

INDIGENOUS MĀORI KNOWLEDGE AND PERSPECTIVES OF ECOSYSTEMS

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ABSTRACT: A framework/model based on Māori knowledge, values and perspectives is presented that distinguishes ‘cultural values’ from ‘cultural services’ and extends the definition of cultural values across the whole ecosystem services framework. Māori aspirations and well-being are interdependent on ecosystems and ecosystem services. Ultimately Māori wish to use these ecosystem approaches and frameworks to increase participation and inclusion in decision-making, to achieve multidimensional aspirational goals and desired indigenous outcomes.

INTRODUCTION

‘Ka mau tonu nga taonga tapu o nga matua tupuna
Koinei nga taonga i tuku iho, na te ātua’

‘Hold fast to the treasures of the ancestors

For they are the treasures that have been handed down to us
by God’

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.

Māori see the declining area and condition of natural ecosystems and the services they provide as significant and challenging. Many factors are involved in the ongoing and ubiquitous destruction and decline of the world’s forest, freshwater, wetland, coastal, and marine ecosystems. But with this destruction has come an alarming decline in life forms such as plant, animal, bird, and fish species, a rapid rise in the extinction of many species, and a reduction in the area and quality of habitat required to sustain this range of life forms. For Māori this widespread degradation is manifest through declining areal extent and quality of customary resources, and increasing difficulty in accessing such resources. For Māori, as with other indigenous cultures, there are clear links between healthy ecosystems (with greater life-supporting capacity) and people’s cultural and spiritual well-being. There is a realisation that most ecosystems require a diversity of life forms to exist and function properly (DOC & MfE 2000), and to sustain the services provided by ecosystems. This holistic thinking, based on traditional Māori values and beliefs, has increasing parallels with late 20th century emergent concepts and practices of interdisciplinary mainstream science, sustainability, ecological economics, and integrated planning and policy.

These sentiments resound strongly in the following Māori proverbs (whakatauki) and are often used to express indigenous perspectives in Māori planning and policy documents.

E tangi ana nga reanga o uta, e mahara ana nga reanga a
taima ta aha ra e whakamahana taku ora kia tina – When the
land, river and sea creatures are in distress then I have nothing to
be proud of (Ngāti Wai)

He kawenga ki te whenua, ki ngā uri o ngā ātua – The ethic
of responsibility towards the natural environment (Ngāti Wai
and Ngāti Whatua)

Ko ahau te taiao, ko te taiao, ko ahau – The ecosystem
defines my quality of life (Ngāti Wai and Ngāti Whatua)

Whakarongo, whakarongo, whakarongo ki te tangi o te manu
e karanga nei; tui, tui, tui, tuia – Listen to the cry of the birds
calling for unity – the introductory lines of the karakia remind us
that the natural world has a lot to teach mankind about the pres-
ervation of unity, interdependence, harmony and balance (Ngāti
Paoa iwi environmental management plan).

TRADITIONAL KNOWLEDGE AND BELIEFS

Traditional concepts and knowledge still shape the thinking of most Māori today, and traditional values resonate strongly in contemporary Māori society, forming the basis for indigenous perspectives. The Māori world view acknowledges a natural order to the universe, a balance or equilibrium, and that when part of this system shifts, the entire system is put out of balance. The diversity of life is embellished in this world view through the interrelationship of all living things as dependent on each other, and Māori seek to understand the total system and not just parts of it.

Māori beliefs, custom, and values are derived from a mixture of cosmogony, cosmology, mythology, religion, and anthropology (Best 1924a, b; Buck 1950; Marsden 1988; Barlow 1993; Henare 2001; Mead 2003). Integral to this complex and evolutionary belief system are the stories of the origins of the universe and of Māori people; the sources of knowledge and wisdom that have fashioned the concepts and relationship Māori have with the environment today (Marsden 1988; Henare 2001). From a Māori perspective, the origin of the universe and the world can be traced through a series of ordered genealogical webs that go back hundreds of generations to the beginning (Figure 1). This genealogical sequence, referred to as whakapapa, places Māori in an environmental context with all other flora and fauna and natural resources as part of a hierarchical genetic assemblage with identifiable and established bonds. The whakapapa (Roberts et al. 2004; Hudson et al. 2007) follows a sequence beginning with the nothingness, the void, the darkness, to a supreme god (Io-matua-kore), then emerging light, through to the creation of the tangible world, the creation of two primeval parents (Ranginui and Papatū-ā-nuku), the birth of their children (the wind, the forest and plants, the sea, the rivers, the animals), through to the creation of mankind. The two primeval parents, once inseparable, had many children, often termed departmental atua or Māori gods (Figure 2 – about 100 departmental gods), each with supernatural powers.

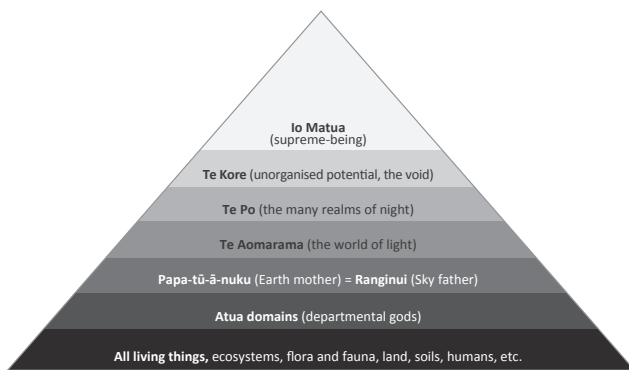


FIGURE 1 Te Timatanga – Māori creationist theory from the beginning

In a plan carried out by the children to create light and flourish, the parents were prised apart. The separation of the parents led to Ranginui (the Sky father) forming the sky, resulting in the rain as he continued to weep for his separated wife Papa-tū-ā-nuku (the Earth mother), and Papa-tū-ā-nuku forming the land to provide sustained nourishment for all her children. As part of this ancestry, a large number of responsibilities and obligations were conferred on Māori to sustain and maintain the well-being of people, communities, and natural resources.

It is within this context of cosmology and knowledge that Māori can form a perspective of ecosystems and ecosystem services and make sense of existing and emerging non-Māori scientific and ecological terms, concepts and knowledge forms. Māori language and oral tradition are imperative in unlocking this understanding (Wehi et al. 2009). From a Māori perspective, therefore, an understanding of ecosystems starts with Māori language translation and whakapapa.

