



Routledge Studies in Archaeology

CULTURAL AND ENVIRONMENTAL CHANGE ON RAPA NUI

Edited by

Sonia Haoa Cardinali, Kathleen B. Ingersoll,
Daniel W. Ingersoll, Jr., and Christopher M. Stevenson



Cultural and Environmental Change on Rapa Nui

Rapa Nui, one of the world's most isolated island societies and home to the *moai*, has been at the centre of a tense debate for the past decade. Some see it as the site of a dramatic cultural collapse occurring before Western contact, where a self-inflicted ecocide was brought on by the exhaustion of resources. Others argue that the introduction of Western pathogens and the slave raids of 1862 were to blame for the near extinction of the otherwise resilient Rapa Nui people.

Cultural and Environmental Change on Rapa Nui brings together the latest studies by prominent Rapa Nui researchers from all over the world to explore the island's past and present, from its discovery by Polynesians, through the first documented contact with Western culture in 1722, to the 20th century. The exiting new volume looks beyond the *moai* to examine such questions as: was there was a cultural collapse; how did the Rapa Nui react to Westerners; and what responses did the Rapa Nui develop to adjust to naturally – or humanly –induced environmental change?

This volume will appeal to scholars and professionals in the fields of history, archaeology and ecology, as well as anyone with an interest in the challenges of sustainable resource management, and the contentious history of Rapa Nui itself.

Sonia Haoa Cardinali is a Rapa Nui archaeologist with extensive experience – 41 years – in Rapa Nui archaeology. She began her work with Dr William Mulloy and the Orongo restoration project. She has worked with a multitude of international scholars in the management and direction of island excavations that include some of the largest and most impressive monuments on the island, and some 28,000 sites. She has directed the comprehensive island-wide survey of archaeological features and is also keenly interested in the prehistoric ecology of the island and has actively pursued a program of reforestation in conjunction with CONAF. Her abiding interest is in the way humans everywhere relate to the landscape and environment, and how to give back to the present the rich discoveries made in the past.

Kathleen B. Ingersoll, BA, MA, PhD. Her academic interests lie in anthropology, environmental and landscape archaeology, food/horticulture, historic preservation and museum studies, and the interpretation of landscapes, especially in the eastern US and Polynesia. Her latest work includes consulting on museum exhibits for The Mata Ki Te Rangi Foundation on Rapa Nui, both on the island of Rapa Nui and in Tenerife, Spain. She is also a Master Leave No Trace environmental educator and believes in the importance of understanding the relationship between humans, nature, and heritage on a global scale. In this vein, she successfully designed and implemented study tours to Rapa Nui that combined Leave No Trace training with archaeology.

Daniel W. Ingersoll, Jr. His interests include historical archaeology, experimental archaeology, American culture, symbolism, agriculture, and Rapa Nui culture. Ingersoll received his A.B. and Ph.D. in anthropology from Harvard College and Harvard University, respectively. Now professor emeritus, he taught at the University of Massachusetts, Amherst, and then St. Mary's College of Maryland for 37 years until retirement. Publications include *Experimental Archaeology*, with William K. Macdonald and John Yellen and *Mirror and Metaphor: Material and Social Constructions of Reality*, with Gordon Bronitsky. Ingersoll's interest in Rapa Nui studies began in 2006.

Christopher M. Stevenson received his doctorate from The Pennsylvania State University in 1984 for his work on the archaeology of Easter Island (Rapa Nui). Since that time he has worked within cultural resource management and academic contexts and continues to focus on Easter Island prehistory. Since 1988 he has led over 19 expeditions to Rapa Nui and works collaboratively with Rapa Nui/Chilean archaeologists. He has served as a Fulbright Specialist in Chile. His other interests include obsidian hydration dating, the Colonial archaeology of Virginia and Eastern United States prehistory. Currently he is an Assistant Professor Anthropology in the School of World Studies, Virginia Commonwealth University.

