

# Western science and Indigenous wisdom: Is integration possible, practical, plausible?

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*Kimihia katoa ngā pūtaka o te kaupapa, ina i kitea, kimihia te rongoā!*

*Seek out origins and there-in lie the solutions*

## Abstracts

*This article contrasts and compares Western science and Indigenous Knowledge or wisdom, discussing their origins, essential features and how they might engage and speak to each other across cultures. In order to explore this interface, it is necessary to examine the epistemological origins of each knowledge system and the societal drivers that shape them. From this it is possible to examine how science and traditional wisdom have interacted during the processes of colonisation, and how they might better engage entering a time of post-colonisation change. Furthermore, it is possible to see how these knowledge systems might integrate in an on-going way.*

*Ka whakatauaro, ka whakataurite hoki tēnei tuhinga i te mātauranga taketake ki te pūtaiao Pākehā, me te āta wānanga hoki i ō rāua ake orokohanga mai, i ō rāua ake tino āhuatanga, ka mutu i te huarahi e pōwhiri tahitia ai, e kōrero tahi ai hoki tētahi ahurea ki tērā atu. E wānangahia ai tēnei pōwhiri tahitanga, me tino aromātai ngā orokohanga mai o te mātauranga o tēnā, o tēnā o ngā kete mātauranga me ngā āhuatanga ā-tangata e mirimiri nei i ō aua kete. Mā tēnei e taea ai te āta whakatewhatewha, kua pēhea rānei ngā pōwhiri tahitanga i te wā o te whānako whenua, me te pātai anō ka pēhea rānei ngā pōwhiri tahitanga i ēnei rā o muri mai e huri nei te ao. Āpitihia atu ki reira, ka taea te kite ka pēhea rānei te tūhono tahitanga o ēnei puna mātauranga ā haere ake nei.*

**Keywords:** *Western science, Indigenous Knowledge, societal drivers, post-colonisation change*

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## Introduction

This article contrasts and compares Western Science and Indigenous Knowledge or wisdom, discussing their origins, essential features, and how they might engage and speak to each other across cultures. In order to explore this interface, it is necessary to examine the epistemological origins of each knowledge system and the societal drivers that shape them. From this it is possible to examine how science and traditional wisdom have interacted during the processes of colonisation, and how they might better engage while entering a time of post-colonisation change. Furthermore, it is possible to see how these knowledge systems might integrate in an on-going way.

## Origins of Western Science

Prior to the seventeenth century, the Western medieval world held a holistic view of nature as God's plan. The holistic worldview interconnected knowledge of the environment, the spiritual world, and culture. Less than 500 years ago, medieval scholars debated how many angels could dance on the point of a pin (Dunphy 2001). The angels represented the metaphysical order, and the pin point, the most precise definition of the physical order. The relationship between the spiritual and the secular, angel and pin point, and ultimately life and death, was considered the central issue to be understood.

A new contemporary worldview replaced the medievalist view during the seventeenth century. Bacon in 1626 (Gauch 2003) introduced scientific rationality, arguing that reliance on scientific truth was more important than the spiritual aspects of life. Descartes in 1641 (Gauch 2003) introduced the idea of objectivity, separating humankind from nature, thereby increasing the emphasis attributed



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to scientific thought and method. Galileo Galilei proved Copernicus's theory of a heliocentric universe, showing that the Earth did indeed revolve around the Sun (Galilei 1642 reprinted 2005). The combination of Bacon, Descartes, and Copernicus outwardly challenged the established authority of religion, discrediting the Ptolemaic ideal, that the Earth was the literal centre of the universe. The concept of the heliocentric universe, that the sun is the centre of our solar system, was developed solely from a scientific standpoint, and challenged the validity and authority of the religious power base of society, including the control of knowledge.

As early as 1597, Bacon demonstrated the *power* of knowledge (Spedding 1872), in the form of his observation and experimentation philosophy, the inductive methodology for scientific inquiry (Baconian method). While ill-regarded by the Aristotelian and religious academies, as well as some contemporary historians (Merchant 2006), this work eventually culminated in the founding of the Royal Society in 1660, enjoying the confidence and official support of the restored monarchy of King Charles II. These advances in knowledge meant that scientific discovery became more important to society than religion.

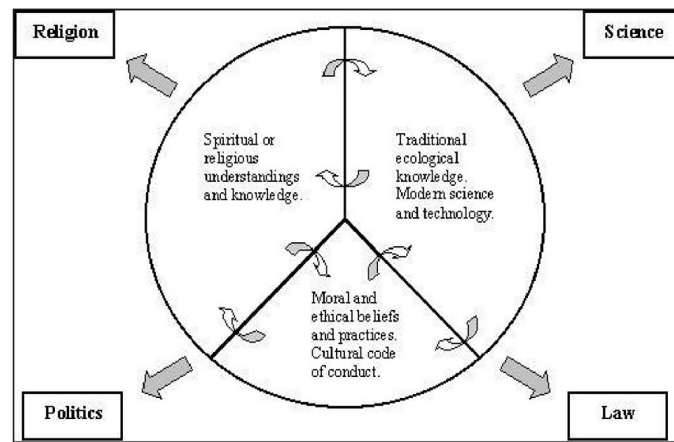
As rational, scientific thought developed, specialised branches of knowledge emerged, and as this occurred, each branch became separate from the others, and fragmented from the whole body of knowledge (Roberts 1996). Figure 1 depicts the separation of knowledge into specialised branches enabling scientific knowledge to develop generally unencumbered by and separate from religious, legal, or political concerns.

