
9 Indigenous Māori Values, Perspectives, and Knowledge of Soils in Aotearoa-New Zealand

A. Beliefs, and Concepts of Soils, the Environment, and Land

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9.1 INTRODUCTION

Whatungarongaro te tangata, toitū te whenua
(People come and go, but the land endures).

Indigenous Māori in Aotearoa-New Zealand have had a long history and close interdependent relationship with the natural environment particularly the soil resources. People from northern Polynesia migrated to Aotearoa-NZ about 1000 years ago (McKinnon et al. 1997; King 2003), and it was in this new country that Māori culture developed and flourished (Best 1924a; Buck 1950), drawing on the early Polynesian cultural beliefs, customs, language, and philosophies. At present, indigenous Māori make up around 15% of the total population of just over 4 million in a largely multicultural mixed society based on relatively high inter-marriage between Māori and Europeans and other smaller ethnic groups. Around 85% of all Māori now live in urban environments following large migration shifts to cities for employment predominantly after the World War II, from the early 1950s. This Māori migration (~post-1990) is now global—mainly to Australia. This society is very different from when Europeans first colonized New Zealand in the mid-nineteenth century, when there were two distinct and separate cultures, one-Māori, one-English (King 2003). The first contact Europeans had with Māori is generally accepted in 1769. Māori culture since the arrival of the Europeans has gone from being strong and vibrant, through a long period of being at risk from the pressures of colonization, to a newfound Māori cultural renaissance that has progressively grown in the latter half of the twentieth century to the present (Durie 1998; Walker 2004). However, traditional beliefs, values, and cultural perspectives still resonate strongly in a contemporary society, and have taken on new importance through a resurgence of interest in cultural identity and philosophies, and the preservation, development, and use of indigenous language and traditional knowledge (Durie 1998; Walker 2004).

Ancestral lineage (*whakapapa*) links Māori to each other and to the natural environment. This intricate genealogical web, which provides the basis for Māori societal structure, divides Māori into three main hierarchical levels: *iwi* (tribal regional), *hapū* (district, local, sub-tribal), and *whānau* (extended family). Different tribes have authority over distinct geographic areas, although decisions on tribal areas do not always fall under the purview of a single *iwi* or *hapū* group. The basic tenets of traditional Māori society remain strong and influence the way Māori construct tribal status and authority, manage their lands and resources, and relate to other agencies and government. The connection between the land (*whenua*), ancestry, and people is well reflected in Māori proverbs (*whakatauki*) such as the following:

Ko nga mana ko nga mauri o te whenua kei i raro iho i nga tikanga a o tatou tupuna.
(The prestige and life force of the land is enhanced beneath the mantle of our ancestral traditions.)

9.2 TRADITIONAL MĀORI BELIEF SYSTEM

Māori beliefs, custom, and values are derived from a mixture of cosmogony, mythology, religion, and anthropology (Best 1924b; Buck 1950; Marsden 1988; Barlow 1993). Within this complex and evolutionary belief system are the stories of the origin 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. 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 9.1 is a very simplified version of this Māori belief system.

This genealogical sequence is referred to as *whakapapa*, and places human beings (e.g., 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. *Whakapapa* (Figures 9.1 and 9.2) follows a sequence beginning with the nothingness, the void, the darkness, a supreme god (Io-matua-kore), emerging light, through to the creation of the tangible world, the creation of two primeval parents,

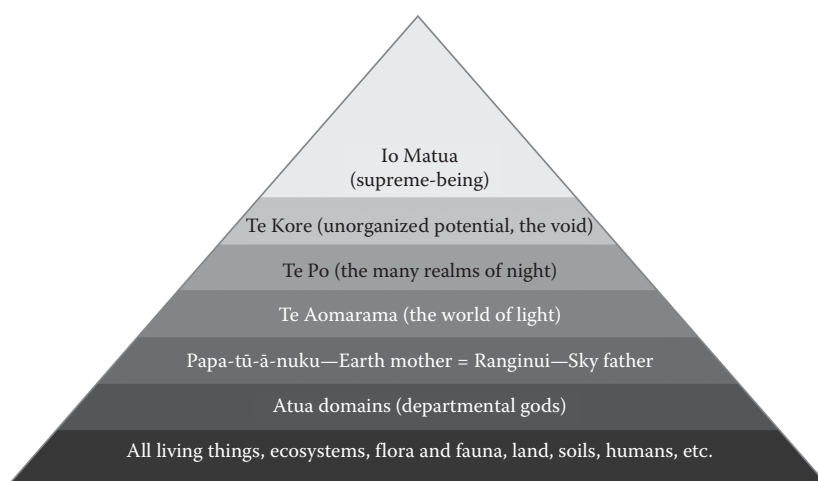


FIGURE 9.1 Te Timatanga—Māori creationist theory from the beginning.

Ranginui—the sky father, and Papa-tū-ā-nuku—the earth mother, the birth of their children, such as 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 *Ātua*, deities, or Māori gods (about 100 departmental gods), each with supernatural powers, who preside over different domains (Best 1924b; Buck 1950; Marsden 1988; Barlow 1993). In a plan carried out by the children to create light and flourish, the parents were prised apart. The separation of the parents led Ranginui the sky father to form the atmosphere and continually weep with rain for his departed wife, and Papa-tū-ā-nuku the earth mother to form the land and 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 that Māori commonly develop frameworks for resource management based on *whakapapa* to help make sense and explain their environments.

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) and Tū-te wehiwehi (grandson of Tangaroa and also referred to as the father of reptiles, lakes, rivers, freshwater)
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 9.2 The main Atua or departmental gods, children of Papa-tū-ā-nuku and Ranginui.