MĀTAURANGA MĀORI

Mātauranga Māori (Barlow 1993; Durie 1998; Harmsworth 1998; Harmsworth et al. 2002; Mead 2003; Waitangi Tribunal 2011) provides the basis for the Māori world view and is a perspective encompassing all aspects of knowledge – e.g. philosophy, beliefs, language, methods, technology and practice. There are numerous definitions of mātauranga Māori. One of the more generally accepted is Marsden's (1988), which defines it, in a traditional context, as “the knowledge, comprehension or understanding of everything visible or invisible that exists across the universe”; this includes all Māori knowledge systems or ways of knowing and doing. It can also be simply defined as wisdom. In moving beyond the strictly traditional (i.e. locked in the past),

TWO PRIMEVAL PARENTS	
Papa-tū-ā-nuku (Earth mother) = Ranginui (Sky father)	
DEPARTMENTAL ATUA (CHILDREN)	
Tangaroa	The god of oceans, seas, rivers, lakes, and all life within them (and reptiles, fish, amphibians) & Tū-te-wehiwehi (grandson of Tangaroa is also referred to as the father of reptiles, lakes, rivers, fresh water)
Tāne-mahuta	The god of the forests and all living things within them
Tāwhiri-mātea	The god of winds and storms
Rongo-mā-Tāne	The god of cultivated foods (e.g. kūmara sweet potato), also god of peace
Haumia-tiketike	The god of fern roots and other wild foods
Rūaumoko	The god of earthquakes and volcanoes
Tū-mata-uenga	The god of man and war
Whiro	The god of evil, the domain of darkness and death

FIGURE 2 The main ātua or departmental gods of Māori, children of Papa-tū-ā-nuku and Ranginui

mātauranga Māori has grown into many contemporary forms (e.g. historical, local and regional indigenous knowledge (e.g. Ulluwishewa et al. 2008), Māori perspectives, new innovative approaches) that are complementary to Western scientific knowledge; a view consistent with many recent Māori authors who regard Māori knowledge as a dynamic and evolving knowledge form that represents more than the past (Harmsworth 1997; Durie 1998; Harmsworth et al. 2002, 2011; Morgan 2003, 2006b, 2007; Awatere et al. 2011).

MĀORI VALUES

Māori values (Henare 1988, 2001; Marsden 1988; Marsden and Henare 1992; Barlow 1993; Harmsworth 1997; Mead 2003) are derived from the traditional belief system based on mātauranga Māori. Values can be defined as instruments through which Māori make sense of, experience, and interpret their environment (Marsden 1988). They form the basis for the Māori world view (te ao Māori), and provide the concepts, principles, and lore Māori use to varying degrees in everyday life, and often to form ethics and principles. This can govern responsibilities and the relationships Māori have with the environment and the way they make decisions. Important Māori values (see glossary) 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). 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).

KEY MĀORI ENVIRONMENTAL CONCEPTS

The Māori values listed above underlie important Māori environmental concepts (Henare 1988, 2001; Marsden 1988; Barlow 1993; Durie 1994; Kawharu 2000; Harmsworth et al. 2002; Mead 2003; Awatere et al. 2011) and form the basis for Māori perspectives when seeking to assess and understand ecosystems. Some of the key environmental concepts are:

- 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

A MĀORI VIEW OF ECOSYSTEMS

An ecosystem is a dynamic complex of plant, animal and micro-organism communities, and the non-living environment interacting as a functional unit. The conceptual framework for the Millennium Assessment (2005a) assumes that people are integral parts of ecosystems. Māori also see themselves as a part of ecosystems rather than separated from ecosystems. To achieve well-being humans require basic materials, health, good social relations, security, and freedom of choice and action. Many of these basic necessities are provided directly and indirectly by ecosystems. Humans not only depend on ecosystems, they influence them directly through land use and management. The strength of this interdependency between humans and ecosystems may be conceptualised as a reciprocal relationship comprising manaaki whenua (caring for the land) and manaaki tangata (caring for people).

The term ‘Te Ao Marama’, based on whakapapa, means ‘a world of light and opening, and symbolises a rich diversity of life, resources, and biodiversity’ and ‘richness of life’ (Harmsworth 2004). It 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. Te Ao Turoa and taonga tuku iho articulate a desired intergenerational equity for natural, treasured resources, passed from one generation to the next in as good a condition or state as has been determined in the previous generation. These terms convey knowledge about existence itself and reiterate the interconnection between human beings and the environment as fundamental for food, shelter, recreation, cultural practice, arts, and human well-being, providing the basis for human survival. They also give meaning to the spiritual and tangible dimensions of life.

The great Māori scholars Sir Apirana Ngata and Te Rangi Hiroa (Buck 1950) both wrote of the tradition of harmonising with the environment; and Rangi Mete-Kingi wrote of how the ancestors established their philosophy of preservation and conservation as a foundation on which future generations could build. Rangimarie Rose Pere relates the concept of conservation to that of whenua (meaning both land and placenta):

The land for me has the same significance as the placenta that surrounds the embryo in the womb – the Māori word ‘whenua’

is the term used for both the land and the placenta. Each living thing has a mauri, a life-force that relates to, and interacts with, the earth’s forces (Pere 1982).

Respecting and valuing the Māori world view and Māori concepts is an essential first step to understanding the iwi/hapū perspective of ecosystems. The term ecosystem needs to be understood within Māori contexts and frameworks (e.g. Douglas 1984; Awatere et al. 2011, 2012) to be meaningful to Māori and allow them to participate more fully in dialogue, protection and sustainability of ecosystems through inclusive management planning and policy setting.

MĀORI CONCEPTUAL MODELS OF ECOSYSTEMS

The traditional Māori world view acknowledged a natural order to the universe, a dynamic system built around the living and the non-living. For Māori the modern use of the terms ecosystem and ecosystem services can be explained through traditional knowledge and the interwoven concepts of whakapapa, mana and kaitiakitanga, and possession of the spiritual qualities of tapu, mauri, and wairua.

Traditionally Māori realised that shifts in mauri (life force, life spirit) of any part of the environment, for example through use, would cause shifts in the mauri of immediately related components. As a result, the whole system is eventually affected. All activities and relationships were bound up and governed by mythology, tapu, and an elaborate system of ritenga or rules. The process used by Māori to guide resource use reflects this belief in the interrelationship of all parts of the environment.

Several sophisticated cultural models based on a blend of mātauranga Māori, traditional concepts, and Western scientific knowledge have been developed in the last 15 years to provide Māori with assessment and monitoring tools to express and articulate their values and perspectives, by recording changes to the environment and ecosystems. They also provide a means to explain broad international concepts such as sustainability (Jollands and Harmsworth 2007). These models and cultural tools help connect humans, activities, and use, to ecosystems. They are being increasingly used to provide cultural perspectives, through resource management frameworks for planning, policy and decision-making.

Three well-known cultural assessment models are briefly described: the Cultural Health Index (CHI), Māori wetland indicators, and the Mauri Assessment model. The Cultural Health Index and its assessment methods are becoming commonly accepted, adapted, and used by many Māori groups around New Zealand; the wetland indicators provide an important approach to underpin wetland restoration and enhancement of ecosystems; while the mauri model provides a useful framework for many assessments linking ecosystems and human well-being. These approaches, among others, form the basis for Māori environmental monitoring in New Zealand, especially in regard to fresh-water ecosystems (Douglas 1984; Tipa 2006a, b; Harmsworth et al. 2011) and to restoration of biodiversity/cultural values (Harmsworth 2002)

Cultural Health Index (CHI)

The Cultural Health Index was developed from 1999 onwards to provide Māori groups (iwi/hapū, kaitiaki) with a tool to express their cultural values relating to river and stream health and customary resources (i.e. mahinga kai) in a way that could be incorporated into catchment management decisions. The CHI lists several cultural indicators – heritage sites, taonga species

(flora and fauna), water quality, mahinga kai – collectively assessed as mauri. Details of the tool are well documented (Tipa 1999; Tipa and Teirney 2003a, b, 2006a, b; Townsend et al. 2004; Harmsworth et al. 2011). It provides a scoring ‘index’ for assessing streams and rivers. The index comprises a score (e.g. A-1/2.9/4.1) for recognising and expressing Māori values, and can be used as an indicator for environmental reporting. It can be used for entire river and stream catchments rather than solely for small sections or sites along a river/stream. Three components make up the numeric index at any given river or stream site:

- Establishing the relationship or association by tangata whenua, iwi/hapū (site status)
- Evaluating mahinga kai values (mahinga kai measure)
- Assessing stream health (stream health measure)

Māori wetland indicators

Māori wetland indicators were developed (1998–2002) as part of a large national project ‘Coordinated Monitoring of New Zealand Wetlands’ (Harmsworth 2002). The aim was to develop a Māori-based monitoring approach for assessing wetlands together with a set of indicators based on mātauranga Māori. The project was carried out using participatory research with a number of iwi and hapū throughout New Zealand. The pressure–state–response model (OECD 1993, 1997; MfE 1998) was used to develop the main indicator groups and more specific or key indicators in each group. Within a participatory research framework the model was explained to Māori as:

- What’s causing the problem(s)/issue?
- What taonga and mauri will be assessed or recorded?
- What are the trends (through time), how will you know if the wetland is getting better or worse (from a cultural perspective)?

