

Native Ecologies: Environmental Lessons from Indigenous Histories

Gregory D. Smithers
Virginia Commonwealth University

SINCE THE LATE 1960s, the fields of indigenous and environmental history have boomed. In the United States these large, nuanced, and often-overlapping historiographies have provided college educators with enormous scope to re-evaluate the past and contextualize contemporary political and social issues related to Native peoples and the environment. Since the Civil Rights Movement of the 1950s and 1960s energized a new generation of professional historians, topics such as race, gender, sexuality, and social justice have become staples of historical scholarship and instruction in college classrooms. The social movements that followed the civil rights struggles, such as the counterculture, third-wave feminism, and the modern environmental movement, provide us—college history professors—with the historiographical tools to rethink what it is we want our undergraduate students to get out of indigenous and environmental history.¹

There are good pedagogical reasons for weaving indigenous and environmental histories into the historical narratives that we ask our students to critique. To begin with, the roiling social atmosphere of political protest and consciousness-raising of the 1960s and 1970s

constituted an era when Native peoples asserted their historical and political voices on issues related to place, land rights, and ecological sustainability.² For instance, the American Indian Movement (AIM), founded in Minneapolis, Minnesota in 1968, became one of the most publicly visible American Indian activist organizations of the 1970s in raising popular awareness about environmental racism, especially as it related to the preservation of sacred sites.³

Major political developments also helped to increase the visibility of both Native American and environmental issues and, therefore, warrant our students' careful consideration. The Endangered Species Act (1973) and the Indian Self-Determination and Education Assistance Act (1975) were two of the most important pieces of federal legislation to play significant roles in bringing issues of environmental (and, specifically, species) sustainability and Native governance into mainstream political discourse in the United States. At an international level, the decolonization of Africa, Asia, and the Pacific raised similarly pressing questions about Native governance and environmental management. In more recent years, the United Nations has recognized that the issues of Native self-determination and climate change are not mutually exclusive historical and political issues; they are inextricably bound together by the reality of global warming and the potentially devastating consequences of rising sea levels on disproportionately large numbers of indigenous peoples throughout the world.⁴

Given the synergies between indigenous and environmental histories, it seems only reasonable that we as college instructors challenge our students to think critically about the historical complexities of contemporary indigenous and environmental issues.⁵ This essay presents readers with historiographical examples of the types of reference points that might be effectively deployed in the college classroom to encourage students to develop historical frameworks that enhance civic engagement and sociopolitical decision-making on issues related to Native ecological knowledge and environmental sustainability. Striving for such learning outcomes is not mere pie-in-the-sky idealism; it is, or at least should be, part of the core mission of a history (and, indeed, humanistic) curriculum that seeks not only to invest in students a sense of historical consciousness, but also to nurture the analytical skills necessary to critically reflect on, and develop

potential solutions to, the ecological challenges facing indigenous communities around the globe.⁶

My analysis builds on the insights of historian Mark Carey, who posits the need for a “critical climate history” that incorporates historical analysis into the science and politics of climate change discourse.⁷ I agree with Carey, but would like to expand on his conclusions by proposing a framework that I refer to as “Native ecologies.” By “Native ecologies,” I refer to the development of a deeper historical appreciation for indigenous modes of environmental stewardship and ecological thinking that enables historians to analyze the local (or comparative) dimensions of climate change, while still recognizing the global, transnational nature of rapid environmental change. The following analysis begins by considering theories of Native ecologies. It does this by drawing insights from traditional ecological knowledge in North America, and transitions to take a global perspective of the historical significance of indigenous ecological knowledge among Native people outside of North America. My analysis seeks to balance ecocentric perspectives on climate change with reflections on the anthropocene, or human action—a balancing act that indigenous people throughout the world have a long history of engagement with.⁸

Traditional Ecological Knowledge (TEK) and Indigenous Ecological Knowledge (IEK)

When I ask undergraduate students about indigenous people and the environment, I routinely read or listen to anecdotes about the “ecological Indian.”⁹ Many students admit that Native American history is a mystery to them. As a result, students often fall back on popular culture understandings about indigenous people being more attuned to the environment than Europeans and Euro-Americans. The trope of the ecological Indian is deeply rooted in Western culture. It is a trope that dates back to the seventeenth and eighteenth centuries and European perceptions of American Indians living as “noble savages” who have virtually no impact on the environment. Such was the environmental awareness of Native peoples that they lived in perfect harmony with nature. Or so the trope of the ecological Indian asserts.¹⁰

While the idea of the ecological Indian situates indigenous people as part of nature and tends to give primacy to environmental agency over human action, it nonetheless has some analytical utility, even if that utility is only to get students thinking about Native ecologies. Prior to regular contact with Europeans in the sixteenth and early seventeenth century, Native people in the Americas lived communal lives that were guided by the principles of balance and harmony. Indigenous Americans were not guided by Western linear conceptions of time/progress, nor were they motivated by the pursuit of profits. Instead, Native people sought ways to balance the needs of their communities with the ecological limitations of the local environment. This is not to say that American Indians did not attempt to shape and reshape their environment; they did. Instead, it is an acknowledgement of how indigenous people tried to understand and respect the ecological limits of a given environment or ecosystem.¹¹

The pursuit of balance and harmony between Native American communities and local ecologies existed both before and well after European colonization took root in the Americas. In fact, the quest for human-environmental balance and harmony can also be identified in other parts of the world where Europeans colonized indigenous lands. Whether scholars refer to pre- or post-contact periods, the ecological practices of Native people are often conceptualized as traditional ecological knowledge (TEK) or indigenous ecological knowledge (IEK).¹²

TEK/IEK revolves around the ideals of balance and harmony between human populations and the environmental capacity of local ecologies to meet the needs of humans. This is what environmentalist and political leaders often refer to as “sustainability.” For indigenous people, sustainability, or balance and harmony, did not involve a romanticized connection to the natural world—as the trope of the ecological Indian posits. It instead centered on adaptive ecological skills and knowledge. Native people knew, and continue to acknowledge, that the environment is not static; therefore, ecological knowledge—of which I include territorial, maritime, and riverine ecologies, in addition to horticultural and agricultural knowledge systems—cannot be unchanging or static if balance and harmony between human needs and ecological sustainability is to be achieved.¹³

Native Ecologies Approaches

This dynamic framework for understanding TEK/IEK applies to Native North Americans as much as it applies to indigenous people throughout the world, and is the intellectual foundation for the Native ecologies approach. For instance, anthropologist Ben Campbell refers to the ideal of balance and harmony in relation to the indigenous Himalayans as “indigenous eco-relational sensibility expressed in stories of an animated landscape of interacting, diverse beings,” be they human beings, animals, rocks, spirits, or vegetation.¹⁴ Using TEK/IEK to inform Native ecologies thus provides a historical framework for understanding species-ecologies interactions at a spiritual and material level of analysis.