Science, now free of the constraints imposed by morality, ethics and culture, could explore the secrets of the universe, leading to an unprecedented level of detailed knowledge and technological innovation. Technological innovation was an important and attractive area of science, as it offered significant potential for economic benefit, gain and profit, a philosophical direction that perseveres today.

The ability of science to generate new knowledge that transforms society and generates wealth over long time-spans in unexpected and far-reaching ways is reflected in the late seventeenth century work of Newton (Walker 1998). Having conceived the concept of gravity, Newton then had to invent calculus to calculate the orbits of the planets and moons in the solar system. The intended application for Newton's work was a system to determine longitude at sea (Sobel 1995), which is largely forgotten due to the more enduring economic and political 'achievements' of the colonisation of Africa, Oceania, Asia, the subcontinent, Pacific and Americas, and their Indigenous populations.

In *Principia*, Newton created an intellectual model of a physical world that was absolutely predictable, a mechanical universe subject to universal mathematical laws. As previously mentioned, the intended application of his work was to devise a system for determining longitude at sea, as the governments of Spain, France, and England understood that this ability would provide the means to safely navigate and therefore control the oceans of the world. A huge reward was offered to the person who could facilitate this.

The Royal Society, follower of Galilei and Newton, applied itself mightily to the task, estimating the weight of the earth and the distance to the stars. Ironically it was an



**Figure 1: The separation of scientific knowledge (after Roberts 1996).**

artisan clockmaker, John Harrison, who invented the dual chronometer that was subsequently tested by Captain Cook on his second and third explorations of the Pacific (Walker 1998). Thus, early science was a willing agent of political and economic gain. Furthermore, although Harrison's chronometer more than met the accuracy specified by the Lords of the Admiralty in England, the Royal Society, which judged his contribution, delayed payment of the £20,000 reward for forty years (Walker 1998). Thus scientific discovery transformed Western Society in far-reaching ways economically, politically, socially, and culturally. However, with scientific endeavour's stated disinterest in religion, morality and ethics, economic power became the primary objective.

The historical lesson is that science has rarely acted independently of politics. Furthermore, the danger of compartmentalising branches of knowledge as shown in Figure 1, is the potential that arises when decisions or recommendations are made from isolated knowledge bases working in self-interest rather than in conjunction with others for a wider societal good. Marsden (2003) identified this danger, observing that science produces 'know how' that is of little value without 'know why', a means without an end. Marsden (2003 p. 27) states that the 'know why' reflects one's values and the motivation for our actions.

Following the work of Bacon, Descartes, and Newton, Darwin's 1859 Theory of Evolution and its child, Social Darwinism, the view that all societies evolved from the primitive (Indigenous) to the civilised (West) completed the initial base 'scientific' intellectual construct necessary to explain the living world in scientific terms. Newtonian reductionism provided the foundations for the contemporary Western worldview, which enthrones analytical thinking, and enables humankind to control, dominate, exploit, and redesign the natural world (Dunphy 2001). Darwin's principles of natural selection (survival of the fittest) were randomly mutated to justify unethical processes such as European expansion, colonisation, racial superiority, elite control (capitalism), and economic rationalism.

Aside from the evident economic and political drivers for knowledge creation, scientific discovery made a huge contribution to the Western world's understanding of the tangible world. As a consequence however; social, cultural, spiritual, and environmental knowledge became less relevant. The chronology in Figure 2 illustrates the beginnings of the scientific revolution.

## Origins of Indigenous Wisdom

In contrast, Indigenous viewpoints of sustainable development are based on ideas of reciprocity and giving back to Creation, recognising that which sustains all life. Understanding and acknowledging these inter-relationships with all of Creation is of the utmost importance and involves a tremendous responsibility. This included the First Nations people sharing their knowledge and technology freely to ensure the survival of colonial 'newcomers', who in many instances lacked the capacity to look after themselves at first contact (McGregor 2004).

McGregor (2004) states that 'traditional teachings offer profound guidance about how to work with Creation and not to interfere with other beings' ability to fulfil their duties and responsibilities'. Indigenous scholars argue that Traditional Ecological Knowledge (TEK), a term used to describe Indigenous Knowledge, is inherently sustainable and spiritual, and essential for survival, because it crafts the relationship between the world and her people (La Duke 1997, p. 36). Intellectual, social, cultural, and spiritual learning unfolds within the context of this relationship. It is participative in a way that holds the key to sustainability.

