

Chapter 32

The H.J. Andrews Experimental Forest Long-Term Ecological Research Program, Oregon, USA: A Historical Biocultural Perspective



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Abstract The H.J. Andrews Experimental Forest and Long-Term Ecological Research (LTER) Program, Oregon, USA, has a history of influence in biocultural conservation through basic and applied ecology and forestry research, close partnership with managers of public forest lands, and a growing arts/humanities program. Studies of old-growth forests, the northern spotted owl flagship species, and watersheds over several decades underpinned a major shift in federal forest lands management policies in the early 1990s as the public sense for native forests shifted from their utilitarian values to their intrinsic value. Since the 2000s, a program engaging arts and humanities, including creative writers and philosophers, has richly expressed the profound beauty, wonder, and mystery of the forest, perhaps foreshadowing a new era of forest stewardship. This transformation parallels merging of environmental science, arts, and humanities at other USA LTER sites and similar programs internationally, notably the Omora Ethnobotanical Park Long-Term Socio-Ecological Research program in the Cape Horn Biosphere Reserve, Chile.

Keywords Biocultural conservation · Environmental arts and humanities · Environmental education · Long-term ecological research · Old-growth forest

32.1 Introduction

Recognizing that conservation issues have become acute globally, sites and programs of long-term ecological science and other forms of inquiry have intensified efforts to advance biocultural conservation (Rozzi 2013). These programs are emerging at long-term socio-ecological research sites, biological field stations, marine laboratories, botanical gardens, and sites rooted in arts/humanities residency

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programs (Swanson 2015; Zhu 2022). The common objective has been to encourage human-nature connections in their bioregions.

The most explicit conceptualization and practice of these biocultural conservation objectives has been associated with the Omora Ethnobotanical Park and Long-Term Socio-Ecological Research site at the southern tip of South America (Rozzi et al. 2006; Rozzi 2013). Tauro et al. (2021), for example, advance Field Environmental Philosophy (FEP) as “a novel educational philosophy” to embody a “biocultural ethic that values the vital links among the life *Habits* of *co-in-Habitants* (human and other-than-humans) who share a common *Habitat*”—the “3Hs” model (Rozzi et al. 2008). Rozzi et al. (2006) outline ten principles, such as presence of a “flagship species,” necessary to advance biocultural conservation at Omora. These principles can pertain to programs anywhere with adjustments to local socio-ecological conditions.

This chapter describes the history and influences of the H.J. Andrews Experimental Forest and Long-Term Ecological Research (LTER) program (Oregon, USA) in terms of fostering connections of people with nature. The different socio-ecological setting of the Andrews Forest stands as an interesting point of comparison with Omora Park and its FEP model; there is striking resonance, despite the differences. Work that began at the Andrews Forest with science to support forest exploitation evolved to explicitly embrace synergies among environmental sciences, humanities, and arts with the objective to “find new ways to understand and re-imagine our place in the natural world” in the words of philosophy professor and nature writer Kathleen Dean Moore (Panel 1 in Swanson et al. 2008).

The northern spotted owl (*Strix occidentalis caurina*) flagship species and the ancient rainforest flagship ecosystem of Andrews Forest speak to those who visit and work there, and to the broader public who learn about them through media communications and the storytelling of visual arts, music, and the spoken and written word (Fig. 32.1). This case study traces phases of development of the Andrews Forest program, the nature of the science work, the contexts of the values of the participants and the public in which the work takes place, and the methods employed to encourage connection between people and nature.