For the world’s indigenous peoples, local ecologies have never simply been resources that make economic growth possible; they are living systems that connect human societies to the global biosphere and a spiritual sense of being. As such, the introduction of TEK/IEK into the college classroom opens a space for students to consider indigenous environmental thinking in relation to Western ideas about environment, agriculture, science, and commerce more broadly. For example, can Native ecological thinking be effectively meshed with concepts such as biocentrism, or the proposition that all living things have moral standing? Perhaps. Native peoples in North America and other parts of the world have long histories of talking about the connection between the souls of animate and inanimate objects. Thus, just as a biocentric view of environment posits a world that is delicately balanced, so do traditional concepts of balance and harmony capture the concept of ecological interconnectedness.¹⁵ For example, when Australian Aborigines go “walkabout,” they follow the same routes that their ancestors took, becoming as one with both their forebears and the land upon which they journey.¹⁶

Ecocentric Approaches

What about the concept of ecocentrism? The American ecologist Aldo Leopold developed the concept of ecocentrism.¹⁷ Ecocentrism posits an evolutionary model for understanding the interrelatedness of all species, including humans. While ecocentrism strives to be

more holistic than biocentric perspectives, and ecocentrists insist that ecosystems have intrinsic (as opposed to instrumental) value, critics charge that the term is often associated with conservation, an ideal that raises questions about the significance of evolution in understanding ecosystems. Can ecocentric models be effectively meshed with Native ecologies and the adaptive ecological strategies of Native people as they strive to achieve balance and harmony between human society and the environment?¹⁸

Why should such questions matter to history majors? Given that many of our students will ultimately embark on careers in which their historical knowledge and analytical skills are used for purposes other than historical writing, preservation, or even teaching, a working historical framework for indigenous and Western environmental conceptualizations constitutes an invaluable analytical skillset. Such skills can be deepened not only by engaging students with indigenous history and Native studies paradigms, but by integrating environmental historiography into reading lists and classroom discussions. Since the 1970s, environmental history has grown dramatically. Increasingly sophisticated studies provide our students with ever-more detailed insights into the historical dimensions of horticultural and agricultural development, the ecological consequences of resource extraction, and climate change and global warming. Indeed, the future impact that global warming could potentially have on all species in our own time has become the most significant challenge of the twenty-first century.¹⁹ Understanding the pitfalls and potentials posed by twenty-first-century climate change requires historical perspectives that enable our students—the future scholars, scientists, and policy makers of the world—to have the intellectual tools and multicultural literacy to develop informed solutions to a challenge that is global in scope and local in its consequences.

Inviting students to consider the relative merits of ecological frameworks such as TEK/IEK, biocentrism, and/or ecocentrism should be done with a view to nurturing creative analytical thinking. Asking students to reflect on whether these frameworks can be effectively merged, or getting them to consider if concepts such as ecocentrism are too deeply entrenched in Western epistemologies of nature, has the potential to produce original insights in student thinking.²⁰

Ethnohistory Approaches

We as professional historians have many methodological tools at our disposal to open our student's minds to new learning opportunities and enhanced historical insights. The continued growth of ethnohistory, for example, is an exciting form of historical analysis. Ethnohistory is the product of much closer collaboration between historians and anthropologists (particularly cultural anthropologists), especially in the field of indigenous history, since the 1960s.²¹ The result is a large—and still growing—library of case studies, methodological innovations, and dynamic narratives that invite our students to think critically and practically about indigenous and environmental histories. One of the best and most profound insights to come out of ethnohistory (and Native studies more broadly) is the development of frameworks that insist that non-Native scholars work not only in the archives, but collaborate with indigenous communities. Such an approach opens up worlds of analytical possibility through the incorporation of indigenous oral histories with written archives of Western history.²² Applied in the classroom, such an approach encourages students to be more empathetic to the world outside the classroom, and to draw on indigenous oral traditions to challenge the fragmentary nature of written archives.

Transnational Approaches

Other methodological innovations also provide our students with models for deepening their engagement with indigenous and environmental histories, while also developing analytical frameworks that will help them make important interpretive connections. Transnational indigenous history is one area of scholarship that has started to grow dramatically over the past decade. Important literary work by Chadwick Allen and historical analysis by scholars such as Richard Feinberg, Lynette Russell, and Nancy Shoemaker reveal how Polynesians, Aboriginal Australians, and American Indians worked on whaling, sealing, and merchant vessels as early as the eighteenth century.²³ These studies demonstrate how indigenous people have experienced different environments and innovated their ecological knowledge based on geographical and historical context.

The historical study of maritime and riverine cultures has also become an important development in indigenous and environmental studies.²⁴ In Latin America, for example, historians have revealed the importance of riverine cultures in indigenous systems of ecological knowledge. In northern Brazil, historian Heather Roller observes how rivers played a vital role in post-contact indigenous community formation. Native peoples in northern Brazil adapted to the political and military realities of colonialism by using rivers not only to maintain a sense of their collective identities, but also to engage actively in what one scholar labels “social reproductive strategies.”²⁵ As Roller observes, “colonial Indian men” canoed and trekked through the Amazon’s interior, using mobility “as a means of consolidating and sustaining colonial Indian communities.”²⁶

Some scholars caution that a transnational—or a transcolonial—approach to indigenous history that uses water as a means of connecting Native pasts must remain careful not to fall back on Eurasian models of agricultural development.²⁷ However, focusing on Native mobility and agricultural adaptability need not flatten indigenous historical experiences and ecological engagement if caution is taken to highlight the importance of how indigenous people incorporated the agricultural and livestock practices of outsiders in geographically specific contexts. In North America, for example, there exists a long history of Native agricultural change that tested the limits of local ecologies. From the introduction of the Three Sisters—corn, squash, and beans—from Central and South America, to the raising of livestock introduced to North America by Europeans, Native people have tested and rethought their ecological knowledge over thousands of years. In other words, Native North Americans shaped, and were shaped by, their respective ecologies in addition to new ways of thinking about agriculture and livestock in different ecological zones.

The above discussion leads me to posit that the growth in original, innovative indigenous and environmental scholarship over the past two decades should have a major impact on the way we teach history to our undergraduates. Teaching that is actively informed by research makes it possible to frame the overlapping historiographies of indigenous and environmental scholarship around the concept of Native ecologies.²⁸ The phrase “Native ecologies” can effectively frame a broader understanding of the relational nature of the

human-environment dynamic. It is dynamic because it is ongoing—something that TEK/IEK articulates when emphasizing the quest to balance human needs with ecological limitations. Just as importantly, the term “Native ecologies” underscores how invoking “tradition” does not preclude adaptation, change, or the incorporation of new ecological knowledge or practices. Scholars write about all sorts of ecologies—from the biological to the political—and all of these ecologies change over time. Ecologies, like human societies, are not static, but exist in a perpetually delicate state of flow. Put another way, Native ecologies are diverse, adaptive, and interconnected.

Indigenous Historical Perspectives

Conceptions of Time, Place, and History

How might Native ecologies be incorporated into undergraduate history courses? Answering this question begins by observing that if history focuses on change and/or continuity over time, it follows that inquiries into indigenous historical perspectives on environment must begin with a deceptively simple question: what is time to Native peoples? In many Native cultures, time does not have a linear direction, but moves in cycles. For the Southeastern Indians of North America, such as the Cherokees and Creeks, time was measured according to the cyclical rotation of the seasons. For coastal peoples, such as the Salish in the Pacific Northwest, the ebb and flow of tidal waters provided a sense of time.²⁹ The idea of time therefore connects indigenous historical consciousness with a sense of place, be it a physical place such as a town; a spiritual or sacred space; or a sense of place that is more abstract, but no less real, such as belonging to clan or moiety.³⁰ Moreover, a Native sense of time often rolled into a “seamless unity,” with the cycles of life giving meaning to being in ways similar to how the physical and spiritual sense of place anchored one’s identity as part of a local community or kinship network.³¹

