1-15-2021

Lessons from Rapa Nui (Easter Island, Chile) for Governance in Conditions of Environmental Uncertainty

Carl P. Lipo
Binghamton University--SUNY, clipo@binghamton.edu

Pamela A. Mischen
Binghamton University--SUNY, mischen@binghamton.edu

Terry L. Hunt
University of Arizona, tlhunt@arizona.edu

Recommended Citation

Chapter 2
Lessons from Rapa Nui (Easter Island, Chile) for Governance in Conditions of Environmental Uncertainty

Carl P. Lipo, Pamela Mischen, and Terry L. Hunt

> It amazes me how people are often more willing to act based on little or no data than to use data that is a challenge to assemble. (Robert J. Shiller, Economist (Heins, 2010))

Over the past several years, a group of islanders living on a remote and tiny island in the corner of the southeastern Pacific Ocean have been wrestling with complex but fundamental issues of governance. The island of Rapa Nui (Easter Island, Chile) is just 161 km^2 with a resident population of about 6600 people as of 2016 (see Figs. 2.1 and 2.2). After more than 130 years of Chilean rule—located more than 3600 km away across the sea—islanders have been working to establish a governance system to equitably manage the island's cultural and natural resources while also addressing the overlapping sets of authority that stem from family groups, a series of 10 clans (*mata*), resident-elected town government officials, a provincial governor appointed by the Chilean President, and numerous Chilean agencies at the provincial and national levels. Although the island has been a sovereign territory of Chile since 1888, challenges to the overarching colonial structure of governance have been growing over the past several decades, as islanders have moved from addressing voting rights in the 1960s (Tector, 2014), to referendums for decolonization in the 1980s (Delaune, 2012, p. 129), to the first native governor appointment in 1984, to its status as a special territory in 2007, to calls for complete autonomy,

---

C. P. Lipo (✉)
Department of Anthropology, Binghamton University, Binghamton, NY, USA
e-mail: clipo@binghamton.edu

P. Mischen
Department of Public Administration, Binghamton University, Binghamton, NY, USA
e-mail: pmischen@binghamton.edu

T. L. Hunt
Honors College, University of Arizona, Tucson, AZ, USA
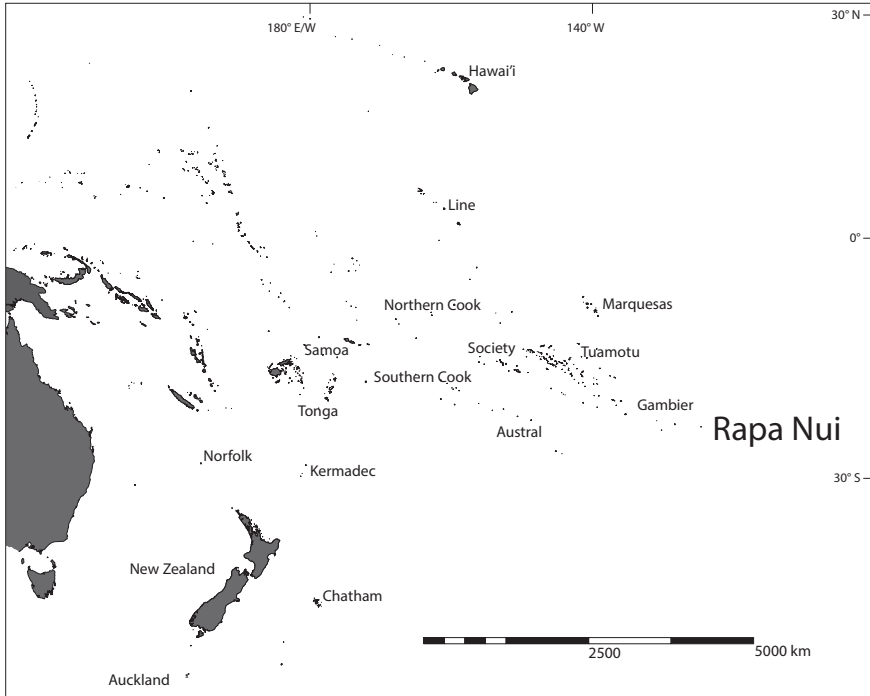e-mail: tlhunt@email.arizona.edu

25

Fig. 2.1 Location of Rapa Nui in East Polynesia. Source: Design by authors

demonstrations, and open conflict in 2010−2012 (COHA, 2011; Delaune, 2012; Warren, 2011). The most recent step towards reshaping island governance has been the establishment of *Ma'u Henua*, a Native Rapa Nui organization that recently assumed administration of the large portion of the island comprising the National Park and formerly under the Chilean National Forest Corporation (i.e., CONAF).

Efforts to change Rapa Nui's governance structure are particularly timely given present and growing threats to the island's resources. With increasing numbers of flights and cruise ship visits, the annual number of visitors to the island has surged to more than 60,000 (CODEIPA, 2015), with expectations of significant increases. Such increased numbers have resulted in greater use of the natural landscape, with widespread impacts to the archaeological record. In 2008, for example, a Finnish tourist broke a portion of an ear from one of the island's iconic statues, a *moai,* creating an international incident (Barfelz, 2011). These kinds of events have led to greater efforts to restrict access to archaeological features and keep tourists from damaging the cultural resources they come to see. In addition to rising visitor numbers, the island's residents grew from about 3000 to nearly 4000 between 1992 and 2002, and the current 6600 has surpassed predictions of just a few years ago (Biblioteca del Congreso Nacionale de Chile, 2015). The population growth has resulted in many new houses in the town of Hanga Roa and its surrounding area, concerns over the growing number of cars and traffic, as well as an expansion of
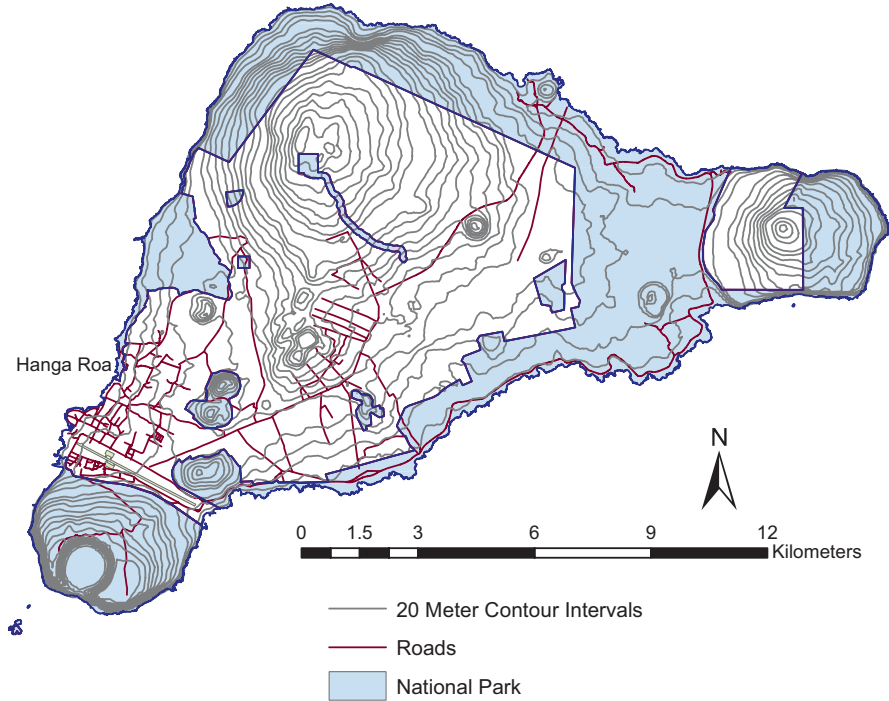
Fig. 2.2 The island of Rapa Nui (Easter Island, Chile). Source: Design by authors

hotels and businesses to support tourism. From a resource perspective, the population growth places an ever-increasing burden on the freshwater resources that come from wells, garbage that must be removed or put in landfills, septic systems, energy requirements, as well as imported fuel, food, and building materials. The impacts to the island's resources are occurring at a time when island residents are increasingly worried about the predicted effects of global climate change (Carabine & Dupar, 2014). To meet such challenges, governance structures must operate efficiently, effectively, and equitably.