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Contents

<i>List of contributors</i>	ix
Introduction	1
1 Prehistoric settlement, ancient gardens and population dynamics on the Hiva Hiva lava flow, Rapa Nui, Chile CHRISTOPHER M. STEVENSON, THEGN N. LADEFOGED AND OLIVER CHADWICK	9
2 A vanished landscape – phenomena and eco-cultural consequences of extensive deforestation in the prehistory of Rapa Nui ANDREAS MIETH AND HANS-RUDOLF BORK	32
3 The potential for palm extinction on Rapa Nui by disease KATHLEEN B. INGERSOLL AND DANIEL W. INGERSOLL, JR.	59
4 New interpretations of pollen data from Easter Island JOHN FLENLEY AND KEVIN BUTLER	74
5 Subsistence strategies on Rapa Nui (Easter Island): prehistoric gardening practices on Rapa Nui and how they relate to current farming practices JOAN A. WOZNIAK	87
6 By the Quebrada of Ava Ranga Uka A Toroke Hau – about landscape transformation and the significance of water and trees BURKHARD VOGT AND ANNETTE KÜHLEM	113

7	Re-use of the sacred: late period petroglyphs applied to red scoria topknots from Easter Island (Rapa Nui)	133
	GEORGIA LEE, PAUL BAHN, PAUL HORLEY, SONIA HAOA CARDINALI, LILIAN GONZÁLEZ NUALART, AND NINOSKA CUADROS HUCKE	
8	An earthly paradise? Easter Island (Rapa Nui) as seen by the eighteenth-century European explorers	156
	JAN J. BOERSEMA	
9	The impact of the whalers and other foreign visitors before 1862	179
	RHYS RICHARDS	
10	Healing a culture's reputation: challenging the cultural labeling and libeling of the Rapanui	188
	KATHLEEN B. INGERSOLL, DANIEL W. INGERSOLL AND ANDREW BOVE	
11	Reflections	203
	<i>Index</i>	209

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Georgia Lee (1926–2016) received her Ph.D. from UCLA for her outstanding research and documentation of rock carvings and paintings of Easter Island. This research project embraced many years of intensive field work, culminating in publication of the “Rock Art of Easter Island: Symbols of Power, Prayers to the Gods”, which became the landmark reference book in the field. Further, Dr Lee worked extensively in the Hawaiian Islands (publishing another prominent book “Spirit of Place: Petroglyphs of Hawai'i” in co-authorship with Edward Stasack) and continued on with important research of Chumash rock paintings in California. Georgia Lee established the *Rapa Nui Journal*, which for thirty years served as an important forum for academic discussions in Rapa Nui studies and Polynesian archaeology. She was also the founding member of the Easter Island Foundation that provides scholarships to the promising students of Rapanui heritage, helping to continue their education in leading colleges and universities. She lived in California until she passed away, July 9, 2016. She will be sorely missed.

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Introduction

Things are not always what they seem . . . the sentiment is an appropriate observation and one that scholars engaged in fieldwork on an unfamiliar landscape know all too well. Anthropologists, historians, geologists and archaeologists, in particular, delve into the past without a secret decoder ring, but instead with the hypotheses and physical remnants of the culture they wish to learn more about. They are mindful of the fluidity of time and space that seductively acts to bring particular objects – monumental or minute – into sharp relief, and that those objects may ultimately serve as the bedrock that supports theory. In the case of Rapa Nui, or as English-speaking Westerners refer to it, Easter Island, the monumental statues on their altars were so intriguing and mysterious that they stole the ink of interpretation at the very first European contact, a foundation for a legacy that has held sway for more than three hundred years.

To be certain, the *moai* and *ahu* are powerful, mysterious and grand in scale and design. They constitute awesome material statements of cultural meaning and chiefly legitimacy writ large on the landscape. As with monumental stonework around the world, they evoke speculation and awe, especially when they are located in a remote island setting more than two thousand miles away from any substantial body of land. The *moai* and their *ahu* have been romanticized and glorified by explorers and scholars in recent history, most notably by Thor Heyerdahl and Jared Diamond in the twentieth century. These two scholars, with extremely different research agendas, had one thing in common: the ability to write in a fashion that captivated the lay audience through either swashbuckling adventure or blanket theories of cultural disconnect and disruption. Both scholars used the *moai* as their linchpin, capitalizing on their sheer volume and construction to advance theories of migration that “prove” indigenous people incapable of achievement (Heyerdahl) or cost benefit analyses that show they exhausted their resources (Ponting, Diamond, and others).