Understood in these ways, Native conceptions of time overlap with the standard conceptualization of environmental history as the “*history of the role and place of nature in human life*, the history of all the interactions that societies have had with the nonhuman past, in their environs.”³² Indigenous conceptions of time and

place challenge us to think critically about the utility of Western linear notions of time and place. Does time always move forward? Must learning, as the post-Enlightenment Western world maintains, always result in “positive knowledge” that increases, for instance, profits? Importantly, how do Western conceptualizations of time and place square with ideals of sustainability? In Hopi culture in the Southwestern United States, success in getting a job done is not measured by the accumulation of profits, or efficiency at completing a task, but in the balancing of collective needs with natural resources.³³ Among Aboriginal Australians, a linear sense of time has less utility than a spiritual connection to the land. This connection in turn informs the accumulation of knowledge in oral tradition that nurtures gathering information about the spiritual and medicinal significance of, for example, specific plants while also providing Aboriginal people with the flexibility to adapt to changing ecological circumstances.³⁴

Horticulture/Agriculture and the Oral-Aural System

The ecological and agricultural activities that buttressed many Native communities throughout the Americas and other parts of the world often went unnoticed or underappreciated by Europeans when they began their colonizing ventures from the sixteenth century. The knowledge that informed these activities was many millennia in the making, and often the product of human migration and innovations in horticulture and agriculture. In 2003, Jared Diamond and Peter Bellwood argued in *Science* that the rise and migration of early horticultural societies “constitute collectively the most important process in Holocene human history”—or the period after the Pleistocene epoch, beginning about 11,700 years before the present.³⁵ In the Americas, as horticultural populations dispersed and resettled throughout the Americas, indigenous communities adapted agricultural practices to local ecologies. For example, Iroquoian farmers adapted crop rotation techniques that were likely introduced to the Northeast from Native farming practices in the Midwest.³⁶ Farther South, Algonquin-speaking people in southern Maryland adapted their agricultural practices as populations grew. Indeed, with the introduction of corn, squash, and beans, the practice of “encouraging” plants gave way to more systematic forms of

horticulture, often known as “digging stick horticulture.” By the end of the seventeenth century, Native peoples up and down the Atlantic coast had also started cultivating crops introduced from Europe, such as turnips, carrots, and onions.³⁷ In other words, Native ecologies adapted and innovated over time and as indigenous peoples migrated and resettled throughout the Americas.

In the Americas, then, traditional Native agricultural practices varied from region to region. In tropical regions of the Americas, as in the Caribbean, root crop cultivation was fairly common. Root crop agriculture was not confined to Native communities in the tropics, but tropical ecologies appear to have been well suited to root crops.³⁸ Root crop agriculture involved the cultivation of sweet potatoes, yams, and cassava—all crops adapted to tropical ecologies. Native peoples grew root crops because they produced anywhere between five and ten times the bulk of seed crops in tropical climates.³⁹

The links between indigenous culture and their adaptive horticultural practices, or what is known as arboriculture, highlights the close relationship that indigenous people developed with local ecologies over many thousands of years. Knowledge of trees, shrubs, and plants provided both a sense of time and place, just as it enabled Native people to remain focused on balancing human needs with environmental limitations.⁴⁰ In the pre-contact Americas, Native people were non-literate as far as written records; yet their literacy revolved around the oral sharing of knowledge. Ecological knowledge was therefore part of the oral and aural cultures of Native communities, cultures that are capable of both conserving knowledge and innovating.⁴¹

In the rainforests of Brazil, for example, indigenous people developed oral-aural traditions that allowed for the communication and innovation of intricate knowledge about rainforest ecosystems.⁴² The connection between indigenous people and Amazonia has occupied a mythic space in Brazilian culture for some time. Accordingly, the writer Lucio Paiva Flores wistfully describes how “it is in the forests, in the rivers, and alongside the animals” that indigenous people gather their spiritual strength. Flores’ remarks may sound like a romantic re-articulation of the ecological Indian trope, but the notion of the Amazon’s indigenous people actively cultivating communities that sought out knowledge to balance social needs with ecological limitations is one of the hallmarks of Native ecological knowledge.⁴³

Native ecological knowledge is therefore one area in which students can clearly see the utility of oral-aural ecological understandings. This is particularly true in the study of Native agriculture. Anthropologists distinguish between two major types of crop cultivation. Swidden (or slash-and-burn) horticulture, which required little in the way of work, can be done using basic technologies, and generally does not alter the landscape dramatically if horticulturalists use the land for a relatively short period. In contrast, plow agriculture required farmers to engage in more labor-intensive work, such as clearing fields, using plows to turnover topsoil, and altering the landscape through the construction of irrigation systems. Agriculture thus has a much greater impact on the landscape and local ecologies, something that is reinforced when twenty-first-century farmers use pesticides and herbicides on crops.⁴⁴

The Bakairí of Brazil engaged in both horticulture and agricultural practices. Over the course of the twentieth century, these divergent practices not only had different impacts on local top-soils, but also produced socioeconomic differences.⁴⁵ Like other Native peoples in tropical regions of the Americas, the Bakairí have innovated their agricultural practices over the course of many hundred of years. Even into the present, Bakairí people strive to continue traditional horticulture while recognizing the economic advantages that may accrue from more intensive agricultural practices. Thus, many Bakairí refuse to use pesticides or herbicides to grow tubers and roots, preferring instead to use rudimentary technologies: an ax, machete, and digging stick.⁴⁶

Studying indigenous systems of agriculture as part of Native ecologies is important for gaining analytical perspective on how traditional concepts of balance and harmony have been acted on over the past century and half-century. The Bakairí are but one example of indigenous communities striving to balance traditional ecological knowledge with innovations in agricultural practices. For the Maori of New Zealand, the tension between tradition and the contemporary socioeconomic needs of community tests the adaptive abilities of their Native ecological systems of knowledge.

In traditional Maori culture, *mauri*—"it possessed all living things"—is a critically important concept to ecological knowledge. Specific places have certain characteristics, nature, or a "vital spirit."⁴⁷ Place names identify geographical features—and on

occasion, events that took place at a specific location assume a shared significance—in Maori cultures. To recognize Maori place names invites people to reflect on the connection indigenous people had (and continue to have) with the land, rivers, and oceans that gave physical and spiritual meaning to Maori life. Rooted in locality, and expressed through oral traditions, *mauri* articulates a form of collective belonging and thus challenges colonial land claims.⁴⁸

For Maori people, as for Polynesian and Melanesian peoples throughout the Pacific, arboriculture has long been important to defining place and to sustaining communities in ways that balance human-ecological needs. Sensitivity to ecological limitations is apparent from the archaeological evidence of arboricultural activity among Melanesian and Polynesian peoples. In Melanesia, archaeologists have recovered an array of preserved plant and tree crops, while among Polynesian peoples the archaeological evidence suggests that arboriculture was more selective, focusing for example on breadfruit and coconut.⁴⁹

Archaeological evidence also points to how Maori horticulturist paid particularly close attention to soil type in their pre-European contact history. Due to the wet, heavy nature of lowland soils in New Zealand, and the steepness of hill soils, Maori agriculturists preferred elevated soils for their crops.⁵⁰ Human waste was kept away from lands on which Maoris produced food crops because it would offend *Pap-tu-a-nuku* (Earth Mother) to pollute the site of food production with human excrement.⁵¹ The study of Polynesian and Melanesian ecological-agricultural practices thus has the potential to broaden our students thinking in relation to sustainable land use practices.