9.2.1 MĀORI ANCESTRAL LINKS TO THE SOIL

In Māori tradition, the link between Māori and the soil was strong and reciprocal, stretching back to the time of creation. All flora and fauna were the grandchildren (*mokopuna*) of Papa-tū-ā-nuku. In many stories the departmental god Tāne Mahuta formed the first woman called Hine ahuone (woman made from earth) from soil before breathing life into her (Buck 1950; Rangitāne o Wairarapa Inc. 2006; Keane 2011b). In other tribal stories, it was a man Tiki-āhua, who was formed from soil by Tāne-mahuta (Best 1924b; Buck 1950; Rangitāne o Wairarapa Inc. 2006; Keane 2011b). After the creation story came the attainment of knowledge, “to help humankind acquire knowledge.” This knowledge (wisdom) was special and pertained to the earth, land, water, flora and fauna, and everything else to enable long-term survival. This deep-rooted ancestral connection between land, soils, living organisms, and people, means there are several words that are the same when expressing characteristics about land and living things. *Papa-tū-ā-nuku* was often referred as a protective cloak, a skin covering the earth. Many words were used for parts of the landscape and interchangeably for humans. *Whenua*, for example, is used to mean both placenta and land; *rae* is used either as forehead or a land promontory; *iwi* refers equally to a nation of people, a tribe, or to bones (as *ko-iwi*); *hapū* can denote pregnancy or sub-tribe; *whānau* means birth or family. In terms of narratives, the complete life cycle starting, with birth and ending in death, was frequently acknowledged. When the demigod Māui failed to convince Hine-nui-te-pō, goddess of the underworld, to let humans die like the moon (die and return) she told him, “*Me matemate-a-one*” (let man die and become like soil).

9.2.2 MĀORI TRADITIONAL STORIES

Hawaiki and Rangi-atea are two distant ancestral islands from which early Polynesian migrated, and many ancestral names repeatedly occur in many of the old manuscripts and oral translations (JPS; JPS 1913, 1915). Early Māori explorers who arrived on canoes from Polynesia were often interested in the agricultural qualities of soils in New Zealand (NZ). After landing in NZ, the great navigator Kupe returned to Hawaiki and told of the sweet-scented and rich soils of New Zealand (JPS; Keane 2011b). Turi, captain of the Aotea canoe, decided to settle at Pātea after smelling its fertile soil and “whilst at Patea he distinguished the soil qualities through his senses, and found it to be para-umu—a rich black soil—and sweet scented” (JPS 1913 22(87): 128; Keane 2011b; Roskrige 2011). The sons of Whātonga from the Kurahaupō canoe decided to move to Matiu island in Wellington Harbour because the soil was good and the island was easy to defend. In a number of traditions, Māori explorers from voyaging canoes (*waka*) expressed their views and knowledge of Aotearoa and of soils at various locations around the NZ coast (JPS; JPS 1913 22(87): 129–130; Keane 2011b).

Another tribal story from about 1350 AD, describes the Tākitimu canoe landing at Whangaparāoa, in the eastern Bay of Plenty, North Island, NZ. Its captain, Tamatea-ariki, found that Hoturoa (chief of the *iwi* Tainui) and Ngātoroirangi, a *tohunga* (high priest) of the Arawa canoe, were already there, and he asked them “What kind of land is this?” Ngātoroirangi replied:

“It is good. Some parts are limestone, some are sandy soil, others rich soil, others friable soil, black soil, sand, pumiceous soil, and light sandy soil, red volcanic soil, some parts are gravelly, stony, and some are very loose soils” (JPS 1915, 24(93), 1).

9.2.3 TRADITIONAL ENVIRONMENTAL CONCEPTS

9.2.3.1 Mātauranga Māori and Māori Values

Mātauranga Māori is wisdom, how to do something and why, and therefore includes all Māori knowledge systems or ways of knowing. Knowledge provides the basis for the Māori worldview or perspective encompassing all aspects of Māori knowledge from philosophy, cosmology to practice. Māori retained, organized, and imparted knowledge orally rather than in any written form. Huge quantities of specialized (especially ancestral and traditional) knowledge were memorized

and retained by people such as *tohunga* (priests, specialists), *rangatira* (chiefs), *kaumātua* (elders), *kuia* (elderly female), and *pakeke* (adults). Parts of this knowledge were documented mainly by early Europeans, such as explorers and missionaries, (since about 1769), and from the late nineteenth century, by European and Māori scholars and authors. In moving beyond the traditional *mātauranga Māori*, *mātauranga Māori* has grown into many contemporary forms (e.g., historic, local indigenous knowledge, Māori perspectives) that are complementary to western science knowledge; a view consistent with many recent Māori authors who regard Māori knowledge as a dynamic and evolving knowledge system that represents more than the past (Durie 1998; Harmsworth et al. 2002; Raskin 2009; Roskrug 2012).

Māori values (Marsden 1988; Barlow 1993; Mead 2003) are derived from traditional belief systems and are part of the wider Māori knowledge system (*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 worldview (*Te Ao Māori*), and provide the concepts, principles, and lore Māori use to varying degrees in everyday life, and often form ethics and principles. This can govern their responsibilities and relationship with the environment. Important Māori values (see glossary) include: *tikanga* (customary practice, values, protocols); *whakapapa* (relationships, traditions, connections); *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 represented as to what is valued, for example, natural resources, soils, significant cultural sites, significant biodiversity habitats and species, iconic cultural flora and fauna species. *Tikanga* is one of the most encompassing values, and within the context of soils can be used to define customary and best management practices for each *iwi/hapū* group and embodies many of the other values such as *whakapapa* and *kaitiakitanga*.

9.2.3.2 Traditional Māori Environmental Perspectives

Māori sought to understand the total environment or system, its connections through *whakapapa*, not just a part of it and their perspective as today is very holistic and integrated. Māori values form the basis for a number of key Māori concepts for resource management (Marsden 1988; Barlow 1993; Durie 1994; Harmsworth et al. 2002; Mead 2003, Roskrug 2011) and some of the most important environmental concepts are:

- *Kaitiakitanga*—stewardship or guardianship of the environment, an active rather than passive relationship.
- *Ki uta ki tai*—a whole of landscape approach, understanding and managing inter-connected resources and systems from the mountains to the sea (the Māori concept of integrated catchment management).
- *Mauri*—an internal energy or life force derived from *whakapapa*, an essential essence or element sustaining all forms of life, denoting a health and spirit, which permeates through all living and nonliving 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, laws that regulate actions and behaviors related to the physical environment and people. *Ritenga* includes concepts such as *tapu*, *rahui*, and *noa*, which were practical rules to sustain the wellbeing of people, communities and natural resources. Everything was balanced between regulated and deregulated states where *tapu* was sacred, *rahui* was restricted and *noa* was relaxed access or unrestricted.
- *Wairuatanga*—the spiritual dimension, a spiritual energy and dimension as a concept for Māori wellbeing.