A final set of nine key Māori indicators, largely based on mātauranga Māori, included mauri, recording extent and abundance of taonga iconic species, percent change in spatial area through time, and increases/decreases in perceived problem or exotic species. The indicators were strongly linked in order to measure trends and assess progress towards desired cultural and environmental aspirations and goals for wetland restoration or rehabilitation. The methods were developed to complement other Māori and scientific approaches and to support cultural impact assessments and long-term monitoring programmes (Harmsworth 2002; Jollands and Harmsworth 2007).

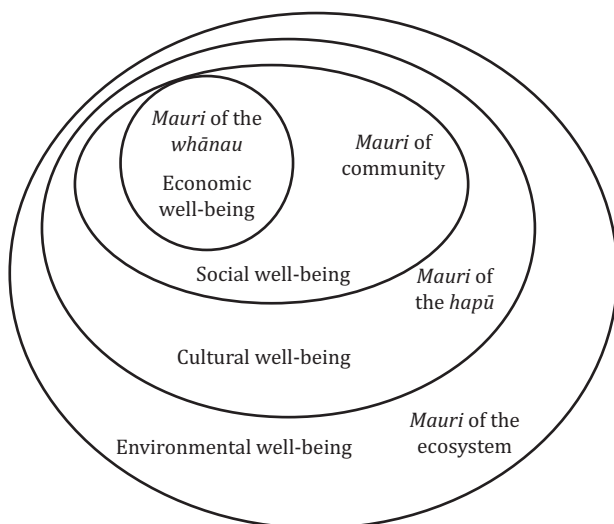


FIGURE 3 A decision-making tool for assessing the important cultural concept of mauri (from Morgan 2003).

Mauri assessment model

The Mauri Model (Morgan 2003, 2006a, b, 2007) was developed from 2002 onwards as a framework, assessment method, and decision-making tool to integrate economic, social, cultural dimensions – regarded as subsets of the environment. It is based on the concept of mauri. As such, the tool demonstrates methods for understanding the interrelatedness or interconnectedness of all living things, and for measuring sustainability and human well-being. From an indigenous perspective it measures the impacts of certain (anthropogenic) activities and practices on the mauri within four key aspects: ecosystems (environmental), hapū (cultural), whānau (economic), and communities (social) (see Figure 3).

The model’s aim is to assist decision-making by helping understand how different activities impact on the intrinsic values of ecosystems, and showing the interrelatedness between sustainability dimensions. It therefore helps improve resource management and sociocultural outcomes by (1) measuring impacts on cultural, social, economic and environmental dimensions from an indigenous perspective, (2) integrating te ao Māori values and knowledge into Western models of sustainability, and (3) analysing both institutional and environmental performance.

The relative importance of aspects can be addressed independently by users and decision-makers choosing a weighting applied to each aspect before scoring is completed and hierarchies developed. Impacts on the mauri (Figure 4) can be regarded as:

- Strong
- Weak
- Exhausted
- Six ratings of mauri are given for each aspect:
 - Highly sustainable – 5
 - Viable practice enhancing the mauri – 4
 - Contributing to mauri – 3
 - Neutral – 2
 - Diminishing the mauri – 1
 - Significantly diminishing the mauri and the resource – 0

The resulting effect of activities and practices on the mauri (Figure 4) will be seen as: –2, destroyed mauri (mauri mate); –1, diminishing mauri (mauri noho); neutral; +1, maintaining mauri (mauri mahi); +2, enhanced mauri (mauri ora/kaha). Evaluation methods identify whether an option/development/practice is:

- Enhancing
- Diminishing
- Neutral

MĀORI MODELS OF WELL-BEING

A number of holistic models of well-being and human health have been proposed, based on Māori traditional knowledge and understanding. Most were postulated as a part of a renaissance in Māori culture, education, and politics in New Zealand in the

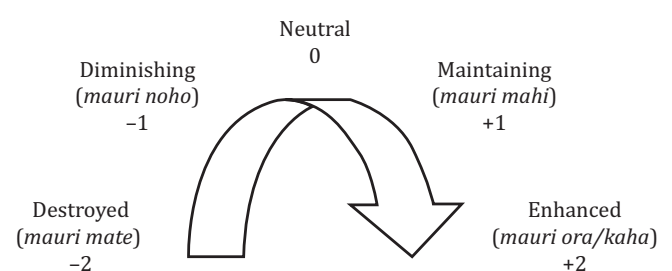


FIGURE 4 Assessment of mauri (from Morgan 2003).

1970s. These models are particularly useful when linking Māori well-being to the natural environment as they demonstrate Māori relationships with and dependency on environmental conditions.

Māori believed at the time, however, that the models' health focus was too narrow and too concentrated on physical illness. As Māori participation in the health debate grew, several perspectives were advanced by Māori, all emphasising the need to better balance traditional belief systems and cultural values with Western approaches to health (Durie 1994).

These health perspectives were in accord with contemporary Māori thinking, especially in their advocacy of greater integration and (w)holism. Three models became widely accepted and have since formed the basis for modern health programmes for Māori and non-Māori in New Zealand:

- The Whare Tapa Wha
- Te Wheke
- Ngā Pou mana

These three main Maori well-being models are presented in Table 1 (from Durie 1994).

TABLE 1 Three common Māori well-being models (Durie 1994)

	Whare Tapa Wha	Te Wheke	Nga Pou Mana
Components	Wairua Hinengaro Tinana Whānau	Wairuatanga Hinengaro Tinana Whānaungatanga Mana ake Mauri Ha a koro ma a kui ma Whatumanawa	Whānaunga-tanga Taonga tuku iho Te Ao tūroa Turangawaewae
Features	Spirituality Mental health Physical Family	Spirituality Mental health Physical Family Uniqueness Vitality Cultural heritage Emotions	Family Cultural heritage Environment Land base
Symbolism	A strong house	The octopus	Supporting structures

The Whare Tapa Wha model compared health to the four walls of a house, all four necessary to ensure symmetry and balance, and each representing a different dimension: taha tinana (the physical side, the body), taha wairua (the spiritual), taha hinengaro (the mental – thoughts and feelings), and taha whānau (the family). To treat the whole person and achieve well-being all four dimensions must be in balance.

The Wheke (8-legged octopus) model extended these four dimensions to eight, adding mana ake (the unique qualities of each individual and family, to create positive identity), mauri (the life-sustaining principle in all people and objects), ha a koro ma a kuri ma (breath of life from ancestors), and whatumanawa (the open and healthy expression of emotion). The collective waioara – the total well-being for the individual and family – is gained from a combination of these dimensions, and is represented in the model as the eyes of the octopus.