Specialization and Dispersal

The study of indigenous dispersal and migration in the Pacific has also proven a particularly important area of historical and environmental study since the 1970s and holds exciting pedagogical possibilities for the teaching of indigenous environmental histories.⁵² Peter Bellwood has argued that Neolithic farmers spread out across the Pacific between approximately 3000 and 1500 BCE.⁵³ These farming people took with them domesticated pigs and rice, and began engaging in arboriculture and vegeculture in locations such as Borneo and New Guinea. In New Guinea, for example, indigenous people

engaged in vegecultural practices that focused on the cultivation of sago, sago palms, bananas, roots, and tubers that proved well-adapted to New Guinea's ecology.⁵⁴ The innovations that took place in Native ecological knowledge in New Guinea over two millennia ultimately produced regional specialization in ecological knowledge and agricultural practices. For instance, highland New Guineans developed more complex and specialized agriculture. The cultivation of sweet potatoes and the raising of pigs enabled highland populations to increase, and agricultural practices became more intensive as the needs of the population grew.⁵⁵ Thus, while encouraging our students to reflect on the importance of place in the formation of indigenous ecological knowledge, the Native remains important to undergraduate teaching. The Native New Guineans remind us that we should not overlook the significance of migration and resettlement in Native ecologies.

Native Ecologies in the Classroom

If the above examples in Native ecological knowledge prove anything, it is that concepts such as time and place mattered enormously to the development of indigenous understandings about the environment and innovations in agriculture. At the same time, Native people have not always been anchored to a particular patch of earth; mobility and migration has long been a part of Native cultures. That being so, indigenous knowledge—specifically ecological knowledge—travelled with the Native people and invariably adapted to new ecological zones.

The oral-aural nature of indigenous knowledge systems made Native ecologies ideally malleable to new environments. Thus, unlike Western forms of knowledge and education that sought to conquer nature and harness ecological systems to advance the modernist goals of settler colonial expansion, economic growth, and profit maximization, Native ecologies have historically shown an inclination to innovate knowledge so that the human impact on the environment remains true to the ideal of balance and harmony.⁵⁶

But it is not only in the diverse contexts of migration and resettlement that Native ecologies innovated and adapted over several millennia. Being of a place, and responding to environmental change, also demanded innovation. Global climate change is not a

new phenomenon, but studying how Native peoples innovated their ecological knowledge and environmental practices in the context of climate changes of different durations has the potential to reveal important insights into how we might respond to twenty-first-century climate changes.

Beginning 2.6 million years ago, the earth experienced what scholars refer to as a glacial period, or Ice Age. This glacial period peaked 21,000 years ago and ended approximately 11,000 years ago. Climate scientists contend that the subsequent environmental epoch produced ecologies around the world that proved well suited to the development of horticulture and agriculture. In Mesoamerica, for example, Native peoples domesticated squash between 8,000 and 10,000 years ago. Thereafter, maize and beans were domesticated between 6,500 to 5,000 years. Beans, corn, and squash—the so-called Three Sisters—fed the large and culturally sophisticated Native civilizations that emerged in Mesoamerica during this period. The Three Sisters had trans-regional impacts, entering the culinary culture of Native peoples in eastern North America circa 800 years ago.⁵⁷

Studying the environmental changes that led to innovations in ecological knowledge and the agricultural practices that fed Native civilizations, such as the Mayan in Mesoamerican and the Cahokian chiefdom in North America, is a worthwhile intervention in undergraduate history courses, given our own era is one in which rapid climate change dominates scientific, political, and pop culture discourses. Looking back in time, and to the rise of civilizations such as the Mayan and Cahokian, can offer important insights into how human societies respond to climate change. Indeed, these and other Native peoples experienced a period of rapid global warming similar to our own. Climate scientists refer to this global warming as the medieval warm period, which occurred between circa 800 to 1400 CE. How did Native people respond? They responded either by trying to innovate and adapt, or by migrating and resettling at locations better suited to agricultural production. Written assignments—such as short reviews of scholarly and journalistic literature, historiographical essays, and/or research papers—will facilitate the deepening of a student’s knowledge base about how human societies adapt knowledge and alter lifestyles in response to rapid climate change.

Students can also acquire some invaluable insights into how human beings respond to relatively rapid changes in environment by comparing environmental histories across different Native societies. In fact, if we direct our students' attention to the centuries between 1400 and 1800 CE, they can examine how Native communities responded to yet another period of relatively rapid climate change: the Little Ice Age. During this period, Polynesian people were on the move, migrating in search of food due to the sudden inability of local ecologies to provide the sustenance needed to support human beings.⁵⁸ Natural disasters, in addition to relatively sudden changes in environment, also impact Native peoples during this period. For example, massive volcanic explosions, like the explosion of Krakatoa in 1883, had devastating effects on Native communities throughout the Pacific littoral.

Behavioral ecologists argue that evolutionary impulses lead people to seek out environments in which communities can prosper. If we stay in the Pacific, we can see that with the arrival of the Maori in New Zealand approximately 1,000 years ago, the sudden rise in human population led to what some scholars estimate was the extinction of as many as thirty-four bird species.⁵⁹ Few indigenous people would argue that they and their forebears did not impact species in different ecological regions.⁶⁰ The key to undergraduate education is to guide our students in gaining insights from such historical examples to better understand the delicate balance that exists among humans and all other species sharing a single ecosystem. In other words, it may be useful to encourage students to experiment with different environmental epistemologies, such as behavioral ecological models and elder knowledge in indigenous communities.⁶¹

Assignments and classroom activities that integrate Native ecologies open a space for Native ways of thinking to be integrated into a historically Western system of formal education. By taking oral histories seriously—and having students participate in “speakers’ circles”—it becomes possible to decolonize historical pedagogies and make space for Native perspectives. Engaging in oral-aural assignments and classroom activities, Western environmental knowledge becomes denaturalized as a normative way of thinking, and Native ecologies begin to enter the consciousness of Native and non-Native students.⁶² This type of integrative approach lends itself to service learning assignments (assignments that make it possible for

students to work *with*, and be *led* by, Native communities and learn from elders). Students can also incorporate multimedia tools that can be harnessed to foster a multidisciplinary approach to assessing student knowledge and critical thinking skills.

What I am proposing here is a humanistic approach to environmental studies that examines points of synergy and/or complementarity between TEK/IEK and Western scientific ideas about environmental sustainability.⁶³ Given that Western environmental epistemology defines the study of ecology as the quest to understand the “web of life,” Native ecological knowledge and its emphasis on the interconnectedness of all living species seems well suited to enriching our students’ understanding of environmental history.⁶⁴

I am also suggesting that it is possible to broaden students’ civil engagement by introducing them to a deeper historical perspective about time and place.⁶⁵ As historian Patty Limerick observes, “in a time of remarkably ill-tempered popular politics, case studies from environmental history can deliver a form of civic education that acquaints students with down-to-earth and fully credible alternatives to political polarization and stalemate.”⁶⁶ I agree with Limerick; I also think it is possible to challenge undergraduates to actively reflect on the multidisciplinary nature of Native environmental history, thereby opening a space for non-history majors—from disciplines as diverse as environmental science, political science, economics, and geography—that will help them to engage with environmental questions in both an informed and ethical manner.⁶⁷

Notes

1. Andrew G. Kirk, “‘Machines of Loving Grace’: Alternative Technology, Environment, and the Counterculture,” in *Imagine Nation: The American Counterculture of the 1960s and '70s*, ed. Peter Braunstein and Michael William Doyle (New York: Routledge, 2002), 362-368; Andrew G. Kirk, *Counterculture Green: The Whole Earth Catalog and American Environmentalism* (Lawrence, KS: University of Kansas Press, 2007), 17-19; Christopher Gair, *The American Counterculture* (New York: Oxford University Press, 2007), 163-164; Sherry Smith, *Hippies, Indians, and the Fight for Red Power* (New York: Oxford University Press, 2012), 49.

2. Matthew Ortoleva, “‘We Face East’: The Narragansett Dawn and Ecocentric Discourses of Identity and Justice,” in *Environmental Rhetoric and Ecologies of Place*, ed. Peter N. Goggin (New York: Routledge, 2013), 84-96.