Such actions demonstrate the dangers of the adage above – things are not always what they seem – and the limitations of lifting one element, especially the most obvious element, up to the light without explaining the larger overarching picture. Each scholar, with equal amounts of Barnum and Bailey

2 Introduction

aplomb and Madison Avenue salesmanship, sold a Rapa Nui story that was anchored in a current Western motif – exploration of the Pacific via an experimental sailing vessel or going to the ends of the earth to find the poster children for environmental degradation and cultural collapse. Both models were palatable and exciting for armchair explorers and the green machine looking for someone to blame for the end of the world as we know it. The advent of the Internet and its memes helped to spread these ideas around the world, and Rapa Nui became a hot ticket on the wealthy eco-travel express so nimby (not-in-my backyard) visitors could congratulate themselves as witnesses to cultural collapse.

While the controversies in the media progressed in the late twentieth century, promoting movies and books related to the island's negative components, a remarkable paradigm shift slowly took shape among Rapa Nui scholars. Scholars began to look at the landscape from a settlement pattern perspective that acknowledged the presence of the *moai* and *ahu* but only from their location within the larger domestic pattern. Any visitor to the island marvels, and maybe curses, the sheer volume of rock on the island that hampers easy access to sites and beaches. In fact, if you look around, you realize that you are often in a sea of rocks looking out to a limitless ocean from one vantage point or to the backbone of the island from the shore. One of us, Sonia Haoa Cardinali, a Rapanui archaeologist who worked and consulted with both Heyerdahl and Diamond on Rapa Nui, remembers talking to the island's elders about landscape patterns, especially as related to gardens and subsistence. The use of rocks as landscape resources was a recurring story. When coupled with the current tradition of using rocks for planting, a very different landscape story has slowly come to light thanks to the work of a cadre of international scholars. Far from a culture of collapse and doom, a snapshot of extreme innovation and resolve has emerged. As the most prolific resource on the island, rocks could be thought of as the medium or the currency for the creation of gardens, cooking ovens and boathouses that frequently align with a focal *ahu* and *moai*.

Archaeologists from around the world have worked for the last twenty years on projects not focused on the extraordinary *moai* and *ahu* but rather the more mundane domestic arrangements all cultures share as they go about their day-to-day lives. Advances in environmental sciences have granted new ways to look at stone tools, plant materials, and soil amendments. What has emerged is a story of a remarkable set of innovations that served to feed groups of people in a sustainable fashion that is emulated today with great success. In reality the Rapanui were a far cry from the resource sucking entity as defined by Diamond and others and any cultural collapse came at the hands of Europeans who enslaved the Rapanui and introduced disease.

The articles included in this text demonstrate the power of seeing things in a different light and help to explain how the smallest details can be more meaningful than the largest monuments in the creation of a sustainable and innovative world.

If you face inland, standing at the edge of the ocean where most of the *ahu* and *moai* are or were situated, what about the landscape that stretches from the shore up to the summit of the volcano cones? What did it look like? What was there? Was it occupied? How did that expanse from shore to crater relate to the total cultural and social world of the Rapanui at various points in time?

This volume addresses what you see if you look past the *moai*, inland. The pre-Western contact Rapa Nui landscape is addressed in Chapters 1 to 6, mostly with the tools of archaeology and palynology (pollen analysis), including archaeological survey and testing, mapping and laboratory analysis. Chapter 7 is a pivot point, dealing with petroglyphs both before and after Western contact. Chapters 8 through 11 explore the post-Western contact period and what happens to the landscape, using archaeology and historical documents.