32.2 Setting the Stage

32.2.1 *Andrews Forest: The Place, the Institutions*

The Andrews Forest encompasses the 6400 ha Lookout Creek watershed in the Oregon Cascades Range. It ranges in elevation from 380 m to over 1600 m. The watershed is cloaked with old, native conifer forest up to 500 years in age and forest plantations created by clearcutting mainly in the 1950s and 1960s, and laced with cold, fast-running streams. It is an experimental forest in the US Forest Service system of such properties and is managed jointly by the Pacific Northwest Research Station and Willamette National Forest. Oregon State University (OSU) also



Fig. 32.1 Old-growth forest in the HJ Andrews Experimental Forest, Oregon Cascade Range, USA. The small aluminum tags on the two 500-year-old Douglas-fir (*Pseudotsuga menziesii*) trees indicate that this is in a long-term research plot. This photograph, created using a painting-with-light technique by artist-in-residence David Paul Bayles, is one of his “Outside of time/Forest landscapes” set of images (Bayles 2019)

participates in the management by virtue of sustained funding since 1980 from the National Science Foundation under the LTER program. Close collaboration among academic and agency scientists and federal land managers has proven essential for exchanging ideas with the public. Many of the humanities and arts activities associated with Andrews Forest since 2002 are conducted through a collaboration of the science community with the privately-funded Spring Creek Project for Ideas, Nature, and the Written Word based in OSU. While sometimes difficult to navigate, this institutional complexity also offers benefits, such as the opportunity to reach different audiences.

32.2.2 *Facts and Values*

The emergence of a biocultural ethic for human engagement with public lands, such as those where Andrews Forest is located, had to transcend the “command and control” management model of government control (Holling and Meffe 1996) in which decisions were to be made based on the “best science” without explicit consideration of the values dimension of decision making. Kathleen Dean Moore

and fellow philosopher Michael Paul Nelson, who have long been associated with Andrews Forest, have written:

Any argument that leads to a conclusion about how we ought to act or what policies we ought to adopt must have two premises. The first premise is empirical, based on observation and experiment, often grounded in science. This is the way the world is, this is the way the world may soon be. The second premise is normative, based on cultural values and ethical norms. Here is the collected human wisdom about what is of value, an affirmation of what is worthy and worth doing. From this combination of facts and values, but from neither alone, we reach conclusions about what we ought to do. Collaborations between science and humanities are, in this respect, a logical as well as a practical necessity. (Moore and Nelson 2010, xvii–xviii).

Consequently, connection of humans with nature involves both the clear distinction and the alignment of facts and values. Science is a source of “facts,” and arts and humanities are expressions of “values.” Scientists do their science and are custodians of processes of science (e.g., reviewers of proposals and publications); artists/humanists do their work exploring and expressing values, while philosophers are custodians of moral reasoning to bring the facts and values together to reach a decision.

32.2.3 A History of Andrews Forest Through the Lens of the Biocultural Ethic

The history of the Andrews Forest in terms of human connections with the land is manifest in shifting societal expectations for public forest lands, motivations of the science community, and conditions of the land itself in the form of legacies of land use, such as clearcutting and roads. We trace the history of the Forest in terms of the mission of the science program in the context of the dominant value systems of the time. We mention the relation between the science and land management communities, because these are federal public lands subject to values expressed in federal legislation. The land management system is a channel for connections among science, society, and the forest. Furthermore, influences on federal policy can have great geographic reach.

This story begins at the end of World War II as the Timber Era of the US Forest Service commenced in the Pacific Northwest with the objective of converting native forest, much of it old-growth greater than 200 years in age established after wildfires, to tree plantations (Hirt 1994). Native forests are old-growth forests or secondary forests reestablished by natural processes after disturbances such as wildfires. The post-war housing boom, depletion of timber on private lands, and government incentives fueled this conversion of federal forests, which were widespread across the western USA. As part of this process, the research arm of the US Forest Service established the Blue River Experimental Forest in 1948. In 1953, it was renamed to honor Horace Justin Andrews, a prominent Forest Service leader who was instrumental in selecting the site. Management of the experimental forest aimed to develop

and test methods of logging, road systems, and forest regeneration, while minimizing negative impacts on soil, streamflow, water quality, and plants and animals. Comprehensive histories of the Andrews Forest are told by historians Max Geier (2007) and William Robbins (2018, 2020).