T'Seleie (*in Blake et al. 1977, p. 16*) makes an analogy between his people, the Dene Nation, and a great 'river that flows and changes, yet is always the same'. His people take their strength, wisdom, and ways from the flow and direction that has been established by their ancestors for them and future generations. The river is a source of knowledge required for survival and is thus, a 'holistic metaphor for the essential relationship between people and the rest of Creation' (T'Seleie *in Blake et al. 1977, p. 17*)

The Indigenous peoples of North America for instance demonstrate an intrinsic spiritual connection and relevance to their worldview. McGregor (2004) states that, to be sustainable is to take responsibility and be spiritually connected to all of Creation, all of the time. Her statement is reinforced with references to Indigenous belief regarding ancestral lands, the 'closest scientific equivalent being the ecosystem without the spiritual component'. She references other literature for the following extracts:

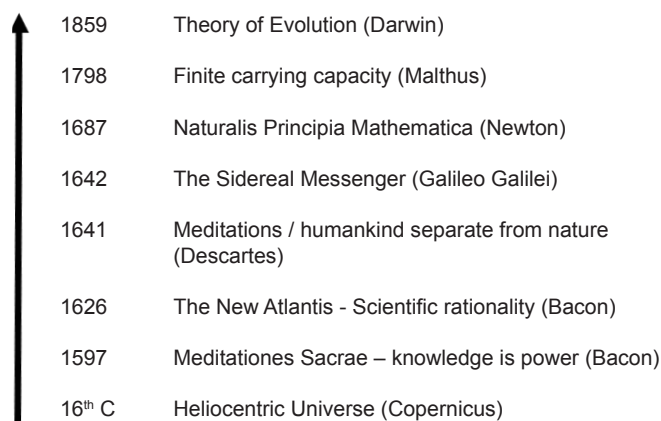
*When the government people talk about the land ... [they talk] about all the things we use ... I think about the Great Spirit (Elder Annie Catholique in Raffan 1993, p. 49).*

*Spiritual and ethical values are woven into knowledge and regarded as inseparable from the land (Gwich' in Elders 1997, p. 14).*

McGregor (2004) confirms that Indigenous Knowledge is inherently sustainable and spiritual, is based on spirituality, on multiple lifetimes spent enhancing sustainable relationships with the Creator and all of Creation.

## Mātauranga Māori

Although now widely understood within Māoridom, when initially introduced in 1998 at a Whakarewarewa hui, mātauranga was an unfamiliar concept to the Te Arawa Koeke present. Te Arawa stated a preference for the concept mōhiotanga which affirms a special characteristics of mōhiotanga for Te Arawa, and mātauranga for other Iwi. Mōhiotanga and mātauranga are the localised bodies of knowledge that underpin Indigenous epistemologies. Mōhiotanga and Mātauranga are location specific and highly specialised,



1859	Theory of Evolution (Darwin)
1798	Finite carrying capacity (Malthus)
1687	Naturalis Principia Mathematica (Newton)
1642	The Sidereal Messenger (Galileo Galilei)
1641	Meditations / humankind separate from nature (Descartes)
1626	The New Atlantis - Scientific rationality (Bacon)
1597	Meditationes Sacrae – knowledge is power (Bacon)
16 <sup>th</sup> C	Heliocentric Universe (Copernicus)

Figure 2: Chronology of the Scientific Revolution.

being informed by the intergenerational relationship of Iwi with their own rohe, their ecosystems of origin. These bodies of knowledge do not delineate between physical and spiritual origins of knowledge. Thus mōhiotanga or mātauranga Māori are holistic ways of knowing that are based on the tikanga and kawa that have endured over time and belong to a specific place.

The potential contribution of mātauranga Māori and other Indigenous Knowledge systems to Western societies is often challenged on the basis of the historic occurrences such as the extinction of the Moa and impact of forest burn-off after Māori first settled New Zealand. This sort of invalidating of mātauranga Māori is an example of how Western Science has been and continues to be an agent of colonisation (Walker 1998). Science itself in different parts of the world has contributed to a larger number of more spectacular environmental failures, e.g. nutrient enrichment of rivers and lakes from farming and sewage effluent, introduction of pests, synthesis and use of agent orange, asbestos, persistent organic chemicals. The impacts of these failures have been 'global, systemic and complex, both in time and space, and have exposed a lack of understanding of the underlying cause-and-effect relationships of scientific applications' (Parliamentary Commissioner for the Environment 2001).

It is useful to continue the examination of the historical record to provide some understanding of the timeframe over which mātauranga Māori evolved as an Indigenous basis of wisdom. An understanding of the timeframe for mātauranga Māori is appreciated by considering the basis for this knowledge system and its transmission. Central philosophy is based on the creation stories and whakapapa. These pakiwaitara (traditions) include mātauranga of genealogies from numerous other parts of the Pacific Ocean and share in common conceptual frameworks that form the basis of Polynesian ontologies and epistemologies.