How were settlements organized with respect to gardens? In Chapter 1, “Prehistoric settlement, ancient gardens and population dynamics on the Hiva Hiva lava flow, Rapa Nui, Chile” Christopher M. Stevenson, Thegn N. Ladefoged and Oliver Chadwick analyse settlement patterns on the Hiva-Hiva lava flow (western Rapa Nui, about half-way up the west coast), an area where volcanic activity may have occurred as recently as 10,000 years before the present. An earlier archaeological survey logged in over 2200 cultural features from which the present study defined two smaller survey areas within the Hiva Hiva lava flow. Encountered in the survey areas were remains of dwellings, stone walls and pavements, lithic workshops, extensive rock gardens, rock quarries and other features, all relocated or located with great precision on GIS (Geographic Information System) maps. Soil samples for nutrient analysis were taken, both from inside and outside of the ubiquitous stone gardens. From these soil samples, it was possible to relate the soils to the surface lava flow events and to evaluate the productivity potential of the soils. Carbon and obsidian samples were dated and a chronological framework was constructed that enabled the researchers to trace changes in settlement intensity in the two survey areas through time, and to derive an indirect measure of population density fluctuations there. The result: the researchers’ melding of field survey, biogeochemistry, radiometric and obsidian hydration dating and GIS, generates for us a much sharper picture of evolving Rapanui life and community on a local scale.

In Chapter 2, Andreas Mieth and Hans-Rudolf Bork provide a context for how an emphasis on the control of water came about. In their contribution, “A vanished landscape – phenomena and eco-cultural consequences of extensive deforestation in the prehistory of Rapa Nui”, the authors argue that the scale and rapidity of forest clearing was a remarkable, transformative event for the population of a small island. Upon arrival to the island, in their estimation perhaps as early as 700 AD (others researchers argue ca. 1200 AD), the Polynesians entered a pristine environment believed to be untouched by human hands. Initially, human modification to the environment was minimal

4 Introduction

as agricultural plantations were less intensive and intermingled with standing palms. However, this was short-lived and within 300 years the impacts of humans on the landscape is dramatic. They use zoological, palynological, and landscape investigations to show the rapidity of human forest clearance and its impacts. What motivated the residents of Rapa Nui to systematically clear the island? Was it the need to establish intensive agricultural fields to raise the staple crops of sweet potato and taro for an expanding population, or were there additional needs? Their observation that very little palm wood was used for fuel in the hearths and earthovens suggests the trees were felled for another reason. They postulate that the core of palm containing many litres of sap was one of the driving forces. The need for moisture again rears its head as a central concern of the Rapa Nui.

What caused the disappearance of the palm? This question is considered in Chapter 3, “The potential for palm extinction on Rapa Nui by disease” by Daniel and Kathleen Ingersoll. The chapter opens by examining some of the popular hypotheses and statements in the literature concerning the extinctions of the palms of Rapa Nui. The focal species is the *Jubaea chilensis*-like palm, or *Paschalococos disperta*. Overharvesting, climate change and predation by the introduced rats (*Rattus exulans*) currently represent the major proposed hypotheses. Alternative hypotheses deserve serious consideration including fungi, viruses, bacteria, nematodes, insects, birds and combinations such as insects transmitting fungi. Some examples of palm loss to these threats on other Pacific islands besides Rapa Nui are discussed.

Chapter 4 by John Flenley and Kevin Butler, “New interpretations of pollen data from Easter Island”, builds upon Flenley’s early investigations of pollen analysis in the Rano Kau fresh-water crater lake to sceptically address the questions of initial human settlement on Rapa Nui. Taking advantage of new AMS dating methods, and the ability to date the smallest of seeds, the pollen record for Rano Kau is re-dated and re-interpreted. With the former dating inversions in the profile removed, the environmental changes in the Holocene become readable, but the causes of ecological changes are sometimes difficult to interpret. This is especially true for the time period around 100 AD where they document a decline in palm abundance and increase in charcoal accumulation. The low probabilities associated with volcanism or lightning in the creation of repeated burning points at the intervention of man on the landscape during this early period, a full thousand years before recent reconstructions of Polynesian dispersal places humans on Rapa Nui (Wilmherst et al. 2011). Flenley and Butler argue for an earlier colonization, and possible abandonment of Rapa Nui, that may have been partially obliterated by sea level rise. Although additional evidence in the form of cultural material is absent, this signature for human environmental impact in the pollen record requires that we keep an open mind with respect to Polynesian human dynamics and dispersal.