Rapa Nui is a particularly notable case when it comes to identifying strategies for living on a remote island in the face of tremendous adversity. Over the course of the twentieth century, Rapa Nui has been promulgated as a case of an island community whose poor decisions ultimately led to environmental and demographic catastrophe. Although this perspective is derived from narratives of the earliest Europeans who visited the island in the eighteeth century (Hunt & Lipo, 2011), the idea that Rapa Nui's past represents a case of failure of governance remains strong in popular culture. Part of this popularity comes from the work of Jared Diamond via his various essays (e.g., Diamond, 1995) and his book *Collapse*: *How Societies Choose to Fail or Succeed* (2005). The popularity of this notion has also led many scholars to offer Rapa Nui as an exemplar case for potential future human population growth

coupled with dwindling natural resources (e.g., Erickson & Gowdy, 2000; Foot, 2004; Nagarajan, 2006). In these cases, Rapa Nui is used to illustrate what happens if communities fail to consider the long-term consequences of their actions, and that if we are to avoid the same fate as Rapa Nui, we (i.e., contemporary Western societies) need to avoid making the same kinds of mistakes. One key assumption embedded in this logic is that prehistoric Rapa Nui was a *failed* governance system—a community that made the wrong choices and thus provides a warning for the future (Flenley & Bahn, 2003). Given that the governance of Rapa Nui is moving toward more traditional forms of governance, the veracity of our knowledge of Rapa Nui's past is critical for understanding the possibility of success in the future.

In this chapter, we explore how knowledge informs governance in general and why understanding the foundations for knowledge is critical to effective governance systems. We present the changing face of modern Rapa Nui governance that points toward a move to more traditional forms of governance. Based on this discussion, we examine the logic that supports the notion of Rapa Nui as a case of environmental and demographic catastrophe. We then review how new research has drastically reshaped our understanding of Rapa Nui prehistory. Based on this new information, we reconsider how the people of Rapa Nui are changing their governance to suit the community's new challenges. We suggest that a better understanding of the role of knowledge in governance potentially re-shapes our assumptions about strategies for the future and how we can engineer governance systems to consider new and changing information.

Governance and Knowledge

As social communities, we are challenged to make effective decisions that have future impacts. Much of the difficulty that surrounds systems of decision-making comes from the uncertainty associated with the knowledge upon which decisions might be based: The greater the uncertainty, the more difficult the decision. People often use policy to guide their decisions and by doing so assume a degree of veracity of a priori knowledge with the hope that their decisions will have a greater likelihood of achieving some desired outcome. For example, policymakers use experience with the incidences of forest fires and the conditions that cause them to guide policy about building requirements and fire break maintenance. The degree to which one can make decisions based on knowledge comes from one's understanding of risk (i.e., events for which one can calculate the odds) and minimizing uncertainty (i.e., events for which one lacks sufficient information to accurately calculate the odds (Knight, 1921)). Uncertainty arises in situations where the number of factors leading to an outcome are unknown, too numerous, and/or too complex based on current systems understanding. Although decisions based on an assessment of risk are typically made by balancing the odds, costs, and potential returns, uncertainty can only be mitigated through the generation of knowledge. The more one knows about a phenomenon and its explanation, the lower the degree of uncertainty and the better one's decision-making can be.

It is in this way that knowledge and its creation are critical features in the operation of effective governance. Traditionally, governance is viewed as "the process by which a society or organization steers itself" (Rosell, 1999, p. 1). For the purposes of this chapter and to accommodate contemporary and archaeological contexts, we must establish a definition for governance that contains the necessary and sufficient conditions for all forms (i.e., observed and inferred from archaeological evidence). Here, we combine a cultural framework from cultural inheritance theory (e.g., Eerkens & Lipo, 2007; Laing, 2008; Richerson & Boyd, 2005) with mechanisms that favor pro-social behaviors on the scale of groups (Bowles, Choi, & Hopfensitz, 2003; Henrich, 2004). For our discussion, governance is thus defined as the *culturally inherited rule set for individual and group behaviors that serve to benefit group level unit of organization*. Based on this definition, the rule set can be explicit (e.g., written) and/or implicit (e.g., culturally inherited) and can take a form that is formal (e.g., laws) and/or informal (e.g., customs). The rule sets are also cultural and contingency-bound, as governance depends on contingent history as well as the combination of information used to assemble the rule set. Because information can change over time, so can governance structures.

Decision-making can happen in one of four contexts: simple, complicated, complex, or chaotic (Snowden & Boone, 2007). Modern day governance occurs largely within a complex context, which is characterized by flux and unpredictability, unknown unknowns, many competing ideas, and the need for creative and innovative approaches (Snowden & Boone, 2007, p. 7). The governance of Rapa Nui is no exception. Governing in complex contexts means recognizing many bases of knowledge. Clarke et al. (2013) argue that in situations such as coastal adaptation to climate change, science and technical knowledge alone are inadequate to deal with the system uncertainties and that participatory, local (particularly indigenous) knowledge and a networked approach to governance is preferred.

Governance Structure

Within contemporary forms of governance, knowledge is managed in ways that depend on the underlying philosophy of governance. The public administration regime, which emerged during industrialization, produced what we now recognize as the large governmental bureaucracy. According to Max Weber, "the more complicated and specialized modern culture becomes, the more its external supporting apparatus demands the personally detached and strictly 'objective' *expert*" (Weber, 1978, p. 216). Other influential perspectives during this time period were scientific management (Taylor, 1911), which prized efficiency over all else and the separation of politics and administration (Goodnow, 1900). Taken together, the focus of these theories was the objectivity of knowledge and its place within large bureaucratic organizations. Toward the end of this period, theorists came to recognize the issue of equity (Frederickson, 1971), but remained focused on governmental institutions as having primary responsibility for the creation of a more equitable state. As time

passed and large bureaucracies became known as inflexible bastions of red tape, the public sector began looking to the private sector for answers. Under this New Public Management (NPM) regime (sensu Osborne, 2010), knowledge shifted from the bureaucracy to the "customer." Osborne and Gaebler (1992) argued that as society became one of knowledge workers, the "one-size-fits-all services" of government were no longer satisfactory. They called for government agencies to "reinvent" themselves by being entrepreneurial and listening to their customers. The market became the mechanism by which knowledge exerted its impact on the public sector. The lasting effects of NPM were outsourcing and decentralization (Alonso, Clifton, & Díaz-Fuentes, 2015), both of which served to broaden the base of knowledge from mainly within a large federal bureaucracy to include the private and nonprofit sectors as well as local governments.

Since the late 1990s, western public administration has been moving to yet another governance regime: New Public Governance. To understand the New Public Governance approach to knowledge, one must look at the networks and collaboration literature. As early as 1997, O'Toole (1997, p. 45) urged the field of public administration to "treat networks seriously" as "[p]ublic administration increasingly takes place in settings of networked actors who necessarily rely on each other and cannot compel compliance on the part of the rest." Since that time, there has been an explosion of literature regarding networks and collaboration. Emerson and Nabatchi (2015, p. 25) created an integrative framework for collaborative governance that "attempts to identify and arrange the concepts needed to study and understand collaborative governance regimes." They view knowledge as critical for creating the capacity for joint action. Just as knowledge was the currency of the market in the New Public Management approach, Emerson and Nabatchi (2015, p. 71) argue:

> In many ways, knowledge is the currency of collaboration. Knowledge, once guarded, must be shared with others; and knowledge jointly needed must be generated by participants working together. Contested knowledge requires full consideration, and incomplete knowledge must be balanced and enhanced with new knowledge. In essence, collaboration requires the aggregation, division, and reassembling of data and information, as well as the generation of new, shared information.

One can also look at the roles that information and knowledge play from an organizational perspective. Wei Choo (2006, p. ix) argues that organizations use information for sense making, knowledge creation, and decision-making. A "knowing organization" can anticipate environmental changes, learn and innovate, and "take timely, purposive action."

The key here is that as groups begin to confront new social, economic, and environmental challenges such as those produced by climate change, there will be pressures on governance systems to change to ones better suited to managing a multiplicity of issues and voices. Additionally, those governance structures best suited to a radically uncertain future are those that are most able to attend to change and that can adapt to new knowledge.

Governance of Modern-Day Rapa Nui

When one examines the recent historical governance structures of Rapa Nui, one finds systems that were imposed by an external entity (Chile) to operationalize a colonial structure. This structure emphasized external knowledge in the actions of governance. For example, the Rapa Nui National Park (RNNP) was created in 1935. In 1973, the park administration was officially given to the National Forestry Corporation (CONAF). In addition to managing erosion and deforestation, CONAF was charged with the management of the park as a cultural resource and source of cultural tourism (CODEIPA, 2015, p. 10). CONAF is comprised of three departments. The first, Park Administration, oversees park operations, supervizes the park rangers, and includes one archaeological expert. The second department is Natural Resources, which is in charge of the nursey and the Forest Fire Brigade. The third is the Administration and Finance Department.

Several criticisms have arisen regarding CONAF's management of the Park and resulted in the creation of a proposal for a new park administration (CODEIPA, 2015). The charges can be divided into two categories. The first category addresses inadequacies in CONAF's current management of the park, seen as resulting in the damage of archaeological artifacts, including an inadequate number of park rangers for the protection of the archaeological and cultural artifacts, inadequate collection of entry fees, and an insufficient number of archaeological experts.