The specific example used here is that of Mauri (life supporting capacity or potential), a pervasive concept throughout mātauranga Māori. Do similar concepts to mauri exist in cultures located elsewhere in the Pacific Ocean? An equivalent of mauri exists in the languages and cultures of the peoples from other South Pacific Island groups: Tonga has mouri and Nuie has moui (Best 1934 p. 80); Hawai'i (Pukui 2007) and 'Uvea have mauri; Futuna, tamauri; and in Rotuma, Efate (Vanuatu) and the Tuamotu group, mauri



(Best 1934 ,p. 80). Best (1934, p. 80) also describes the physical manifestation of mauri as an 'object that represents the vitality, and general welfare of a place, a forest, river, lake, village, or of people'. The proliferation of the mauri concept throughout the South Pacific, and its continued relevance for the Indigenous peoples of the South Pacific, supports its ancient existence for at least two millennia.

The continued relevance of mauri and the practice of kaitiakitanga (enhancing ecosystem mauri) in many Polynesian cultures indicates the concepts were already important to the ancestors of modern Māori before their journeys to Aotearoa New Zealand, and were significantly important to have been retained throughout the colonisation process. Thus the concept of mauri predates the migration of early Māori to Aotearoa, a feat achieved at least five centuries prior to Tupaia and Cook's arrival in 1769. The adoption of kaitiakitanga in Aotearoa therefore occurred between 800 and 1200 years ago. The significance of this timeframe can be established by considering the century during which much of the Pacific Ocean was explored by Cook and the relevance of his achievements to Western Science.

Captain Cook and the *Endeavour* are recorded as visiting Tahiti (April 1769), Aotearoa (October 1769), and the Australian east coast (1770), before returning via Torres Strait to Britain in 1771. Cook and *Resolution* returned to the Pacific on a Royal Society commission in 1772 to search for Terra Australis, this time securing another Tahitian, Omai, to assist on the voyage with his Indigenous Knowledge of the Pacific. On its return voyage, in 1774, HMS *Resolution* landed at the Friendly Islands (Tonga), Rapa Nui (Easter Island), Norfolk Island, New Caledonia, and Vanuatu. Cook's second voyage successfully employed the K1 chronometer, which facilitated the accurate measurement of longitude. Omai also accompanied Cook on his third voyage, again on HMS *Resolution*, and in 1778 Cook and his crew became the first Europeans to reach the islands of Hawai'i. HMS *Resolution* continued on to North America and mapped the coast from California all the way to the Bering Strait, before returning again to Hawai'i, where Cook was killed in 1779 (Salmond 1991, 1997, 2003).

Tupaia and Omai's roles are often made invisible in historical accounts of Pacific exploration by European historians. For more than a millennium before Newton's and Harrison's work culminated in the chronometer, allowing the European navies to map the oceans of the world, the ancestors of the Indigenous peoples of the Pacific Ocean journeyed between the island groups, developing and implementing strategies for their population of the Pacific. Walker (1998) observes that the earliest Māori must have had a systematically organised knowledge of their world to have discovered Aotearoa. The Indigenous Knowledge of those early Māori was essential for survival. Conversely, the knowledge and technology that allowed Europeans to deliberately venture out of sight of land only marginally improved their chances of finding land in an environment that is 99.8% ocean. The chronometer technology alone did not enable Cook's arrival in Aotearoa and the other Pacific Islands, but rather there must have been a reliance on Tupaia and Omai's Indigenous Knowledge to locate the various island groups visited.

The relevance of this example from history is that, prior to and following early European settlement in Aotearoa, European visitors were heavily reliant on the Indigenous

Knowledge of Māori to survive (Orange 2004). Initially Cook relied on Indigenous Knowledge to find the various island groups in the Pacific and to communicate with the Māori (Vaggioli 1896, translated 2000). Once the locations of these island groups were recorded on maps, the process of imperial expansion / colonisation could begin, although settlers continued to be dependent on the Māori for their survival.

## Comparing Western Science and Indigenous Wisdom

Indigenous Wisdom differs from Western Science in that while Western Science is separated from law, politics, and religion, Indigenous Wisdom is understood and applied as a holistic knowledge system. In both Western Science and Indigenous Wisdom, empirical evidence is based on the systematic accumulation of detailed observation and abstraction of norms from disparate data sets. The similarity ends here, however, as Indigenous Wisdom assesses deviation from the norm in a morally qualitative sense, leading to different conclusions from the economic quantitative nature of Western scientific analysis. Indigenous Knowledge systems are holistic, making no distinction between the material and spiritual worlds. Thus, Indigenous decision-making processes are based on all available indicators.