What is a rock garden and why do they cover nearly half the landscape? Joan A. Wozniak in Chapter 5, “Subsistence strategies on Rapa Nui (Easter

Island): prehistoric gardening practices on Rapa Nui and how they relate to current farming practices”, addresses the subsistence role of rock, stone or lithic mulch gardens, as they are variously called. A wide array of data sources including archaeological field work at *Ahu Te Niu* (located about two thirds of the way up the west coast) and laboratory analysis as well as the historical literature, ethnography and Rapanui oral tradition are synthesized to provide an understanding of the terminology, types, function, distribution and time depth of rock gardens. A review of comments on Rapa Nui’s horticulture by eighteenth- and nineteenth-century western observers sets the scene. A consideration of ethnographic data and information gained from Wozniak’s and others’ informants helps shed light on how the landscape was gardened. Analysis of microfossils such as pollen, phytoliths and starch residues from *Ahu Te Niu* and other sites makes it possible to know which plants such as sweet potato, taro and banana were grown and where, and to discover salient characteristics about the make-up of the humanly-amended soils underlying the rock gardens. Wozniak advances the interesting postulate that some of the rocks for mulching the gardens may have come from piles of reused materials, employed in an earlier period for moving and erecting the *moai* – one of her informants suggested that *moai* were moved on small rocks that served as roller bearings. But perhaps the most important aspects of rock mulches that Wozniak reveals is their ability to buffer temperature changes, reduce wind and water erosion, offer shelter from the wind and conserve moisture and render horticulture practical and sustainable without fallowing.

The Rapanui transformed the landscape with rock, but that is not the only way. Burkhard Vogt and Annette K hlem in Chapter 6, “By the Quebrada of Ava Ranga Uka A Toroke Hau – about landscape transformation and the significance of water and trees”, describe a remarkable site located midway up the slopes of the main volcano, Maunga Terevaka, that focused upon the control of water. At this location two large earthen and rock dams were positioned below a small waterfall within the ravine to capture the seasonal rainfall from higher elevations. Behind the dams a series of superimposed pavements covering the valley floor give further evidence for a significant level of effort directed to creating an abundance of fresh water on an island largely devoid of surface streams. A carved basin of basalt blocks, decorated with petroglyphs, was constructed below the waterfall and water flow was directed through the basin to comfort the bather. The positioning of an *ahu* on the lip of the ravine suggest that access to the oasis was not for everyone, but likely restricted to the chiefly elite who could rest under the shade of maintained palm trees on an island that was nearly deforested. Clearly, this was a sacred place of central importance to the leadership of one island lineage.

In Chapter 7, Georgia Lee et al. look at another aspect of sacred behavior in the latter parts of prehistory. “Re-use of the sacred: late period petroglyphs applied to red scoria topknots from Easter Island (Rapa Nui)” documents the changing meaning of sacred objects. The body of Easter Island

6 Introduction

rock art, comprising several thousand images, is one of the most impressive in Oceania. A wide array of motifs were executed on a large variety of carving surfaces: cave entrances and ceilings, house entrances, the inner side of worked basalt house foundation slabs, stones in the vicinity of water sources, statue quarries at Rano Raraku and top knot quarries at Puna Pau, basalt boulders at the ceremonial center of ‘Orongo, as well as countless carved flat lava panels scattered over the island. One of these images, a stylized boat with curved stern and prow, is disproportionally located on the red scoria topknots (*pukau*) that once adorned the yellow tuff statues (*moai*). Applied after the topknots had become separated from the head, an interpretation of the boat image meaning becomes problematical within a new interactive context where society is changing quickly in response to frequent European visits and the biological pathogens, such as small pox, left behind. The documentation of these motifs by 3D scanning, and their association with many of the European landing locations, provides some indication that the images document the arrival events of the post-contact period.