9.2.4 TRADITIONAL MĀORI AND THE SOIL RESOURCE

9.2.4.1 Māori Terms for Landscapes

Much of the heritage of Māori resides in the landscape. Māori had names for almost every part of the landscape and these expressions of place were linked back to *whakapapa* through stories and became increasingly descriptive locally. Examples in Tables 9.1 through 9.3, show that Māori were very

TABLE 9.1
Māori Terms for Landforms, Features, and Descriptors

Māori Expression	English Landform Term Eq.	Māori Expression	English Landform Term Eq.
Papa-tū-ā-nuku	Earth Mother	<i>whenua</i>	Land, terrain, placenta
<i>Wāhi</i>	Place, site, location	<i>haumako, mōmona, ngotongoto</i>	Flat, fertile, good fertile land
<i>roa</i>	Long or high	<i>whenuapai</i>	Highly productive, good land
<i>ika whenua, tuatua, tuarā maunga</i>	Range, axial range	<i>awa</i>	River
<i>pou karangaranga</i>	Landmarks, significant land features	<i>ma, manga</i>	Stream, tributary, creek
<i>tāhinga</i>	Slope	<i>kautawa</i>	Tributary
<i>papa, papatahi, raorao, mānia, papatika, papatairite (level flat)</i>	Flat, plains, broad flat ground	<i>kekee</i>	Creek
<i>raorao, mānia, papatika</i>	Flats, plains	<i>korere</i>	Channel
<i>tāwakawaka</i>	Undulating	<i>pūau, huihuinga wai</i>	Confluence
<i>pāraharaha</i>	Rolling	<i>parehua</i>	River terrace
<i>papa</i>	Terraces	<i>taha</i>	Bank of riverside
<i>puke</i>	Hill	<i>waha</i>	Mouth of river
<i>rapaki, puketai</i>	Hillside, rolling and steep hills	<i>wahapū</i>	Entrance, mouth of river
<i>poupou, tūparipari</i>	Steep	<i>parahua</i>	Alluvial areas, wet, muddy
<i>paeroa</i>	Low range, steep hills	<i>repo</i>	Swamp
<i>pae</i>	Ridge, step, resting place	<i>roto</i>	Lake
<i>taumata</i>	Brow of a hill	<i>moana</i>	Extensive lake area
<i>tau</i>	Ridge of a hill	<i>wahapū</i>	Estuary
<i>tihi, tautara, taumata</i>	Summit, peak	<i>whanga</i>	Bay, harbor, or inlet
<i>tara</i>	Peak	<i>one, tāhuna</i>	Beach
<i>taukahiwī, kahiwī, ranga</i>	Ridge	<i>takutai</i>	Coast, sea coast
<i>maunga</i>	Mountain	<i>mata</i>	Point of land, headland, headwaters, face, cliff
<i>riu, awaawa, whārua</i>	Valley	<i>rae, mata</i>	Headland, head of river
<i>pari</i>	Cliff	<i>koutu</i>	Promontory
<i>āpiti, kapiti, tawhārua</i>	Gorge	<i>kūrae</i>	Headland, promontory
<i>tākau</i>	Escarpment	<i>moutere, motu</i>	Island
<i>horo</i>	Landslide, landslip, to swallow	<i>taha moana, tātahi, takutai, tai (tidal)</i>	Coastal, sea coast
<i>pakohu, awa, kopia, parari</i>	Gully	<i>whenua kāki, whenua kuiti</i>	Isthmus
<i>ana</i>	Cave, cavern		
<i>waiariki</i>	Hot springs, geothermal		
<i>puia</i>	volcano		
<i>takiwā-waiariki</i>	Hydrothermal, geothermal district		

Source: Adapted from Williams, H. W. 1975. *A Dictionary of the Māori Language*. 7th ed. Wellington, New Zealand, A. R. Shearer, Government Printer. 507pp.; Ngata, H. M. 1993. *English-Māori Dictionary*. Wellington: Learning Media. 559pp.

TABLE 9.2
Rocks

Māori Term	English Equivalent	Māori Term	English Equivalent
<i>toka, kāmaka, kōhatu, pōhatu</i>	Rock, stone	<i>tāhoata, pungapunga</i>	Pumice
<i>pōhatuhatu</i>	Rocky	<i>pounamu</i>	Greenstone
<i>pōhatu, kāmaka, kōhatu</i>	Stone	<i>kairangi</i>	Quality, finest greenstone
<i>horo kōhatu</i>	Crumbling stone	<i>auhunga</i>	Pale greenstone
<i>matā, kiripaka, takawai</i>	Quartz, flint	<i>tongarewa</i>	Semi-transparent greenstone
<i>omata</i>	Place of quartz	<i>kutukutu</i>	Speckled greenstone
<i>matā, mātara, tūhua</i>	Obsidian	<i>tōtōeka</i>	Streaked greenstone
<i>karā, ōnewa</i>	Basalt	<i>Tangiwai</i>	Transparent greenstone
<i>rino</i>	Iron	<i>Inanga</i>	Whitish greenstone
		<i>Pakeho</i>	Limestone

Source: Adapted from Williams, H. W. 1975. *A Dictionary of the Māori Language*. 7th ed. Wellington, New Zealand, A. R. Shearer, Government Printer. 507pp.; Ngata, H. M. 1993. *English-Māori Dictionary*. Wellington: Learning Media. 559pp.

sophisticated in their use of *te reo Māori* (Māori language) to describe accurately different parts of the natural environment and its characteristics and condition, using root words, aggregation of terms, categories, subdivision, and descriptors (Williams 1975; Ngata 1993). These were an early form of oral classification for Māori and through the language these classifications became increasingly complex, structured, sophisticated, and both generic and local. Being based on *whakapapa* there was always a hierarchical assemblage and inter-connection within classifications, linking to them to each

TABLE 9.3
Māori Terms for Degrees of Wetness on Land

Māori Term	English Equivalent	Māori Term	English Equivalent
<i>wai</i>	Water	<i>para</i>	Muddy, sediment
<i>waipara</i>	Stream across plain, river with thick muddy sediment	<i>Paretai</i>	Bank of a river
<i>repo, ngaere</i>	Swamp	<i>Pipiwai</i>	Damp or swampy
<i>mākū</i>	Wet, wet place	<i>Reporoa</i>	Long swamp
<i>waipuke</i>	Flood	<i>Mangareporepo</i>	Muddy creek
<i>puaha, ngutu awa</i>	The mouth of a river	<i>Mimi</i>	Stream or creek
<i>pukaha</i>	Spongy or swampy	<i>Oaro</i>	Bog, aro is bog, a boggy place
<i>pukaki</i>	Head of creek, or where the stream meets tidal waters, pu is heaped or bunched up, and kaki means neck	<i>Opara</i>	Muddy place
<i>te ngae</i>	Swamp	<i>pākihi</i>	Opening, clearing, flat land dried up and poor, swampy, low fertility
<i>putarepo</i>	A place at the end of a swamp that can be crossed	<i>Manga</i>	Tributary, drain, creek
<i>whakatahe(a)</i>	Drained	<i>Puna</i>	Spring of water

Source: Adapted from Williams, H. W. 1975. *A Dictionary of the Māori Language*. 7th ed. Wellington, New Zealand, A. R. Shearer, Government Printer. 507pp.; Ngata, H. M. 1993. *English-Māori Dictionary*. Wellington: Learning Media. 559pp.

other and enabling everything to be traced back to a common ancestor or *Ātua*, and then back to the stories describing in order the origin of all life, the earth, plants, animals and humans, and so on.