O'Regan (1984) observed that the historic (Māori) viewpoint is in terms of the environment, and that Māori had the capacity to tie the practical together with their theological beliefs. Conversely, Marsden and Henāre (1992) observed that in rational Western thinking there is rather a disconnection of the physical and spiritual, the secular and the sacred. The separation of knowledge and its compartmentalisation into silos described by Henāre creates tensions between the two bodies of knowledge and has been the basis for Western society devaluing Indigenous Wisdom in the past.

The devaluing of Indigenous Wisdom is evident in written accounts of Māori ethnography. Firth (1929) describes an economic 'magic' of the Māori, classifying it as magic of protection and magic of production. In his view:

*The object of the protective type of magic is to guard the natural resources on which the Māori depends for his livelihood from the inexplicable and unforeseen accidents due to change in natural conditions. Sometimes birds migrate from a forest for no apparent cause, fish desert their accustomed reefs and shoals, or fail to appear at the usual season, the fruits of trees are lacking in a lean year. Not being equipped with a comprehensive scientific knowledge, primitive man is not apt to attribute such phenomena to the working of natural laws. A simpler reason is always at hand – the conduct of man himself. This postulate of the interference of human agency is one which is in accord with the emotional temper of man's feeling of dependence on his environment. The object of the magic of protection, then, is to obviate any ill results which may be presumed to follow from carelessness or neglect (Firth 1929, p. 254).*

Yet Firth's description of the Māori postulate that the interference of human agency is consistent with the understanding that humankind is dependent on his (sic) environment. This is central to the ethic of sustainability in the context of valuing the environment for its intrinsic value. The use of the term 'magic' rather than spiritual beliefs and also of 'primitive' also appears pejorative.

Despite Firth's biased account of the economic 'magic' of the Māori, his thesis contributes his understanding that mauri was a measure of valuing things with the end objective being protection of valued aspects of the economic life of the Māori:

*It was the old Māori belief that every natural object or aggregate of objects possessed a spiritual essence, a non-material core, or life principle (mauri), and to this was due their vitality, even their very existence. If it were a forest, for instance, on the maintenance of this vital principle depended its fertility and productive powers. The fruiting of the trees, the abundance of birds and rats, the vigorous growth of the forest as a whole, all hinged upon the preservation of the mauri intact and unharmed. Fisheries too, had their mauri, representing their productivity, as had all other types of natural resources, and man himself. In its nature this mauri was an intangible, imponderable essence, impersonal in character, and not to be confused with any idea of an indwelling spirit (Firth 1929, p. 255).*

While Firth's description of mauri is useful, his separation and rejection of supposed non-scientific attributes of the concept, and therefore his failure to consider the role of mauri in a holistic context, is inconsistent with the field of Indigenous Knowledge from within which the concept has its origins. The scientific worldview is reflected in his purely scientific approach, as is his assumption that the Traditional Ecological Knowledge incorporated into mātauranga Māori has no scientific value.

In isolation, the description of life principle used by Marsden (also Best 1924, Williams 1957, and Patterson 1992) can be narrowly construed in Western thinking to imply that mauri only applies to things that are alive. A limited perception of mauri such as this is incorrect and rather reflects the limitations of the English language to convey such a concept as any inconsistency on the part of Marsden or others. Williams' translation equivalent demonstrates this point, including alongside life principle, the thymos of man. Mead (2003) has commented that the Greek word, thymos, mystifies mauri, contributing little to understanding the concept. That the concept thymos also creates confusion for the Western mind is likely a result of its lack of contemporary mainstream use, possibly due to the concept being abolished by Christianity (Scaruffi 2007). Nevertheless thymos is described as spiritedness or the active soul (Plato), and according to Hegel (cited in Zinkin 2011), man's humanity flourishes most when he transcends survivalist (reason), materialistic (desire) inclinations and engages his thymotic side pursuing self-sacrificing higher ends. Thymos is considered to be a very ancient belief, predating civilisations, the equivalent conceptual division of thymos from psyche (immanent soul or spirituality) existing in the ancient cultures of Egypt, China, Judaism, Buddhism, and Zoroastrianism (Scaruffi 2007). Scaruffi describes thymos as pertaining to the active soul that is thought, consciousness, and awareness today. Was Williams then referring to mauri in the context that by binding the physical and spiritual in man, it enables humankind's conscious existence?

## The holistic worldview

Indigenous Knowledge systems, conversely, share an integrated and holistic viewpoint. The wisdom incorporated into the creation traditions of Māori, establishes an obligation of reciprocity, founded on the concept of an interrelated natural and supernatural world that is inextricably connected to the Māori by the kinship ties of whakapapa. These ties define a person's identity in the context that the physical condition and spiritual well-being of a geographic region and the person's hapū are one and the same.

The Indigenous worldview is a non-dualistic perspective of an integrated natural environment. Understanding sustainability in terms of Indigenous Wisdom is based on the holistic viewpoint adopted by Māori in terms of the environment, and may have strengths that are absent in the Western scientific approach. The Indigenous worldview of Māori and the inherent obligations that result from this view have many dimensions. The holistic approach of Māori avoids the disjunction between the secular and spiritual, the inherent compartmentalisation and isolation of one institution from another, and the piecemeal approach to problem and conflict resolution (Marsden 2003).