3. Joel W. Martin, *The Land looks After Us: A History of Native American Religion* (New York: Oxford University Press, 1999), 119; David Schlosberg, *Environmental Justice and the New Pluralism: The Challenge of Difference for Environmentalism* (New York: Oxford University Press, 1999), 36-37; Carolyn Merchant, *American Environmental History: An Introduction* (New York: Columbia University Press, 2007), 218; Raymond Pierotti, *Indigenous Knowledge, Ecology, and Evolutionary Biology* (New York: Routledge, 2011), 157-158.

4. Permanent Forum on Indigenous Issues, Seventh Sessions, 3rd and 4th Meetings, Economic and Social Council of the United Nations, HR/4946; Daniel R. Wildcat, “Introduction: Climate Change and Indigenous Peoples of the USA,” in *Climate Change and Indigenous Peoples in the United States: Impacts, Experiences and Actions*, ed. Julie Koppel Maldonado, Colombi Benedict, and Rajul Pandya (New York: Springer, 2013), 1-8; Emily Gerrard, “Towards a Carbon Constrained Future: Climate Change, Emissions Trading and Indigenous Peoples’ Rights in Australia,” in *Country, Native Title and Ecology*, ed. Jessica K. Weir (Canberra, Australia: Australian National University ePress, 2012), 141; Randall S. Abate and Elizabeth Ann Kronk, “Commonality among Unique Indigenous Communities: An Introduction to Climate Change and its Impacts on Indigenous Peoples,” in *Climate Change and Indigenous People: The Search for Legal Remedies*, ed. Randall Abate and Elizabeth Ann Kronk (Cheltenham, United Kingdom: Edward Elgar Publishing, 2013), 13.

5. In a recent anthology, a number of leading historians of Native America made the case for why United States history cannot be taught effectively without indigenous content. While some of the essays touched upon indigenous-environmental history, there was surprisingly no chapter dedicated to Native American environmental history. See Susan Sleeper-Smith, Juliana Barr, Jean M. O’Brien, Nancy Shoemaker, and Scott Manning Stevens, eds., *Why You Can’t Teach United States History without American Indians* (Chapel Hill, NC: University of North Carolina Press, 2015).

6. The role that historical analysis and historians can play in the current debates about climate change have been taken up by J. R. McNeill, “Can History Help Us With Global Warming,” in *Climatic Cataclysm: The Foreign Policy and National Security Implications of Climate Change*, ed. Kurt M. Campbell (Washington, DC: Brookings Institution, 2008), 26-48; Dipesh Chakrabarty, “The Climate of History: Four Theses,” *Critical Inquiry* 35, no. 2 (Winter 2009): 197-222; Richard C. Foltz, “Does Nature Have Historical Agency? World History, Environmental History, and How Historians Can Help Save the Planet,” *The History Teacher* 37, no. 1 (November 2003): 9-28; Joshua P. Howe, “History and Climate: A Road Map to Humanistic Scholarship on Climate Change,” *Climatic Change* 105, no. 1-2 (March 2011): 357-363; Mark Carey, “Climate and History: A Critical Review of Historical Climatology and Climate Change Philosophy,” *WIREs Climate Change* 3, no. 3 (May-June 2012): 233-349.

7. Mark Carey, "Science, Models, and Historians: Toward a Critical Climate History," *Environmental History* 19, no. 2 (April 2014): 355.

8. The concept of the anthropocene involves scholars paying particular attention to the historical impacts of human actions on the environment. In this way, the anthropocene's focus on historical time differentiates it from geological notions of "deep time." Will Steffen, Paul J. Crutzen, and John R. McNeill, "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Royal Swedish Academy of Sciences* 36, no. 8 (December 2007): 614-621; Chakrabarty, "The Climate of History," 216; Will Steffen, Jacques Grinevald, Paul Crutzen, and John McNeill, "The Anthropocene: Conceptual and Historical Perspectives," *Philosophical Transactions of the Royal Society* 369, no. 1938 (13 March 2011): 842-867.

9. R. David Edmunds, "Native Americans, New Voices: American Indian History, 1895-1994," *American Historical Review* 100, no. 3 (June 1995): 721; Steven Crum, "Rare Exceptions: Some University Professors and the Teaching of Native American History, 1900-1970," *The History Teacher* 39, no. 2 (February 2006): 153-173.

10. Gaile McGregor, *Noble Savage in the New World Garden: Notes Toward a Syntactics of Place* (Bowling Green, OH: Bowling Green State University Press, 1988); Stelio Cro, *The Noble Savage: Allegory of Freedom* (Waterloo, Canada: Wilfred Laurier University Press, 1990), x. See also Gregory Evans Dowd, "Wag the Imperial Dog: Indians and Overseas Empires in North America, 1650-1776," in *Companion to American Indian History*, ed. Philip J. Deloria and Neal Salisbury (Oxford, United Kingdom: Blackwell, 2002), 4-67; Terry J. Ellingson, *The Myth of the Noble Savage* (Berkeley, CA: University of California Press, 2001), 81-82.

11. Deborah McGregor, "Indigenous Knowledge in Canada: Shifting Paradigms and the Influence of First Nations Advocates" in *Proceedings of the 1999 Sustainable Forest Management Network Conference, 14-17 February, 1999*, ed. Terrence S. Veeman, Daniel W. Smith, Brett G. Purdy, Fiona J. Salkie, and Gillian A. Larkin (Edmonton, Canada: Sustainable Forest Management Network, 1999), 193, 195; Robert E. Johannes, "Traditional Ecological Knowledge: A Collection of Essays—Introduction," in *Traditional Ecological Knowledge: A Collection of Essays*, ed. Robert Earle Johannes (Cambridge, United Kingdom: International Union for Conservation of Nature Publication Services, 1989), 6; Marie Battiste, "Enabling the Autumn Seed: Towards a Decolonized Approach to Aboriginal Knowledge, Language, and Education," *Canadian Journal of Native Education* 22, no. 1 (1998): 16-27; Jose M. V. Fragoso and Nicholas J. Reo, "Complex Interactions between Biota, Landscapes, and Native Peoples," *Ecological Processes* 2 (December 2013): 28; Winona LaDuke, "Traditional Ecological Knowledge and Environmental Futures," in *The Winona LaDuke Reader*, ed. Winona LaDuke (Stillwater, MN: Voyageur Press, 2002), 78; Charles R. Menzies and Caroline Butler, "Understanding Ecological Knowledge," in *Traditional Ecological Knowledge and Natural Resource Management*, ed. Charles R. Menzies (Lincoln, NE: University of Nebraska Press, 2006), 1-2; Paul C. Rosier, "'Modern America Desperately Needs to Listen': The Emerging Indian in an Age of Environmental Crisis," *The Journal of American History* 100, no. 3 (December 2013): 711-735.