The second category is longer-standing and relates to the history of how lands have been acquired, used, and allocated. In 1988, 36 five-hectare parcels of land (*parcelas*) were taken from the National Park and repatriated to islanders (Ramirez, 2000). Later, the Comisión de Desarrollo de Isla de Pascua, created by the Indigenous Law in 1993 and launched in June 1999, began distributing *parcelas* to 267 families, land that was owned by the state development corporation Corfo (IWGIA, 2012). Although this process has rightly resulted in the return of land to the island's native community, the transfer of property to individuals has resulted in substantial conflict over land received (given disparities in economic value), leading to greater community strife and loss of protection for the archaeological record (Ramirez, 2000).

In 2014, the Rapa Nui Commissions of CODEIPA asked CONAF to establish a wholly indigenous management system for the park. CONAF instead presented a co-administration plan (known as GOSPAN), in which the Rapanui People's role was merely consultative (CODEIPA, 2015, p. 2). CODEIPA responded with its own proposal for an organization called *Ma'u Henua*, to be implemented in three phases. The first phase, viewed as a transition phase, is the GOSPAN proposal, which allowed for co-administration between CONAF and the Rapanui People represented by the *Ma'u Henua* Council. In this phase, operations continued to be the responsibility of CONAF, but the voice of the Rapanui People was enhanced in strategic decision-making and the management of a Reinvestment Fund. During this phase, the emphasis was on adequate representation of the Rapanui and the building of organizational capacity to better manage the archaeological and cultural resources.

The second phase, beginning in June 2018, was called the Law Stage. In this phase, the authors of the *Ma'u Henua* proposal argued for the creation of a Public Law Corporation, managed by the members of the Rapanui. In this phase, roles were reversed and CONAF became subsumed by a Public Law Corporation responsible for the management of the park, with state officials acting as advisors. Additionally, a Rapa Nui Park Law established new park boundaries under the administration of the Corporation. The Board of the Corporation is constituted by four members of Rapanui, elected by the 36 traditional families, four Rapa Nui professionals, elected by popular election by members of the Rapanui, one representative of the Council of Elders, one representative of the Provisional Government, one representative of the Municipality of Isla de Pascua, and one representative of CONAF. In addition to the Board of Directors, there is a Technical Advisory Board that includes members from the Provincial Government, Municipality of Easter Island, CONAF, Council of Monuments, CAM, Ministry of National Assets, CONADI, and Sernatur (CODEIPA, 2015, pp. 35–36). The Corporation will be comprised of seven (rather than three) departments: Operations, Archaeology and Heritage, Natural Resources, Planning and Development, Administration, Communications, and Financing.

The final stage, proposed for the year 2025, is called the Consolidation Stage. During this stage, the vision is for the Board of the Corporation to be comprised only of members of the Rapanui People (the four members elected by families, four professionals, and one representative of the Council of Elders).

Analysis of Governance Regimes: From CONAF to Ma'u Henua

How are the theories of governance and knowledge reflected in the past, present, and future governance of the park? Beginning with CONAF administration of the park, it is evident that the initial approach was the public administration approach. Complete control of the park rested within this bureaucracy and knowledge was largely provided from external sources in a colonialist fashion. Over time, with indigenous claims to land and occupations of the park, one could argue that CONAF moved to more of a New Public Management style, dominated by market mechanisms and private property rights rather than collective decision-making. The GOSPAN proposal represents a move toward a New Public Governance approach to the park. However, by continuing to hold the reins and cede no real control of the park to the Rapanui People, CONAF set the stage for the *Ma'u Henua* proposal, which continues organizational (rather that network) governance of the park, but under the control of the Native Rapanui.

The second stage of the *Ma'u Henua* proposal most closely resembles the New Public Governance regime. It is plural and pluralist in its approach, with representatives of the Rapanui, local elected officials (which may or may not be Rapanui), and

CONAF on the Board of Directors, as well as a more expansive Technical Advisory Board that includes representatives of Chilean government organizations. The focus is not solely on the organization, but the organization and its environment, and will undoubtedly deal with the negotiation of values, meanings, and relationships.

The type of governance that will emerge during the Consolidation Stage is unclear. The *Ma'u Henua* proposal includes an emphasis on moving toward a traditional (Polynesian) governance approach. Therefore, to understand what the governance approach of the future will be, one must look to the governance of the past.

How do the authors of the *Ma'u Henua* proposal handle the role of changing knowledge? One type of knowledge is technical. The *Ma'u Henua* proposal's authors recognize this as a lack of concern for archaeological expertise as traditionally embraced by CONAF. Although the new organization will certainly provide direct contribution by local community members over the protection and preservation of the archaeological record, it is not clear from the proposal, however, just how the new organization will foster new forms of expertise that would come from a blend of local knowledge combined with the potential for external technological contributions. Educational programs that train community members, however, will certainly result in significant contributions in this area.

The second is cultural. In the new *Ma'u Henua* structure, local knowledge is now embedded explicitly into governance through the pluralist organization. This structure will potentially go a long way to enabling the community to respond to local needs and in ways that are consistent with local values. But is this governance structure sufficiently adaptive to cope with the magnitude and uncertainty of impacts of events that are associated with future climate change? From the traditional narrative of the island, one might conclude that the answer is no. The "collapse" accounts that are often assumed to be (e.g., Diamond, 2005; Flenley & Bahn, 2003) suggest that the island's populations, acting on individual maximizing strategies, tend to overexploit resources and produce their own demise. Thus, one might argue that the degree to which local knowledge is incorporated into governance, as was entirely the case in prehistoric times, will be correlated with the likelihood of failure. Anti-colonial sentiments aside, wouldn't the island do better with a smartly designed, top-down governance structure?

This claim and the potential that *Ma'u Henua* and local information play in guiding the future of the island requires an evaluation of the assumptions built into traditional ideas about Rapa Nui. Is Rapa Nui's past as solid an example of ecological destruction? Did local strategies for managing limited resources and environmental uncertainty ultimately fail, leading to "collapse"? To develop an understanding of how reliance on traditional governance structures will impact the future sustainability of Rapa Nui, one must reconsider what one knows about Rapa Nui's past.

Knowledge of the Past

Based on popular media such as the 1994 movie *Rapa Nui* (Reynolds & Rose-Price, 1994) and Diamond's 2005 book *Collapse*, the prehistory of Rapa Nui is commonly considered to represent "the" canonical example of a population that failed catastrophically through its own actions. In this account and with steadily increasing intensity, past populations are assumed to have engaged in an island-wide cult of massive statue construction and transport that required tremendous resources to support. Ultimately, due to the resources required to sustain the outsized population and their outlandish behavior, the island's originally abundant natural resources became depleted. Consequently, the people of Rapa Nui suffered the inevitable consequences of their actions: ecological failure, warfare, starvation, cannibalism, depopulation, and societal collapse. The remaining people of the island were left in an environment that was forever degraded relative to previous times of ecological abundance.

Until relatively recently, Rapa Nui's tale has gone largely unchallenged. For much of the twentieth century, this kind of story was taken as simple fact, for its logic seems unassailable. Researchers' assumptions about Rapa Nui were reinforced general assumptions about humans and their behavior. Indeed, the notion that a "Paradise Lost" parable could have transpired on Rapa Nui is certainly not far-fetched when one examines the environment and geography of the island. For instance, the island is remarkably small—just 161 km² in overall surface area, a size that allows one to walk across in a single leisurely day. The island is also located in a remote part of the southeastern Pacific, more than 3500 km from the coast of South America, 4000 km from Tahiti, and almost 2000 km from Pitcairn Island, the nearest other inhabited island. And if the small size and remote location were not enough to make inhabitation unlikely, the island is exceedingly poor in natural resources. There are no permanent streams and only limited terrestrial and marine resources. The volcanic soils that comprise the entire island have experienced millennia of weathering and, as a result, have low agricultural productivity, the island lacks a productive fringing reef, and the climate is subtropical with seasonally variable rainfall and droughts. At first glance, Rapa Nui is an island that would present a challenge to simple human habitation, much less monumental architecture.

Paradoxically and despite the limited abundance of natural resources, the island boasts some of the most dramatic examples of prehistoric monuments and statues in the world. European visitors were repeatedly astonished to find that islanders had created more than 1000 massive statues, known as *moai,* with hundreds transported many kilometers across the volcanic terrain and placed atop massive stone-constructed platforms, or *ahu.* This record stands in stark contrast with the island's natural setting.

One way in which the contradiction between the island and its limited natural resources has been reconciled is to presume that the number of statues and monuments can only have been constructed if there was a time in which resources were more plentiful. Speculations about the cause of the island's deforestation and

cultural ruin began with one of the island's early European visitors. From a single day's visit in April 1786, French explorer Jean-François de Galaup La Pérouse speculated that Rapa Nui's past inhabitants decimated the island's trees and that the present inhabitants were "indebted to the imprudence of their ancestors for their present unfortunate situation" (La Pérouse, 1797, pp. 318–319). This speculation forms much of the basis for the assumptions made by later authors. For example, many speculate what the likely population must have been (e.g., Bologna & Flores, 2008; Brander & Scott Taylor, 1998; Puleston et al., 2017; Reuveny & Decker, 2000) and then use this to model the environment, assuming that so many statues could not possibly have been made on such a tiny island in any other way. As Diamond (1995, p. 62) reasons: "[T]he statues imply a society very different from the one that Roggeveen saw in 1722. Their sheer number and size suggest a population much larger than 2000 people."