The responsibilities of their descent from the gods and ancestors made Māori guardians of the deities that controlled the relationships among the human, animal, vegetable, insect, fish, bird, mineral, and spirit worlds. These ancestral and spiritual relationships determined that Māori fished, hunted, and cultivated only to the degree necessary to secure their well-being (Sinclair 1975). Thus, before natural resources are allocated for a community's use, propitiatory rites to the appropriate deity must be observed. Their observance ensures that nature is treated with care and respect (Walker 1998).

The holistic worldview, with obligations of responsibility and respect, is a reciprocal relationship between humankind and the gods. Thus the gods and ancestors sustained and protected humans and the other beings of this world (Patterson 1992) reinforcing the inseparability of Indigenous Knowledge and spiritual consideration. For our part, the links between us and the gods are nurtured through ritual. Patterson also summarises earlier writers' attitudes thus:

*Sir Apirana Ngata and Sir Peter Buck write of the tradition of harmonising with the environment; Te Rangi Mete-Kingi mentions how the ancestors 'inculcated their philosophy of preservation and conservation as a foundation for future generations to build upon' (Patterson 1992, p. 20).*

Mete Kingi introduces the concept of intergenerational equity, an aspect of sustainability thinking, and embodied in the ancient Māori proverb: *Whatungaro te tangata, tū tonu te whenua* (People disappear, the land remains forever).

Rangihau (1981) explained that, in the Māori world, a person is aware of the mauri of the land, and how consideration of this determines appropriate behaviour. He explains that people who live very close to nature apply a feeling of aura to the things around them. In the case of Māori, everything is given a mauri. The acknowledgement of mauri imbues conservation, a strong awareness of their dependence on the environment. Māori strive to maintain balance, due to an intrinsic connection to the land based on the traditional genealogical relationships established in the creation beliefs.

## Indigenous Wisdom in a modern postcolonial world

In a postcolonial world, Indigenous Wisdom must be practised to retain its relevance. The ability of mana whenua to continue the application of Indigenous Knowledge is strongly influenced by the way Indigenous Wisdom is perceived within society. Unfortunately, the efforts of hapū as mana whenua to influence common development practice in Aotearoa are often marginalised, the result of dominant Western society's perception of Indigenous Wisdom.

Negative perceptions of Indigenous Wisdom, advanced by the historic denigration of its value in the literature, have resulted in Indigenous Wisdom being ignored, maligned, and depicted as myth or folklore that is primitive, simple, and static. The historic neglect, whether as a result of racism, ethnocentrism, modernism (with its complete faith in scientific method), and postmodernism, has contributed to the decline of Indigenous Knowledge systems, through monoculturalism, and lack of use and application. As Indigenous peoples have adopted Western ideologies, the proffered advances in well-being have been accompanied by impoverishment of culture (Grenier 1998). Furthermore, failures to realise the expected improvements were attributed to the foolish influences of culture. Thus, Indigenous Wisdom was devalued, portrayed as inferior to Western knowledge and blamed when Western knowledge could not provide all the answers. A better situation for the Indigenous peoples would have been to gain access to the benefits of 'modern life' without losing traditional values and institutions necessary to sustain their sociocultural capital (Hooper 2005). This has not happened.

In an about-face, Western Science has more recently started to research the potential value of Indigenous Wisdom, with an increasing awareness that the Indigenous cultures, environments, and peoples that support this wisdom (and Western societies themselves) are being destroyed by the material advances promulgated by westernised societies as driven by the application of Western Science. Thus while Indigenous Wisdom is in danger of being lost through suppression, it has also become vulnerable to exploitation for commercial gain (the basis of the WAI262 claim to the Waitangi Tribunal) as science struggles to remediate its less than desirable impacts. There is therefore a need to develop appropriate mechanisms for the protection of Indigenous Wisdom, and for securing its integrity, but are there more positive ways of looking at Indigenous Wisdom within society?

Indigenous Wisdom is holistic in nature, and it is this characteristic that is synergetic with sustainability aspirations. The report from the Second International Indigenous Peoples Forum on Climate Change includes (2000):

*Our traditional knowledge on sustainable use, conservation and protection of our territories has allowed us to maintain our ecosystems in equilibrium. This role has been recognised at the Earth Summit and is and has been our contribution to the planet's economy and sustainability for the benefit of present and future generations (Second International Indigenous Peoples Forum on Climate Change 2000, 11–12 November, Part II, 2).*

It follows that much greater value is available from Indigenous Wisdom than that resulting from its commercial

exploitation. To realise this greater value, however, it is necessary to forego the purely commercial incentives driving much of the effort made in contemporary society.

