by Lyver et al. is perhaps more relevant to the development of a framework for surveillance of plant pathogens due to the similar ecosystem setting and its use as a monitoring tool, as opposed to a general assessment tool. It is anticipated that the tools and approaches informed by the development of the MMFS of plant pathogens will be used continually over time and space and will provide capacity beyond specific pathogen surveillance. Characteristics of the approach presented by Lyver et al. that are compatible and potentially useful within an MMFS of plant pathogens include:

- Alignment of important cultural/community-based indicators with scientific measures

- Dual application of field survey and interview-based methods
- Recognition of factors not usually included in a national (biodiversity) approach; for example, biological resource use, human-environment links to wellbeing, and spiritual or metaphysical elements
- Underpinning principles of kaitiakitanga, manaakitanga and whakawhanaungatanga; with a consistent emphasis on reciprocal relationships
- Acknowledgement and inclusion of community elders and/or experts in building and applying the approach/system
- Community verification of indicators and overall approach
- Comprehensive system that is community specific, but may be adjusted to represent other communities/sites, and/or to provide aggregate data at a broader scale
- Consideration of declining forest use by the community and how this may affect indicator observation and interpretation of forest changes or trends
- The need to balance variability from diverse spatially-specific indicators and indicator comparability across communities, with the usefulness of aggregated indicators for broader environmental/biodiversity assessment and/or the community's relationship with it ?

## 4. Discussion

As reflected within this review, the examined literature can be considered according to theoretical approaches to environmental management that are based upon a Māori worldview, values and beliefs (Marsden 1988, Marsden & Henare 1992, and Lyver et al. 2018); and applied models that seek to enhance environmental participation, management and decision making for Māori (Morgan 2004, Tipa & Tierney 2006, Harmsworth & Awatere 2013, and Lyver et al. 2017). Expectedly, the theoretical approaches lend support to the development of an MMFS of plant pathogens, with the reviewed literature offering important insight and understanding of the Māori worldview and relationships with the natural world. Whilst the proposed framework will primarily address plant pathogen surveillance, an evaluation of the literature that explores theoretical underpinnings reinforces the need to develop a more holistic platform, from which cause and effect may be identified and remedied, as opposed to a more narrowly-focused detection framework. However, as indicated by Lyver et al. (2018), the development of an MMFS or a broader platform must have governance and institutional support that will sustain genuine community engagement and subsequent success of the desired approach.

In terms of the four applied models, analysis reveals a distinctive difference in the methodology of three of the models, compared with that of the fourth model. Whilst Morgan's 'Mauri Model', Tipa and Tierney's 'Cultural Health Index' and Harmsworth & Awatere's 'Māori Ecosystem Services Framework' point toward 'universal' application, or a 'one-size-fits-all' approach, the community-based monitoring system presented by Lyver et al. (2017) is more concerned with the specificity of land and people as a complete interdependent and interrelated ecosystem.

When working with tangata/mana whenua, one of the challenges which confront 'one-size-fits-all' models is the degree of ownership and participation that the project can engender. Presenting a universal model has the potential to predetermine the 'terms of the conversation' and perhaps silence otherwise valuable knowledge, experience and wisdoms. For example, the 'Mauri Model' presumptively assumes the concept of 'mauri' as its key focus, however, attempting to obtain a universal or unanimously agreed interpretation for mātauranga related concepts, including mauri, may prove difficult. In contrast, the key focus adopted by Lyver et al. (2017) was the strength of relationships the Tuawhenua people maintained with their lands and forests.

Also, the use of generic signifiers for people, such as 'tangata whenua', 'mana whenua', 'iwi' and 'hapū' may fail to appreciate the dynamic that is to be found within these groups. As the Tuawhenua project notes, not all members of a Māori community share the same knowledge, observations and relationships with their ecosystem. A universal approach, without an awareness of this reality, becomes vulnerable to engaging with a multiplicity of competing and potentially confusing tangata whenua opinions. Correspondingly, a universal or one-size-fits-all approach has the potential to render invisible the plurality of knowledges, observations

and relationships specific to each ecosystem. The 10-year Tuawhenua project began with opportunity and determination to 'listen' to the tangata/mana whenua. That is, let the land speak. It is apparent that this approach elicited a different focus when compared with the other three models. Conversely, a predetermined, prescriptive model has the potential to 'tell' tangata whenua what to do. This approach can effectively prevent the 'land itself from speaking'. In contrast, community-specific emphasis on the intimate human-nature (or tuakana-teina) relationship provides opportunity for in-depth ecosystem analysis that explores biological interactions through a mātauranga Māori lens.