On 9th April, 1722, Dutch explorers, under the command of Jacob Roggeveen, were the first Europeans to set foot on Easter Island. They were later followed by explorers from Spain (1770), Great Britain (1774) and France (1786). Each of these expeditions produced accounts of their findings on this remote Polynesian isle including a variety of official logs, notes by crew members, reports by scientists and even “second hand” writings. Jan J. Boersema’s Chapter 8, “An earthly paradise? Easter Island (Rapa Nui) as seen by the eighteenth-century European explorers” summarizes the main revelations of these accounts in respect to food production. What do the accounts tell us about the ecological and cultural situation at the time of these visits? Do they render reliable information on (over)population and/or (over)exploitation? How are the various reports to be interpreted in view of later scientific studies? The conclusion drawn is that the accounts do not confirm the reported collapse, suggested by Clive Ponting and Jared Diamond. Easter Island may not have been the “earthly paradise” that Jacob Roggeveen deemed possible, but rather appears to support the existence and continuation of a sustainable society in the pre-European period, even after deforestation.

Substantial literature concerning the first Western contacts beginning with Roggeveen (1722) is readily available including republished original accounts and interpretations of them. Earlier in this volume, Wozniak draws on some of the eighteenth-century visitors’ records for valuable horticultural observations. Here in Chapter 9, “The impact of whalers and other foreign visitors before 1862”, Rhyss Richards offers a unique contribution to Rapa Nui studies by pulling together all the known visitors’ accounts from the late eighteenth century until 1862 when the slaving expeditions arrived. Richards identifies what it is the visitors sought – usually re-provisionings for ships’ water, fruit and vegetables – and how the exchanges with the Rapanui were transacted. What emerges overall is a picture of a vigorous horticultural economy on a small island that produced sufficient surplus to

supply ships with surprising quantities of sweet potatoes, bananas and sugar cane. While many of the encounters proceeded peacefully, some of the ships exhibited confrontational behaviour early on, which prompted the emergence of an offshore exchange protocol. Meeting offshore, Richards argues, limited possibilities for modes of cultural accommodation such as the presence of beachcombers, and may even have delayed gradual development of immunities to Western diseases.

Western explorers, anthropologists, archaeologists, historians, novelists, and filmmakers create captivating and enduring stereotypes of other cultures. Once established, some of the stereotypes emerge as conceptually dominant and especially resistant to modification. In Chapter 10, Daniel and Kathleen Ingersoll and Andrew Bove argue that the pre-European contact Rapanui (Easter Islanders) have been mislabelled and libelled since the initial encounters. Some of the prevalent stereotypes they examine follow: the *moai* were built, not by the Rapanui, but by people from North or South America who arrived first but were later replaced by the Rapanui; the late period pre-European contact Rapanui became a society immersed in civil discord ruled by blood thirsty warriors and cannibals; a massive cultural collapse occurred on Easter Island after the palms were harvested to extinction; Rapanui cultural practices led to ecocide. This chapter challenges the dominant Western cultural characterizations of the Rapanui and attempts to redress the situation.

We especially hope this book will help provide balance to a literature and media picture often dominated by an emphasis on a glorious distant past of *ahu* and *moai* followed by gloom and doom. We wanted to draw attention to the full, vibrant Rapanui world, past and near-present, following the Rapanui from their beginnings on the island through the nineteenth century. In this vein, we dedicate this book to the Rapanui people for their kindness and hospitality, and for the inspiration of their unquenchable human spirit.

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8 Introduction

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1 Prehistoric settlement, ancient gardens and population dynamics on the Hiva Hiva lava flow, Rapa Nui, Chile

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Introduction

When colonialists arrived on Rapa Nui around AD 1100–1300 (Hunt and Lipo 2006; Wilmshurst et al. 2011; Mulrooney 2013) their double-hulled canoes were loaded with the plants and animals necessary to start a new life on a remote volcanic island. This pristine habitat mostly covered by a dense palm forest (Mieth and Bork 2005) and an understory of about a dozen shrubby species (Orliac 2000) was the home to nesting sea birds and possibly a small rail (Steadman et al. 1994). While this diminished biodiversity might have worried the Polynesians arriving during the initial discovery voyage, it was not sufficient to deter a later colonization effort. What could not be assessed at that time was the full range of ecological and geological constraints, the eventual human-generated environmental challenges, and technological changes that would eventually impact the Rapa Nui farmers in the years to come.