The links between people, the land, and flora and fauna are well recorded in all tribal narratives (Buck 1950; Park 1995). Ancestral stories, *mātauranga Māori*, and oral traditions, were attached to every part of the landscape and its associated features linking people and culture to place, establishing spiritual and ancestral significance, serving to locate points in tribal history and therefore relating the occupation of the land and the way it became part of a tribe. Landmarks such as *maunga* (mountains) and *awa* (rivers) are considered to be *iwi/hapū* (tribal) elements and identifiers when recited in *pepeha* (recitations). Other examples refer to the *mauri* of the soil and sacred earth which was brought from traditional homelands to NZ by Polynesian ancestors and placed on gardens and at other sacred sites to reaffirm connection and whakapapa (JPS 1913, 1915; Keane 2011a,b).

Terminology was therefore contextual and descriptive and combined root words, location, and landscape setting, with more descriptive terms from adjectives such as color, texture, wetness. In most cases, Māori descriptions of soils and land can be used generically, while more specific detail is added at the *iwi/hapū* level denoting more specific knowledge and description locally. Hundreds of terms described different parts of the landscape into elements and attributes of the natural environment. The more general Māori terms have been organized into classifications (Tables 9.1 through 9.3).

9.2.4.2 Māori Terms for Soils

Māori identified at least 50 different types of soils in various locations around Aotearoa-NZ. *Oneone* (pronounced awneyawney) was the general term used to describe soil or earth, and “one” was often used as a prefix for the names of different soil types in different landform and ecosystem locations (e.g., sand country–dunes, swamps, alluvial flats, terraces). For example, *one-pū* was sand, *one-parakiwai* was silt, *one-nui* was rich soil made of clay, sand and decayed organic matter, *one-matua* was loam. “Kere” was used as a prefix for some types of clay, including *keretū*, *kerematua*, and *kerewhenua*. Other terms included references to animals, birds, fish, and so on, to improve description and indicate relationships, for example, *tenga kākārīki* (parakeet’s crop), was a white volcanic sand in the Bay of Plenty (Keane 2011b), and was named in this way because it resembled the rough inner surface of a parakeet’s crop (a pouch near the throat).

9.3 HISTORICAL MĀORI SOCIETY AND LAND

9.3.1 TRADITIONAL LAND TENURE

From mid-eighteenth to the mid-nineteenth centuries, many dominant *iwi/hapū* collectives with distinct *whakapapa* and origins, had well-defined territories marked by distinct places and land features such as *awa* and *manga* (rivers and streams), *maunga* (mountains and axial ranges), rocks, and coastlines. Over time, and following much conflict Māori internal migration and settlement patterns became entrenched in certain geographical locations, with growth in tribal dominance and inter-marriage. Increasingly, Māori started to live and work together in small, geographically distinct groups and settlements as part of larger hierarchical tribal structures (*iwi*, *hapū*, *whānau*) while Māori beliefs and values (*tikanga*) continued to be practised under local systems. From the seventeenth century, there is evidence of a well-developed communal land tenure system in many areas in NZ, where resources were shared collectively within and between tribes. This gave rise to a communal society where Māori lived and worked together to survive, adapted to change, and cared for each other in extended families (*whānau*) and sub-tribes (*hapū*), while sustaining and managing natural resources locally and collectively.

The notion of how central land and soil was, and still is to Māori, was described by Asher and Naulls (1987, p. 5): “To the early Māori, land was everything. Bound up with it was survival, politics, myth, and religion. It was not part of life but life itself.” Taking culture in its widest context, there was no part of early Māori culture that was not touched by the physical environment, land in particular.

9.3.2 THE TREATY OF WAITANGI

The Treaty of Waitangi (Te Tiriti o Waitangi), signed on February 6, 1840, was enacted between Māori (~540 Māori chiefs) and the Crown (British Government) and conferred responsibilities and obligations on subsequent NZ Governments (representing the Crown) to uphold rights for Māori as British subjects and NZ citizens, to protect their land, estates, water, forests, and other resources or treasures (*taonga*). The Treaty has been the source of arduous debate and interpretation by European and Māori ever since but is enshrined into NZ legislation at many levels. The Waitangi Tribunal was established in 1975 to hear Māori land grievances under modern legislation to address land alienation, confiscation, and breaches of the Treaty.

9.4 CONTEMPORARY MĀORI SOCIETY AND LAND

9.4.1 MĀORI LAND

Through *whakapapa* (ancestral lineage) Māori continue to be affiliated with hierarchical groupings such as *iwi*, *hapū*, and *whānau*. The basic unit of Māori society is still the *whānau*, the extended family. Today, the *hapū* or *iwi* and urban Māori are the main groupings involved in pooling resources for economic, business, social, health, education, employment, and housing programs, and many are involved in environmental and resource management. *Whānau* and *hapū* groupings still provide the basic unit for decision making on specific blocks of land, local business activities, coastal and fisheries resource management, and utilizing specific natural and human capital. Traditional and historical Māori social structure has been an enduring feature of new Māori business and governance models.

