Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

Hokia ki te whenua

A thesis presented in partial fulfilment of the requirements for the degree of

Doctor of Philosophy in Soil Science

at

Massey University, Palmerston North,

New Zealand



Nick Roskruge



Abstract

This thesis aims to produce a distinctive model for the sustainable horticultural development of Māori resources, primarily land. It is inclusive of tikanga Māori and indigenous production systems based on the unique body of knowledge aligned to Māori. The integration of this knowledge with western science is both argued and applied through the model itself. The hypothesis applied was that mātauranga Māori relevant to horticulture and pedology can inform and add value to the future development of Māori land resources. The thesis is built on a unique set of contributing knowledge bases aligned to soils and horticultural management supported by three case studies, identified through their common association i.e. whakapapa links. The format of the thesis intentionally follows science principles in structure and presentation and some assumptions are made regarding base knowledge surrounding Māori cultural factors and the science disciplines relative to soils and horticulture.

The indigenous element, including Māori knowledge, is incorporated into the model using a triadic kosmos/corpus/praxis approach. Where *kosmos* is applied as *Te Ao Māori*, *corpus* as *mātauranga Māori* and *praxis* as *tikanga Māori*, the relationship between each element is clear and the interpretation of the associated knowledge becomes more apparent and can be applied to cultural assessments of resources, including land.

The crux of the cultural assessment model is the quality of information used to assess Māori resources, especially from the cultural perspective. The Māori cultural paradigm, traditional horticulture and pedology, and various decision systems are purposefully accessed to act as contributors to the assessment model and to highlight the diversity and quality of information land managers have at their disposal.

The ability to apply a cultural layer drawn from a body of knowledge not previously included in decision models relative to land utility in New Zealand is the key point of difference of the model. The model is discussed from the perspective of its beneficial role for future use by Māori and how it can be continuously refined to meet the needs of Māori land owners and thus contribute to the rangatiratanga of Māori.

Acknowledgements

Kia mihia te mano tini kua mene ki ngā Hawaiiki katoa. Rātou te tutūtanga o te puehu, te whiunga o te kupu i ngā wā takatū ai rātou, tātou te urupā o rātou mā, ngā waihotanga mai e hāpai nei i ō rātou wawata, tūmanako hoki. Kia ora tātou.

It is impossible to individually acknowledge every person who has been involved in this thesis from its conception through to completion. To all the whānau, friends, and colleagues, including my supervisors, who have contributed with positive encouragement and input; ngā mihi atu. I have been especially priviledged to have shared time and knowledge with many kaumātua and kuia around the country and they have in their own way given this thesis its mauri or energy. If the outcome of this work contributes to our future generations' ability to manage our resources as intended then the work will have achieved its aim.

No reira, ngā mihi atu ki a koutou, ngā mihi aroha ki a koutou, Tēnā ano tātou katoa.

Table of Contents

Abstracti
Acknowledgementsii
Table of Contentsiii
List of Tablesx
List of Figuresxi
List of Platesxii
List of Appendicesxiii
Introductionxv
Te Kūmaranui ā Tongaxvi
Chapter 1: General introduction 1
1.1 Hypothesis
1.2 Background
1.3 Case studies
1.3.1 Wakatu Incorporation
1.3.2 Parewahawaha hapū/Parewahawaha Marae, Bulls
1.3.3 Tahuri Whenua Incorporated Society
1.4 Research objectives
1.5 Chapters5
Chapter 2: Methodology9
2.1 Introduction 9
2.2 Scientific theory
2.3 Applied science
2.4 Kaupapa Māori methodology
2.5 Participatory research approaches
2.6 Ethnopedology framework
2.7 Case study methodology
2.8 Data collection

	2.9 Māori knowledge and Māori science	. 21
	2.10 Chapter summary	. 23
C	Chapter 3: Māori and horticulture	24
	3.1 Introduction	. 24
	3.2 Māori and horticulture	. 24
	3.3 Whakapapa	. 27
	3.4 I te timatanga (in the beginning)	. 30
	3.4.1 Maru	. 32
	3.5 Maramataka	. 32
	3.5.1 Climate	. 35
	3.6 Whenua	. 36
	3.7 Tikanga	. 38
	3.8 Chapter summary	. 40
C	Chapter 4: Te Oneone: Ethnopedology	. 41
	4.1 Introduction	. 41
	4.2 Soils - Māori nomenclature	. 43
	4.3 Land characteristics (including Māori nomenclature)	. 49
	4.4 Site selection	51
	4.5 Terracing	53
	4.6 Rotation	54
	4.7 Māori soils	55
	4.8 Drainage	58
	4.9 Soil fertility	59
	4.10 Irrigation	60
	4.11 Chapter summary	61
	Chapter 5: Māra Kai	. 62
	5.1 Introduction	62
	5.2 Traditional horticulture	62
	5.3 Pre-European phase (pre 1769)	65
	5.3.1 Stone gardens	67
	5.3.2 Wetland cultivation	67