32.2.3.1 1950s–1960s: Convert Old Growth to Plantations—“Domesticated Science”

Conversion of native forests on Forest Service lands in the Pacific Northwest was based on an instrumental/utilitarian view of the value of the forests—they are valuable only for human use as wood products. The native forest was being erased (Fig. 32.2), imposing a disconnect between humans and the natural world. In this era science was conducted at the Andrews Forest by a small cadre of Forest Service researchers mainly to support utilization, while minimizing environmental impacts. Communications efforts targeted scientists and land manager audiences, but interaction with land managers was otherwise minimal. In a sense, this was “domesticated science” in support of the management paradigm of the day (Franklin 1999). The Andrews program had no direct engagement with the notion of non-utilitarian values of the forest.



Fig. 32.2 Dispersed-patch clearcutting of native forest on the Willamette National Forest in the Mona Creek watershed adjacent to Andrews Forest in the 1980s (US Forest Service photo)

32.2.3.2 1970s–1980s: Ecosystem Science of Native Forests—“Wild Science”

Between 1950 and 1970, the old-growth liquidation policy and practice continued, even as the US Congress passed laws placing value on the well-being of species and ecosystems, such as the:

- National Environmental Policy Act of 1969
- Endangered Species Act of 1973
- National Forest Management Act of 1976

These acts express the values of native ecosystems, which aligned with the rise of the environmental movement. These values are also manifest in the annual Earth Day celebrations beginning in 1970, as well as in arts and creative writing telling ecosystem stories and extolling the value of old-growth forests and other native ecosystems. Also, beginning in 1970, ecosystem science in the International Biological Program was launched at Andrews Forest as a large group of academic scientists funded by the National Science Foundation (NSF) joined Forest Service researchers in studies of old, native forest, the northern spotted owl, watershed processes, and other topics. The NSF support for fundamental research created independence from the management system of the day—in this sense it was “wild science” free of commercial constraints and expectations (Franklin 1999, 2018). This science revealed the incredibly complex nature of wild, old forest systems (Franklin et al. 1981)—e.g., large standing live and dead trees and downed logs with a profusion of epiphyte, invertebrate, and other species (Fig. 32.1)—in sharp contrast with the simplicity of intensively managed plantations. The implications of these findings for forest management were explored intensively with local land managers, who incorporated attributes of natural forests into their practices, such as retention of large, dead wood on land and in streams. Realization of the distinctive properties of ancient forests also proved pivotal in environmentalists’ efforts to terminate old-growth logging on public land.

During the 1970s–1980s, the Andrews Forest did not have an arts and humanities program to express values of native ecosystems, but many Andrews scientists, especially JF Franklin, spoke and wrote in many forums about the complexities and wonder of old-growth forests. These science findings and the scientists themselves became subjects of public communications through many media. Franklin promoted “New Forestry,” later framed as “ecological forestry,” as middle ground between clearcutting and no cutting (Franklin et al. 2018). Hundreds of field tours and media accounts reached broad audiences, including elected officials. The sense of the intrinsic value of native forests was clear in the scientists’ passion for the subject matter. Environmentalists pushed for policy change to protect native species and ecosystems through many means, including arson on Forest Service facilities, occupation of tree tops, and lawsuits and timber sale appeals, based in part on science findings.

32.2.3.3 Late 1980s-Early 1990s: The Forest Wars—Injunction, the President’s Forest Summit

By 1990 a national sense of commitment to environmental stewardship was widespread, and the science of old-growth forests and the declining populations of northern spotted owl, both prominent topics of Andrews Forest research, proved critical in the battles over the future of federal forest lands. A judge’s injunction stopping logging on almost ten million hectares of federal land encompassing the range of the northern spotted owl brought the matter into sharp focus. The battle was often framed as demanding “over protection” of native forests and biodiversity versus “logging” to support jobs and local communities. Of course, it was much more complex than that. A defining moment of political drama was the convening of the President’s Forest Summit by President Bill Clinton and Vice President Al Gore in April 1993 in Portland, Oregon. This aimed to establish an innovative forum for sharing *all points of view* to set the stage for the development of the Northwest Forest Plan as a path forward. This plan was envisioned to be a statement of *public values* expressed in the laws.