Māori today only have a fraction of the land and natural resources to which they once had rights or title (Durie 1998; Harmsworth and Roskrige 2014) and live in a more fragmented, modern, free-market society. In 1840, most land in NZ was under Māori control and tribal ownership but with the onset of British colonization, a raft of Crown–Government interventions increasingly alienated Māori from their collective land resource base. After 1840, and the signing of the Treaty of Waitangi, Māori land drastically reduced in total area (Table 9.4), with a large decrease in area due to the Native

TABLE 9.4
Patterns of Māori Land Ownership from 1840 to 2000

Year	Hectares
1840 (customary land)	27,053,400
1852	15,300,000
1860	9,630,000
1891	4,985,000
1911	3,211,000
1920	2,154,000
1939	1,813,000
1975	1,350,000
1986	1,181,740
1996	1,515,071
2000	1,515,071

Source: Adapted from Durie, M. 1998. *Te Mana, Te Kawanatanga: The Politics of Māori Self-Determination*. Auckland: Oxford University Press. 280pp. and from the TPK Maori land database; Te Puni Kōkiri (TPK) 1998. *Māori Land Information Database* MLIB 1998–2002. Te Puni Kōkiri (TPK) Wellington, New Zealand: Ministry of Māori Development. <http://www.tpk.govt.nz/en/services/land/> (accessed 2000–2002).

Land Act in 1860–1862, which individualized the title on Māori land and increasingly opened it up to sale under colonial legislation to direct it away from collective ownership and tribal authority. Māori access to land, forests, and coastal and marine (e.g., fisheries) resources rapidly diminished. Māori gradually lost control, retention, and access to the best soil resources in NZ, and were reduced to the present Māori land area that is mainly hilly and steep with marginal characteristics (Table 9.5). By 1998 Māori collectively owned “freehold” land had diminished to only 6% of the total NZ land area or some 1.5 million hectares (Table 9.4; Durie 1998; TPK 1998; Harmsworth 2003; Hui Taumata 2006; MAF 2011). Most land now under Māori collective ownership comes under a Māori Land Act, Te Ture Whenua Act 1993, that focuses on retaining Māori land, acknowledging rights of *whakapapa*, allowing multiple-ownership, and facilitating and promoting effective use, management, and development (Maughan and Kingi 1998; Durie 1998). Commonly termed Māori freehold land, this land represents a collectively owned land asset base and is held under different types of Māori governance, typically trusts, to protect owners’ rights and promote participatory decision making. Māori land analyses intersecting Māori freehold land data with environmental datasets (e.g., Harmsworth 2003; Harmsworth

TABLE 9.5
Land Use Capability LUC 1–8 (Areas and % for Māori Land (TPK1998) Compared with New Zealand National Averages)

Potential of Māori Land by NZLRI Land Use Capability (LUC)				
Land Use Capability Class	% of Total New Zealand Land	Māori Land Area (ha)	% of Māori Land	Description of Land-Use Capability
1	0.7%	7514.76	0.50%	Most versatile multiple-use land—virtually no limitations to arable use
2	4.55%	43,733.59	2.89%	Good land with slight limitations to arable use
3	9.22%	85,534.33	5.65%	Moderate limitations to arable use restricting crops able to be grown
4	10.5%	153,972.29	10.16%	Severe limitations to arable use. More suitable to pastoral and forestry
5	0.8%	6883.47	0.45%	Unsuitable for cropping—pastoral or forestry
6	28.1%	507,706.36	33.51%	Nonarable land. Moderate limitations and hazards when under a perennial vegetation cover
7	21.4%	469,830.47	31.01%	With few exceptions can only support extensive grazing or erosion control forestry
8	21.8%	230,142.75	15.19%	Very severe limitations or hazards for any agricultural use
Other	2.97%	9752.96	0.64%	Nonarable land. Moderate limitations and hazards when under a perennial vegetation cover
Total	100.00% (26,930,100 ha)	1,515,071.00	100.00%	

Source: From the New Zealand Institute of Economic Research (NZIER). 2003. *Māori Economic Development: Te Ōhanga Whanaketanga Māori*. Wellington, NZ: New Zealand Institute of Economic Research. 116pp; Landcare Research NZ Ltd GIS 2012. (accessed Feb to Dec 2012); Harmsworth, G. 2003. Māori perspectives on Kyoto Policy: Interim Results. Reducing Greenhouse Gas Emissions from the Terrestrial Biosphere (C09X0212). *Landcare Research Report LC0203/084. Discussion paper for policy agencies (Climate Change Office, MfE, MAF, TPK)*. Updated November 2003 GIS tables and statistics. 30pp; Harmsworth, G. R., C. Insley, and M. Tahi. 2010. *Climate change business opportunities for Māori land and Māori organisations*: FRST Contract: C09X0901. Prepared for MAF Wellington, under the Sustainable Land Management Mitigation and Adaptation to Climate Change (SLMACC). Landcare Research report LC0910/157. 59pp.

TABLE 9.6
Landcover Class (LCDBv2) Comparisons for Māori Land and New Zealand Land at 2011

Landcover Class	New Zealand (LCDBv2)		Māori Land (MLIB)	
	Area (ha)	Area (%)	Area (ha)	Area (%)
Indigenous Forest	7,109,546.4	26.4	586,332.5	38.7
Scrub	1,804,316.7	6.7	212,109.9	14.0
Planted exotic forest	1,965,897.3	7.3	206,049.6	13.6
Pastoral (grassland)	10,583,529.3	39.3	401,493.8	26.5
Horticultural	430,881.6	1.6	12,120.6	0.8
Inland water and wetlands	807,903.0	3.0	31,816.5	2.1
Other (e.g., mines, tussock, bare ground)	4,228,025.7	15.7	65,148.1	4.3
Total	26,930,100	100	1,515,071.00	100

Source: Adapted from Landcare Research NZ Ltd GIS 2012. (accessed Feb to Dec 2012); Harmsworth, G. R., C. Insley, and M. Tahi. 2010. *Climate change business opportunities for Māori land and Māori organisations*: FRST Contract: C09X0901. Prepared for MAF Wellington, under the Sustainable Land Management Mitigation and Adaptation to Climate Change (SLMACC). Landcare Research report LC0910/157. 59pp.

et al. 2010; MAF 2011) give statistics for national Land Use Capability (LUC; Table 9.5) and vegetative cover (Table 9.6) on Māori land compared with national NZ land data. Table 9.5 shows that at 2010 <4% (<50,000 ha) of Māori freehold land is classified as LUC 1 and 2—the most highly versatile multiple use land in NZ, containing large areas of high class soils—while a further ~16% or 239,000 ha may be suited to horticulture and cropping. Over 65% of Māori land is classified as steep, hilly, and mountainous (Table 9.5) and as a result much remains in indigenous forest and scrub (Table 9.6).