Many scientists' rejection of Indigenous Knowledge is on the basis that it does not have the same level of intellectual rigour, is unscientific or scientifically invalid. Walker (1998) identifies this exclusion of other sources of knowledge as a technique designed to ensure science retains its assumed role as producer and keeper of verifiable knowledge of the external world. In the same paper, Walker identifies the appropriation of Indigenous Knowledge through ethnography mining when the reductionist approaches of science are insufficient to address the scale or complexity of the scientific challenge.

### Opportunities yet to be realised

An approach inclusive of Indigenous Knowledge could realise greater benefit. Further it would be inappropriate to underestimate the contribution that Indigenous Wisdom will make. It is unlikely that Western Science alone, driven as it is by economic imperatives, could identify solutions as sophisticated as those possible within a holistic paradigm.

An example is the Indigenous Wisdom-based selection of a tree for the creation of a waka. Asymmetry within the natural world is understood within a holistic paradigm and is a desirable characteristic that can be optimised within a holistic design approach such that the eccentric centroid of mass in the asymmetric cross-section provides inherent stability for the waka hull when crafted appropriately to take advantage of this characteristic. The knowledge of the existence of this phenomenon, the knowledge of the location of the trees exhibiting the optimum combination of the most desirable asymmetric attributes, the inherent spiritual processes that support these efforts, and their seamless integration is Indigenous Wisdom that Western Science is unable to replicate. To create a similar result would require significantly greater resource levels with inherent increased levels of uncertainty that would need to be compensated by increased safety factors if attempted from a Western scientific approach. In effect the waka created from a Western scientific paradigm would in all likelihood be too heavy, slow and ponderous due to over-design.

Science practitioners seek predictability and repeatability to ensure very high levels of confidence and as a measure of quality control. However, that approach to gathering knowledge would preclude many of the achievements of Indigenous peoples. Furthermore, much contemporary science and engineering (applied science) is based on statistical probabilities. The assertion of the scientific truth of this knowledge system in this way is on shaky ground, as the statistical means of compliance are rarely absolute, and so repeatability and predictability are not always assured.

Conversely, it can be seen in historic exemplars of engineering (applied science) that Indigenous Wisdom can optimise outcomes by exploiting a holistic understanding of the variability inherent in natural systems, the availability of resources, and the problem context.

Our final example is that of the ocean voyaging waka that surfed to Aotearoa from Hawaiiki. The achievement is not conceivable from a scientific paradigm as the basis of this achievement is the combination of specific Pacific Ocean weather conditions in the Northern Hemisphere



that occur on a timescale of several years, combined with highly specialised sail and hull designs, and observation of repetitive natural phenomena over many centuries. Yet this was the basis of exploration and travel throughout the Pacific centuries before the European navies ventured out of sight of land with any confidence of a safe return.

## Conclusion

With Copernicus and Galilei came the reign of scientific thought, with highly specialised branches of knowledge continuously examined from a reductionist approach. As each branch of knowledge separated itself further from the others, the whole body of knowledge became fragmented. The necessary present-day integration of the social, economic, environmental, and cultural dimensions for sustainability is a difficult goal for Western scientific approaches that treat knowledge as compartmentalised, separate, and commercial. This problem is a fundamental inadequacy of the rational, reductionist paradigm of scientific endeavour. The reductionist paradigm is unable to understand the complexity of human and natural systems.

Is it wise, then, to isolate and marginalise information, intentionally or unintentionally, that other knowledge systems, such as Indigenous Wisdom, would consider highly relevant and indeed essential for a truly holistic and sustainable approach to the relationship between humans and their ecosystems of origin?

The scientific revolution has significantly contributed to our shared understanding of the physical universe, an understanding underpinned by the concept of the attractive force of gravity. Events associated with the scientific revolution heralded by an enhanced understanding of gravity, influence the way contemporary westernised societies think and act right through to today.

The concept of mauri, equally important to Māori, is also an attractive force, but it provides an understanding of the relevance of the non-physical attributes of our universe that Western Science is as yet unable to comprehend.