Leading up to and following the Summit, Andrews Forest scientists partnered intensively with land managers to demonstrate and host critical, public, field discussions of alternative forest practices (Fig. 32.3). Their innovative research and management experiences made the Andrews Forest a go-to place for such conversations, which were widely covered in the media, including articles in the *New York Times*. In addition to these public roles, Andrews scientists were deeply involved in the behind-the-scenes processes (i.e., the Forest Ecosystem Management Assessment Team, FEMAT 1993) that crafted what became the Northwest Forest Plan to guide federal forest land management emphasizing biodiversity protection. Andrews science was central to society’s newly framed connection with the native forests on the public lands. That science revealed the complexity of forest ecosystems and interactions with stream systems, and knowledge of that complexity was translated into new practices, such as incorporation of dead wood in forest and stream management. Still, the arts and humanities dimension did not yet reside within the Andrews program.

32.2.3.4 2000–2020+: Humanities and Arts Emerge in the Andrews Forest

By 2000, federal forest ecosystems in the Pacific Northwest and elsewhere were managed with a high consideration for their intrinsic value, especially biological diversity and watershed integrity. Society was deepening its connections with the natural world, and interest was growing globally in art-literature-science synergies to promote conservation. Science was expanding its scope of inquiry and its tool kit with greater attention to societal issues, including, in the 2000s, social justice, especially for historically disenfranchised peoples, and the effects of climate change.

Fig. 32.3 Public tour circa 1991 to a site of recent logging with retention of living trees and dead wood on the ground as an example of practices intermediate between clear-cut and no-cut (US Forest Service photo)



As described in the next section, Andrews Forest programs in arts/humanities inquiry and communications began in earnest in this period (Fig. 32.4).

32.3 Andrews Forest Based Humanities/Arts Programs and Outcomes

32.3.1 Origin of the Long-Term Ecological Reflections Program

Explicit engagement with the humanities at Andrews Forest began in 2002 through a partnership with the privately-funded Spring Creek Project led by founding director Kathleen Dean Moore. Forest Service research administrator and former Andrews Forest scientist JR Sedell instigated the first activities with Forest Service funding,



Fig. 32.4 A gathering of creative writers, philosophers, scientists, and others convened by the Spring Creek Project in the Andrews Forest (US Forest Service photo)

and Andrews scientist FJ Swanson was Moore's counterpart on the science side. With her combination of perspectives of a philosopher, strong relationships in the world of creative writers, exceptional communication skills, and passion for the natural world, Moore provided critical leadership. In her words, the mission of Spring Creek is: "To bring together the wisdom of the environmental sciences, the clarity of philosophical analysis, and the creative, expressive power of the written word and the arts to find new ways to understand and re-imagine our place in the natural world" (Panel 1 in Swanson et al. 2008). This humanities-science partnership has come to be called the Long-Term Ecological Reflections program (Long-Term Ecological Reflections 2021), modeled after the Long-Term Ecological Research program, both based at the Andrews Forest.

32.3.2 *Field Symposia*

The Long-Term Ecological Reflections program began with a series of field symposia generally involving a weekend retreat in the forest, followed by a public event with community members who could critique the emerging ideas, contribute to them, and carry the work into the local community. In several cases, published statements of our ethical obligations to the well-being of the planet reached much further. The retreats involved around 20 creative writers, scientists, philosophers,

and others relevant to the central themes. The first gathering, held in 2002, was entitled *New Metaphors for Restoration of Forests and Watersheds*, which prompted realization of the need for “re-story-ation”—the need for new stories to articulate the relationship we wish to have with the land. Science alone cannot give us complete stories of connection, so we need to engage a diversity of thinkers and accomplished storytellers.

