Questioning Collapse

Human Resilience, Ecological Vulnerability, and the Aftermath of Empire

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Ecological Catastrophe, Collapse, and the Myth of "Ecocide" on Rapa Nui (Easter Island)

Terry L. Hunt and Carl P. Lipo*

Easter Island! The name is synonymous with mystery and the intrigue of archaeology. The hundreds of giant statues – *moai* – located on a remote windswept and treeless landscape practically demand that archaeologists answer the question of what happened there. Easter Island, or Rapa Nui as it is known to the island's native Polynesians, has also become the "poster child" for what happens when societies squander their resources and destroy their environment. In his book *Collapse*, Jared Diamond describes an ecological catastrophe brought on by the island's inhabitants that led to their own destruction.[1] Diamond calls it "ecocide": the choice to construct giant statues led to the island's ecological devastation and the collapse of the ancient civilization. He and other researchers offer the ecocide story as a parable for our own potential destruction of the global environment. But is the story told for Easter's human-induced environmental change correct, particularly what's been said about the causes and consequences? We consider new evidence from Rapa Nui in light of recent discoveries from the Hawaiian Islands and offer some perspectives for the island's ecological transformation and the consequences.

From our own archaeological research on Rapa Nui we show that a much later settlement for the island than has been previously recognized calls into question important aspects of its ecological history.[2] When we take a closer look at the palaeo-environmental and archaeological evidence we find a complex history of ecological

FIGURE 2.1 Giant stone statues (*moai*) at Ahu Tongariki, Rapa Nui. (Photo by Terry Hunt)

change for the island, not a single cause but a variety of impacts that occurred in combination with one another. This history is quite different from the notion of ecocide in which reckless Polynesians overexploited their environment. It is essential to disentangle environmental changes in Rapa Nui from a population collapse that resulted from European contact. Such contact brought Old World diseases and slave trading. Contrary to today's popular narratives, ancient deforestation was *not* the cause of population collapse. If we are to apply a modern term to the tragedy of Rapa Nui, it is not ecocide, but genocide.

Rapa Nui is small (164 square kilometers) and isolated in the remote southeastern Pacific. Except for the Polynesian islands of Pitcairn, Ducie, and Henderson, themselves small, remote, and relatively impoverished, Rapa Nui's nearest neighbors are more than 3,000 kilometers away. Voyaging from the central islands of eastern Polynesia would have normally gone against the prevailing trade winds, with the island forming only a small target, although westerly winds associated with periodic El Niño conditions may have carried Polynesian colonists on a downwind voyage to the island.

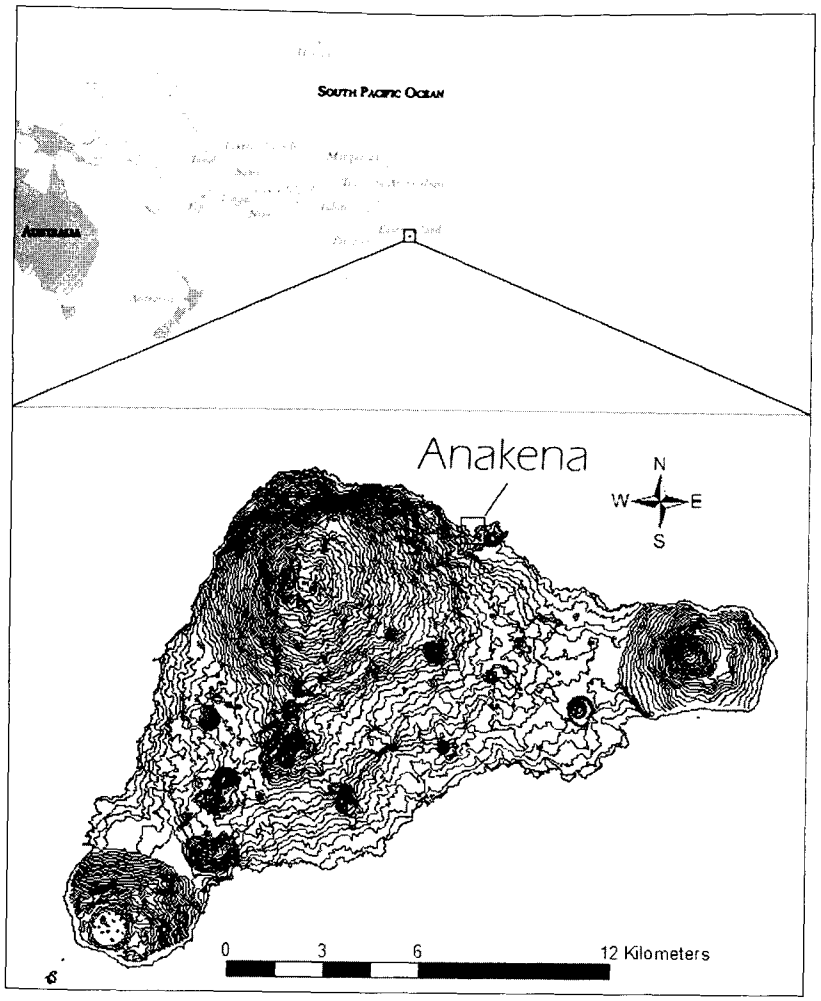

FIGURE 2.2 Rapa Nui and southeastern Pacific.