The Ngā Pou mana (four supports) model described a full set

of values and beliefs as pre-requisites for health and well-being (Henare 1988; Durie 1994). The model placed greater emphasis on the external environment and the significance of oral tradition. Again with four key supports, the interacting variables for both individual and group well-being included whānaungatanga (the importance of the family), taonga tuku iho (cultural heritage), te ao tūroa (the natural environment) and Turangawaewae (the land base, a place of belonging, standing and identity).

Taha wairua is generally felt by Māori to be a significant and integral part of Māori well-being. As Durie (1994) explains, 'It implies capacity to have faith and be able to understand the links between the human situation and the environment. Without a spiritual awareness and a mauri (spirit and vitality) an individual cannot be healthy and is more prone to illness and misfortune.' 'Belief in god is one reflection of wairua, but it is also strongly evident in relationships with the environment.' 'Land, lakes, mountains, reefs all have a spiritual significance quite apart from economic and agricultural considerations, and are regularly commemorated in song, tribal history, and formal oratory.' 'A lack of access to tribal lands or territories is regarded by tribal elders as a sure sign of poor health since the natural environment is considered integral to identity and fundamental to a sense of well-being' (p. 71).

The Ngā Pou model also emphasises that well-being is affected not just by access to or quantity of natural resources but also by their state or condition. Therefore the loss of land, pollution (through sewage effluent and other contaminants) affecting traditional areas of food gathering, and the depletion of natural resources are all destabilising factors on health and well-being, and debase spiritual and cultural values. Particular reference to the natural environment (Te Ao Tūroa) was made by a large number of Treaty of Waitangi claims (Waitangi Tribunal), especially the series of 1980 landmark decisions responding to the pollution and modification of culturally significant waterways. All these claims recognised the significance of a clean environment for good health.

MĀORI ASPIRATIONS

The 2000 Millennium Declaration was adopted by 189 countries and in 2005 eight Millennium goals were set by the United Nations: end of poverty and hunger; universal education; gender equality; child health; maternal health; combat HIV/AIDS; environmental sustainability, and global partnership. Following the 2000 declaration the United Nations led Millennium Ecosystem Assessment was carried out between 2001 and 2005 (MEA 2005a, b) to assess the consequences of ecosystem change for human well-being. The reports (MEA 2005a, b) made strong links between human well-being and ecosystems, and linked the Millennium Development goals to ecosystem services. A number of development goals linked to ecosystem services were identified: health; natural hazard protection; adaptation to climate change; freshwater provision; environmental conservation; food production; poverty reduction; and energy security (MEA 2005a,b; WRI 2008).

In various forums and reports Māori have also stated their development aspirations, which have been universally and regularly considered and discussed at national, regional, tribal, and local hui (e.g. Hui Taumata – the Māori economic development summit, 1984). Many aspirations were generic, such as well-being and wealth creation. Māori self-determination is about the advancement of Māori people, as Māori, and the protection of the environment for future generations. The modern concept of

Māori development stresses notions of economic self-sufficiency, social equity, cultural affirmation, and a greater measure of Māori autonomy (Durie 2003).

TABLE 2 Generic national aims of Māori self-determination (Durie 2003)

The aim of Māori advancement	The aim of affirming Māori identity	The aim of environmental protection for future generations
Economic self-sufficiency	Personal identity	Land and forests
Social equity	Whānau identity	Rivers and lakes
Cultural affirmation	Hapū identity	Harbours and the sea
Political strength	Iwi (tribal) identity	Air
	Identity as a Māori nation	Environmental links with humankind

Following on from national hui in the 1980s and 1990s, Māori developed common aspirations, many progressing towards Māori self-determination, through a series of development frameworks and strategies and produced steps towards generic national aims and outcomes (Durie 2003) (see Table 2). A good outcome was described by Durie (2003) as being ‘where Māori resources are plentiful and in development mode’. Desired outcomes and indicators developed as part of a national development framework and agenda are summarised with examples in Table 3. Two broad outcome domains were given:

- Human capacity (reflects the way in which Māori participate as Māori in society generally, as well as in Māori society – as individuals and groups);
- Resource capacity (on which the human capacity is built) and refers to the state of Māori resources, including cultural and intellectual resources as well a physical resources.

In terms of Te Ao Turoa, the Māori world view places value on the whole environment (natural modified, urban) using concepts and values such as kaitiakitanga (Marsden and Henare 1992; Roberts et al. 1995; Awatere et al. 2011) in all decision-making. A good result produces ongoing respect and application of Māori values in all ecosystems management, where Māori knowledge systems sit equally alongside Western science to manage and enhance ecosystems and taonga (e.g. culturally significant flora and fauna), where Māori are part of all decision-making processes for resource management, where Māori derive sustained direct and indirect benefit from ecosystem services, and where Māori aspirations are understood and fulfilled.

THE MODERN MĀORI ECONOMY

In a contemporary context Māori rely on traditional resources for customary practice but also have extensive interests in agriculture, forestry, fishing, aquaculture, horticulture, urban and rural development, and eco-tourism, all of which are based on healthy ecosystems and sustainable natural resources.

While Māori understand ecosystems from a traditional Māori values perspective, they also see ecosystems as underpinning the modern vibrant Māori economy (Te Puni Kōkiri 2002; Whitehead and Annesley 2005; BERL 2011), where Māori have major assets and wealth in the primary sector, particularly in pastoral farming, cropping, horticulture, forestry, and fisheries. About 52% of the Māori economy is concentrated in the primary industry (Te Puni Kōkiri 2007) and therefore depends heavily on the protection, management, and sustainability (Harmsworth 2009) of natural ecosystems. These productive landscapes provide Māori with an

economic base on which to achieve individual and group aspirations and prosperity. This productive base of high natural capital provides services and benefits, to help sustain human well-being. While Māori regard themselves as kaitiaki of all lands, water, forests and fisheries, collectively in 2010 Māori owned only about 6% or 1.5 million hectares of the total New Zealand land area. In 1840 the land area used by Māori, along with natural resources, was nearly 100% of New Zealand. Over time, since European settlement, land ownership has become increasingly fragmented as a result of national legislation and policy that has essentially individualised and privatised land title, alienating Māori from much of the land and water resources formerly available to them. Following Treaty of Waitangi settlements, however, Māori now own about 20% of the fisheries resource and the estimated value of Māori exports in 1999/2000 was about \$650 million (NZIER 2003) and in 2001 the total annual tax contribution from the Māori economy was \$2.4 billion (NZIER 2003).

The Māori contribution to New Zealand’s farming economy is significant, for example, in 2003 Māori were farming 720 000 ha mainly in sheep, beef and dairy. In the early 2000s more than 15% of the country’s sheep and beef exports came from Māori farming interests, and in 2010 Māori owned around \$NZ 100 million worth of shares in Fonterra, the largest NZ dairy company. It was estimated that in 2003 the annual agricultural and forestry production from Māori communally owned land assets was approximately \$750 million, contributing 7.5% of New Zealand’s total annual agricultural outputs (NZIER 2003). As the Māori asset base grows, so does its contribution to local, regional, and national economies.