Subsequent field symposia included *Catastrophe and Renewal* held in the volcanic eruption zone of Mount St. Helens in 2005, *The Meaning of Watershed Health* hosted at Andrews Forest in 2006, and the *Salmon Nation Environmental Philosophers Gathering* at Andrews Forest in September 2007, which brought environmental ethicists and philosophers together for a weekend retreat on the topic “what is our work in a ‘wounded world’?” This led organizers philosophers Kathleen Dean Moore and Michael Paul Nelson to assemble the book *Moral Ground: Ethical Action for a Planet in Peril* (2010) with powerful testimonies by over 80 visionaries from around the globe stating our moral responsibility to the planet. The short essays are grouped into 14 affirmative responses to the question: “Do we have a moral obligation to take action to protect the future of a planet in peril?” The first two responses are “Yes, for the survival of humankind” and “Yes, for the sake of the children.” Moore and Nelson then took this set of moral arguments to more than 60 cities to share the stories and encourage local communities to address climate change.

In 2011, a subsequent field symposium, *The Eye of the Storm: Re-imagining Ethics for a Changing Planet*, led to crafting the “Blue River Declaration: An Ethic of the Earth” (Blue River Quorum 2011). This gathering of philosophers, activists, theologians, writers, and scientists composed the Declaration written as a philosopher’s argument addressing a series of points, which align with the 3H’s model in Tauro et al. (2021). To quote the biocultural ethic from the Declaration:

What is the world? Who are we humans? How, then, shall we live? Given that life on Earth is interconnected, that humanity is inescapably dependent on the Earth for gifts both material and spiritual, that the Earth’s resources and resilience are finite, that life on Earth is resilient, we arrive at the necessity of achieving a concordance between ecological and moral principles, and the new ethic born of this necessity (Blue River Quorum 2011).

32.3.3 Residencies, Residents, and Their Works in the Forest Log

The Long-Term Ecological Reflections program began a writer-in-residence initiative in 2004, which grew to include visual and sound artists and visiting scholars. Over 100 writers, artists, and scholars have produced many works documented in The Forest Log on the Spring Creek website (Long-Term Ecological Reflections 2021). Articles have been published in *Orion*, *The Atlantic*, terrain.org, and the book *Forest Under Story: Creative Inquiry in an Old-Growth Forest* (Brodie et al. 2016). In addition, artworks have been exhibited in galleries, the halls of NSF, and as

permanent installation art pieces; written works have been presented in public readings and other performances. As the diversity of views, “lenses,” and voices has grown, synergies among writers, visual and sound artists, and scientists have also grown. For example, theologian Vince Miller found David Paul Bayles’ artistic photography deeply moving, so he invited him to illustrate his essay *A Cathedral Not Made by Hands* (Miller 2020) and the cover of the journal in which it appears (Fig. 32.5). Visual artist Leah Wilson teamed with tree canopy scientists for inspiration, technical assistance, and artistic fidelity with the forest as she climbed a tree taller than 50 m in each season. With this art-action foundation, she created a large installation art piece entitled *Listening to the Forest*, inspired by the title and content of the essay *Listening to Water* by Grignon and Kimmerer (2019), based on Kimmerer’s Andrews Forest residency.

A schematic overview of some of the participants in the residency program outlines a sample of the wide range of perceptions and representations of the natural world and the human presence (Fig. 32.6). Artists, writers, traditional knowledge holders, theologians, philosophers, and scientists all experience the complex, highly interconnected ecosystem, which is constantly changing through ecological succession and periodic disturbance by fire, wind, forest practices, scientific experimentation, and other processes. These residents are encouraged to visit several of the same places, noted as Reflections Plots, including a 200-year log decomposition experiment initiated in 1985. Despite this common ground, their perceptions and expressions of their responses vary greatly. Regardless of their formally designated “discipline,” they all seem to share awe and wonder in the presence of the mystery of the ancient forest. They may also share senses of practice: humility, empathy, and “serene attentiveness” in the words of Pope Francis in his encyclical *Laudato si’* (Francis 2015). Together, these perceptions of the natural world may catalyze public commitment to stewardship of ecosystems—of nature.