In 1975, a Waitangi Tribunal was established to hear Treaty of Waitangi land grievance claims by Māori claimant groups through a lengthy and costly legal process—largely *iwi/hapū* claims from all over NZ—responding to land loss due to illegal sale, forfeiture, and colonial confiscation. The number of land claims for property, resources, and proprietary rights lodged with the Tribunal at 2012 number well over 1900. Since the establishment of the Waitangi Tribunal, the resource base to which Māori have access and control is slowly increasing again as a result of continual and constructive redress. With increasing settlement, many tribal organizations are now positioning themselves to manage hundreds of millions of dollars of assets, while other Māori business and enterprise have been highly successful and have flourished outside the Treaty process in the past 20–30 years. Recognized indigenous or aboriginal rights under the 1840 Treaty of Waitangi and in NZ legislation mean that Māori are widely included in decision making for lands, water, coastal, and marine environments, especially where Māori can demonstrate a long-standing cultural or customary tribal relationship with specific natural resource areas.

9.4.2 MĀORI ECONOMIC DEVELOPMENT

Māori increasingly moved from rural to urban settlements after the World War II, around 1950. Today, Māori social structure is complex, and fragmented, and most Māori live outside the ancestral lands that they once occupied. Modern Māori businesses take many forms; including *whānau*- and *hapū*-(family) based trusts, incorporations, *rūnanga* (councils), through to limited liability companies and privately owned businesses/enterprises. A large majority of businesses have key characteristics that include a distinctly Māori style of governance, management structure, entrepreneurship, strategic planning, networks, many reflecting Māori values, a cultural dimension, and cultural drivers (e.g., history, land ownership, resources, ancestral connections, cultural values) (Harmsworth 2009).

The term “the Māori economy” has increasingly been used since the late 1990s to indicate a Māori dimension within the NZ economy that is largely culturally and ancestrally based (TPK 2002; NZIER 2003; Whitehead and Annesley 2005; TPK 2007a,b; Harmsworth 2009). The term was defined broadly, and generally referred to total assets owned and income earned by collectives such as Māori-owned trusts and incorporations, Māori-owned businesses, and service providers (Whitehead and Annesley 2005; TPK 2007b). However it has been very difficult to distinguish and quantify the Māori economy as a separate entity from the wider economy as the two are interconnected. Many reports have assessed Māori involvement and contribution to the NZ economy, and this provides a snapshot in time and a baseline to model future scenarios and trends (BERL 2011). In 2011, the 2010 Māori asset base of the Māori economy was estimated at \$37 billion, based on a large range of Māori businesses, entities, employers, and household incomes (BERL 2011). In 2010, Māori industry and enterprise in the primary sector—mainly made up of agriculture, farming, forestry, and fishing—contributed approximately to \$10.6 billion (or ~30%) of this total Māori asset base. In addition, Māori continue to have major interests and rights in water, land, soil, and geothermal, mineral, and petroleum resources. These figures, however, show that Māori have contributed much value to the NZ economy through a very low land resource base.

At 2012, very little Māori land is in horticulture or cropping (~<2%); most tends to be in pastoralism, mainly sheep and beef (~20%), a reasonable proportion in dairying (about 6% Māori land), and larger areas in production forestry—almost 14% of all Māori land (Table 9.6). In 2003, it was estimated that the annual agricultural and forestry production from Māori communally owned land assets was approximately \$750 million per annum, and contributed 7.5% of NZ’s total annual agricultural outputs (NZIER 2003). In 2006 (Ahie 2006; MAF 2011), it was estimated that Māori freehold land provided about \$633 million to the national GDP. In the first decade of the twenty-first century, more than 15% of the country’s sheep and beef exports have come from Māori farming interests, and Māori were farming 720,000 hectares in 2003—mainly in sheep, beef, and dairy. Māori freehold land now carries about 10–15% of the national sheep and beef stock units (MAF 2011). General estimates are that at 2011 Māori agribusiness enterprises provide about 8–10% of the national milk solids production in NZ (MAF 2011), and own around \$NZ 100 million worth of shares in Fonterra, the largest dairy company in NZ. Further development of Māori land and its economic base has the potential to produce significant gains.

Because of the limiting agricultural characteristics of the present 2012 Māori land base, many authors continue to describe Māori land as underperforming, and common perceptions are that about 50% of the present Māori land base is underutilized or undeveloped, although these figures are difficult to confirm. MAF (2011) stated that on average, Māori land production was about 60–70% of the national average, but this figure cannot be substantiated. The Māori contribution to NZ’s farming economy remains significant and productive Māori land constitutes a large fraction of the national Māori asset base. As the Māori asset base grows, so does its contribution to local, regional, and national economies. At 2012, the Māori asset base is still largely concentrated in export-orientated areas of primary production and processing—mainly agriculture, farming, forestry, and fisheries—with approximately \$10.6 billion worth of collective assets recorded in 2010 (BERL 2011).

9.5 CONCLUSIONS

This chapter describes the intricate traditional belief system of the indigenous Māori that links humans to land, soils, ecosystems, and flora and fauna. Many of these beliefs and values influence the way Māori now see the world and make decisions about soils and land environments. The Māori relationship and interdependence with the soil resources of Aotearoa-NZ can be traced back to the time of creation. The primal parent, Papa-tū-ā-nuku, was the earth mother, and the first human was formed from the soil that cloaked Papa-tū-ā-nuku. All life depended on her for its well-being. Traditional beliefs stated that “people have the option of caring for Papa-tū-ā-nuku to maintain their

own health, or abandoning her to concentrate on their own short-term personal needs,” and “ultimately an unhealthy Papa-tū-ā-nuku will lead to unhealthy people” (Rangitāne o Wairarapa Inc., 2006). This interwoven relationship with land (*whenua*) and soil resources give Māori a personal affinity with land and soils in tribal areas, through their ancestral lineage, values, stories, and language; an affinity that was further developed through a long history of interdependence with natural resources, and a growing interest in horticulture and soil management which gave rise to Māori naming and classifying many parts of the landscape and soils.