12. Scott Slovic, "Varieties of Environmental Nostalgia," in *The Memory of Nature in Aboriginal, Canadian, and American Contexts*, ed. Françoise Besson, Claire Omhové, and Héliane Ventura (Newcastle upon Tyne, United Kingdom: Cambridge Scholars Publishing, 2014), 11-30.
13. David Molden, *Water for Food Water for Life: A Comprehensive Assessment of Water Management in Agriculture* (Washington, DC: Earthscan, 2007), 570.
14. Ben Campbell, "Beyond Cultural Models of the Environment: Linking Subjectivities of Dwelling and Power," in *Culture and the Environment in the Himalaya*, ed. Arjun Guneratne (New York: Routledge, 2010), 192. See similarly, Marc Wohling, "The Problem of Scale in Indigenous Knowledge: A Perspective from Northern Australia," *Ecology and Society* 14, no. 1 (2009): 1-14.
15. Andrew Gray, *Indigenous Rights and Development: Self-Determination in an Amazonian Community* (New York: Berghahn, 2003), 317-318; Irene van Lippe-Biesterfeld and Jessica van Tijn, *Science, Soul, and the Spirit of Nature: Leading Thinkers on the Restoration of Man and Creation* (Rochester, VT: Bear and Company, 2005), 102; Joseph Bruchac, *Native American Animal Stories* (Golden, CO: Fulcrum Publishing, 1992), xiv, 130; Scott Richard Lyons, "Rethinking Responsibility: A Response to Simon Ortiz," in *Writing Environments*, ed. Sidney I. Dobrin and Christopher J. Keller (Albany, NY: SUNY Press, 2005), 215.
16. John P. Miller, *The Holistic Curriculum*, second ed. (Toronto, Canada: University of Toronto Press, 2008), 114.
17. George Sessions, "Ecocentrism, Wilderness, and Global Ecosystem Protection," in *The Wilderness Condition: Essays On Environment And Civilization*, ed. Max Oelschlaeger (San Francisco, CA: Island Press, 1992), 90-130; Leena Vilkkä, *The Intrinsic Value of Nature* (Amsterdam, Netherlands: Rodopi, 1997), 71; Mathew Humphrey, *Preservation Versus the People?: Nature, Humanity, and Political Philosophy* (New York: Oxford University Press, 2002), 42; Andrew Kernohan, *Environmental Ethics: An Interactive Introduction* (Buffalo, NY: Broad View Press, 2012), 181.
18. Joseph R. des Jardin, *Environmental Ethics: An Introduction to Environmental Philosophy* (New York: SUNY Press, 1993), xii-xiii, 151-152, 201-202; Charlene Spretnack, "Critical and Constructive Contributions of Ecofeminism," in *Worldviews and Ecology: Religion, Philosophy, and the Environment*, ed. Mary Evelyn Tucker and John A. Grim (Lewisburg, PA: Bucknell University Press, 1993), 181-189; Edwin C. Koenig, *Cultures and Ecologies: A Native Fishing Conflict on the Saugeen-Bruce Peninsula* (Toronto, Canada: University of Toronto Press, 2005), 106-109.
19. Kari M. Norgaard, *Living in Denial: Climate Change, Emotions, and Everyday Life* (Cambridge, MA: The MIT Press, 2011).
20. Will Kymlicka, "Concepts of Community and Social Justice," in *Earthly Goods: Environmental Change and Social Justice*, ed. Fen Osler Hampson and Judith Reppy (Cornell, NY: Cornell University Press, 1996), 39; Daniel Lunney, Shelley Burgin, and Chris R. Dickman, *A Clash of Paradigms: Community and Research-Based Conservation* (Sydney, Australia: Royal Zoological Society of New South Wales, 2002), 66; Jim Ife, *Community Development in an Uncertain*

World (New York: Cambridge University Press, 2013), 46; Jules Pretty, Andy Ball, Ted Benton, Julia Guivant, David R. Lee, David Orr, Max Pfeffer, and Hugh Ward, eds., *The SAGE Handbook of Environment and Society* (London, United Kingdom: SAGE Publications, 2007), 87; William R. Jordan and George M. Lubick, *Making Nature Whole: A History of Ecological Restoration* (Washington DC: Island Press, 2011), 4.

21. Francis Jennings, "A Growing Partnership: Historians, Anthropologists, and American Indian History," *The History Teacher* 14, no. 1 (November 1980): 88-89.

22. One of the most moving examples of this is the documentary *Message from Mungo*. Andrew Pike and Ann McGrath, dir., *Message from Mungo* (2014; Ronin Films, Canberra, Australia: Ronin Films, 2014), DVD.

23. Chadwick Allen, *Blood Narratives: Indigenous Identity in American Indian and Maori Literary and Activist Texts* (Durham, NC: Duke University Press, 2002); Chadwick Allen, *Trans-Indigenous: Methodologies for Global Native Literary Studies* (Minneapolis, MN: University of Minnesota Press, 2012); Richard Feinber, *Polynesian Seafaring and Navigation: Ocean Travel in Anutan Culture and Society* (Kent, OH: Kent State University Press, 1988); Lynette Russell, *Roving Mariners: Australian Aboriginal Whalers and Sealers in the Southern Oceans, 1790-1870* (Albany, NY: SUNY Press, 2012); Nancy Shoemaker, *Native American Whalers and the World: Indigenous Encounters and the Contingency of Race* (Chapel Hill, NC: The University of North Carolina Press, 2015).

24. Ted L. Gragson, "Fishing the Waters of Amazonia: Native Subsistence Economies in a Tropical Rain Forest," *American Anthropologist* 94, no. 2 (June 1992): 428-440; Daniel Vickers, *Farmers and Fishermen: Two Centuries of Work in Essex County, Massachusetts, 1680-1830* (Chapel Hill, NC: The University of North Carolina Press, 1994); Kelly K. Chaves, "Before the First Whalers: The Emergence and Loss of Indigenous Maritime Autonomy in New England, 1672-1740," *The New England Quarterly* 87, no. 1 (March 2014): 46-71; Joshua L. Reid, *The Sea Is My Country: The Maritime World of the Makahs* (New Haven, CT: Yale University Press, 2015).

25. Brooke Larson, as quoted in Heather F. Roller, *Amazonian Routes: Indigenous Mobility and Colonial Communities in Northern Brazil* (Stanford, CA: Stanford University Press, 2014), 9

26. Roller, *Amazonian Routes*, 3.

27. Luc Vrydaghs and Tim Denham, "Rethinking Agriculture: Introductory Thoughts," in *Rethinking Agriculture: Archaeological and Ethnoarchaeological Perspectives*, ed. Tim Denham, José Iriarte, and Luc Vrydaghs (Walnut Creek, CA: Left Coast Press, 2007), 1-2.

28. James P. Collins, "Forward," in *The Theory of Ecology*, ed. Samuel M. Scheiner and Michael R. Willig (Chicago, IL: The University of Chicago Press, 2011), ix.

29. Stephen J. Gould, *Times Arrow, Time's Cycle: Myth and Metaphor in the Discovery of Geological Time* (Cambridge, MA: Harvard University Press, 1987); Peter Nabokov, *A Forest of Time: American Indian Ways of History* (New York: Cambridge University Press, 2002), 44-45.

30. R. Kevin Seasoltz, *A Sense of the Sacred: Theological Foundations of Christian Architecture and Art* (New York: Continuum Publishing, 2005), 7; Nabokov, *A Forest of Times*, 47.

31. Joseph Epes Brown with Emily Cousins, *Teaching Spirits: Understanding Native American Religious Traditions* (New York: Oxford University Press, 2001), 14.

32. Mart A. Stewart, "Environmental History: Profile of a Developing Field," *The History Teacher* 31, no. 3 (May 1998): 352.

33. Kathryn Shanley, "Time and Time Again: Notes Toward an Understanding of Radical Elements in American Indian Fiction," in *Transforming the Curriculum: Ethnic Studies and Women's Studies*, ed. Johnella E. Butler and John C. Walter (Albany, NY: SUNY Press, 1991), 248. See similarly, David Christian, *Maps of Time: An Introduction to Big History* (Berkeley, CA: University of California Press, 2004), 17, 84, 382.