Rapa Nui also has a limited number of native plants and animals reflecting its young geological age, small size, and great isolation – quite apart from its losses in recent ecological history. Concerning the island's biology C. Skottsberg wrote that "there is in the Pacific Ocean no island of the size, geology and altitude of Easter Island with such an extremely poor flora ... nor is there an island as isolated as this ... [T]he conclusion [is] that poverty is a result of isolation –

even if man is responsible for disappearance of part of the flora, [Rapa Nui] cannot have been rich."[3] Today biologists count only forty-eight "native" plants. Fourteen of these, including sweet potato and the other cultigens, were ancient Polynesian introductions. However, studies of pollen found in lake-floor sediments and identifications of wood charcoal from ancient cooking ovens suggest many other woody plants once covered Rapa Nui.

The island has few, if any, indigenous terrestrial vertebrates. Two lizard species may be native to the island, but biologists are not certain. The only land birds found on the island today are recent introductions, but archaeological discoveries show that the island once supported twenty-five species of seabirds and on present evidence perhaps about six land bird species. A few seabirds survive today, but the original land birds became extinct. Since there is a lack of extensive reefs, the number of fish is small when compared to other islands of the Pacific. Sea mammals and turtles are known from Rapa Nui. On present archaeological evidence, the only animals brought in the canoes of the ancient Polynesians were rats (*Rattus exulans*) and chicken. The introduction of the former decisively affected life on Rapa Nui.

Unlike the luxuriant islands typical of Polynesia, Rapa Nui does not enjoy abundant regular rainfall and a tropical climate. There are no permanent streams. At twenty-seven degrees south, Rapa Nui is just outside the tropics, where important Polynesian food crops such as coconut and breadfruit would not have survived. Rainfall (only about 1,250 millimeters annually) can fluctuate dramatically. Most of the island's soils are excessively well drained, and devastating droughts are common. The island is also often plagued by strong winds with salt spray that damage – sometimes even destroy – the food crops that Polynesians cultivated. Rapa Nui was not a Polynesian Paradise. Droughts, winds, poor soil, and no permanent streams certainly meant problems for the ancient farmers on this isolated speck at the farthest reaches of Polynesia.

THE ECOLOGICAL PARABLE

Speculations of ecological ruin on Rapa Nui began with one of the island's early European visitors. From a single day's visit in April 1786, French explorer La Pérouse speculated that at some time in the past Rapa Nui's inhabitants had thoughtlessly cut down all the trees. He wrote that loss of the forest

> has exposed their soil to the burning ardor of the sun, and has deprived them of ravines, brooks, and springs. They were ignorant that in these small islands, in the midst of an immense ocean, the coolness of the earth covered with trees can alone detain and condense the clouds, and by that means keep up an almost continual rain upon the mountains, which descends in springs and brooks to the different quarters. The islands which are deprived of this advantage, are reduced to the most dreadful aridity, which, gradually destroying the plants and scrubs, renders them almost uninhabitable. Mr. de Langle as well as myself had no doubt that this people were indebted to the imprudence of their ancestors for their present unfortunate situation.[4]

Today the idea of the "imprudence of their ancestors" is taken up by Jared Diamond as a moral for our time: "In just a few centuries, the people of Easter Island wiped out their forest, drove their plants and animals to extinction, and saw their complex society spiral into chaos and cannibalism. Are we about to follow their lead?" Diamond continues:

> Eventually Easter's growing population was cutting the forest more rapidly than the forest was regenerating. The people used land for gardens and wood for fuel, canoes, and houses – and of course, for lugging statues. As forest disappeared, the islanders ran out of timber and rope to transport and erect their statues. Life became more uncomfortable – springs and streams dried up, and wood was no longer available for fires. ... As we try to imagine the decline of Easter's civilization, we ask ourselves, "Why didn't they look around, realize what they were doing, and stop before it was too late? What were they thinking when they cut down the last palm tree?"[5]

Diamond believes Rapa Nui is "the clearest example of a society that destroyed itself by overexploiting its own resources" and that the consequences of deforestation "start with starvation, a population crash, and a descent into cannibalism."[6]

Some archaeologists have argued that on Rapa Nui the efforts required to carve and transport the giant statues eventually led the population to deplete their own natural resources and plunge into a downward spiral induced by overpopulation and environmental destruction. In other words, people willingly destroyed the island and, in turn, destroyed themselves. Ecocide!

Did human recklessness, overexploitation, and overpopulation lead to deforestation and ecological catastrophe? Did a collapse of ancient population and culture result from an ecological catastrophe before European contact in 1722 C.E.?

THE ECOLOGICAL EVIDENCE

Early Observations

The earliest European visitors did not leave us with many details about Rapa Nui's environment, and the earliest accounts are contradictory. For example, the Dutch expedition led by Jacob Roggeveen in 1722, expecting to relocate a "low and sandy island" sighted earlier by Captain William Dampier, reported:

> The reason why, at first, when at a farther distance off, we had regarded the said Easter Island as being of a sandy nature is that we mistook the parched-up grass, and hay or other scorched and charred brushwood for a soil of that arid nature, because from its outward appearance it suggested no other idea than that of an extraordinarily sparse and meager vegetation.