5.4 Contemporary Māori horticulture	. 68
5.5 Phases of contemporary Māori horticulture	. 69
5.5.1 Post Contact Phase (1769 -1840)	. 69
5.5.2 Post Treaty of Waitangi Phase (1840 - 1860)	74
5.5.3 Post Land Wars Phase (1860 - 1940s)	. 76
5.5.4 Post World War 2 Phase (1940s - 1980s)	. 78
Treaty of Waitangi Act	80
5.5.5 Contemporary Society (1980s onwards)	. 81
5.6 Examples of present-day Māori horticulture	83
5.6.1 Ngāi Tukairangi	83
5.6.2 Moteo Trust	84
5.6.3 Wi Pere Trust	84
5.6.4 Te Māra o Te Umutahi	84
5.6.5 Tānehopuwai Gardens, Te Kuiti	84
5.7 The social politics of horticulture	85
5.8 Māori economics	88
5.9 Organics	91
5.10 Chapter summary	92
Chapter 6: Key crops in Māori Horticulture	93
6.1 Introduction	93
6.2 Kūmara - Ipomoea batatas (Sweetpotato)	94
6.3 Hue – Lagenaria siceraria (bottle gourd)	96
6.4 Uwhi/Uhi – Dioscorea alata (yam)	98
6.5 Tii / Kōuka – Cordyline spp. (cabbage tree)	99
6.6 Taro - Colocasia esculenta (L.) Schott	02
6.7 Aute (Maro) – Broussonetia papyrifera (paper mulberry) 1	03
6.8 Taewa/Peruperu/Rīwai/Parareka - Solanum tuberosum (Māori potatoes) 1	04
6.9 Kānga – Zea mays (Indian corn/maize)	06
6.10 Kamokamo – Cucurbitaceae family 1	.08
6.11 Rengarenga / Māikaika – Arthropodium cirratum (rock lily) 1	.09
6.12 Pūhā (sometimes given as pūwhā)/Rauriki/Pororua – Sonchus spp 1	10

6.13 Hāria / Paea/ Nīko/ Puka/ Rearea/ Nanī/ Pora – Brassica oleracea	112
6.14 Poroporo – Solanum aviculare	112
6.15 Harakeke – Phormium tenax (New Zealand lowland or swamp flax)	112
Wharariki – Phormium cookianum (NZ coastal or mountain flax)	112
6.16 Karaka – Corynocarpus laevigatus (Kopi [Chatham Islands])	115
6.17 Aruhe/Roi – Pteridium esculentum/P. aquilinum/Pteria acquiline/ (Fernroot)	116
6.18 Watercress – Lepidium sativum (Kowhitiwhiti/ Wāta kirihi/ Kirihi wāta)	119
6.19 Raupō – Typha orientalis (bulrush)	119
6.20 Kōkihi / Rengamutu – Tetragonia tetragonioides (NZ Spinach)	120
6.21 Para – Marattia salicina (King fern or horseshoe fern)	120
6.22 Pikopiko	121
6.23 Mamaku /Korau – Cyathea medullaris (Black tree fern)	122
6.24 Nīkau – Rhopalostylis sapida – (Miko [Chatham Islands])	123
6.25 Other crops	124
6.26 Crop migration	124
6.27 Chapter summary	126
Chapter 7: Decision systems	127
7.1 Introduction	127
7.2 Systems approach	127
7.3 Traditional decision systems	128
7.3.1 Kosmos	128
Values	129
7.3.2 Corpus	131
7.3.3 Praxis	131
7.4 The application of tikanga in traditional horticultural management	132
7.4.1 Seasonal approach	134
7.4.2 Labour	134
7.4.3 Seed selection	134
7.4.4 Crop production	135
7.4.5 Harvest	136

	7.4.6 Storage	136
	7.4.7 Preserving	138
	7.4.8 Trading	138
	7.5 Case study - Sample Crop; taewa	139
	7.5.1 Participants	139
	7.5.2 Rituals	140
	7.5.3 Pre-cultivation	140
	7.5.4 Cultivation	141
	7.5.5 Seed preparation	141
	7.5.6 Planting days	143
	7.5.7 Crop husbandry	143
	7.5.8 Harvest	143
	7.5.9 Storage methods	143
	7.6 Contemporary decision support systems	144
	7.7 Soil and resource assessment models	147
	7.8 Education needs	150
	7.9 Chapter summary	152
C	Chapter 8: Case Study Report	153
	8.1 Introduction	153
	8.2 Case study 1: Wakatu Incorporation	155
	8.2.1 History – te toto.	155
	8.2.2 Establishing the Incorporation	157
	8.2.3 Wakatu in the 21st Century	159
	8.2.4 Cultural evaluation	162
	Kosmos	
	Corpus	163
	Collective Wakatu Incorporation values set	163
	Praxis	
	8.2.5 Physical evaluation	166
	Environmental	166
	Soils	166