Recent research into prehistoric agriculture on Rapa Nui has demonstrated that its small size, low elevation, wind-driven evapotranspiration, cool temperatures, and lower rainfall restricted these farmers to dryland agriculture (Horrocks and Wozniak 2008; Stevenson et al. 2006; Wozniak 1999) and small-scale irrigation by rain-water capture techniques (Stevenson 1997). During the first few centuries of settlement, the surface vegetation may have served to buffer environmental stresses but with the rapid slash-and-burn process of deforestation that cleared the lower elevations of Rapa Nui by AD 1450 and the upper elevations by the early AD 1600s (Horrocks et al. 2015), the damage to agricultural productivity must have been soon recognized. In the face of this self-inflicted change in environmental conditions, the Rapa responded technologically by creating rock gardens and behaviourally by more direct supervision and management of agricultural production (Stevenson et al. 2005).

The Hiva Hiva lava flow (Figure 1.1) is one such place on Rapa Nui where pre- and post-deforestation agriculture would have been practiced. This geological substrate represents the most recent volcanic activity on Rapa Nui and its emplacement is dated to approximately 0.11 mya (Vezzolli and Acocella 2009). The recent age of the flow, in comparison to the

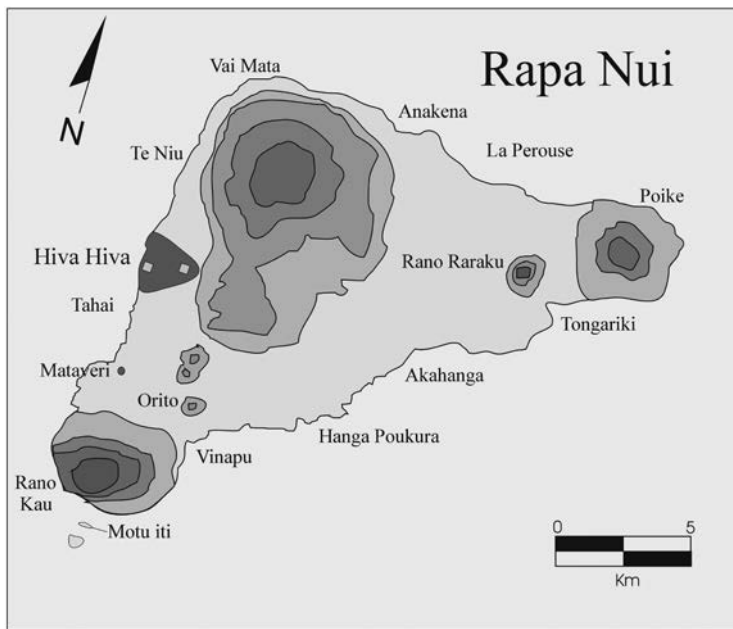


Figure 1.1 Island of Rapa Nui showing the location of Hiva Hiva

more extensive and older lava sheets (0.78–0.3mya) covering the remainder of Rapa Nui, means that the newly created ground surface has experienced much less weathering and rainfall leaching. As a result, the surface has the appearance of basalt rock outcrops covered by thin soils in convex positions that are interspersed with accumulated tephra- and/or volcanic loess-based soils in swales. These factors suggest that human use of the landscape would have required adaptations to a unique set of circumstances not found in many other parts of the island.

Archaeological survey and remote sensing within the last decade (Stevenson and Haoa 2008; Ladefoged et al. 2012) has identified the numerous rock gardens that cover much of the Rapa Nui landscape. These gardens consist of a variety of stone accumulations that can be characterized as boulder, veneer, or lithic mulch gardens (Stevenson et al. 1999). The Hiva Hiva terrain is covered by numerous prehistoric rock gardens. It is also well suited for farming on a treeless and windy terrain because the ground surface is undulating and has many swales and protected areas created by elevated lava exposures. In addition, the large quantity of basalt surface rock provides ample raw material for the construction of rock gardens and walled enclosures.

The success of ancient farming also depended upon the quality of the soil. In many other parts of Rapa Nui the soils have been characterized as nutrient poor (Louwagie et al. 2006; Ladefoged et al. 2005; Vitousek et al. 2014) as