CULTURAL VALUES AND ECOSYSTEMS

A value can be defined as an ‘enduring belief that a particular mode of conduct (e.g. being courageous, honest, loving, obedient) or a state of existence (e.g. peace, equality, pleasure, happiness) is personally and socially desirable’ (Rokeach 1973; Gilbert and Hoepfer 1996, p. 59). For the New Zealand context the Ministry of Education (2005), after an extensive review of national and international literature, developed this definition: ‘Values are internalised sets of beliefs or principles of behaviour held by individuals or groups. They are expressed in the way people think and act. They are based on cultural, religious, philosophic and spiritual traditions, and on current critical reflection, dialogue and debate’.

Cultural values cum services were defined by Costanza et al. (1997, p. 254) as ‘aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems’. This definition was expanded by the Millennium Ecosystem Assessment (2005, p. 894) to include ‘the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g. knowledge systems, social relations, and aesthetic values’. These types of cultural non-material or ‘non-use’ values are included within ecosystem services in all prominent typologies (Costanza et al. 1997; Daily 1997; de Groot et al. 2002; MEA 2005a) but in practice have received very little attention in ecosystem services research (Chan et al. 2012a, b). In New Zealand, these types of values were defined under the Resource Management Act 1991 (RMA) as ‘amenity’ or ‘character’ values (Legget 1996) and are commonly used by planners. Amenity values are defined in the RMA as ‘those natural or physical qualities and characteristics of an area that contribute to people’s appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes’.

TABLE 3 Māori aspirations defined as outcome goals and classes by Durie (2003)

Outcome classes	Outcome goals	Indicators	Examples
Te Manawa – a secure cultural identity	Positive Māori participation in society as Māori	Māori active in government, business, industry and decision-making, etc.	Number of Māori in managerial positions, number of Māori MPs, equitable educational achievement, sector employment, Māori decision-making at local government level
	Positive Māori participation in Māori society	Māori active in their communities, whānau, marae	Activities at whānau and marae level, number of people living in tribal areas, networks, etc.
Te Kāhui – collective Māori synergies	Vibrant Māori communities	Organised Māori community networks, institutions	Māori community standards of living, number of marae & condition
	Enhanced Whānau capacities	Strong and supportive families	Levels of Māori well-being
	Māori autonomy (tino rangatiratanga)	Māori practising self-determination	Decision-making in local politics, active kaitiakitanga groups
Te Kete Puāwai – Māori cultural and intellectual resources	Te reo Māori in multiple domains	Increased use of Māori language	Number of fluent Māori speakers by iwi and nationally, use of te reo Māori in society
	Practice of Māori culture knowledge, and values	Māori values and mātauranga Māori being used across institutions	Māori knowledge systems developed and being regularly used
Te Ao Turoa – the Māori estate	Regenerated Māori land base	Area of Māori land and resources	Māori registered land area quantified
	Guaranteed Māori access to clean and healthy environment	Māori participation in monitoring and state of environment reporting, Mātauranga in all ecosystems assessment	State and condition of mahinga kai, quantity and condition of flora and fauna;
			abundance/presence/absence of taonga species
	Resource sustainability and accessibility	Māori have access to clean and healthy resources and ecosystem services	State and condition of natural resources in tribal areas

TABLE 4 An ecosystem services classification framework of provisioning, regulating, cultural and supporting services showing the 33 main service sub-categories for New Zealand (Dymond et al. 2012)

			Important services to assess in NZ	Natural ecosystems	Production ecosystems
Total value of ecosystem services	Direct use values	Provisioning services	Food: crops	Forest	Pasture
		Regulating services	Food: livestock	Shrubland	Cropland
	Indirect use values	Cultural services	Food: aquaculture	Grassland	Orchard
		Supporting services	Food: capture fisheries	Alpine ecosystem	Forest
	Passive values	Option values	Food: wild foods	Subalpine shrubland	
		Existence values	Fibre: timber and wood fibres	Wetland	
		Bequest values	Fibre: others	Estuary	
			Biomass fuel	Mangroves	
			Freshwater	Lake	
			Genetic resources	River	
		Minerals	Marine		
		Physical support for dwellings			
		Climate regulation (global)			
		Water regulation			
		Water purification and waste treatment			
		Erosion regulation			
		Pest regulation			
		Disease regulation			
		Pollination			
		Air quality regulation			
		Natural hazard regulation			
		Spiritual and aesthetic values			
		Recreation			
		Tourism			
		Sense of belonging			
		Soil formation and maintenance			
		Provision of natural habitat free of weeds and pests			

Māori ‘cultural values’, as explained above, are based on the traditional Māori belief and knowledge system, which is the foundation from which Māori seek to understand and comprehend their world, ethics, behaviour and protocols; form perspectives; create new knowledge; and determine strategies and priorities to achieve Māori goals and aspirations (at global, national, regional and local levels). These aspirations include: economic prosperity; protection and management of the environment and cultural resources through concepts such as kaitiakitanga; Māori advancement through increased knowledge, social, and decision-making capacity; social and economic equity; a strong cultural identity; Māori health and well-being.

Cultural values such as these are difficult to define – Chan et al. (2012b) calls them ‘ill fitting’ – and they are usually categorised as ‘non-use’ or non-materialistic, non-monetary values that are less tangible and ‘extremely difficult to define and package using economic instruments’ (Awatere 2005, 2008; Steenstra 2010). For Māori, therefore, cultural values can include such aspects as the spiritual (wairua), sacred (tapu), metaphysical (e.g. mythology, beliefs, superstition), intrinsic, customary (e.g. protocols – tikanga), ethics-integrity, education-knowledge, amenity, heritage, well-being, recreation, and prestige and authority (mana). These values underpin (and transfer into planning) policy and actions that can be expressed in areas such as protection and management of traditional cultural sites, resources, and ecosystems – such as sacred sites (wāhi tapu), burial grounds (urupā), mahinga kai (customary harvest), traditional places and sites (wahi taonga), sustaining customary flora and fauna and natural resources (habitats and taonga species, plants, animals, birds, water) and safeguarding and strengthening the language and culture (e.g. te reo Māori, whakatauki, mōteatea, waiata, haka). They are also values not readily open to trade-offs.

The term ‘cultural values’ for Māori includes values that can be either tangible or intangible, material or non-material, use or non-use, qualitative or quantitative, and the extent of the term ‘cultural values’ needs to be fully understood and elaborated. For Māori, achieving aspirations requires a careful balance of a complete range of values from non-monetary to monetary, non-use to use. This extends the term ‘cultural values’ for Māori to also cover ‘use’ values (e.g. for economic prosperity and well-being) that are more tangible. Therefore, Māori wish to achieve their development needs and aspirations through a combination of ‘use’ and ‘non-use’ values, and would prefer that their values were not defined merely as ‘non-use’. Rather, all Māori values should be considered when making decisions in regard to ecosystem services.

ECOSYSTEM SERVICES

Humans derive benefit from a multitude of resources, processes, products and assets from the natural environment and its ecosystems. These are termed ecosystem services. The 2005 Millennium Ecosystem Assessment (MEA) grouped ecosystem services into four main categories:

- Provisioning services, such as fresh food, water, timber, and fibre
- Regulating services, such as the regulation of climate, floods, disease, wastes and water quality
- Cultural services, such as offering recreational, aesthetic, and spiritual benefits
- Supporting services, such as soil formation, photosynthesis, and nutrient cycling

Using the four main MEA (2005a) categories of ecosystem services, Dymond et al. (2012) identified, defined, and listed 33 main service sub-categories of ecosystems in New Zealand (Table 4). These services make up a comprehensive ecosystem classification framework whereby trends and measures can be assessed.