The logic is simple: Large statues dictate that more massive numbers of populations of people once existed and that they were fueled by an environment that must have been more abundant than what was observed at contact. This logic is certainly seductive, in part due to the deep-rooted nature of the idea that humans tend to despoil the world in which they live.

Ecology and Rapa Nui

Drawing on growing ecological awareness, William Mulloy (1974) published an account of pre-contact Rapa Nui society in which the population invested in spectacular constructions, statues, and ceremonial activities leading to over-exploitation of the island's fragile resources and devastating warfare. Mulloy's narrative gained additional support with the documentation that the island lost a once-extensive palm forest through studies of sediment cores taken from the island's volcanic lakes (e.g., Flenley, 1979; Flenley et al., 1991; Flenley & King, 1984). Kirch (1984, p. 264) echoed this story, writing that by the time of European contact the island had "already begun a downward spiral of cultural regression" and "crashed devastatingly." Bahn and Flenley (1992) followed this thread and argued for "collapse" scenario, suggesting Rapa Nui served as a microcosm of the Earth's impending resource and population crisis.

The biogeographer and popular science author Jared Diamond (1995, p. 63) later adopted these accounts and widely popularized them 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 (2005, p. 118) asserts that Rapa Nui is "the clearest example of a society that destroyed itself by over exploiting its own resources" and that the consequences of deforestation "start with starvation, a population crash, and a descent into cannibalism." Diamond (2005) goes on to argue that for 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 crisis induced by overpopulation and environmental destruction. In other words, people willingly destroyed their island and, in turn, destroyed themselves, thus committing "ecocide."

Diamond and other researchers (e.g., Flenley & Bahn, 2003) tell a story that provides a powerful warning for today's potential destruction of the global environment. With scientific recognition that human industrial practices are resulting in rapid climate change with radical impacts to habitat, rainfall patterns, storms, and sea-level, there are compelling reasons to accept the Rapa Nui "ecocide" narrative as simple fact (even if it is not). Flenley and Bahn (2007, p. 13) argue that "the point about the present ecological prognoses for the world is not that they are absolutely proven, but that they may well happen, and therefore we must take evasive action before it is too late." Apparently, the facts do not matter as much as the need to act quickly.

From this perspective, it is not surprising that Rapa Nui has served as an exemplar of the consequences of ignoring the impacts that humans make on their environment. As of December 5th, 2017, for example, the topic of "Easter Island," "environment," and "warning" currently appears on more than 1,470,000 websites and countless blogs (e.g., Busch, 2016; Hari, 2005). The warning narrative of Rapa Nui has spread through popular culture while also providing rationale for governance decisions—around the globe but also on Rapa Nui itself, as islanders are presently considering the best strategies for local governance of the island's limited resources.

Given the importance of society's understanding of the consequences of its actions relative to the future, if one hopes to use Rapa Nui as a case study that leads to behavior change, one should be particularly concerned about the veracity of current understanding of the island's prehistory. Although the idea that Rapa Nui's history demonstrates the consequences of unbounded growth is consistent with general and widespread ideas about human behavior as well as contemporary ecological fears, does the evidence found in the archaeological record of the island support these assumptions? The answer to this question is significant, as the effectiveness of governance will depend on the degree we have well-documented and thoroughly researched evidence.

Questioning Assumptions of Rapa Nui Governance Failure

Proponents of the "collapse" narrative for Rapa Nui make the critical assumption that the governance structures (i.e., the cultural traditions connected to individual and group-level organization) resulted in actions inconsistent with the island's empirical constraints and conditions. The carving and transport of massive statues and documented loss of a palm forest with the assumed consequences would appear to be inconsistent with resource management of the island, leading one to think that the Rapanui lacked a governance system that accounted for the long-term effects of their actions. But given the fact the islanders lived in a remote and isolated location where their actions (e.g., how much food to grow, where to plant, how much land to

clear, how many children to have, how much to share, how to compete) directly determined their survival on an seasonal basis, it is reasonable to question the idea that the islanders engaged in activities without some reason to believe that their efforts would prove beneficial—even they were ultimately disastrous. From an islander's perspective, one should wonder if local conditions led the population to expect long-term benefits from their behavior.

The "collapse" narrative assumes that statue-making was fueled by a population of organizational "complexity" and then, in the words of Kirch (1984), experienced a "downward spiral of cultural regression." The assumption is based in *orthogenesis*, the idea that societies progress in their development and reach "peaks," as indicated by the level of apparent organization exhibited by the cultural achievements and driven by progress (variously defined, if at all) as an inherent mechanism of change. Extrinsic changes, then, necessarily result in failure and regression to earlier simpler states. Orthogenesis—and the related assumptions about the way which societies change—provides much of the theoretical warrant for a concept of "collapse." Overall, however, empirical studies of the nature of change reject orthogenesis. As the many contributions to McAnany and Yoffee's (2009) book *Questioning Collapse* indicate, population "collapse" is often just change in the way populations are organized without any "failure" or "cultural regression." In these views, local populations change with innovation in new solutions for success, even though those new solutions might appear as "collapse." Here, we might ask ourselves whether Rapa Nui statue manufacture and the loss of palm forest might have been solutions to the island's constraints, rather than wanton behavior leading to destruction.

There are multiple reasons to challenge the collapse narrative and to look carefully at the evidence about the conditions leading to monumental architecture, environmental change, and the observations made by early Europeans as they arrived on the island in the eighteenth century.

A New Understanding of Rapa Nui Prehistory: Five Things Now Known About the Island and Its Past

Although the "collapse" story of Rapa Nui fits many cultural expectations about human behavior, researchers conducting fresh studies have greatly reshaped what is now known about the island (e.g., Cauwe, 2011; Cauwe & de Dapper, 2015; Hunt, 2007; Hunt & Lipo, 2006, 2008, 2011; Lipo & Hunt, 2009; Lipo, Hunt, Horneman, & Bonhomme, 2016; Lipo, Hunt, & Rapu Haoa, 2013; Morrison, 2012; Mulrooney, 2012, 2013; Mulrooney, Ladefoged, Stevenson, & Rapu Haoa, 2009). Based on excavations, extensive surface surveys, remote sensing of island structure, revaluation of chronological evidence and detailed examinations of attributes related *moai* transport, the new findings can be summarized in these five categories: (1) the empirical basis for prehistoric "collapse," (2) post-European-contact events, (3) prehistoric population size and structure, (4) the island's natural resources, and (5) *moai* transportation.

Collapse

Most significantly, there is simply no empirical evidence for a prehistoric demographic catastrophe. Instead, notions of a "collapse" prior to European contact can be traced to the misconceptions of these early visitors (Hunt & Lipo, 2011) and the perpetuation of historic myths (Hunt & Lipo, 2010, 2011; Lipo & Hunt, 2009; Mulrooney, 2012; Mulrooney et al., 2009). Archaeological evidence cited for a pre-contact "collapse" reveals just the opposite: steadily expanding landscape use (Stevenson et al., 2015) until the arrival of Europeans followed by well-documented impacts due to European contact (e.g., see Lipo & Hunt, 2009; Mulrooney, 2012). Fundamentally, there are few archaeological indications that the population of Rapa Nui was ever much larger than the estimated 3000 witnessed at European contact (Boersema, 2017; Corney, 1908; Hunt, 2007; Morrison, 2012) or that it had ever been substantially larger in the past and then declined. Although researchers continue to make claims of much larger populations (e.g., Diamond, 2005; Puleston et al., 2017), they base these claims on conjecture or preconceptions of what "could have" happened without linking the claims to any empirical evidence for population size. For example, there is currently no evidence for a hiatus in the archaeological record that might signal a massive population decline (Mulrooney, 2013; Mulrooney et al., 2009; Stevenson et al., 2015), which would be required if a large population once existed. There is also little evidence for the level of conflict associated with the "collapse" narrative, including that for lethal skeletal trauma, mass graves, systematic production of lethal weapons, or fortifications (DiNapoli, Morrison, Lipo, Hunt, & Lane, 2018; Gill & Stefan, 2016; Lipo et al., 2016; Lipo & Hunt, 2009; Owsley, Barca, Simon, & Gill, 2016). A population at contact of about 3000, as Spanish observers reported in 1770 (Boersema, 2017), is consistent with archaeological studies whose authors demonstrate a low-density and dispersed settlement/land-use pattern (Morrison, 2012).