But following their stay on the island, the Dutchman wrote:

> We found it not only not sandy but to the contrary exceedingly fruitful, producing bananas, potatoes, sugar-cane of remarkable thickness, and many other kinds of the fruits of the earth, although destitute of large trees and domestic animals, except poultry. This place, as far as its rich soil and good climate are concerned, is such that it might be made into an earthly Paradise, if it were properly worked and cultivated; which is now only done in so far as the Inhabitants are obliged to for the maintenance of life.[7]

Deforestation

The first clear evidence for deforestation on Rapa Nui came from pollen studies by John Flenley and his colleagues.[8] Sediments of the lake floor of Rano Kao contained microscopic pollen grains from a giant palm tree similar in size and form to the native of mainland Chile, *Jubaea chiliensis,* that once dominated the island's forest. The pollen evidence shows that the forest disappeared and was replaced by the grassland we see today. Dating just when the dramatic vegetation

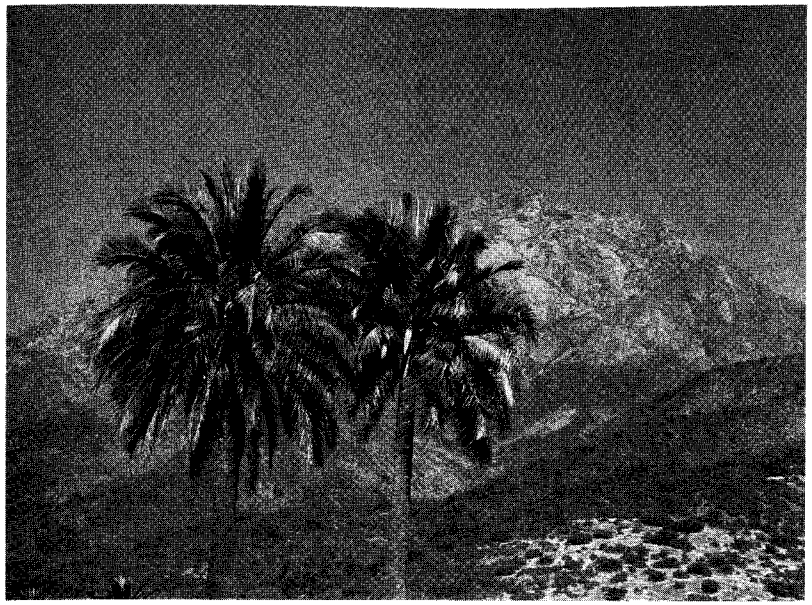

FIGURE 2.3 Mature *Jubaea chiliensis* palms at La Campaña National Park (32°51′S), mainland Chile. (Photo by Terry Hunt)

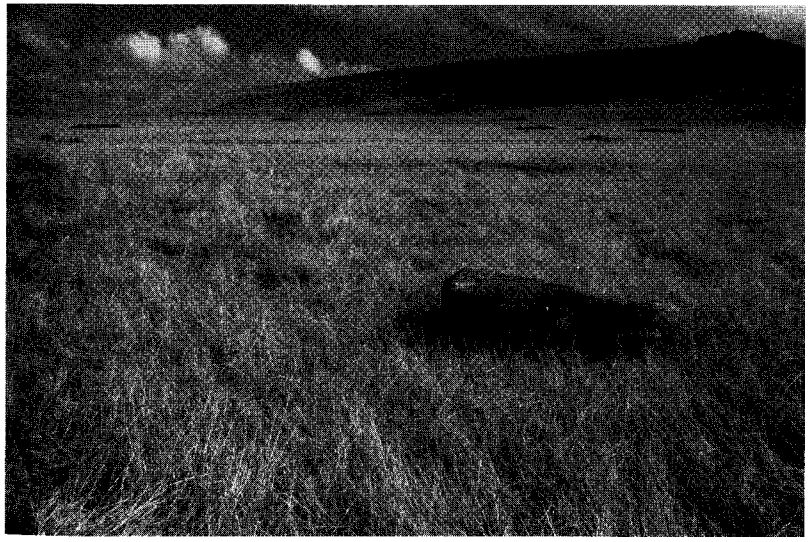

FIGURE 2.4 Grasslands of Rapa Nui today. (Photo by Terry Hunt)

changes occurred, and even how fast deforestation proceeded, has not been easy. But careful field work by Daniel Mann[9] and his colleagues, Andreas Mieth[10] and his team from Germany, and French researchers led by Catherine Orliac[11] and our own excavations[12] have shown that the forest disappeared over a period of about 400 years, from around 1250 to 1650 C.E. The palm trees in particular left behind nuts that were burnt or gnawed by the rats that people brought with them in their migration in about 1200 C.E. This clear association of radiocarbon-dated palm nuts with people and rats tells us when the forest grew and disappeared. From accounts of what early visitors reported, some native forest may have survived until the late eighteenth and nineteenth centuries.

Until recent discoveries came to light,[13] most archaeologists believed that Rapa Nui was first settled circa 400 C.E. or a few centuries later, about 800 C.E. With the first signs of human impacts on the forest only *after* 1250 C.E., researchers were forced to imagine an early, largely invisible, human presence on the island with farmers who practiced undetectable farming. In this scenario a small founding population with a remarkably slow population growth had few, if any, visible ecological impacts. Indeed, Polynesian colonizers on Rapa Nui, in this story, would have remained archaeologically and environmentally invisible for many centuries. Thus, it was not surprising that some scholars imagined, first, a period when people were ecologically aware, and, then, a period when they decided to ruin their paradise. But now, because we know that the early dates of migration are suspect, the early period of supposed low-impact ecological management probably didn't exist.