It was stated (MEA 2005b) that ‘an ecosystem services assessment can help build a bridge between development and environmental communities by providing credible and robust information on the links between ecosystem management and the attainment of economic and social goals’. It therefore provides ‘benefits of ecosystem services, so that decision-makers can understand how their actions might change these services, consider trade-offs among options, choose policies to sustain a mix of services’, etc. Yet the MEA (2005a, b) found that the majority of ecosystem services were in a serious state of decline. An assessment of ecosystem services provides the connection between environmental issues and people. ‘Reconciling economic development and nature is challenging because they have traditionally been viewed in isolation or even in opposition and the full extent of humanity’s dependence on nature’s benefits or ecosystem services is seldom taken into account by development or environmental communities’ (MEA 2005a, b).

Ecosystem services in the Millennium Ecosystem assessment were defined as benefits whereas Costanza et al. (1997) defined them as values. In the interests of conceptual clarity, Chan et al. (2012b) noted 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)’.

Māori would agree that a significant component of cultural values transfers into direct and indirect benefits, and some cultural values transfer directly into cultural services while others don’t. Many of the ‘non-monetary’, ‘non-material’, ‘non-use’ or more ‘intangible’ cultural values described previously would fit this definition ‘ecosystem contributions to non-material benefits’ (Chan et al. 2012b).

For Māori all benefits are reciprocal and not a one-way process, and an important principle in kaitiakitanga is reciprocity (tau utu utu). The principle of kaitiakitanga *entails an active exercise of power in a manner beneficial to the resource*. It can be illustrated by *humans providing benefit to the ecosystem and natural resource, through for example guardianship and sustainability, and means that the ecosystem or resource is sustained, if cared for, and can then provide benefit back to humans*.

ECOSYSTEM SERVICES FRAMEWORKS

Ecosystem services as a concept bridges the gap between ecology and economics and has helped to internalise and take account of values. Although it represents two main perspectives – economic and ecological – it still uses economic valuation techniques to assign a value to ecosystems, but has enabled a common language to be used with economists, and is becoming a useful tool in planning, policy, and decision-making. However, the persistent focus on an ‘economic worldview’ may have ‘closed the door to other social perspectives’ (Chan et al. 2012b). Within the broader ecosystem services approach and application, Chan et al. (2012b) therefore says, ‘some values do not fit naturally into the ES approach’, and there should be a broader consideration of ‘ill-fitting’ values such as non-use, cultural, intrinsic, and

moral so they are not dismissed as ‘hidden externalities’. There should be the appropriate space to understand and take into account these types of values (Chan et al. 2012b) and ecosystem services should not be insensitive to these values. This broader world view of values and ecosystems enables a move towards a more unified, integrated management framework (away from fragmented, single-focus frameworks) as required to sustain and manage ecosystems in the future (Dymond et al. 2012). This view sits very comfortably with Māori. As we emphasise, Māori well-being is integrally linked to the well-being of ecosystems and vice versa. They cannot be separated; through whakapapa humans and ecosystems are inter-connected and humans are significant within the ecosystem.

Therefore ecosystem services frameworks need to accommodate different kinds of values for valuation and decision-making, particularly cultural values. ‘The overarching goal is to enhance awareness of the diversity of values that are integral to the ES framework – and ecosystem based decision-making – to motivate a meaningful change in representation and analysis of how human well-being may change alongside ecological change’ (Chan et al. 2012b, p. 9).

A MĀORI FRAMEWORK FOR ECOSYSTEM SERVICES

Integration of ecological and economic approaches has provided a major advance to ecosystem services research. However, when working with indigenous groups the complete range of cultural values need to be fully comprehended and understood, that is, both non-use (more traditional, customary) and use values (economic, production). An ecosystem services framework for Māori must recognise that ‘cultural values’ range across material (e.g. provisioning, regulating, supporting) to non-material values (e.g. customary-cultural, spiritual, sacred). The framework is therefore better structured to categorise all values aligned to the multidimensional goals and aspirations of iwi/hapū. 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. This provides a best-practice model (Figure 5) to achieve integrated sustainability planning and management of natural resources, ecosystems and their components. The participatory and decision-making process framework in Figure 5 shows the pathway to indigenous well-being, as compared with the MEA framework (MEA 2005a, b).

The acknowledgement and recognition of taonga and customary resources is paramount for Māori within an ecosystem management framework. To be effective the framework needs to show what is required to better protect and manage natural resources and deliver ecosystem services to achieve iwi/hapū Māori goals, aspirations and outcomes. Obviously critical to this inclusiveness is participatory decision-making (Figure 5) by indigenous groups in ecosystem policy, planning, and management, to achieve sustainability and enhancement of ecosystems and taonga (i.e. an outcome that can be measured).

MĀORI DECISION-MAKING IN ECOSYSTEM MANAGEMENT

One of the major motivations for ecosystem services research is participation in decision-making (Daily et al. 2009; Chan et al. 2012a) and understanding how decisions affect well-being by causing changes to ecosystems. If we examine this from a cultural perspective, Māori see engagement in ecosystem management as a right, but successful engagement and participation for Māori is

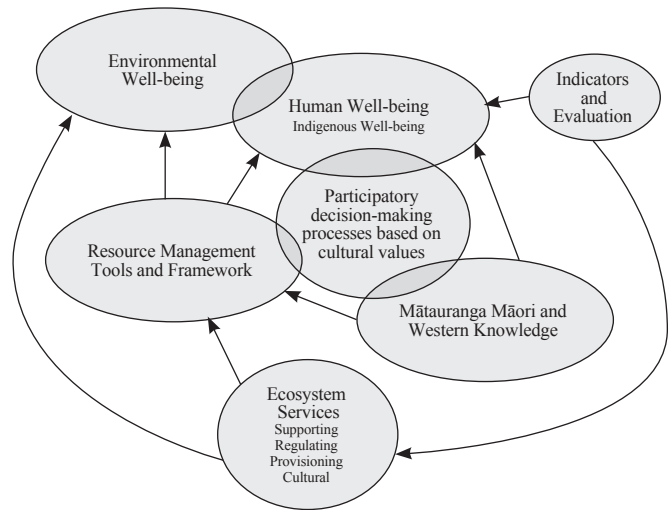


FIGURE 5 Resource management frameworks and participatory decision-making play an important role in helping to secure a strong cultural identity and support Māori well-being. Ecosystem services are only one part of this complex process.

of varied success. Māori are seldom involved in actual decision-making. Although there are well-developed and well-documented models and processes for Māori participation and collaboration in resource management decision-making (Harmsworth 2005a, b; Harmsworth et al. 2011; Awatere et al. 2011), there are still widespread difficulties, often reflecting factors such as lack of genuine commitment, mistrust, lack of respect, lack of knowledge, low capacity, and lack of resources. The most effective models and processes for decision-making are based on the Treaty of Waitangi (Awatere et al. 2011) as shown in Figure 6).