Post-European Contact Events

Historians document dramatic population decline resulting from the impacts of European contact and the introduction of Old-World diseases, slave raiding, and other calamities (Fischer, 2005; Hunt & Lipo, 2011). The case for European-caused population loss is unquestionable: It is documented in historic accounts (see Fischer, 2005) with the population ultimately declining to just 111 people in 1877. Early observers, however, were largely unaware of the effects of disease produced by contact, leading them to interpret the island's state as the result of the "imprudence of the ancestors" (e.g., La Pérouse, 1797, p. 319). Sadly, this confusion has produced the collapse narrative, in which the victims of European contact have been blamed for their own demise (Hunt & Lipo, 2010, 2011; Rainbird, 2002).

Prehistoric Population Structure

Uncovering new evidence, researchers have now documented that the island was always resource poor and that small numbers of people could easily have carved and transported the *moai* (Hunt & Lipo, 2011; Lipo et al., 2013). This observation is supported by studies of archaeological community patterning and structure: There is no evidence of large, dense settlements indicative of large populations. Instead, archaeological data from extensive field surveys and satellite image analysis of rock mulch (Ladefoged, Flaws, A., & Stevenson, 2013; Kovalchik, 2014) and *manavai* gardening (Ayala-Bradford, Lipo, & Hunt, 2005) suggest that the island's communities consisted of distinct groups arrayed along the coast in dispersed settlement patterns (Morrison, 2012; Stevenson, 1984). Rather than living in nucleated villages, communities consisted of family groups living at low density interspersed with areas of cultivation. *Ahu* and *moai* served as central locations for episodic gatherings that served to bind communities in activities and resource sharing (Hunt & Lipo, 2011).

Natural Resources of Rapa Nui

Vast areas of the island were transformed into rock mulch gardens (e.g., Bork, Mieth, & Tschochner, 2004; Hunt & Lipo, 2011; Stevenson, Wozniak, & Rapu Haoa, 1999; Wozniak, 1998, 1999). These gardens' remains can be seen across the island as artificial rock concentrations on the surface. Although European visitors have often viewed these rocky landscapes as the result of "ecocide," such mulch formed a critical dimension to survival. Rapa Nui's soils are derived from heavily weathered volcanic rocks. Given their age, these soils are relatively nutrient poor. Adding broken rock to the soil (i.e., "lithic mulching") served to enrich nutrient-leached soils. Soil samples taken from rock mulch areas show elevated levels of nitrogen, phosphorus, and potassium, key nutrients for cultivation of plants such as taro and sweet potato (Hunt & Lipo, 2011; Ladefoged et al., 2010; Ladefoged, Stevenson, Vitousek, & Chadwick, 2005). In this way, a key dimension to the island's productivity was the area covered by rock mulch gardening. More than 10% of the island's total land surface may have been devoted to lithic mulch cultivation (Ladefoged et al., 2013). Small walled gardens known as *manavai* also contributed to food production but were likely used to grow plants such as taro, banana, and sugar cane that needed additional protection and care to flourish (Ayala-Bradford et al., 2005).

Recognizing the significance of rock-mulch gardening has played a central role in rethinking Rapa Nui's prehistory. Contrary to early observations, rock mulch formed the basis of a productive agricultural system key to the population's success. Second, replacing the now-extinct palm trees with gardens increased agricultural potential and was not a catastrophe, as traditionally assumed. Third, cultivation was widely dispersed, and no single part of the island provided an abundance of crops. Dispersed cultivation coincides with a relatively small population living at low density. Thus, the population size observed by the first European observers, of about

3000 individuals, reflects a likely stable population size and not a remnant population that survived "post-collapse" (Hunt & Lipo, 2011; Morrison, 2012).

Moai Transportation

The question of how the multi-ton statues (*moai*) of Easter were transported has puzzled visitors and researchers for centuries, and for some it even played a role in deforestation. No visitors to the island ever witnessed the process, leaving much to an array of speculations. The islanders' oral traditions have long recounted simply that the statues "walked" (e.g., Thomson, 1889). Modern attempts to explain *moai* transport, however, have focused on experiments that began with Heyerdahl's efforts in the 1950s that involved simply dragging them (Heyerdahl, 1989). To resolve problems of friction and damage to statues, later efforts employed wooden sledges, pods, rollers, and sliders in various configurations (Hunt & Lipo, 2011). The idea that wood contraptions were used fits pre-existing notions of statue transport contributing to deforestation, and researchers have thus rarely questioned it.

New field research and experimentation has resolved the question of statue transport. A central finding of the research of Hunt and Lipo (2011; Lipo et al., 2013) is that the statues found along prehistoric roads have shapes that distinguish them from those statues erected on platforms (*ahu)*. The road *moai* have statistically wider bases when measured relative to shoulder width than *ahu moai* (see Lipo et al., 2013, Fig. 3). Once statues arrived on platforms, prehistoric carvers modified the statues to decrease the width of the base relative to the shoulders. In addition, although *ahu moai* stand in an upright fashion with their mass located well over their base, road *moai* show a distinctive angled base that would cause the statue to lean significantly forward, often well over 10 degrees. The pronounced forward lean of the road *moai* points to how they were "walked" in an upright position with little wear to the base. *Moai* "walking" is achieved by ropes tilting the body from side to side, while allowing it to fall forward, controlled by a rope to the rear. This arrangement minimizes friction between the base and the ground, allowing for conservation of energy, increasing overall efficiency, and removing the potential for damage as the statue "walks" (Lipo et al., 2013). This means of transportation is only possible, however, because the statute is carefully shaped to move in this fashion.

Apart from labor and engineering expertise, *moai* transport required only ropes; few if any trees were required in statue transport. A woody shrub (*hau hau*, *Triumfetta semitrioba)* provided abundant materials for making rope (Metraux, 1940; Skottsberg, 1920). Thus, *moai* carving and transport did not contribute to deforestation, nor can one argue that forests were cleared for extensive cultivation of surplus crops to feed thousands of statue workers, as some have supposed (see Diamond, 2005; van Tilburg & Ralston, 2005, p. 299). Instead, the evidence for *moai* carving and transport points to activities by small-scale social groups rather than the product of laborers unified under a powerful centralized chiefdom.

Explaining the Success of Rapa Nui

Rather than a story of catastrophe and collapse, Rapa Nui prehistory is a case study of success on a remote, resource-poor island. Polynesians populated Rapa Nui around AD 1200 as part of rapid expansion throughout the remote Pacific (Hunt & Lipo, 2006; Wilmshurst, Hunt, Lipo, & Anderson, 2011). Colonists brought a roster of plants (taro, sweet potato, banana, sugar cane, etc.) and animals (rats, chickens) along with a variety of knowledge about subsistence strategies (fishing, cultivation) and cultural practices (statue and monument construction). Starting with these variables, Rapanui populations quickly grew in number as the island was transformed from a palm forest into an agricultural and human landscape.

Polynesian rats, as hitchhikers or an intentional introduction, rapidly spread across the island, potentially reaching numbers in the millions in a short time (Hunt, 2007). Rats would prey upon native plant seeds—especially the nuts of a dominant palm forest—contributing to depressed recruitment and ultimately the forest's demise. Forest removal would make way for cultivation, with workers using slash-and-burn cultivation practices common in Polynesian food production. The nutrients released from burning vegetation would have been key to making the relatively poor soils temporarily more productive. Thus, given rats' predilection for palm nuts, the slow rate of growth of the native *Jubaea* palm, and on-going land clearance with fire, the palms went extinct over several centuries. Importantly, no carrying capacity calamity befell the island when the forests were cleared. Clearing the landscape for cultivation and nutrients released from the burned trees created opportunities for at least short-term soil enrichment and cultivation as the island was transformed from a natural to an agricultural landscape.

From the available archaeological evidence, populations resided in multiple, functionally redundant dispersed communities, but groups benefited from interaction through activities at large *ahu* (Hunt & Lipo, 2011). The benefits of interaction among dispersed communities likely explain why investment in monuments, although present elsewhere across the Pacific, took such an exuberant form in this location. On Rapa Nui, monument construction provided advantages to individuals and communities, serving to provide individuals with ways of competing while also mitigating problems of resource uncertainty (through sharing) and reducing inevitable intergroup competition as populations grew (see Hunt & Lipo, 2011 for a more in-depth discussion).

The benefits of *moai* and *ahu* construction on Rapa Nui allow one to understand these phenomena as the products of effective governance, even if such things are not consistent with common assumptions about what "successful" societies should do. *Moai* making and transport appear incongruous with the island's resource limitations and remote isolation, and thus stand apart from what one might assume as central to survival. On this island, however, *moai* werethe key to long-term sustainability. Although activities and forms of investments varied over time, the Rapanui successfully persisted. Populations remained stable and reasonably healthy until 1722 and the arrival of the Europeans. Rapa Nui's success over its pre-European history is tied directly to the cultural practices involved in *moai* and how these practices structured and supported the island's communities.