32.3.4 Additional Andrews Forest Programs Advancing Biocultural Ethics

Philosopher and Andrews Forest LTER principal investigator Michael Paul Nelson leads a program in Conservation Ethics (Andrews Forest 2021). In his essay, *Ground Rules for Ethical Ecology* Nelson argues that all our major challenges—climate change, zoonotic disease pandemics, pollution, food insecurity, biodiversity loss—are intertwined scientific, economic, technological, and ethical problems (Nelson 2021). Using the book *Moral Ground* (Moore and Nelson 2010) as a model, Nelson makes a call to action to address such major issues as moral crises. The Conservation Ethics program has produced a series of articles addressing the conceptualization of the topic generally.

More specifically, Nelson’s Conservation Ethics program seeks “to understand how ideas work at the interface of science and management” by examining the basis



Fig. 32.5 A synergy between an artist and a writer generated the cover of the journal *Commonweal* in which Vincent Miller's essay "A Cathedral Not Made by Hands" appears (Miller 2020). David Paul Bayles used a "painting-with-light" technique to create this image of a mossy log on the floor of an old-growth stand in the Andrews Forest

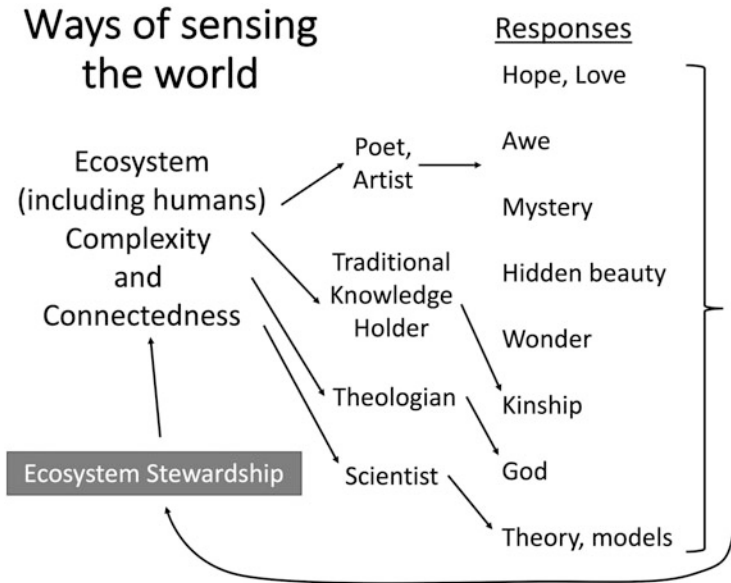


Fig. 32.6 Diagram of some of the many ways that people conduct inquiry of complex, highly-interconnected native ecosystems and the variety of reactions and expressions they have from those inquiries in the Andrews Forest. Writers in residence have included traditional knowledge holder Robin Wall Kimmerer and theologian Vincent Miller. The resulting communications feedback to catalyze a greater public sense for stewardship of ecosystems

for management decisions using philosophical methods such as argument analysis. While much of this work is not Andrews-based in the field in the sense of FEP, it has tested the rigor of science and ethical reasoning of some management recommendations with roots in Andrews Forest science. Batavia and Nelson (2016), for example, critique the proposal to use “ecological forestry” in management of federal forest lands (Franklin et al. 2018), and find significant inadequacies in the arguments because “facts” and “values” are not fully differentiated and disentangled.