Multiple lines of evidence from archaeological and palaeoenvironmental research on Rapa Nui show that from the first time that migrants landed on Rapa Nui, their presence meant impacts to the environment. These events are easily visible to archaeologists. Our excavations in the deep, stratified sand dune at Anakena Beach, with more than a dozen radiocarbon dates, provide a chronology beginning about 1200 C.E. Our oldest radiocarbon samples from the deepest layers of our excavation contain the first artifacts, charcoal, and bones found directly above the undisturbed clay deposits that are riddled with the root molds of primeval palms. The oldest layers in our Anakena excavations also reveal the bones from the first

FIGURE 2.5 Excavations at Anakena Dune, Rapa Nui, University of Hawai'i archaeological field school, 2005. (Photo by Terry Hunt)

introduction of the Polynesian rat, as well as the remains of the earliest human meals, which included sea mammals, birds, and fish.[14]

The relatively late dates for first colonization came as a surprise. We, like our colleagues, had believed in a longer chronology. In questioning our own findings, we returned to the radiocarbon dates published from previous studies on Rapa Nui and found that those falling before 1200 C.E. were unreliable. Some of these dates appeared to predate that year, but when corrected by modern standards, their true age turned out to be centuries younger. The large body of dates for the island fell completely within a range that begins after 1200.[15]

Our discovery fits perfectly with the chronology for initial human impacts and deforestation after 1200 C.E. If people arrived well before the first signs of regular fires and changes in the vegetation, then we would have to assume that human and rat population growth was incredibly slow and had no visible impact for 400 to 800 years. This would be unlikely from what we know from many other Pacific Islands. Perhaps people could have survived with exceedingly small populations with low growth rates, but it is difficult to argue that rats

feeding on palm nuts from an estimated 16 million trees would limit their numbers and leave the island's vegetation untouched. We will return to this issue below.

Like Rapa Nui, the careful scrutiny of existing radiocarbon chronologies and "redating" of the oldest deposits on other islands across Polynesia have consistently shifted island colonization centuries later than researchers had originally thought. The mistakenly long chronologies in places such as Hawai'i, the Marquesas, Cook Islands, and New Zealand have now been corrected with better research and more advanced technological methods. Today the earliest dates for the eastern Pacific show that archipelagos such as the Cooks, Societies, Marquesas, and Hawai'i were first colonized between 800 C.E. and 1000. Colonization of the islands of the southeastern margins of Polynesia as well as New Zealand occurred a few centuries later, about 1100–1200 C.E.[16] So a date of 1200 C.E. for Rapa Nui fits well within the broad pattern for the settlement of Polynesia.

HAWAIIAN RESEARCH

Recent archaeological and palaeo-environmental field research from the 'Ewa Plain on the southwestern corner of the island of O'ahu, in the Hawaiian Islands, provides findings that are relevant for our understanding of Rapa Nui. From extensive archaeological excavations and analysis of lake-core sediments, Steve Athens and his colleagues discovered that before arrival of Polynesians, the lowlands of O'ahu (and other Hawaiian islands) were covered in a forest of native palm trees (*Pritchardia* spp.).[17] Then, around 1000 C.E., the Hawaiian palm forests began to disappear rapidly. Within just 100 to 200 years, the forest had crashed precipitously. Whereas many archaeologists had blamed Polynesians for recklessly using fire to clear land for agriculture, new evidence from the 'Ewa Plain showed that the palms on this portion of the island vanished, but without any trace of local fires. In the same area excavations in dozens of limestone sinkholes, excellent sediment traps that capture local environmental changes over time, showed that also around 1000 the introduced Polynesian rat was exploding in numbers. At the same time native birds as well as the forest suffered dramatic decline, with some species lost to extinction. In the local lake-core sediments from nearby Ordy Pond,

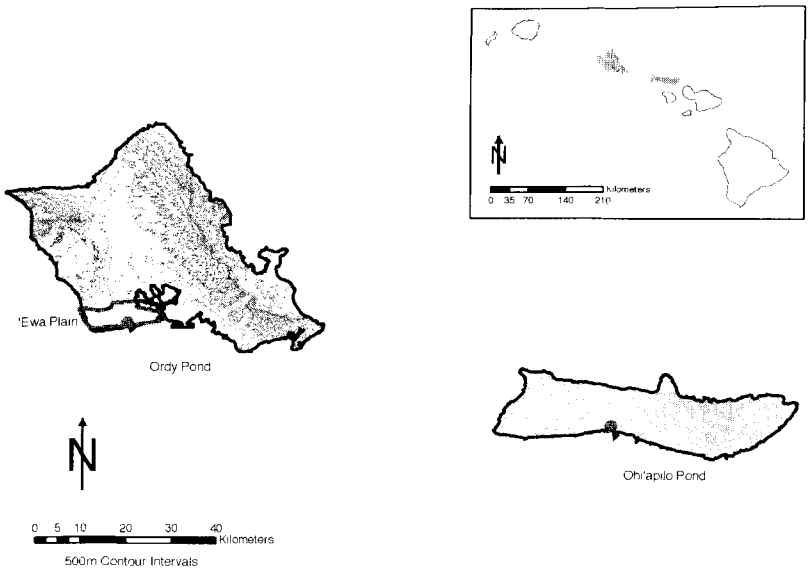

FIGURE 2.6 Hawaiian Islands showing the 'Ewa Plain on O'ahu Island and Ohi'apilo Pond on Moloka'i Island.

FIGURE 2.7 *Pritchardia* palms, National Tropical Botanical Garden, Kaua'i, Hawaiian Islands. (Photo by Terry Hunt)

where the palm pollen witnesses the fate of the native forest, minute charcoal particles from local fires make their first appearance, but only *after* the native forest had all but vanished. Fires did not destroy the palm forest on the 'Ewa Plain on O'ahu.