Spatial	169
Climate	169
8.2.6 Capital evaluation	170
Structural	171
Investment	171
Natural	171
8.2.7 Economic evaluation	171
8.2.8 Summary	172
8.3 Case Study 2: Ngāti Parewahawaha Hapū o Ngāti Raukawa	173
8.3.1 History – te toto	173
8.3.2 Entity	174
8.3.3 Cultural evaluation	177
Kosmos	177
Corpus	177
Praxis	178
8.3.4 Physical evaluation	178
Environmental	178
Soil	179
Spatial	181
Climate	181
8.3.5 Capital evaluation	182
Structural	182
Investment	183
Natural	183
People	183
8.3.6 Economic evaluation	183
8.3.7 Summary	183
8.4 Case Study 3: Tahuri Whenua Inc. Soc.	185
8.4.1 History of establishment	185
8.4.2 Cultural evaluation	186
Vagnag	186

	Corpus	186	
	Praxis	187	
	8.4.3 Land use decision systems and taewa production	189	
	8.4.4 Summary	190	
	8.5 Chapter summary	192	
C	Chapter 9: Model	193	
	9.1 Introduction	193	
	9.2 Establishing a framework	193	
	9.3 Māori resource assessment model	193	
	9.4 Cultural Indicators (CI) for Māori land assessment model	196	
	9.5 Decision matrix		
	9.6 Implementation pathway	199	
	9.7 Physical indicators	200	
	9.8 Capital indicators	201	
	9.9 Economic indicators	201	
	9.10 Chapter summary	204	
C	Chapter 10: Discussion	205	
	10.1 Introduction	205	
	10.2 Māori knowledge	205	
	10.3 Māori and horticulture	206	
	10.4 Māori and soils	208	
	10.5 Cultural assessment	209	
	10.5.1 Decision processes	210	
	10.6 Rangatiratanga	212	
	10.7 Chapter summary	214	
C	Conclusion	215	
R	References		
	Personal communications.		
Δ	sppendices		
, M	WWW.IVW.IVW.IVW.	00 64 301	

List of Tables

Table 2.1:	A Māori Centred Research Framework	14
Table 3.1:	Identification of seasons in Māori calendar	34
Table 3.2:	Vernacular Māori terms for climate characteristics.	35
Table 4.1:	Māori nomenclature for soils	44
Table 4.2:	Māori nomenclature for soil parent materials	46
Table 4.3:	Māori nomenclature for land forms and vegetation.	50
Table 5.1:	Crops introduced by early explorers to Aotearoa/New Zealand	70
Table 5.2:	Māori Land Use Capability (LUC) ratings-1998 (Source: MMOLDC,	
	1998)	. 82
Table 5.3:	Māori land area by Māori Land Court (MLC) District	. 87
Table 6.1:	Varieties of Tii (cabbage tree) in New Zealand and their uses	101
Table 7.1:	Calendar of events in traditional Māori society for horticulture activities	133
Table 7.2:	10-step decision process used in decision & management processes	144
Table 8.1:	Vision and values identified by Wakatu Inc 2006	164
Table 8.2:	Soil test results - Robbies Block, Wakatu Inc. Motueka.	168
Table 8.3:	SWOT Analysis: taewa production on Robbies Block, Wakatu	
	Incorporation	172
Table 8.4:	Core values identified by Ngāti Parewahawaha	177
Table 8.5:	Soil test results - Section 141C2A Ohinepuhiawe Block, Parewahawaha	180
Table 8.6:	SWOT Analysis: taewa production on Ohinepuhiawe 141C2A	184
Table 9.1:	Model for assessment of Māori land	195
Table 9.2:	Cultural Indicators (CI)	197
Table 9.3:	Sample decision matrix using success/fail approach.	198
Table 10.1	Comparison of decision processes after Boehlie & Eidman (1984)	211

List of Figures

Figure 1.1:	Map of Aotearoa New Zealand indicating places and localities	
	introduced in the text of the thesis	8
Figure 3.1:	Sample whakapapa relative to horticulture (Source: Roberts et al., 2004)	31
Figure 7.1:	Visual depiction of traditional systems	28
Figure 8.1:	Climate data, Motueka District – Temperatures (monthly averages) 1	.70
Figure 8.2:	Climate data, Motueka District – Rainfall distribution	70
Figure 8.3:	Climate data, Ohakea District – Temperatures (monthly averages) 1	82
Figure 8.4:	Climate data, Ohakea District – Rainfall distribution	82
Figure 9.1:	Visual representation of Māori resource assessment model	94
Figure 9.2:	Implementation pathway for Māori land assessment model	99
Figure 9.3:	Visual representation of data collection within model	203