From the Past and Looking at the Future: Governance on Rapa Nui

This new understanding of the way prehistoric people on Rapa Nui managed uncertainty offers a means of evaluating governance structures from the recent past as well as what might best be implemented for the future. From the archaeological record, one can see that the island's long-term success came from governance structures comprised of multiple local groups that cooperate as well as compete with one another. Such a structure allowed for variability in local knowledge to feed back into practice and spread across the island, thus leading to a system that would dynamically accommodate changes in environmental conditions. This system worked until the Europeans' arrival, when extrinsic changes resulted in social disruption and massive population loss due to disease and other European-driven catastrophes (Hunt & Lipo, 2011).

An important question for Rapa Nui's future is how well this traditional governance structure will work under vastly different circumstances. Cooperation and competition between local groups must be managed in ways that foster multi-level governance, support a population twice the size of the prehistorical carrying capacity, and enable flows of people and goods between the island and the rest of the world. The knowledge of how to live sustainably on the island will need to evolve and adapt to these changes in circumstances. Furthermore, the pluralist form is not necessarily as adaptive as it was in the past, as it still retains a strong top-down structure, a legacy of CONAF. This structure, therefore, might limit the ability for local innovations to emerge and spread across the island, constraining the community's ability to respond to changing and uncertain conditions. So, although *Ma'u Henua* represents a significant positive step forward toward decolonization and the embracing of local knowledge, it still potentially suffers from over-emphasis on top-down governance. Based on the factors that appear to explain Rapa Nui's sustained prehistorical success, future policymakers might well consider adding dimensions of polycentric governance (e.g., Ostrom, 2010; Waring et al., 2015) that combine cooperation and competition at more local levels than what is currently envisioned. For example, the establishment of events that encourage groups to work together while simultaneously competing in some capacity can have tremendously beneficial effects that result in increased prosociality. Wilson (2011), for example, has demonstrated that group-level competition can increase within group cooperation while also increasing global levels of cooperation across a population. The basis of such mechanisms already exists on the island in the form of *Tapati*, a festival that was created in 1968 in which clan groups compete in a series of cultural and athletic events. Like the cooperative efforts involved in making and transporting *moai* that were the foundation of prehistoric Rapa Nui society and governance, events like *Tapati* have the potential to enhance the island's ability to govern effectively in the face of future uncertainty.

Conclusions

Overall, our new understanding of Rapa Nui challenges the idea that traditional, local-based governance systems are inherently flawed. New knowledge, however, brings with it new productive areas in which to consider governance and knowledge systems. Our studies of the archaeological record demonstrate that Rapa Nui's success in the face of uncertainty and constraints (socially, environmentally, and geographically) derived from governance structures in which individuals and local communities shared information and resources. Innovations spread easily through the interaction of multiple, dispersed communities, and resource shortfalls were met by embedded collaborative efforts marked by activities involved in the construction and transport of *moai*. Following the example provided by Rapa Nui prehistory, we suggest that any regular activities (i.e., competitions, rituals, gatherings) that bring communities together and promote within-group cooperation will provide a direct benefit to everyone who participates. With local structures, those groups that cooperate more strongly will do better, particularly in the context of uncertainty. On the island scale, then, competition between these groups who also participate in between-group cooperation will produce general sustainability. The constraints and local conditions faced by populations living on Rapa Nui give an example of resilient and adaptive governance at its finest.

Our understanding has many implications for thinking about governance structures and how their members consider knowledge under conditions of uncertainty. Researchers must first carefully—and constantly—evaluate the assumptions made about the nature of social change. Although long-cherished beliefs might fit contemporary perspectives, they need to explore where these believes come from and to assess their empirical warrant, and must distinguish between the social acceptability of a conclusion versus its empirical support. This concern is why science matters so greatly, particularly when the stakes of failure grow in magnitude. Those in the field must fight the tendency to view knowledge generation as producing "alternative facts," but instead see knowledge as a process by which one continually and critically re-evaluates information from as many sources as possible.

Given that much knowledge about social and cultural change comes from an understanding of the past, science-based archaeology that demands falsifiability in any claims is particularly required. This suggestion does not prioritize science over locally generated knowledge. Instead, one must see knowledge generation as an iterative process in which we continually evaluate all sources of information. Despite having a "scientific" pedigree, the lack of such critical evaluation has contributed significantly to the erroneous acceptance of the "collapse" narrative. There are likely other areas where the field's perceived knowledge must be closely examined for empirical warrant. Likewise, one must not simply rely on "facts" as the basis for knowledge. One's knowledge comes not only from observations, but also the way in which one generates those observations. In this sense, theory is paramount. The idea that human societies will inevitably result in environmental destruction is not only unsupported by the evidence, but also violates a basic understanding

about the relations between organisms and resources: There are conditions in which balances can be reached and sustainability obtained. Researchers must forge their observations from explicit and robust theory (Lewontin, 1974).

In cases of uncertainty such as that posed by imminent climate change, an additional imperative exists to incorporate processes that accommodate dynamic knowledge change into one's governance systems. As society begins to encounter environmental conditions that radically deviate from those upon which its actions have been traditionally based, governance must become increasingly adaptive and dynamic. The systems required must be more like that of prehistoric Rapa Nui: local and pluralist. Following the quote by Robert Shiller that begins this chapter, society requires dynamic and adaptive governance systems that accommodate the iterative process of knowledge generation—rather than those that act on traditional assumptions. These kinds of adaptive management systems (Williams & Brown, 2014) are particularly well-suited to the changing nature of knowledge, as innovation in one area can be evaluated locally and then shared across communities– a process that is difficult to implement in top-down governance models. In this way, Rapa Nui stands to serve once again as an exemplary cultural system, though one of success and promise rather than of collapse and catastrophe.

References

Alonso, J. M., Clifton, J., & Díaz-Fuentes, D. (2015). Did new public management matter? An empirical analysis of the outsourcing and decentralization effects on public sector size. *Public Management Review, 17,* 643–660. https://doi.org/10.1080/14719037.2013.822532

Ayala-Bradford, I., Lipo, C. P., & Hunt, T. L. (2005). The use of satellite imagery to study prehistoric agricultural features (*manavai*) on Rapa Nui. In A. Seelendfreund (Ed.), *Reñaca Papers: VI International conference on Rapa Nui and the Pacific* (pp. 113–123). Los Osos: Easter Island Foundation.

Bahn, P., & Flenley, J. (1992). *Easter Island, Earth Island*. London: Thames and Hudson.

Barfelz, A. L. (2011). The little island that could: How reforming cultural preservation policies can save Easter Island and the world's heritage. *Michigan State International Law Review, 20,* 149–177. Retrieved from https://digitalcommons.law.msu.edu/ilr/vol20/iss1/12

Biblioteca del Congreso Nacionale de Chile. (2015). Reportes Estadísticos Comunales 2015 [Report of the communal statistics 2015]. Retrieved from http://reportescomunales.bcn.cl/2015/index.php/Isla_de_Pascua

Boersema, J. J. (2017). An earthly paradise? Easter Island (Rapa Nui) as seen by the eighteenth-century European explorers. In S. H. Cardinali, K. B. Ingersoll, D. W. Ingersoll Jr., & C. M. Stevenson (Eds.), *Cultural and environmental change on Rapa Nui* (pp. 156–178). Abingdon: Routledge.

Bologna, M., & Flores, J. C. (2008). A simple mathematical model of society collapse applied to Easter Island. *EPL (Europhysics Letters), 81,* 48006. https://doi.org/10.1209/0295-5075/81/48006

Bork, H.-R., Mieth, A., & Tschochner, B. (2004). Nothing but stones? A review of the extent and technical efforts of prehistoric stone mulching on Rapa Nui. *Rapa Nui Journal, 18,* 10–14. Retrieved from https://kahualike.manoa.hawaii.edu/rnj/vol18/iss1/5

Bowles, S., Choi, J.-K., & Hopfensitz, A. (2003). The co-evolution of individual behaviors and social institutions. *Journal of Theoretical Biology, 223,* 135–147. https://doi.org/10.1016/S0022-5193(03)00060-2

Brander, J. A., & Scott Taylor, M. (1998). The simple economics of Easter Island: A Ricardo-Malthus model of renewable resource use. *American Economic Review, 88*(1), 119–138. Retrieved from https://www.jstor.org/stable/116821

Busch, T. (2016, January 6). Collapse issues potent warning for the future. *The Taber Times.* Retrieved from http://www.tabertimes.com/blog/2016/01/06/collapse-issues-potent-warning-for-the-future/

Carabine, E., & Dupar, M. (2014). The IPCC's fifth assessment report: What's in it for small island developing states? Retrieved from https://cdkn.org/wp-content/uploads/2014/08/IPCC-AR5-Whats-in-it-for-SIDS_WEB.pdf

Cauwe, N. (2011). *Easter Island: The great taboo*. Brussels: Versant Sud.