Archaeological studies reveal that Hawaiians first settled on the 'Ewa Plain, a dry region with poor soil, some 400 years *after* extensive deforestation had already occurred. Polynesian colonists had not used fire or chopped down the palms with stone tools to plant their crops. By the time Hawaiians settled this less-desirable part of the island, it had already lost its native forest and witnessed major ecological changes. The demise of the forest had meant loss of habitat for many birds and other native species. Their rapid extinction followed.

Evidence from elsewhere in the Hawaiian Islands records a similar pattern. From 'Ohi'apilo Pond on Moloka'i, sediment cores show that pollen from the native palms declined sharply, but charcoal from local fires appears later. The timing was the same; the palms vanished around a thousand years ago, but fire was not to blame. What happened to the lowland forests of the Hawaiian Islands?

Athens hypothesized that the introduced Pacific rat, *Rattus exulans,* was an immediate and serious destructive agent that played a huge role in the rapid loss of the native lowland forest. Rats arrived on the first canoes of colonizers in the Hawaiian Islands and encountered few, if any, predators or competition from native birds for plant foods. The Pacific rat is an agile climber sometimes described as arboreal. Field ecologists report thousands of rats living in the coconut tree canopies of Pacific atolls where they move on palm frond runways from tree to tree. Some rats, opportunistic omnivores, are content never even to visit the ground. Unlike birds, rats can consume hard, thick seed cases (even coconuts!), and they destroy the reproductive potential of nearly all the seeds they consume. As rats devoured the seeds of the next generation of native plants, forest regeneration was stopped in its tracks. Old trees died and fewer young ones replaced them. Rats were the first invasive species in the fragile islands of the remote Pacific, and their impact was (and is) devastating.

If rats played a major role in deforestation in the Hawaiian Islands, we can predict patterns in today's vegetation: First, in islands free of rats both now and in the past, native forest should survive. This is the

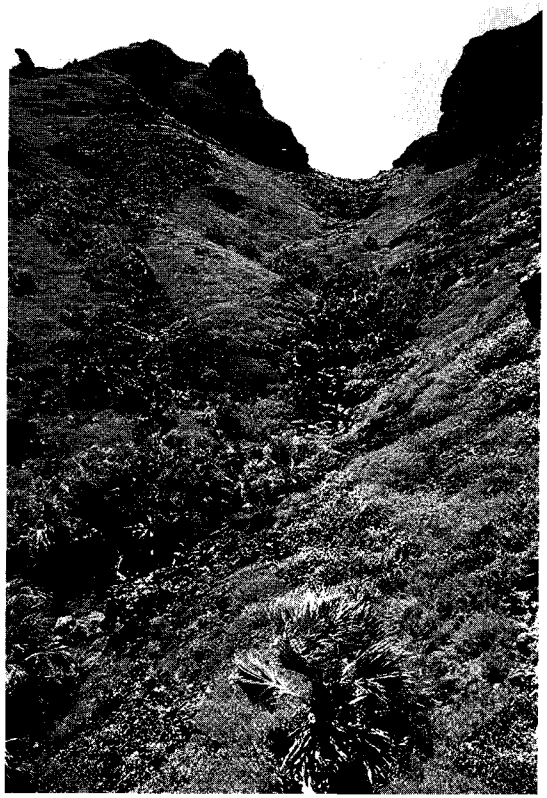

FIGURE 2.8 *Pritchardia remota* palms still growing on Nihoa Island, northwest Hawaiian Islands. Nihoa Island has not sustained impact from introduced rats. (Photo by Terry Hunt)

case for Nihoa Island in the northwestern Hawaiian chain. This small island has no rats and never did. Dense stands of the endemic palm, *Pritchardia remota,* persist on Nihoa despite intensive Hawaiian occupation in prehistoric times, the use of fire, and sweet potato gardens that were cultivated over much of the island.

We see a second expectation in the Hawaiian Islands where native vegetation is more common at higher elevations (above about 1,500 meters). This coincides with the range for the Pacific rat, which is limited by the absence of fruit-producing trees at higher elevations. The native forests we find today in the mountains of Hawai'i may owe their survival to the lowland habitat of the Pacific rat. The

relationship between rats and changes in vegetation is not a simple one. Islands vary by biogeography, ecology, and history, and so will the impacts of invasive species like rats.

RATS AND RAPA NUI

The palaeo-environmental record for Rapa Nui reveals ancient vegetation once dominated by millions of *Jubaea* palm trees. The pollen record shows that the palms have been established on the island for tens of thousands of years (going back at least 37,000 years), and they survived and adapted to significant climate changes and natural catastrophes such as droughts. Other woody plants now extinct or present only in small numbers on Rapa Nui were similar to the kinds of vegetation found on Pacific islands to the west. Rapa Nui's native biota reflects a classic case of island biogeography where the forces of evolution in isolation result in a simple community, a small number of plants and animals, unique adaptations, and few if any predators. Together these features make island ecosystems especially vulnerable to alien invasions, as ecologists working in the region know all too well.

Around 1200 C.E. Polynesian voyaging canoes arrived on Rapa Nui, perhaps from the southern islands of eastern Polynesia, such as the Australs or Mangareva-Pitcairn group. Rats were almost certainly on board. Introduced accidentally or on purpose, the consequences would be the same: rats reached an island with no native predators and an essentially unlimited high-quality food supply provided by millions of palm trees, each producing more than a hundred kilograms of nuts every year. Under these ideal conditions rats could and did reproduce at staggering rates, capable of doubling their numbers every forty-seven days. For example, as laboratory studies suggest, a single mating pair of rats with these kinds of unlimited resources can become a population of nearly 17 million in about 1,128 days, or just over three years!