List of Plates

Plate 1:	Maunga Taranaki	. xix
Plate 2:	Sample varieties of taewa (Solanum spp.)	106
Plate 3:	Sample varieties of kānga (Zea mays)	108
Plate 4:	Sample of kamokamo (Cucurbita spp.)	109
Plate 5:	Nīkau palm (Rhopalostylis sapida)	123
Plate 6:	Selection of taewa cultivars (Solanum tuberosum)	142
Plate 7:	$Motueka\ district\ and\ Wakatu\ or chards-looking\ eastward\ towards\ Nelson$	158
Plate 8:	Te Tau Ihu indicating Wakatu district. (Photo courtesy of Wakatu Inc.	
	2004)	161
Plate 9:	Wakatu marae, Nelson	163
Plate 10	: Robbies Block looking to Whakarewa Street, Motueka (2004)	167
Plate 11	Parewahawaha marae, Bulls	175
Plate 12	: Aerial view of Bulls district indicating Parewahawaha Marae	175
Plate 13	: Parewahawaha Marae and surrounds - Section 141C2A Ohinepuhiawe	
	block is the ploughed paddock to the right of the buildings	176
Plate 14	: Ohinepuhiawe Block 141C2A (Spring 2005)	176
Plate 15	Tahuri Whenua hui, Te Keete Marae, Otorohanga, 2003	191
Plate 16	: Hāngi to complete harvest activities, Tahuri Whenua members, 23 March	
	2006	191

List of Appendices

Appendix 1:	Maramataka Māori – Ātiawa version	. 243
Appendix 2:	Indigenous biological indicators	. 246
Appendix 3:	Māori Land Court Boundaries, 2007	. 247
Appendix 4:	List of hue (Lagenaria siceraria) vernacular names	. 248
Appendix 5:	List of taewa (Solanum spp.) vernacular names	. 249
Appendix 6:	List of harakeke (Phormium tenax & P. cookianum) vernacular names	. 250
Appendix 7:	Pou herenga values as described by AREDS	. 251
Appendix 8:	Value statements – FoMA	. 252
Appendix 9:	Soil test results, Wakatu Case Study	. 254
Appendix 10	: Soil test results, Parewahawaha Case Study	. 255
Appendix 11	: Rules & Objectives, Tahuri Whenua Inc. Soc.	. 256

Ko Papa-tūānuku kei te tuku kai mo ona mokopuna i te ao i te tau, i te tau.

It is Papatūānuku [the Earth Mother] who, every season, provides food for her offspring in the world. (Best, 1995a:275)

WAIATA ORIORI (extract only)

Māhaki.

..... Ko Hakirirangi ka u te uta; It was Hakiri-rangi who reached the shore:

(Hakirirangi came on the Horouta waka and

introduced the kūmara)

Te kowhai ka ngaora, ka ringia te kete And when the kowhai flowered, poured out her basket

Ko Manawaru, ko Araiteuru at Manawaru and Araiteuru (Her plantations near

Turanga/Gisborne)

Ka kitea e te tini, e te mano! It was seen by the many, the multitude

Ko Makauri anake i mahue atu i waho i Tokahuru Only Makauri was left behind at Tokahuru

Ko te peka i rere mai ki uta ra hei kura mo Its branch sped ashore as a treasure for Māhaki

Ko Mangamoteo, ko Uetanguru There are Mangamoteo and Uetanguru

Ko te koiwi ko Rongo-rapua (the name of the belt

in which she brought the kūmara here)

Waiho me tiki ake ki te kūmara i a Rangi! Let it be fetched from the kūmara of Rangi!

Ko Pekehawani ka noho i a Rehua Pekehawani will live with Rehua

Ko Ruhiterangi ka tau kei raro: And Ruhi-te-rangi come down below (all stars that

signal the onset of harvest time)

Te Ngahuru tikotiko-iere The autumn, time of heavy crops and singing;

Ko Poututerangi Poututerangi (The tenth month or harvest time)

Te matahi o te tau, te putunga o te hinu, e tama e! The eleventh month of the year, the abundance of rich

food, my boy.

This extract is from an oriori or lullaby that originates from Te Aitanga ā Māhaki tribe near Gisborne and is concerning the origin of kūmara in their district and the rituals and events which are associated with the seasonal cycle ending each year with the harvest. It reminds us of the importance of horticulture to Māori, especially the subsistence culture that existed prior to European colonisation of Aotearoa/ New Zealand and the introduction of new economic opportunities. The traditional knowledge that surrounds traditional horticulture and associated activities is extensive and this thesis will serve only as an introduction to that store of knowledge.