Cauwe, N., & de Dapper, M. (2015). *Easter Island: Collapse or transformation? A state of the art. Proceedings of the International Conference of Brussels (9–10/11/2012).* Brussels: The Royal Academy for Overseas Sciences.

Clarke, B., Stocker, L., Coffey, B., Leith, P., Harvey, N., Baldwin, C., Baxter, T., Bruekers, G., Galano, C. D., Good, M., Haward, M., Hofmeester, C., De Freitas, D. M., Mumford, T., Nursey-Bray, M., Kriwoken, L., Shaw, J., Shaw, J., Smith, T., Thomsen, D., Wood, D., & Cannard, T. (2013). Enhancing the knowledge-governance interface: Coasts, climate and collaboration. *Ocean and Coastal Management, 86,* 88–99. https://doi.org/10.1016/j.ocecoaman.2013.02.009

CODEIPA. (2015). Ma'u Henua: Propuesta de nueva administracion Parque Nacional Rapa Nui [Ma'u Henua: Proposal for a new administration of the Rapa Nui National Park]. Retrieved from http://ciperchile.cl/wp-content/uploads/PROPUESTA-MAU-HENUA.pdf

Council on Hemispheric Affairs. (2011). Difficult times for Chile's Easter Island. Retrieved from http://www.coha.org/difficult-times-for-chiles-easter-island/

Corney, B. C. (1908). *The voyage of Captain Don Felipe Gonzalez: In the ship of the line San Lorenzo with the frigate Santa Rosalia in company, to Easter Island in 1770–1771*. Cambridge: Hakluyt Society.

Delaune, G. (2012). Rapa Nui on the verge: Easter Island's struggles with integration and globalization in the information age. *Berkeley Planning Journal, 25,* 126–139. https://doi.org/10.5070/BP325112098

Diamond, J. (1995). Easter's end. *Discover, 16*(8), 63–68.

Diamond, J. (2005). *Collapse: How societies choose to fail or succeed.* New York: Viking.

DiNapoli, R. J., Morrison, A. E., Lipo, C. P., Hunt, T. L., & Lane, B. G. (2018). East Polynesian Islands as models of cultural divergence: The case of Rapa Nui and Rapa Iti. *The Journal of Island and Coastal Archaeology, 13*(2), 206–223. https://doi.org/10.1080/15564894.2016.1276490

Eerkens, J. W., & Lipo, C. P. (2007). Cultural transmission theory and the archaeological record: Providing context to understanding variation and temporal changes in material culture. *Journal of Archaeological Research, 15,* 239–274. https://doi.org/10.1007/s10814-007-9013-z

Emerson, K., & Nabatchi, T. (2015). *Collaborative governance regimes.* Washington, D.C.: Georgetown University Press.

Erickson, J. D., & Gowdy, J. M. (2000). Resource use, institutions, and sustainability: A tale of two Pacific Island cultures. *Land Economics, 76,* 345–354. https://doi.org/10.2307/3147033

Fischer, S. R. (2005). *Island at the end of the world: The turbulent history of Easter Island.* London: Reaction.

Flenley, J. R. (1979). Stratigraphic evidence of environmental change on Easter Island. *Asian Perspectives, 22*(1), 33–40. Retrieved from https://www.jstor.org/stable/42929142

Flenley, J. R., & Bahn, P. (2003). *The enigmas of Easter Island* (2nd ed.)*.* Oxford, UK: Oxford University Press.

Flenley, J. R., & Bahn, P. (2007). Conflicting views of Easter Island. *Rapa Nui Journal, 21,* 11–13.

Flenley, J. R., & King, A. S. M. (1984). Late quaternary pollen records from Easter Island. *Nature, 307*(5946), 47–50. https://doi.org/10.1038/307047a0

Flenley, J. R., King, A. S. M., Jackson, J., Chew, C., Teller, J. T., & Prentice, M. E. (1991). The late quaternary vegetational and climatic history of Easter Island. *Journal of Quaternary Science, 6*(2), 85–115. https://doi.org/10.1002/jqs.3390060202

Frederickson, H. G. (1971). Toward a new public administration. In F. Marini (Ed.), *Toward a new public administration* (pp. 309–331). Scranton: Chandler.

Foot, D. K. (2004). Easter Island: A case study in non-sustainability. *Greener Management International, 2004*(48), 11–20. https://doi.org/10.9774/GLEAF.3062.2004.wi.00004

Gill, G. W., & Stefan, V. H. (2016). Rapanui origins, relationships, and warfare: A summary in theoretical context. In V. H. Stefan & G. W. Gill (Eds.), *Skeletal biology of the ancient Rapanui (Easter Islanders)* (pp. 286–302). Cambridge, UK: Cambridge University Press.

Goodnow, F. J. (1900). *Politics and administration: A study in government.* New York: Macmillan.

Hari, J. (2005). Is Easter Island a warning for us all? Don't be fooled: Advanced and rational societies can commit environmental suicide. *The Independent*. Retrieved from https://www.emfacts.com/2005/06/is-easter-island-a-warning-for-us-all/

Heins, J. (2010). Unconventional wisdom: An interview with Robert Shiller. Retrieved from https://www.advisorperspectives.com/newsletters10/pdfs/Unconventional_Wisdom-An_Interview_with_Robert_Shiller.pdf

Henrich, J. (2004). Cultural group selection, coevolutionary processes and large-scale cooperation. *Journal of Economic Behavior & Organization, 53,* 3–35. https://doi.org/10.1016/S0167-2681(03)00094-5

Heyerdahl, T. (1989). *Easter Island: The mystery solved*. New York: Random House.

Hunt, T. L. (2007). Rethinking Easter Island's ecological catastrophe. *Journal of Archaeological Science, 34,* 485–502. https://doi.org/10.1016/j.jas.2006.10.003

Hunt, T. L., & Lipo, C. P. (2006). Late colonization of Easter Island. *Science, 311,* 1603–1606. https://doi.org/10.1126/science.1121879

Hunt, T. L., & Lipo, C. P. (2008). Evidence for a shorter chronology on Rapa Nui (Easter Island). *The Journal of Island and Coastal Archaeology, 3,* 140–148. https://doi.org/10.1080/15564890801990797

Hunt, T. L., & Lipo, C. P. (2010). Ecological catastrophe, collapse, and the myth of "ecocide" on Rapa Nui (Easter Island). In P. A. McAnany & N. Yoffee (Eds.), *Questioning collapse: Human resilience, ecological vulnerability, and the aftermath of empire* (pp. 21–44). New York, NY: Cambridge University Press.

Hunt, T. L., & Lipo, C. P. (2011). *The statues that walked: Unraveling the mystery of Easter Island*. Riverside: Free.

IWGIA. (2012). The human rights of the Rapa Nui people on Easter Island: Report of the International Observers' Mission to Rapa Nui 2011. Retrieved from https://www.iwgia.org/images/publications//0597_Informe_RAPA_NUI_IGIA-Observatorio_English_FINAL.pdf

Kirch, P. V. (1984). *The evolution of Polynesian chiefdoms*. New York, NY: Cambridge University Press.

Knight, F. H. (1921). *Risk, uncertainty and profit*. Hart, Schaffner and Marx Prize Economic Essays: Vol. 31. Boston: Mifflin.

Kovalchik, J. (2014). *Remote sensing and the assessment of prehistoric productivity in cultivation practices of Rapa Nui, Chile* (Master's thesis). Department of Anthropology, California State University Long Beach, Long Beach.

La Pérouse, J.-F. de Galaup. (1797). *Voyage de La Pérouse autour du monde* [The voyage of La Pérouse round the world] (M. L. A. Milet-Mureau, Ed.). Paris: De l'Imprimerie de la République.

Ladefoged, T. N., Flaws, A., & Stevenson, C. M. (2013). The distribution of rock gardens on Rapa Nui (Easter Island) as determined from satellite imagery. *Journal of Archaeological Science, 40,* 1203–1212. https://doi.org/10.1016/j.jas.2012.09.006

Ladefoged, T. N., Stevenson, C. M., Rapu Haoa, S., Mulrooney, M., Puleston, C., Vitousek, P. M., & Chadwich, O. A. (2010). Soil nutrient analysis of Rapa Nui gardening. *Archaeology of Oceania, 45,* 80–85. https://doi.org/10.1002/j.1834-4453.2010.tb00082.x

Ladefoged, T. N., Stevenson, C. M., Vitousek, P., & Chadwick, O. (2005). Soil nutrient depletion and the collapse of Rapa Nui Society. *Rapa Nui Journal, 19,* 100–105. Retrieved from https://kahualike.manoa.hawaii.edu/rnj/vol19/iss2/4

Laing, B. D. (2008). Dual inheritance theory, contract law, and institutional change: Towards the co-evolution of behavior and institutions. *German Law Journal, 9,* 491–514. https://doi.org/10.1017/S2071832200006556

Lewontin, R. C. (1974). *The genetic basis of evolutionary change*. New York, NY: Columbia University Press.