We routinely see these kinds of explosions – biologists refer to them as irruptions – when rats enjoy an abundance of resources. At a latitude similar to Rapa Nui, but with a lower abundance of food resources, Kure Atoll (28 24′N) in the northwest Hawaiian Islands supports Polynesian rat densities averaging forty-five per acre, with

FIGURE 2.9 Prehistoric rat-gnawed *Jubaea* nuts from Rapa Nui (from collections at the P. Sebastian Englert Anthropological Museum, Rapa Nui). (Photo by Terry Hunt)

FIGURE 2.10 Close-up view of prehistoric rat-gnawed *Jubaea* nuts from Rapa Nui (from collections at the P. Sebastian Englert Anthropological Museum, Rapa Nui). (Photo by Terry Hunt)

maximum recorded densities reaching seventy-five. At only forty-five rats per acre, Rapa Nui would have had a rat population over 1.9 million. At seventy-five per acre, a reasonable density given the palm nuts and other forest resources, the rat population of Rapa Nui could have reached more than 3.1 million. Such documented population

growth rates and rat densities on Pacific Islands suggest that Rapa Nui could have easily supported a huge number of rats soon after people first arrived. An initial peak rat population would be sustained until resources diminished and rat numbers fell.

If rats alone decimated the *Pritchardia* palm forest on the 'Ewa Plain of O'ahu, as we have described, then this provides a likely ecological parallel for Rapa Nui. The Hawaiian research demonstrates that rats were capable, on their own, of deforesting large lowland coastal areas in about 200 years or less. Rats, once introduced to Rapa Nui, would certainly have had a profound and immediate impact on the island's forest that was dominated by the nut-bearing *Jubaea* palms. Similar to the impacts on *Pritchardia* palms of Hawai'i, rats consumed *Jubaea* palm nuts and seedlings, greatly inhibiting forest regeneration. In fact, hundreds of palm nuts preserved in caves around the island show the telltale signs of rat gnawing and seed destruction. The older established palms and other forest plants provided plenty of food for rats, but few new seedlings would sprout and survive. Eventually the oldest trees died, and a strong force in deforestation followed as younger trees could not replace them. The giant palms were also undoubtedly lost to fire as people cleared land for agriculture.[18] Importantly, rats and people's use of fire must have both taken their tolls in deforestation, but there is no evidence for massive, reckless felling of trees.[19]

The idea that rats may have played a significant role in Rapa Nui's deforestation is not new. John Flenley and his colleagues hypothesized:

> The effects of introduced rodents on the biota of oceanic islands are known frequently to have been disastrous, and it seems that Easter Island may have been no exception. Whether the extinction of the palm owes more to the prevention of regeneration by rodents, or to the eating of the fruits by man, or to the felling of the mature trees, *remains an open question*.[20]

RETHINKING RAPA NUI'S ECOLOGICAL CATASTROPHE

By the late eighteenth century, when European visits to the island increased, it seems the deforestation of Rapa Nui was complete, or nearly complete. A forest of an estimated 16 million palm trees and more than twenty other woody trees and shrubs had all but disappeared. Perhaps six species of land birds, several seabirds, and an unknown number of other native species had become extinct. Much of this loss occurred before the final devastating blow of the European introduction of thousands of grazing sheep in the late nineteenth century. Certainly from an ecological and biodiversity perspective, Rapa Nui has experienced an environmental catastrophe.

Once rats arrived on Rapa Nui their numbers exploded and reached a population of millions within just a few years. At this historic instance, rat consumption of palm nuts, other seeds, and seedlings more or less halted forest regeneration. Nearly all the plants lost to extinction on Rapa Nui were on the menu as the favorite foods of rats.[21] The exception proves the rule. *Sophora toromiro,* a native woody shrub, was one of the few plants that survived into historic times. Field studies of related plants from New Zealand show that rats damage the seed casings, but in this instance such damage appears to encourage seed germination.[22] Rats inadvertently help disperse the plant, rather than destroy its chances for reproduction.

Polynesians succeeded in settling the vast Pacific in a remarkably short time. Like the *Bounty* mutineers who escaped to Pitcairn Island, small groups of people colonizing unpopulated islands can sustain growth rates of more than 3 percent, at least for short periods of time. Rapid population growth indeed would be essential to successful colonization of remote islands. Even small numbers of initial colonizers, say, about fifty, with a 3 percent growth rate, would result in populations that would rise dramatically and reach more than 2,000 (already a density of over ten people per square kilometer on Rapa Nui) in just over a century after people set foot on the island. People using fire, particularly as the population grew, had an impact on the island, and this must be added to the continuing impacts of rats.

The evidence for Rapa Nui shows that deforestation took at least 400 years (from about 1250 to 1650 C.E.). This means that the number of people grew while forest resources declined over 400 to 500 years. A maximum population for Rapa Nui, growing from an initial colonization of about fifty individuals, was perhaps 3,000 to 5,000 by about 1350–1370 C.E. This maximum population would fluctuate slightly, but probably remained in close balance with the island's resources and the inevitable uncertainties, given the hardships of periodic droughts or salt-laden winds.