The Treaty of Waitangi

The Treaty of Waitangi (Te Tiriti o Waitangi) 1840 provides the basis for partnership and engagement between Māori and the Crown (the Government). It conferred responsibilities and obligations on subsequent New Zealand governments (representing the Crown) to uphold rights for Māori as British subjects and New Zealand citizens, to protect their land, estates, water, forests and other resources or treasures (taonga). The Treaty, written in

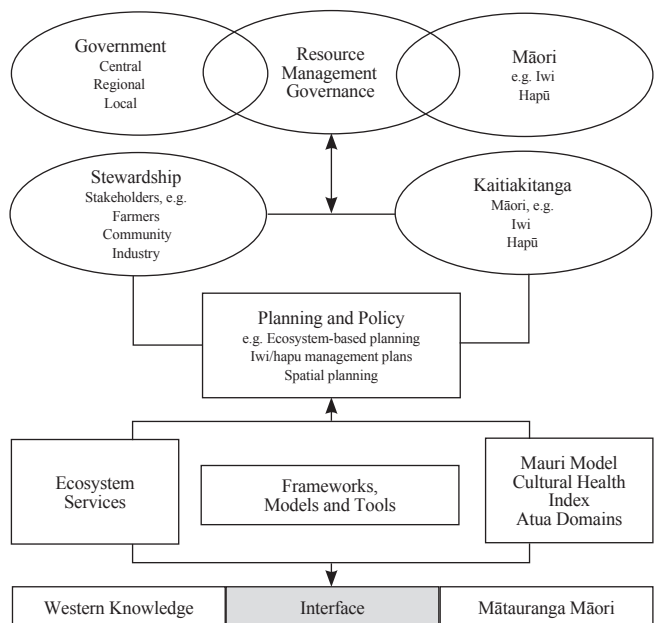


FIGURE 6 A planning framework based on Treaty of Waitangi principles.

Māori and English, has been the origin of arduous debate between Māori and Europeans since 1840, with various interpretations of the text and what it means. However, the principles of the Treaty provide an excellent basis for participation and decision-making by Māori with the Crown and with other stakeholders (e.g. community groups, industry, landowners).

Figures 5 and 6 advocate the position that resource management is a shared responsibility between government and iwi/hapū. The present situation in New Zealand is that mātauranga Māori is sometimes included as an appendage, and generally misunderstood, in a Western planning and policy regime. We advocate a new type of approach that moves beyond the mere co-option of mātauranga Māori into the dominant Western planning paradigm. This mixed-methods approach – where ecosystem services are located within a framework using a suite of tools based equally on mātauranga Māori and Western knowledge (as part of a pātaka or storehouse) – will help inform Māori and non-Māori resource managers. Using a co-planning approach, resource management planners can draw upon a range of planning frameworks, models, and tools based on the dual paradigms to help inform planning and policy.

We are more interested in finding common ground, a space where the ideals of stewardship can work alongside the principle of kaitiakitanga. Care must be taken in differentiating between kaitiakitanga and stewardship – they are not the same thing. While there are some shared characteristics, ultimately kaitiakitanga needs to be seen within a Māori epistemological context that is linked to many other Māori concepts such as whakapapa, rangatiratanga, and mana whenua. Negotiating these differences occurs at the interface of two planning paradigms, the incumbent Eurocentric planning regime and an indigenous planning regime based on mātauranga Māori (Awatere et al. 2011; 2012).

By locating ecosystem services within this type of framework (Figures 5 and 6), the validity of Māori cultural and Western approaches is recognised equally and establishes a more holistic framework for resource management decision-making, giving understanding to cultural values as distinct from cultural services. Because of the relative difficulties of quantifying all values, ecosystem services valuation should be utilised alongside existing qualitative practices such as public forum meetings, hui, focus groups and marae consultation.

DISCUSSION

To solve complex world problems, the Te Ao Pākehā (see Glossary) and international view of the world is becoming increasingly holistic (Figure 7). In fact, in many areas, we are seeing a re-alignment between indigenous and non-indigenous thinking. First, there is a greater need for integrated studies, collaborative learning, and understanding of the interconnected nature of our environment and a move away from a single-focus perspective. Second, different perspectives and knowledge forms are required to understand how different ecosystems work, to define the life-supporting capacity for each of these ecosystems, and to understand the sensitive balance between human beings and nature. Third, there is a need to build capacity at both the individual and community level as a means for achieving greater equity and inclusivity and a requirement for greater participatory decision-making.

One of the most important starting points for understanding where cultural and social values fit into ecosystem services is through constructive engagement and dialogue. In response to increasing pressures and degradation of ecosystems, there is an

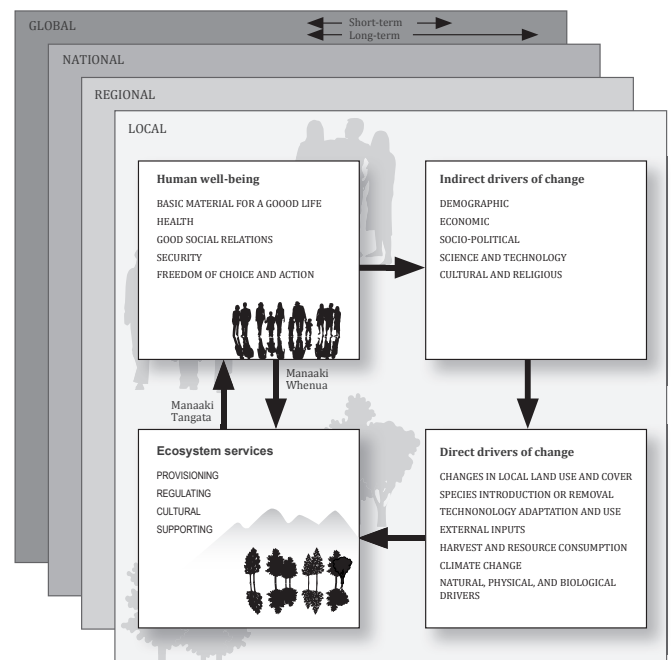


FIGURE 7 Conceptual framework for ecosystem services modified from the Millennium Ecosystem Assessment (from Dymond et al. 2012).

increasing need to understand the sustained flow of benefits from ecosystems for human survival and well-being, with increasing attention to ecosystem management (Chan et al. 2012a). Many frameworks for constructive engagement, dialogue, and collaboration, between various actors (e.g. communities, iwi and hapū, local and central government, industry) have been postulated in New Zealand over many years, and are being continually implemented and evaluated. It is within these collaborative frameworks that ecosystem services can be advanced and adopted (Chan et al. 2012a). In New Zealand, effective and tikanga-based (i.e. customary, correct way, recommended steps) engagement processes with Māori have been well documented (Harmsworth 2001, 2005a, b; Awatere et al. 2011).

Māori wish to be engaged from the beginning of the process (e.g. issues), through research and planning, policy and decision-making, to the end such as actions and activities on the ground. Chan et al. (2012a) has elaborated in several papers that the focus on ecosystem services is to improve decision-making; however, within ecosystem services practice the valuation of material contributions of ecosystems to human well-being has been emphasised, with much less attention to the important cultural and non-material values.

There is an emerging convergence of thinking between the Māori world view and ecological economic epistemologies as to what constitutes ecosystems and ecosystem services and what desirable frameworks are needed to effect change and improve ecosystem management (Figure 7). Māori support the need to recognise, consider, and internalise all values in decision-making through appropriate frameworks, integration, and valuation techniques. Māori have always considered themselves an integral part within all ecosystems, but are loathe to having their values misinterpreted and diluted simply to metrics (i.e. dollars, monetary; Awatere 2005, 2008; Steenstra 2010). The holistic Māori world view sits comfortably to support the view that ecosystems are made up of a ‘dynamic complex of plant, animal and microorganism communities as a functional unit’ (MEA 2005b). In terms of human values (e.g. spiritual, cultural-customary, amenity, character, aesthetic, recreational, intrinsic, material,

economic) and ecosystem services, the internalisation of cultural and ‘non-use’ values (non-monetary, amenity, non-materialistic) with non-use and use values (e.g. use values prescribe a dominant monetary, materialistic, commodity, consumption view) side-by-side is an essential prerequisite for more effective management and sustainability of natural resources. This requires a shift from an economic focus to a broader focus.