Lipo, C. P., & Hunt, T. L. (2009). A.D. 1680 and Rapa Nui prehistory. *Asian Perspectives, 48,* 309–317. https://doi.org/10.1353/asi.2009.0001

Lipo, C. P., Hunt, T. L., Horneman, R., & Bonhomme, V. (2016). Weapons of war? Rapa Nui mata'a morphometric analyses. *Antiquity, 90*(349), 172–187. https://doi.org/10.15184/aqy.2015.189

Lipo, C. P., Hunt, T. L., & Rapu Haoa, S. (2013). The 'walking' megalithic statues (*moai*) of Easter Island. *Journal of Archaeological Science, 40,* 2859–2866. https://doi.org/10.1016/j.jas.2012.09.029

McAnany, P. A., & Yoffee, N. (2009). *Questioning collapse: Human resilience, ecological vulnerability, and the aftermath of empire*. New York, NY: Cambridge University Press.

Metraux, A. (1940). *Ethnology of Easter Island*. Bernice P. Bishop Museum Bulletin: Vol. 160. Honolulu: The Museum.

Morrison, A. E. (2012). *An archaeological analysis of Rapa Nui settlement structure: A multi-scalar approach* (Doctoral dissertation). University of Hawaii, Department of Anthropology, Manoa.

Mulloy, W. T. (1974). Contemplate the navel of the world. *Americas, 26*(4), 25–33.

Mulrooney, M. A. (2012). *Continuity or collapse? Diachronic settlement and land use in Hanga Ho'onu, Rapa Nui (Easter Island)* (Doctoral dissertation). University of Auckland, Department of Anthropology, Auckland.

Mulrooney, M. A. (2013). An island-wide assessment of the chronology of settlement and land use on Rapa Nui (Easter Island) based on radiocarbon data. *Journal of Archaeological Science, 40,* 4377–4399. https://doi.org/10.1016/j.jas.2013.06.020

Mulrooney, M. A., Ladefoged, T. N., Stevenson, C. M., & Rapu Haoa, S. (2009). The myth of A.D. 1680: New evidence from Hanga Ho'onu, Rapa Nui (Easter Island). *Rapa Nui Journal, 23,* 94–105.

Nagarajan, P. (2006). Collapse of Easter Island: Lessons for sustainability of small islands. *Journal of Developing Societies, 22,* 287–301. https://doi.org/10.1177/0169796X06068032

Osborne, D., & Gaebler, T. (1992). *Reinventing government: How the entrepreneurial spirit is transforming the public sector.* Reading: Addison-Wesley.

Osborne, S. P. (Ed.). (2010). *The new public governance? Emerging perspectives on the theory and practice of public governance*. Abingdon: Routledge.

Ostrom, E. (2010). Beyond markets and states: Polycentric governance of complex economic systems. *American Economic Review, 100,* 641–672. https://doi.org/10.1257/aer.100.3.641

O'Toole, L. J. (1997). Treating networks seriously: Practical and research-based agendas in public administration. *Public Administration Review, 57,* 45–52. https://doi.org/10.2307/976691

Owsley, D. W., Barca, K. G., Simon, V. E., & Gill, G. W. (2016). Evidence for injuries and violent death. In V. H. Stefan & G. W. Gill (Eds.), *Skeletal biology of the ancient Rapanui (Easter Islanders)* (pp. 222–252). Cambridge, UK: Cambridge University Press.

Puleston, C. O., Ladefoged, T. N., Rapu Haoa, S., Chadwick, O. A., Vitousek, P. M., & Stevenson, C. M. (2017). Rain, sun, soil, and sweat: A consideration of population limits on Rapa Nui (Easter Island) before European contact. *Frontiers in Ecology and Evolution, 5,* 69. https://doi.org/10.3389/fevo.2017.00069

Rainbird, P. (2002). A message for our future? The Rapa Nui (Easter Island) ecodisaster and Pacific island environments. *World Archaeology, 33,* 436–451. https://doi.org/10.1080/00438240120107468

Ramirez, J. M. (2000). Rapa Nui land management: A personal chronicle. *Rapa Nui Journal, 14,* 47–48. Retrieved from https://kahualike.manoa.hawaii.edu/rnj/vol14/iss2/3

Reuveny, R., & Decker, C. S. (2000). Easter Island: Historical anecdote or warning for the future? *Ecological Economics, 35,* 271–287. https://doi.org/10.1016/S0921-8009(00)00202-0

Reynolds, K., & Rose-Price, T. (1994). *Rapa-Nui: The Easter Island legend on film*. New York: Newmarket.

Richerson, P. J., & Boyd, R. (2005). *Not by genes alone: How culture transformed human evolution*. Chicago, IL: University of Chicago Press.

Rosell, S. A. (1999). *Renewing governance: Governing by learning in the information age*. New York, NY: Oxford University Press.

Skottsberg, C. (1920). *The natural history of Juan Fernández and Easter Island*. Uppsala: Almqvist & Wiksells Boktryckeri.

Snowden, D. J., & Boone, M. E. (2007). A leader's framework for decision making: Wise executive tailor their approach to fit the complexity of the circumstances they face. *Harvard Business Review, 85*(11), 68–76.

Stevenson, C. M. (1984). *Corporate Descent Group Structure in Easter Island Prehistory* (Doctoral dissertation). The Pennsylvania State University.

Stevenson, C. M., Puleston, C. O., Vitousek, P. M., Chadwick, O. A., Rapu Haoa, S., & Ladefoged, T. N. (2015). Variation in Rapa Nui (Easter Island) land use indicates production and population peaks prior to European contact. *Proceedings of the National Academy of Sciences of the United States of America, 112,* 1025–1030. https://doi.org/10.1073/pnas.1420712112

Stevenson, C. M., Wozniak, J., & Rapu Haoa, S. (1999). Prehistoric agricultural production on Easter Island (Rapa Nui), Chile. *Antiquity, 73,* 801–812. https://doi.org/10.1017/S0003598X00065546

Taylor, F. W. (1911). *The principles of scientific management*. New York: Harper & Brothers.

Tector, A. (2014). The delightful revolution: Canada's medical expedition to Easter Island, 1964–65. *British Journal of Canadian Studies, 27,* 181–193. https://doi.org/10.3828/bjcs.2014.12

Thomson, W. J. (1889). *Te Pito te Henua, or Easter Island*. Washington, D.C.: U.S. Government Printing Office.

van Tilburg, J. A., & Ralston, T. (2005). Megaliths and mariners: Experimental archaeology on Easter Island. In K. L. Johnson (Ed.), *Onward and upward! Papers in honor of Clement W. Meighan* (pp. 279–303). Chico: Stansbury.

Waring, T. M., Kline, M. A., Brooks, J. S., Goff, S. H., Gowdy, J., Janssen, M. A., Smaldino P. E., & Jacquet, J. (2015). A multilevel evolutionary framework for sustainability analysis. *Ecology and Society, 20*(2), 34. https://doi.org/10.5751/ES-07634-200234

Warren, M. (2011, February 7). Easter Island cops evict aboriginal squatters at luxury hotel [Article]. *The Denver Post.* Retrieved from http://www.denverpost.com/nationworld/ci_17314100

Weber, M. (1978). *Economy and society: An outline of interpretive sociology* (Vol. 1). Berkeley, CA: University of California Press.

Wei Choo, C. (2006). *The knowing organization: How organizations use information to construct meaning, create knowledge, and make decisions*. Oxford, UK: Oxford University Press.

Williams, B. K., & Brown, E. D. (2014). Adaptive management: From more talk to real action. *Environmental Management, 53,* 465–479. https://doi.org/10.1007/s00267-013-0205-7

Wilmshurst, J. M., Hunt, T. L., Lipo, C. P., & Anderson, A. J. (2011). High-precision radiocarbon dating shows recent and rapid initial human colonization of East Polynesia. *Proceedings of the National Academy of Science of the United States of America, 108,* 1815–1820. https://doi.org/10.1073/pnas.1015876108

Wilson, D. S. (2011). *The neighborhood project: Using evolution to improve my city, one block at a time.* New York: Little, Brown and Company.

Wozniak, J. A. (1998). Settlement patterns and subsistence on the northwest coast of Easter Island: A progress report. In P. Vargas Casanova (Ed.), *Easter Island and East Polynesian prehistory* (pp. 171–178). Santiago: Universidad de Chile, Facultad de Arquitectura y Urbanismo, Instituto de Estudios Isla de Pascua.

Wozniak, J. A. (1999). Prehistoric horticultural practices on Easter Island: Lithic mulched gardens and field systems. *Rapa Nui Journal, 13,* 95–99. Retrieved from https://kahualike.manoa.hawaii.edu/rnj/vol13/iss4/1