34. Lenore Coltheart, "The Moment of Aboriginal History," in *Past and Present: The Construction of Aboriginality*, ed. Jeremy R. Beckett (Canberra, Australia: Aboriginal Studies Press, 1988), 188; Peter Raine, *Who Guards the Guardians?: Intercultural Dialogue on Environmental Guardianship* (Lanham, MD: University Press of America, 2003), 136-138; Philip A. Clarke, *Aboriginal People and Their Plants* (Dural, Australia: Rosenberg Publishing, 2007), 23-24; George Wilson and Margaret Woodrow, "Kuka Kanyini, Australian Indigenous Adaptive Management," in *Adaptive Environmental Management: A Practitioner's Guide*, ed. Catherine Allan and George H. Stankey (New York: Springer, 2009), 134.

35. Jared Diamond and Peter Bellwood, "Farmers and Their Languages: The First Expansions," *Science* 300, no. 597 (2003): 597-603.

36. Seth Kroeck, *Crop Rotation and Cover Cropping: Soil Resiliency and Health on the Organic Farm* (White River Junction, VT: Cheslea Green Publishing, 2011), 4. Crop rotation practices were also part of Native people's traditional land management strategies in California. Kat Anderson, *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources* (Berkeley, CA: University of California Press, 2006), 302.

37. Rebecca Seib and Helen C. Rountree, *Indians of Southern Maryland* (Baltimore, MD: Maryland Historical Society, 2014), 15, 17; Irwin L. Goldman, Geoffrey Schroeck, and Michael J. Havey, "History of Public Onion Breeding Programs in the United States," in *Plant Breeding Reviews*, ed. Jules Janick (John Wiley & Sons, Inc., 2001), 72; On digging stick horticulture and the impact that European agriculture had on Native practices, see Wayne F. Lee, *Empires and Indigenes: Intercultural Alliance, Imperial Expansion, and Warfare in the Early Modern World* (New York: New York University Press, 2011), 243.

38. The Salish in the Pacific Northwest grew edible root crops. See Wayne Suttles, "Coast Salish Resource Management: Incipient Agriculture," in *Keeping it Alive: Traditions of Plant Use and Cultivation on the Northwest Coast of North America*, ed. Douglas Deur and Nancy J. Turner (Seattle, WA: University of Washington Press, 2005), 181.

39. Otto T. Solbrig and Dorothy J. Solbrig, *So Shall You Reap: Farming and Crops In Human Affairs* (Washington, DC: Shearwater Books, 1994), 52, 77, 164;

Peter H. Raven, Ray F. Evert, and Susan E. Eichhorn, *Biology of Plants* (New York: W. H. Freeman and Company, 2005), 480; Lee A. Newsom and Elizabeth S. Wing, *On Land and Sea: Native American Uses of Biological Resources in the West Indies* (Tuscaloosa, AL: University of Alabama Press), 201.

40. Joseph Deniker, *The Races of Man: An Outline of Anthropology and Ethnography* (New York: Charles Scribner's Sons, 1904), 192.

41. J. Randolph Valentine, "Linguistics and Languages in Native American Studies," in *Studying Native America: Problems and Prospects*, ed. Russell Thornton (Madison, WI: University of Wisconsin Press, 1998), 163; L.G. Moses, "Performative Traditions in American Indian History," in *A Companion to American Indian History*, ed. Philip Deloria and Neal Salisbury (Malden, MA: Blackwell Publishers, Inc., 2002), 195.

42. Hal Langfur, "Introduction: Recovering Brazil's Indigenous Pasts," in *Native Brazil: Beyond the Convert and the Cannibal, 1500-1900*, ed. Hal Langfur (Albuquerque, NM: University of New Mexico Press, 2014), 10.

43. Tracy Devine Guzmán, *Native and National in Brazil: Indigeneity after Independence* (Chapel Hill, NC: The University of North Carolina Press, 2013), 179.

44. Robert L. Smith, *The Ecology of Man: An Ecosystem Approach* (New York: Harper and Row, 1972), 102; Robert Anderson, *The Cultural Context: An Introduction to Cultural Anthropology* (Minneapolis, MN: Burgess Publishing Company, 1976), 131; James Edward McClellan and Harold Dorn, *Science and Technology in World History: An Introduction*, second ed. (Baltimore, MD: The Johns Hopkins University Press, 2006), 17-18; Mark Q. Sutton and E. N. Anderson, *Introduction to Cultural Ecology*, third ed. (Lanham, MD: AltaMira Press, 2014), 226.

45. Debra Picchi, *The Bakairí Indians of Brazil: Politics, Ecology, and Change*, second ed. (Long Grove, IL: Waveland Press, 2006), 82, 195. For other case studies, see, for example, Carlos E. A. Coimbra, Jr., Nancy M. Flowers, Francisco M. Salzano, and Ricardo V. Santos, *The Xavante in Transition: Health, Ecology, and Bioanthropology in Central Brazil* (Ann Arbor, MI: University of Michigan Press, 2004).

46. Michael Heckenberger, *The Ecology of Power: Culture, Place, and Personhood in the Southern Amazon, A.D. 1000-2000* (New York: Routledge, 2005), xxi, 47. See also Leslie E. Sponsel, *Indigenous Peoples and the Future of Amazonia: An Ecological Anthropology of an Endangered World* (Tucson, AZ: University of Arizona Press, 1995), 63, 102-103, 265.

47. Geoff Park, "The Polynesian Forest: Customs and Conservation of Biological Diversity," in *Science of the Pacific Island Peoples: Land Use and Agriculture*, ed. John Morrison, Paul Geraghty, and Linda Crowl (Suva, Fiji: University of the South Pacific, 1994), 144.

48. Anne Salmond, *Two Worlds: First Meetings Between Maori and Europeans, 1642-1772* (Honolulu, HI: University of Hawai'i Press, 1991), 121; Pei Te Hurinui Jones, Bruce Biggs, *Nga Iwi O Tainui: The Traditional History of the Tainui People* (Auckland, New Zealand: Auckland University Press, 1995), xiii, 2; Bradford Haami, *Pūtea Whakairo: Māori and the Written Word* (Wellington,

New Zealand: Huia Publishers, 2004), 33; Elwyn Jenkins, *Falling into Place: The Story of Modern South African Place Names* (Claremont, South Africa: New Africa Books, 2007), 95-96; Jani Vuolteenaho and Lawrence D. Berg, "Towards Critical Toponymies," in *Critical Toponymies: The Contested Politics of Place Naming*, ed. Lawrence D. Berg and Jani Vuolteenaho (Surrey, United Kingdom: Ashgate, 2009), 13.

49. Patrick Vinton Kirch, *The Wet and the Dry: Irrigation and Agricultural Intensification in Polynesia* (Chicago, IL: The University of Chicago Press, 1994), 87; Peter Bellwood, *The Polynesians: Prehistory of an Island People* (London, United Kingdom: Thames and Hudson, 1987).

50. Caroline Phillips, *Waihou Journeys: The Archaeology of 400 Years of Maori Settlement* (Auckland, New Zealand: Auckland University Press, 2000), 15.

51. Angela Ballara, *Iwi: The Dynamics of Māori Tribal Organisation from c.1769 to c.1945* (Wellington, New Zealand: Victoria University Press, 1998), 38; *The Soil Underfoot: Infinite Possibilities for a Finite Resource*, ed. G. Jock Churchman and Edward R. Landa (Boca Raton, FL: CRC Press, 2014), 265; Don Graves, "A Comparison of Methods to Apply Biochar into Temperate Soils," in *Biochar and Soil Biota*, ed. Natalia Ladyina and Francois Rineau (Boca Raton, FL: CRC Press, 2013), 218. As among indigenous people in other parts of the world, Maoris also supplement agricultural production with seasonal fishing and food-gathering. See Ian G. Barber, "Early Contact Ethnography and Understanding: An Evaluation of the Cook Expeditionary Accounts of the Grass Cove Conflict," in *Voyages and Beaches: Pacific Encounters, 1769-1840*, ed. Alex Calder, Jonathan Lamb, and Bridget Orr (Honolulu, HI: University of Hawaii Press, 1999), 169.