*Kia aho matuahia te taketake, kia tūwaerea te tau.*

*When information becomes intuition, knowledge becomes wisdom.*

## References

- Best, E. 1934. *The Maori as He Was: A Brief Account of Maori Life as it was in Pre-European Days*. Wellington: Dominion Museum.
- Blake, P., T'Seleie, F., Lamothe, R. 1977. Statement to the Mackenzie Valley Pipeline Inquiry. Pp. 12–17 in Watkins, M. (Ed.), *Dene Nation – The Colony Within*. Toronto: University of Toronto Press.
- Dunphy, D. 2001. *In Search of the Future: Notes for spiritual adventurers*. Paper presented at the 4th Annual Conference on Spirituality, Leadership and Management, Canberra, Australia.
- Firth, R. 1929. *Primitive economics of the New Zealand Maori*. London: George Routledge & Sons.
- Galilei, G. 1642, reprinted 2005. *Dialogues Concerning Two New Sciences*. Philadelphia: Running Press Book Publishers.
- Gauch, H.G. 2003. *Scientific Method in Practice*. New York: Cambridge University Press.
- Grenier, L. 1998. *Working with Indigenous Knowledge: A guide for researchers*. Ottawa, Canada: International Development Research Centre.
- Gwich'in Elders. 1997. *Nanh'Kak Geenjit Gwich'in Ginjik: Gwich'in Words about the Land*. Inuvik, Northwest Territories, CA: Gwich'in Renewable Resource Board.
- Hooper, A. 2005. Introduction. Pp. 1–21 in Hooper, A. (Ed.), *Culture and Sustainable Development in the Pacific* (). Canberra, Australia: ANU E Press and Asia Pacific Press.
- La Duke, W. 1997. Voices from White Earth: Gaa-waabaabiganikaag. In Hannum, H. (Ed.), *People, Land and Community: Collected E.F. Schumacher Society Lectures*. New Haven, CT: Yale University Press.
- Marsden, M. 2003. *God, Man and Universe: A Māori View. The Woven Universe*. Masterton: The Estate of Reverend Māori Marsden.
- Marsden, M., Henare, T.A. 1992. *Kaitiakitanga: A definitive introduction to the holistic worldview of the Māori*. Wellington: Ministry for the Environment, NZ.
- McGregor, D. 2004. Traditional Ecological Knowledge and Sustainable Development: Towards Coexistence. Pp. 72–91 in Blaser, M., Feit, H.A., McRae, G. (Eds), *In the Way of Development: Indigenous Peoples, Life Projects and Globalisation*. Available from [http://web.idrc.ca/openebooks/004-7/#page\\_72](http://web.idrc.ca/openebooks/004-7/#page_72)
- Mead, H.M. 2003. *Tikanga Māori: Living by Māori Values*. Wellington: Huia Publishers.
- Merchant, C. 2006. The Scientific Revolution and the Death of Nature. *Isis*, 97 : 513–533.
- O'Regan, T. 1984. *Māori perceptions of water in the environment: An overview*. Hamilton, NZ: University of Waikato.
- Orange, C. 2004. *An illustrated history of the Treaty of Waitangi*. Wellington: Bridget Williams Books.
- Parliamentary Commissioner for the Environment. 2001. *Beyond ageing pipes. Urban water systems for the 21st Century*. Wellington: Parliamentary Commissioner for the Environment.
- Patterson, J. 1992. *Exploring Māori Values*. Palmerston North: The Dunmore Press Ltd.
- Pukui, E. 2007. *Ulukau*. Honolulu: University of Hawai'i Press.
- Raffan, J. 1993. Where God began. *Equinox*, 71, September/October: 44–57.
- Rangihau, J.T. 1981. Being Māori. Pp. 165–175 in King, M. (Ed.), *Te Ao Hurihuri / The world moves on: Aspects of Maoritanga*. Auckland: Longman Paul.
- Roberts, M. 1996. *Indigenous Knowledge and Western Science: Perspectives from the Pacific*. Paper presented at Conference on Science and Technology, Education and Ethnicity: An Aotearoa / New Zealand Perspective, Wellington.
- Salmond, A. 1991. *Two worlds: First meetings between Māori and Europeans, 1642–1772*. Auckland: Viking.
- Salmond, A. 1997. *Between Worlds: Early exchanges between Maori and Europeans, 1773–1815*. Auckland: Viking.
- Salmond, A. 2003. *The Trial of the Cannibal Dog: Captain Cook in the South Seas*. London: Allen Lane.
- Scaruffi, P. 2007. Thymos: Studies on Consciousness, Cognition and Life. Retrieved 3 February 2007, from <http://www.thymos.com>
- Second International Indigenous Forum on Climate Change. 2000. *Declaration of Indigenous Peoples on Climate Change*. The Hague, Netherlands: United Nations.
- Sinclair, D. 1975. Land: Māori view and European response. Pp. 115–140 in King, M. (Ed.), *Te Ao Hurihuri / The world moves on: Aspects of Māoritanga*. Wellington: Hicks Smith & Sons Ltd.
- Sobel, D. 1995. *Longitude: The true story of a lone genius who solved the greatest scientific problem of his time*. New York: Walker.
- Spedding, J.A.B.F. 1872. *The Letters and the Life of Francis Bacon Including All His Occasional Works*. London: Longman, Green, Longman and Roberts.
- Vaggioli, F. 1896, translated 2000. *Storia della Nuova Zelanda e del suoi abitatori: History of New Zealand and its inhabitants* (English translation edn). Dunedin: University of Otago Press.
- Walker, M.M. 1998. Science and Māori Development: A Scientist's View. *He Pukenga Kōrero*, 3, 2, 15–21.
- Williams, H.W. 1957. *A Dictionary of the Māori Language*, 6th edn. Wellington: Government Printing Office.
- Zinkin, J. 2011. Challenges in Implementing Corporate Governance: Whose Business is it Anyway? *Appendix G: Thymos and "Thymotic Man"*. John Wiley & Sons.