As the forest disappeared, soil erosion brought problems as well. Deforestation would make drought, wind, and soil worse as the cover of trees declined over 400–500 years. Recent studies show that Rapa Nui soils were probably never very fertile,[23] and poor soil explains why early Rapa Nui agriculturalists resorted to using stone mulch and creating thousands of stone enclosures for the cultivation of crops.

There is no reliable evidence that Rapa Nui population ever grew to a large, unsustainable maximum such as 15,000 or more[24] and then crashed from deforestation and resource loss. The large population numbers, 15,000 or even 30,000, often cited for prehistoric Rapa Nui are baseless. They have been posited mainly to dramatize the putative "ecocide" in which populations plummeted. In a short essay,[25] Diamond cites a recent archaeological study that reports hundreds (922 to be precise) of habitation structures on Rapa Nui,[26] and these are dated by a technique known as obsidian hydration. These habitations provide a kind of indirect census of population, not so much in real numbers, but as an index for the rise and fall of population. Diamond argues that the population grew and then collapsed *before* Europeans arrived. However, during the period of deforestation (about 1280 to 1650 C.E., based on many radiocarbon dates), the island's population grew even though the forest declined. The first and only sign of sustained decline in the population, so vital to the "ecocide" thesis, came from 1750 to 1800 C.E., after the arrival of the first European visitors. On Rapa Nui, like so many other places in the New World and the Pacific, European germs decimated the native population that had only limited immunity to Old World diseases. Ironically, this is exactly what Diamond says happened in the New World in his celebrated *Guns, Germs, and Steel*.[27]

Whereas Rapa Nui suffered an ecological catastrophe, there is no evidence that the island represents a case of "ecocide" where a large population crashed from environmental ruin before Europeans arrived. Instead, the real and documented population collapse for Rapa Nui began on Easter Sunday, 1722, when Dutch explorers inaugurated the real tragedy of Rapa Nui. As the ethnographer Alfred Metraux described it long ago, what happened on Rapa Nui was "one of the most hideous atrocities committed by white men in the

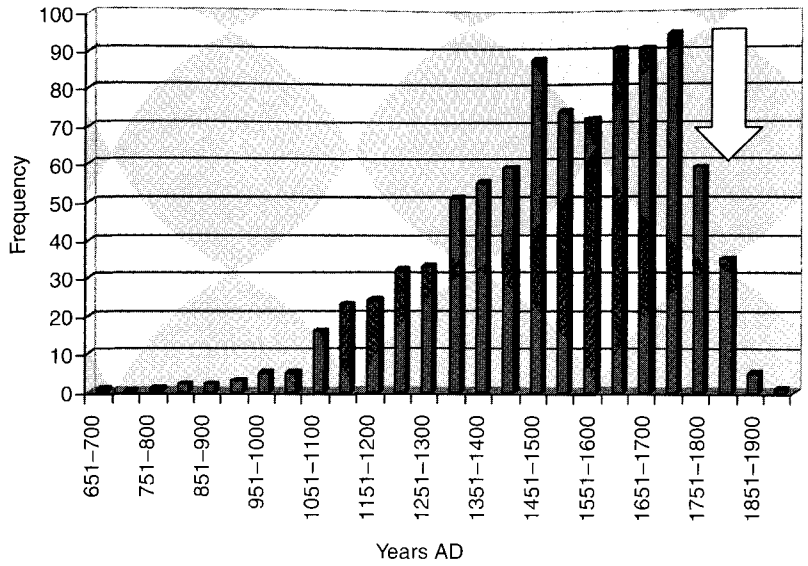

FIGURE 2.11 Distribution of habitation sites dated (in intervals) by the technique of obsidian hydration. The first sustained decline in habitations occurs only after European contact.

South Seas" and it was "the catastrophe that wiped out Easter Island's civilization."[28] As the idea of "ecocide" has gained currency, the victims of cultural and physical extermination have been turned into the perpetrators of their own demise!

The ecological catastrophe of Rapa Nui had a complex history that cannot be reduced to psychological speculations about the motivations of people who cut down the last tree. Indeed, the "last tree" may simply have died, and rats may have simply eaten the last seeds. What were the rats thinking?

The lessons of Rapa Nui plainly are of the effects of invasive species and the impact of people and their portable economies on fragile ecosystems in the remote islands of the Pacific.

On this unlikely island, Polynesian civilization thrived in isolation for more than 500 years. Despite extremely limited resources, a few thousand islanders carved and transported more than 8,000 tons of massive stone sculpture across a rugged landscape. These enormous monoliths embodied the spirits of powerful ancestors who, from their

FIGURE 2.12 Contemporary Rapanui (native Polynesians who live on the island today) take a break on their horse. Despite common misconceptions, descendants of the ancestral people thrive on Rapa Nui today.

PEOPLE OF RAPANUI TODAY

Native Rapanui Islanders, Enrique Pate Encina and his wife Francisca Haoa Hey, were born and raised on Easter Island. Enrique, who is known by his nickname Pota, works at the Padre Sebastian Englert Museum of Anthropology helping with a variety of things. He has worked with our archaeological team doing fieldwork on the island, but Pota spends most of his spare time taking care of his horses, raising their three children, Vaiaratea, Enerike Oroi, and Tehitumana, and playing music with other local musicians in his band Ohiro Reka. Asked about his cultural heritage as a native Rapanui, Pota says, "It is something that we carry in the blood; our connection to our heritage is immediate, direct, all around us on the island, always there. Our heritage comes to us from the past, but we will pass it along to our children in Rapanui language and culture. First we are Rapanui; second, we are Chilean."

venerated platforms, watched over the islanders' fragile existence in isolation. The real story here is one of human ingenuity and success that lasted more than 500 years on one of the world's most remote human outposts.