The present Māori land base is a fraction of what it once was. However, Māori have large areas under Treaty of Waitangi claims, and are progressively acquiring additional resources and assets through claim settlement processes that have continued since 1840 and, since 1975, through the Waitangi Tribunal legal process between the Crown and *iwi/hapū*. With this growing economic base, Māori are becoming significant partners, investors, co-investors, and owners of land and soil resources. The Māori economy depends largely on the primary sector, and agriculture is a significant portion of this. As the Māori contribution to New Zealand’s agricultural and farming economy is significant, Māori rely heavily on sustaining the national soil resource base, which underlies the Māori and NZ economy and its ability to prosper. Modern Māori now seek to achieve the challenging balance between cultural, social, and environmental aspirations through concepts such as *kaitiakitanga* (guardianship of the environment with strong cultural and social objectives), and *tino rangatiratanga* (self-sufficiency, self-determination) combined with increasing economic demands for land development and land management, particularly in the areas of pastoral farming, agriculture, horticulture, forestry, and associated industries. As shown in this chapter, traditional beliefs, concepts, and values still play a significant and integral role in Māori advancement, business, social and cultural development, and economics.

ACKNOWLEDGMENTS

Mātauranga Māori on soils currently resides with a few knowledgeable practitioners (*kaumātua*, *kuia*, and *tohunga*) in different parts of New Zealand, but is now sporadically recorded and most is retained in old documents and some refereed publications. An extensive review has been carried out as part of this chapter. The authors have worked extensively with *iwi*, *hapū*, and *marae* groups throughout New Zealand in soils, land classification, land resource assessment, horticulture, and cropping. We thank those people who have contributed knowledge from past projects that is now used in this chapter. Dr. Nick Roskrige has been a leading authority on preserving knowledge on Māori traditional crops, through collectives such as Tahuri Whenua and the national Māori Vegetable Growers collective, keeping this knowledge alive and active through crop planting programs, use, and application. Many ancestral narratives have come from a variety of publications such as *The Journal of the Polynesian Society*.

GLOSSARY

Aotearoa	Māori name for New Zealand, land/world (ao) of the long (roa) white (tea) cloud
<i>awhinatanga</i>	assist, care for
<i>hapū</i>	pregnant, sub-tribe
<i>iwi</i>	tribe, bones
<i>kaumātua</i>	elderly respected male, one with knowledge and wisdom
<i>kuia</i>	elderly respected female, one with knowledge and wisdom
<i>kaitiakitanga</i>	the ethos of sustainable resource management, guardianship
<i>mahinga kai</i>	food gathering area
<i>manaaki</i>	provide hospitality
<i>manaakitanga</i>	reciprocal and unqualified acts of giving, caring, and hospitality

<i>mana whenua</i>	rights of self-governance, rights to authority over traditional tribal land and resources
<i>mātauranga Māori mauri</i>	Māori knowledge and philosophy an energy, a sustaining life force or spirit, a soul, in all living and nonliving things
<i>oneone</i>	soil
Papa-tū-ā-nuku	Earth mother
<i>pepeha</i>	recitations linking people to place
Ranginui	Sky father
<i>taonga</i>	treasure
<i>taonga tuku iho</i>	treasured possessions passed through generations
<i>te ao Māori</i>	Māori worldview
<i>te ao Pākehā</i>	Pākehā worldview
<i>te reo</i>	Māori language, voice
<i>tikanga</i>	customary practice, protocol, values
<i>tino rangatiratanga</i>	self-determination, independence, or inter-dependence
<i>tohunga</i>	knowledge expert, specialist, priest
<i>wāhi tapu</i>	sacred site
<i>wāhi taonga</i>	heritage site
<i>whakatauki</i>	Māori proverb
<i>whakakoha</i>	the act of giving
<i>whakapapa</i>	ancestral lineage, ancestral connections, genealogical relationships
<i>whānau</i>	family, extended family (incl. cousins, twice, thrice over, etc.)
<i>whānaungatanga</i>	family connections and family relationships
<i>whenua</i>	placenta, land
<i>wairua</i>	the spiritual dimension to life

REFERENCES

- Ahie M. 2006. Application of technologies to Māori agribusiness, report prepared for Te Puni Kokiri Wellington.
- Asher, G. and D. Naulls. 1987. *Māori land. Planning Paper No. 29*. Wellington: NZ Planning Council.
- Barlow, C. 1993. *Tikanga Whakaaro: Key Concepts in Māori Culture*. Auckland: Oxford University Press. 187pp.
- Best, E. 1924a. *The Māori As He Was*. 2nd edition. Wellington: Dominion Museum.
- Best, E. 1924b. Māori religion and mythology. *Dominion Museum Bulletin No. 10*. Wellington: Board of Māori Ethnological Research and Dominion Museum.
- Buck, P. (Te Rangi Hiroa) 1950. *The Coming of the Māori*. 2nd edition. Wellington: Māori Purposes Fund Board/Whitcombe & Tombs. 551pp.
- Business and Economic Research Ltd (BERL) 2011. *The Asset Base Income, Expenditure and GDP of the 2010 Māori Economy*. Wellington, New Zealand: BERL and Māori Economic Taskforce. 44pp.
- Durie, M. 1994. *Whaiora: Māori Health Development*. Auckland: Oxford University Press. 238pp.
- Durie, M. 1998. *Te Mana, Te Kawanatanga: The Politics of Māori Self-Determination*. Auckland: Oxford University Press. 280pp.
- Harmsworth, G., T. Warmenhoven, P. Pohatu, and M. Page. 2002. *Waiapu Catchment Technical Report: Māori Community Goals for Enhancing Ecosystem Health*. Foundation for Research, Science, and Technology (FRST) contract TWWX0001. Landcare Research report LC0102/100 for Te Whare Wananga o Ngati Porou, Ruatorea (unpublished). 185pp.
- Harmsworth, G. 2003. Māori perspectives on Kyoto Policy: Interim Results. Reducing Greenhouse Gas Emissions from the Terrestrial Biosphere (C09X0212). *Landcare Research Report LC0203/084. Discussion Paper for Policy Agencies (Climate Change Office, MfE, MAF, TPK)*. Updated November 2003 GIS tables and statistics. 30pp.
- Harmsworth, G. 2009. Sustainability and Māori business. In *Hatched: The Capacity for Sustainable Development*, eds. R. Frame, R. Gordon, and C. Mortimer, 95–108. <http://www.landcareresearch.co.nz/resources/business/hatched>