Within a model (Figure 8) for categorising items in a Māori ecosystem services framework, cultural values are not interpreted merely as non-use or intangible values. Instead, Māori cultural values comprise both use and non-use components and future inclusivity, planning and policy, decision-making and co-management of natural resources require a broader approach to values to be understood and practised (Figure 5). This has important implications for Māori and means their cultural values do not support and should not be considered just within the framework category of ‘cultural services’ (Table 4) but form an important component to underpin all services (i.e. provisioning, regulating services, cultural services, and supporting services). We therefore propose the terms ‘cultural non-use values’ and ‘cultural use values’ within future ecosystem services frameworks to differentiate. It is hoped this broader consideration of cultural values and cultural services will facilitate greater inclusion of indigenous perspectives in decision-making and ecosystem management, and lead to better outcomes for Māori.

CONCLUDING REMARKS

An indigenous Māori perspective of ecosystems and their services has been provided. The Māori world view strongly supports earlier writers’ attempts to broaden the economic framework of ecosystem services research to include ‘diverse values’, particularly non-use or intangible ones (Costanza et al. 1997; Daily 1997; de Groot et al. 2002; MEA 2005a, b; Chan et al. 2012b). However, Māori would prefer to define these values as non-monetary versus monetary, rather than non-use or intangible. Most values for Māori have a ‘use’ and most ecosystem services have a benefit. Further Māori would like their cultural values considered across a range of services (Table 4; Figure 8): provisioning, regulating services, cultural, and supporting, and not just be seen to equate with ‘cultural services’ such as non-use, intangible values – although these are significant within the Māori world view. We hope that this indigenous perspective will help reinforce moves for ecosystem services approaches not solely to ‘put a dollar value on nature’, but to broaden the way we see and use values and ethics, and lead to better practices (Chan et al. 2012b; Dymond et al. 2012). We must also respect and recognise alternative approaches to conveying values, and using ecosystem service frameworks outside of their normal bounds.

We acknowledge and strongly support the inclusion of ‘cultural services’ in the ecosystem service framework, as it represents a significant category, largely based on ‘non-material’ ‘less tangible’ values, consistent with the views of Awatere

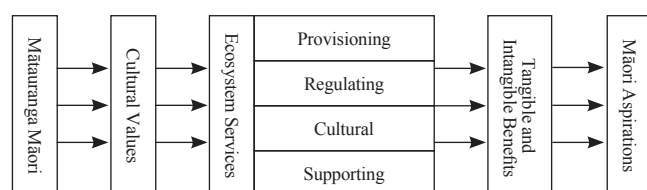


FIGURE 8 A māori ecosystem services framework uses cultural values to underpin all ecosystem services – provisioning, regulating, cultural, and supporting – not just cultural services.

(2005, 2008). However we have challenged the use of the term ‘cultural values and perspectives’ to cover only ‘non-use’, ‘non-material’ ‘intangible’ values, and recommend a different type of framework that considers the full spectrum of values from a cultural perspective that can contribute to positive outcomes for indigenous groups through ‘the provision of direct and indirect benefits to people from ecosystems’ (MEA 2005a). Key questions for Māori are: can we make sensible decisions that embrace all our values without continual reference only to economics – e.g. sole use of dollars? – which generalises our values and denotes arbitrary weightings on natural resources and taonga; and should values be only defined based on the monetary approach of ‘use’ values to allow quantitative trade-offs to take place? Māori remain sceptical of existing economically biased models because they attach dollars to everything and commonly ask a ‘willingness to pay’. Māori suggest introducing more qualitative measures and assessments alongside quantitative measures and assessments so they are regarded equally (Awatere 2005, 2008; Steenstra 2010). Much of this comes back to respect and recognition of holistic values that have validity in all decision-making.

A complementary Māori-based framework and model is presented that distinguishes ‘cultural values’ from ‘cultural services’ and extends the definition of cultural values across the whole ES framework. Ultimately, 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.

GLOSSARY

Awhinatanga	Assist, care for
Ahi kaa	Continued connection and occupation to place, literally means keeping the home fires burning
Hapū	Pregnant, subtribe
Hui	Inclusive meetings, participatory discussion, workshops
Iwi	Tribe, bones
Kaumātua	Elderly respected male, one with knowledge and wisdom
Kuia	Elderly respected female, one with knowledge and wisdom
Kaitiaki	People, agent who carries out kaitiakitanga, environmental practitioner
Kaitiakitanga	The ethos of sustainable resource management, guardianship
Mātauranga Māori	Māori knowledge and philosophy
Mauri	An energy, internal element, a sustaining life force or spirit, a soul, in all living and non-living things
Mahinga kai	Food gathering area
Manaaki	To provide hospitality, host, look after
Manaakitanga	Reciprocal and unqualified acts of giving, caring, and hospitality
Mana Atua	To live within the realms of a supreme power, departmental gods, divine authority, framework within which kaitiakitanga takes place
Mana Tipuna	An authority derived from the ancestors
Mana Whenua	Rights of self-governance, rights to authority over traditional tribal land and resources
Taonga	Treasured resources, a prized possession, precious resources, iconic species, etc.
Te Ao Pākehā	Non-Māori world view
Te Ao Māori	Māori world view
Marae	Social and cultural centres for traditional and modern iwi/hapū/whānau Māori society
Ngā uri	Respect and recognition of descendants and ancestors
Noa	Open access to resources – but under kaitiakitanga

	practice (still protected, valued, managed)
Papa-tū-ā-nuku	Earth mother
Pepeha	Recitations linking people to place
Ranginui	Sky father
Rahui	Customary practice to protect and manage resources through regulatory practice and management, use of restricted and open access to resources/places
Taonga	Treasure
Te reo	Māori language, voice
Tikanga	Customary practice, protocol, values
Rangatiratanga	Self-determination, independence or inter-dependence
Tohunga	Knowledge expert, specialist, priest
Tangata whenua	People of the land, connected to place (e.g. river) through a distinct whakapapa
Taonga	Treasure, something treasured, iconic cultural species, customary flora and fauna
Taonga tuku iho	Treasured possessions
Te Ao Turoa	Sustaining resources/taonga at rate and in an acceptable condition that ensures the same options and opportunities for each generation, principle of sustainability
Tapu	Sacred or restricted access to resources, places, for customary and cultural reasons
Turangawaewae	Place of belonging, place of standing
Wāhi tapu	Sacred site
Wāhi taonga	Heritage site
Wairua	The spiritual dimension to life
Waikino	Water that is dangerous, such as rapids
Waipuna	Spring water
Waimāori	Fresh water
Wānanga	Workshops
Waimate	Water that has completely lost its mauri and is no longer able to sustain life
Waiora	Water in its most pure form
Waitohi	Water for rituals
Whakakoha	The act of giving
Whakapapa	Ancestral lineage, ancestral connections, genealogical relationships
Whānau	Family, extended family (incl. cousins, twice, thrice over, etc.)
Whānauangatanga	Family connections and family relationships
Whakatauki	Māori proverb
Whenua	Placenta, land, connection to land and water, the umbilical cord connecting people to place

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