Notes

* *Terry L. Hunt:* My interest in anthropology and archaeology in particular began when I was fifteen. I had an intense interest in ancient life in Hawai'i, but I found the history books were slanted toward a culture already greatly changed by European contact. When I first picked up a technical report in archaeology showing ancient house foundations, artifacts, and details of what people had eaten, I realized I was headed for a career in archaeology. I completed my B.A. degree at the University of Hawai'i–Hilo, then went to New Zealand to learn more about Pacific Island anthropology and prehistory at the University of Auckland, where I earned my M.A. degree. From New Zealand I returned to the United States and did my Ph.D. work at the University of Washington. I joined the faculty of the University of Hawai'i at Manoa, where I have taught since 1988.

Over the past thirty-five years I have been fortunate to do archaeological field research in the Hawaiian Islands, New Zealand, Fiji, Samoa, Papua New Guinea, and Rapa Nui (Easter Island). My interest in Rapa Nui grew from the question of how and why people invested in such great monumentality in statues, architecture, and other artistic expressions on this remote and resource-impoverished island. In 2000 I visited Rapa Nui and met a friend and former student, Sergio Rapu Haoa, who had become the first native Rapanui governor of the island. Sergio and Claudio Gomez, then the director of the local museum (Padre Sebastian Englert Museum of Anthropology), suggested I come to the island to do research.

In 2001 I began field research as part of an archaeological field school. Our team has completed seven field seasons, including extensive surveys, excavations, and analysis of museum collections. Our work integrates student training, diverse lines of research, and native community-based archaeology and heritage preservation. Our research on Rapa Nui has brought some surprises and a realization that the island's prehistory was not as well known as many of us had assumed.

Carl P. Lipo: My interest in archaeology stems from my schoolboy fascination with the prehistoric effigy mounds (mounds in the shape of animals) that are scattered in and around my hometown of Madison, Wisconsin. This interest resulted in my studies in archaeology as an undergraduate and graduate student at the University of Wisconsin. I expanded my horizons from Wisconsin and did archaeological research in Greece, India, and Pakistan. Subsequently I received my Ph.D. from the University of

Washington; my dissertation, completed in 2000, focused on the emergence of social complexity among late prehistoric populations in the central Mississippi River valley. My enduring interests lie in the study of cultural transmission and the process of natural selection in cultural systems.

I started teaching at California State University Long Beach in 2002 and began working in an area famous for its record of vast historical change, Rapa Nui. In collaboration with Terry Hunt of the University of Hawai'i, we have been documenting the unique series of cultural events on this remarkable island that we report in this chapter.

1. Diamond 2005.
2. Hunt 2006; Hunt 2007; Hunt and Lipo 2006.
3. Skottsberg 1956.
4. La Pérouse 1799: 318–319.
5. Diamond 1995: 63, 68.
6. Diamond 2005: 118.
7. Ruiz-Tagle 2005: 23–24.
8. Flenley et al. 1991; Dransfield et al. 1984.
9. Mann et al. 2008.
10. Mieth and Bork 2004, 2005.
11. Orliac 2000.
12. Hunt and Lipo 2006; Hunt 2007.
13. Hunt and Lipo 2006, 2008.
14. Hunt 2007.
15. Hunt and Lipo 2006, 2008.
16. Wilmshurst et al. 2008.
17. Athens et al. 2002; Athens in press.
18. Mieth and Bork 2004; 2005.
19. Some trees were certainly chopped down by people. However, despite widespread claims, there is no evidence that the palms trees were used as rollers or other devices to transport multi-ton statues (*moai*). Also, our archaeological surveys on several areas of Rapa Nui show that stone tools suitable for cutting down palm trees, particularly in great numbers, are lacking; nor do we find any abundance of fragments of stone tools from such activities.
20. Flenley et al. 1991: 104 (emphasis added).
21. Hunt 2007: table 1.
22. Cambell and Atkinson 2002.
23. Louwagie et al. 2006.
24. Diamond 2005: 90–91.
25. Diamond 2007.
26. Vargas et al. 2006.
27. Diamond 1997.
28. Metraux 1957: 38.

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3

Did the Medieval Norse Society in Greenland Really Fail?

Joel Berglund*

The most famous "archaeologist" of our time, Indiana Jones, said it succinctly: "If you are searching for truth, you must consult the Department of Philosophy; in Archaeology we deal in facts." Probably unintentionally, the film's script writer singled out the central issue in all research. Realities are manifest in archaeological digs, for example, but responsible interpretations of these discoveries depend on the filters they must pass through. One such filter is the knowledge at the archaeologist's current disposal, not the least of which are the scientific tools available. It must be clearly understood that archaeology and history are continuous processes, constantly revised as new information comes in. Except for the fact that we shall all die sometime, there are few ultimate certainties in the world, including in archaeology and history.

COLLAPSE IN THE PAST AND PRESENT

This essay will focus on archaeology and history, on finding a grand design in details, on the relevance of using the past to draw conclusions intended for our own time, on human responses to environmental challenges, and on the possibility that these responses may lead to environmental and social change. In considering these questions, we need to keep in mind that major contours or themes are made up of many small factors, and that oversimplifying those connections and factors will inevitably produce results that at best are inadequate and at worst wrong and misleading.