52. Peter Boomgaard, *Southeast Asia: An Environmental History* (Santa Barbara, CA: ABC-CLIO, 2007), 183.

53. Peter Bellwood, "The Origins and Dispersal of Agricultural Communities in Southeast Asia," in *Southeast Asia: From Prehistory to History*, ed. Ian Glover and Peter Bellwood (New York: Routledge, 2004), 21-22; Peter Bellwood and Immanuel Ness, *The Global Prehistory of Human Migration* (Malden, MA: Blackwell, 2013), 393.

54. Peter Bellwood, *First Farmers: The Origins of Agricultural Society* (Malden, MA: Blackwell, 2005), 8, 25; Tim Denham and Huw Barton, "The Emergence of Agriculture in New Guinea: A Model of Continuity from Pre-Existing Foraging Practices," in *Behavioral Ecology and the Transition to Agriculture*, ed. Douglas J. Kennett and Bruce Winterhalder (Berkeley, CA: University of California Press, 2006), 239. See also Peter Bellwood, *First Migrants: Ancient Migration in Global Perspective* (Malden, MA: Blackwell, 2014).

55. Paula Brown, *Highland Peoples of New Guinea* (New York: Cambridge University Press, 1978), 66-67; Tim P. Denham, "The Roots of Agriculture and Arboriculture in New Guinea: Looking beyond Austronesian Expansion, Neolithic Packages and Indigenous Origins," *World Archaeology* 36 (2004): 610-620.

56. David Orr, *Ecological Literacy: Education and the Transition to a Postmodern World* (Albany, NY: SUNY Press, 1992), x.

57. Kent V. Flannery, "The Origins of Agriculture," *Annual Review of Anthropology* 2 (1973): 271-310; Barbara Pickersgill and Charles B. Heiser, Jr.,

“Origins and Distribution of Plants Domesticated in the New World Tropics,” in *Origins of Agriculture*, ed. Charles A. Reed (Chicago, IL: Mouton, 1977), 9-21; G. H. S. Bushnell, “The Beginning and Growth of Agriculture in Mexico,” *Philosophical Transactions of the Royal Society of London* 275, no. 936 (July 1976): 117-120; Emily McClung de Tapia, “The Origins of Agriculture in Mesoamerica and Central America,” in *The Origins of Agriculture: An International Perspective* (Washington, DC: Smithsonian Institution Press, 1992), 143-172; Thomas W. Killion, “The Archaeology of Settlement Agriculture,” in *Gardens of Prehistory: The Archaeology of Settlement Agriculture in Greater Mesoamerica*, ed. Thomas W. Killion (Tuscaloosa, AL: University of Alabama Press, 1992), 1-13; Richard E. Blanton, Stephen A. Kowalewski, Gary M. Feinman, and Laura M. Finsten, *Ancient Mesoamerica: A Comparison of Change in Three Regions*, second ed. (New York: Cambridge University Press, 1993), 40-41.

58. Charles E. M. Pearce and Frances M. Pearce, *Oceanic Migration: Paths, Sequence, Timing and Range of Prehistoric Migration in the Pacific and Indian Oceans* (New York: Springer, 2010), 303. See also Brian Fagan, *The Great Warming: Climate Change and the Rise and Fall of Civilizations* (New York: Bloomsbury, 2010).

59. Michael M. Trotter and Beverley McCulloch, “Moas, Men, and Middens,” in *Quaternary Extinctions: A Prehistoric Revolution*, ed. Paul S. Martin and Richard G. Klein (Tucson, AZ: University of Arizona Press, 1984), 708-727; Michael Alvard, “Indigenous Hunting in the Neotropics: Conservation or Optimal Foraging,” in *Behavioral Ecology and Conservation Biology*, ed. Tim Caro (New York: Oxford University Press, 1998), 475.

60. Mary E. Tucker and John Grim, *Worldviews and Ecology: Religion, Philosophy, and the Environment* (Maryknoll, NY: Orbis Books, 1994), 32-35; Leslie E. Sponsel, “Spiritual Ecology as an International Environmental Movement,” in *Occupy the Earth: Global Environmental Movements*, ed. Liam Leonard and Sya Buryn Kedzior (Bingley, United Kingdom: Emerald Group Publishing, 2014), 279.

61. Monique Borgerhoff Mulder and Peter Coppolillo, *Conservation: Linking Ecology, Economics, and Culture* (Princeton, NJ: Princeton University Press, 2005); Anne Ross, *Indigenous Peoples and the Collaborative Stewardship of Nature: Knowledge Binds and Institutional Conflicts* (Walnut Creek, CA: Left Coast Press, 2011), 91; Raymond Pierotti, *Indigenous Knowledge, Ecology, and Evolutionary Biology* (New York: Routledge, 2012), 61.

62. Donna Houston, “Red Land, Living Pedagogies: Re-animating Critical Pedagogy through American Indian Land Justice: Response 2,” in *Red Pedagogy: Native American Social and Political Thought*, ed. Sandy Grande (Lanham, MD: Rowman & Littlefield, 2015), 129-136; Wanda D. McCaslin and Denise C. Breton, “Justice as Healing: Going Outside the Colonizers’ Cage,” in *Handbook of Critical and Indigenous Methodologies*, ed. Norman K. Denzin, Yvonna S. Lincoln, and Linda Tuhiwai Smith (Los Angeles, CA: SAGE Publications, 2008), 511.

63. Leanne Cullen-Unsworth and Marilyn Wallace, “Resilience and Returning to Country: Rainforest Aboriginal People of the Wet Tropics of Queensland, Australia,” in *Ecocultures: Blueprints for Sustainable Communities*,

ed. Steffen Böhm, Zareen Pervez Bharucha, and Jules Pretty (New York: Routledge, 2015), 84.

64. Kyle Powys Whyte, "Justice Forward: Tribes, Climate Adaptation and Responsibility," in *Climate Change and Indigenous Peoples in the United States: Impacts, Experiences and Actions*, ed. Julie Koppel Maldonado, Colombi Benedict, and Rajul Pandya (New York: Springer, 2013), 9-22; Robert M. Schwartz, "Teaching Environmental History: Environmental Thinking and Practice in Europe, 1500 to the Present," *The History Teacher* 39, no. 3 (May 2006): 326-354.

65. Michael B. Smith, "Local Environmental History and the Journey of Ecological Citizenship," *Taproot* 23, no. 2 (Fall 2014): 12-21.

66. Patty Limerick, "Everything *and* the Kitchen Sink: Enriching the U.S. History Survey Course with Environmental History," *OAH Magazine of History* 25, no. 4 (October 2011): 11.

67. Robert M. Rakoff, "Doing Original Research in an Undergraduate Environmental History Course," *The History Teacher* 37, no. 1 (November 2003): 30; Kathryn Morse, "Putting History at the Core: History and Literature in Environmental Studies," *The History Teacher* 37, no. 1 (November 2003): 67-72. Service learning continues to grow in influence on college campuses across the United States. See, for example, Mark Wild, "Incorporating Service Learning into a General Education History Course: An Analogic Model," *The History Teacher* 48, no. 4 (August 2015): 643-666.