- Harmsworth, G. R., C. Insley, and M. Tahi. 2010. *Climate Change Business Opportunities for Māori Land and Māori Organisations*: FRST Contract: C09X0901. Prepared for MAF Wellington, under the Sustainable Land Management Mitigation and Adaptation to Climate Change (SLMACC). Landcare Research report LC0910/157. 59pp.
- Harmsworth, G. R. and N. Roskrug. 2014. Indigenous Māori values, perspectives, and knowledge of soils in Aotearoa–New Zealand: B. Māori use and knowledge of soils over time. In *The Soil Underfoot*, eds. G.T. Churchman and E. R. Landa, 257–268, Boca Raton: CRC Press.
- Hui Taumata 2006. Review of Māori land tenure: A report prepared by the Māori Land Tenure Review Committee for the Hui Taumata, Wellington, New Zealand. June 2006 (unpublished).
- Journal of the Polynesian Society* (JPS). Vols. 1–119 <http://www.thepolynesiansociety.org/journal.html>; <http://www.jps.auckland.ac.nz/browse.php> (accessed February–December 2012)
- Journal of the Polynesian Society* (JPS) 1913. Whatahoro, H. T. 1913. (Percy-Smith, S. trans.). The lore of the whare wānanga. Part II Te Kauwae-Raro, things terrestrial. Chapter III Discovery of New Zealand by Kupe as related by Te Matorohanga. *Journal of the Polynesian Society* 22(87): 129–130.
- Journal of the Polynesian Society* (JPS) 1915. Wahi II Te Kauwae-Raro, Ara: Ngā Korero ta Tai o Nehe a ngā Ruanuku o te Whare Wānanga o Te Tai-Rawhiti. Upoko X. Te Haerenga mai o “Takitimu” ki Aotearoa (Te Roanga). *Journal of the Polynesian Society* 24(93): 1. Told by Te Matorohanga, written by H. T. Whatahoro, and translated by S. Percy-Smith, http://www.jps.auckland.ac.nz/document/Volume_24_1915 (accessed September–December 2012).
- http://www.jps.auckland.ac.nz/document/Volume_22_1913
- http://www.jps.auckland.ac.nz/document/Volume_22_1913/Volume_22%2C_No._87/The_lore_of_the_whare_wananga._Wahi_II._Te_Kauwae-Raro%2C_Upoko_III._by_Te_Matorohanga%2C_p_107-133?action=null (accessed September–December 2012).
- Keane, B. 2011a. Oneone—soils—Uses of soils. *Te Ara—The Encyclopaedia of New Zealand*, URL: <http://www.teara.govt.nz/en/oneone-soils/1>; (accessed February–December 2012).
- Keane, B. 2011b. Oneone—soils—Soil in Māori tradition. *Te Ara—The Encyclopaedia of New Zealand*, URL: <http://www.teara.govt.nz/en/oneone-soils/2>; (accessed February–December 2012).
- King, M. 2003. *The Penguin History of New Zealand*. Wellington: Penguin Books. 570pp.
- Landcare Research NZ Ltd GIS 2012. (accessed Feb to Dec 2012).
- Marsden, M. 1988. The natural world and natural resources. Māori value systems and perspectives. *Resource Management Law Reform Working Paper 29. Part A*. Wellington, Ministry for the Environment.
- Maughan, C. W. and T. T. Kingi. 1998. Te ture whenua Māori: Retention and development. *The New Zealand Law Journal* (January): 27–31.
- McKinnon, M., B. Bradley, and R. Kirkpatrick. 1997. *The New Zealand Historical Atlas: Visualising New Zealand. Ko Papa-tū-ā-nuku e Takoto Nei*. Auckland: David Bateman & Department of Internal Affairs New Zealand. 290pp.
- Mead, H. 2003. *Tikanga Māori: Living by Māori Values*. Wellington: Huia Publishers and Te Whare Wananga o Awanuiarangi. 398pp.
- Ministry of Agriculture and Forestry (MAF). 2011. *Māori Agribusiness in New Zealand. A Study of the Māori Freehold Land Resource*. Wellington, Ministry of Agriculture and Forestry. 42p.
- Ngata, H. M. 1993. *English–Māori Dictionary*. Wellington: Learning Media. 559pp.
- New Zealand Institute of Economic Research (NZIER). 2003. *Māori Economic Development: Te Ōhanga Whanaketanga Māori*. Wellington, NZ: New Zealand Institute of Economic Research. 116pp.
- Park, G. 1995. *Ngā Uruora: The Groves of Life. Ecology and History in a New Zealand Landscape*. Wellington: Victoria University Press. 376pp.
- Rangitāne o Wairarapa Inc. 2006. *Ngāti Hāmua Environmental Education Sheets*. Greater Wellington Regional Council. Masterton: Lamb-Peters Print. 39pp.
- Raskin, B. 2009. *The Adoption and Use of Technology in Food Production: Māori Experiences and Perspectives. Literature Review Report*. Wellington: Institute of Environmental Science and Research. 39pp.
- Roskrug, N. 2009. Hokia ki te Whenua: Return to the land, unpublished PhD thesis, Massey University, Palmerston North, New Zealand.
- Roskrug, N. 2011. Traditional Māori horticultural and ethnopedological praxis in the New Zealand landscape. *Management of Environmental Quality* 22(2): 200–212.
- Roskrug, N. 2012. *Tahua-roa: Food for your Visitors. Korare: Māori Green Vegetables their History and Tips on Their Use*. Palmerston North: Institute of Natural Resources, Massey University. 110pp.
- Te Puni Kōkiri (TPK) 1998. *Māori Land Information Database MLIB 1998–2002*. Te Puni Kōkiri (TPK) Wellington, New Zealand: Ministry of Māori Development. <http://www.tpk.govt.nz/en/services/land/> (accessed 2000–2002).

- Te Puni Kōkiri (TPK). 2002. *Māori in the NZ Economy*. 3rd edition. Wellington: Te Puni Kōkiri.
- Te Puni Kōkiri (TPK). 2007a. *Historical Influences: Māori and the Economy*. Wellington: Te Puni Kōkiri. 12pp.
- Te Puni Kōkiri (TPK) 2007b. *The Māori Commercial Asset Base*. Wellington: Te Puni Kōkiri. 20pp.
- Walker R. 2004. *Ka Whawhai Tonu Matou: Struggle without End*. Wellington: Penguin Books. 462pp.
- Whitehead, J. and B. Annesley, 2005. The context for Māori economic development: A background paper for the 2005 Hui Taumata, February 2005. Wellington: The Treasury. 33pp.
- Williams, H. W. 1975. *A Dictionary of the Māori Language*. 7th edition. Wellington, New Zealand, A. R. Shearer, Government Printer. 507pp.