In the development of an MMFS of plant pathogens the discrepancy between a 'universal' approach and an approach that recognises plurality, and therefore accommodates diverse human-nature relationships may prove challenging. Effective pathogen surveillance that provides confidence in 'proof of freedom' will demand the inclusion of universal elements, however, the resultant framework must also ensure the plurality of Māori societies is acknowledged and is given voice. The incursion of these pathogens in our native forests and the subsequent impact upon our revered 'tuakana' presents an issue of urgency. Nevertheless, a mātauranga-Māori based framework should aim to strengthen our 'unity in diversity' as we work collaboratively to manage and protect our natural world.

## 5. Conclusion and Recommendations

The development of an MMFS of plant pathogens, specifically (but not limited to) those pathogens that cause kauri dieback and myrtle rust disease presents a challenging and complex task. As the use of mātauranga Māori within the area of environmental management has become more and more common, the level of universal application has also increased. This increasing application and engagement may create the perception that the incorporation of mātauranga Māori with or alongside science-based solutions is straightforward. However, it is important to note that like ecosystems and their inhabitant communities and interrelationships, Māori societies are also comprised of seemingly similar but in fact quite distinct and diverse elements. It is therefore important that any framework founded upon mātauranga Māori or a Māori worldview is able to accommodate necessary universal aspects (i.e. science-based detection tools and measurement), while also recognising the plurality of human-nature relationships that exist throughout Aotearoa New Zealand.

The literature reviewed in this report supports the use of a holistic approach that is premised upon a Māori worldview and Māori concepts and ways of being and knowing in the world. Primarily, this involves recognition of whakapapa and the interconnectedness of all things, but also of respectful and reciprocal relationships with nature and with each other. Values such as respect and reciprocity are not unique to Māori or to indigenous communities, but are universal values of humanity. In Māori rural communities these values and whakapapa-based relationships with nature have remained strong. The key to successful development and application of the proposed framework is in recognising and enhancing our respective strengths, as we collaborate and work together to address the urgent issue of pathogen incursion upon our native forests and taonga.

In selecting and reviewing literature for this report no duplication of mātauranga Māori based models for plant pathogen surveillance and detection were discovered. Significant aspects of the reviewed literature did however support the development and delivery of a Mātauranga Maori Framework for Surveillance. As well, the reviewed literature highlighted cautionary elements for consideration.

The following recommendations are made in respect of development of the proposed framework:

1. The Māori worldview and its emphasis on whakapapa relationships with the natural world; an appreciation of the symbiosis of nature and our role within that symbiosis as 'teina' (the Tuakana-teina relationship); and demonstrated values of respect and reciprocity should comprise foundational elements of the proposed framework.
2. There are a multiplicity of mātauranga Māori concepts which underpin and inform behaviour, particularly in respect of the natural environment. The elucidation of core concepts that align with key (science based) surveillance measures are recommended as providing a framework base, with interweaving concepts guiding and informing

framework application. Core concepts should be those concepts considered as generic; however, interweaving concepts should be flexible to allow for community specificity.

3. Mātauranga Māori related concepts, values and beliefs have evolved from a holistic view of the world as interconnected and interdependent. As such, the concepts themselves are often interconnected and interrelated and must be applied in the context from which they are derived. Care must therefore be taken to ensure that concepts, values and beliefs are understood by those utilising the framework, thereby ensuring the framework is applied in the appropriate manner.
4. The matching of ecological with social scales (as highlighted by Lyver et al. 2018) when addressing environmental problems is imperative. Hence, a Mātauranga Maori Framework for Surveillance must be supported by adequate resourcing that addresses the ecological scale of the problem whilst also supporting mana whenua, expressly hapū engagement and ongoing involvement. Governance and institutional provision should therefore be positioned to support framework application in to the future.

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## Appendix A:

### A Genealogy of the Cosmos

1. Io  
*creator, root cause*

|

2. Te Kore  
*The Void*

|

3. Te Kōwhao  
*The Abyss*

|

4. Te Anu  
*The Cold*

|

5. Te Pō  
*The Night*

|

6. Te Mauri  
*Life Principle*

7. Te Pū, 8. Te Weu, 9. Te More, 10. Te Aka, 11. Te Rea  
*7. Shoot, 8. Taproot, 9. Laterals, 10. Rhizome, 11. Hairroot*

12. Te Rapunga, 13. Te Whāinga, 14. Te Kukune, 15. Te Pupuke, 16. Te Hihiri  
*12. Seeking, 13. Pursuit, 14. Extension, 15. Expansion, 16. Energy*

17. Te Mahara, 18. Te Hinengaro, 19. Te Whakaaro, 20. Te Whē, 21. Te Wānanga  
*17. Primordial Memory, 18. Deep Mind, 19. Sub-conscious Wisdom, 20. Seed-word, 21. Consciousness Achieved Wisdom*

22. Te Hauora, 23. Te Atāmai, 24. Te Āhua, 25. Wā, 26. Ātea  
*22. Breath of Life, 23. Shape, 24. Form, 25. Time, 26. Space*

27. Ranginui/Papatuanuku  
*27. Heaven-Earth (The Natural World)*

Source: Marsden 2003b, p. 180-181