Education programs for middle schoolers through graduate students are also an essential component of the Andrews Forest program, and several field experiences are designed specifically to engender a connection with nature and an environmental ethic in the students. For several years, Professor Moore taught a field philosophy course bringing landmark nature writings together with field ecology. A field program along the Discovery Trail in an old-growth forest near the Andrews Forest headquarters provides middle and high school students an arts-humanities-science field experience with prompts for reflection and creative work. Students use a digital curriculum on their tablets to explore the forests (Goralnik et al. 2020; Markiewicz et al. 2022). This experience includes readings and commentary by the writers in residence at Andrews in an effort to help students connect with the natural world. In studies of several high school student groups, investigators were encouraged because they found that most students reported that they connected with the place.

Remarkably, “more than 25% [of the students] demonstrated ethical growth by expressing agency for the care of the place” (Goralnik et al. 2020, p. 10).

Additional educational activities with roots in the Andrews Forest include the award-winning illustrated children’s book *Ellie’s Log: In the Forest where the Great Tree Fell* (Li and Herring 2013), which encourages young learners to engage closely with the natural world, observing, drawing, and keeping notes. At the advanced undergraduate and graduate student levels, numerous field courses in both the humanities and sciences have tapped creative writing from the Long-Term Ecological Reflections programs to prompt reflection and connection with the natural world.

32.4 Relations with Other Sites and Programs

Sharing perspectives concerning biocultural dimensions among sites and programs is highly valued because there is no grand plan and programs are evolving independently. We learn from one another, including learning about our own programs when juxtaposed with others. The Andrews Forest program aligns well with many features outlined for the practical development of Omora Park (Rozzi et al. 2008), principles for conduct of a biocultural conservation (Rozzi et al. 2006), and in the “3Hs” conceptual framework of the biocultural ethic (Rozzi 2012). The common ground is seeking to connect humans with nature in ways that respect co-inhabitants, their life habits, and the habits we share with them. This “3Hs” model (Rozzi 2012), and many of the ten principles outlined by Rozzi et al. (2006) are shared by Andrews Forest. More specifically, regarding the four-step cycle of Field Environmental Philosophy (Rozzi et al. 2012), the Omora Park and Andrews Forest Reflections Program converge in the integration ecological and philosophical views, practice of communication through metaphors in narrative compositions, “grounding” the connection with nature in the field, and work toward in-place implementation of biocultural conservation.

Significant points of difference between Andrews Forest and Omora Park programs result from differences in local circumstances. These include the engagement of local Indigenous communities essential in biocultural conservation at Omora Park. This engagement is very limited in the western Oregon setting of Andrews Forest where introduced diseases, displacement, and other factors nearly eliminated native people from the landscape early in the nineteenth century (Beckham 1977). Their past presence in the vicinity of Andrews Forest is clear in obsidian debitage. We endeavor to have the Andrews Forest community come into relationship with the land informed by the perspectives of Indigenous people, as articulated by Robin Kimmerer in *Braiding Sweetgrass* (2013) and consistent with the “3Hs” of the biocultural ethics (Rozzi 2012, 2013). In terms of communications with audiences from far away, ecotourism is not a factor at Andrews Forest, but it provides important opportunities for communication in the case of Omora Park.

Both programs converge in the strong influence of science on environmental policies. The Omora Park research team, for example, has led the creation of 250,000 km² of protected terrestrial and marine ecosystems, including the Cape Horn Biosphere Reserve and the Diego Ramirez Islands—Drake Passage Marine Park (Tauro et al. 2021). For its part, science findings from the Andrews Forest have had a strong record of influence on US federal land-use policies. In a broad sense, both programs are committed to Earth Stewardship (Rozzi et al. 2012; Andrews Forest 2021).

In another form of outreach, members of the Andrews Forest community foster arts-humanities-science collaborations at other sites of long-term ecological inquiry through a variety of activities. The Spring Creek Project manages a webpage to share information about programs at 20+ sites (Ecological Reflections 2021), and has collaborated in organizing multi-site workshops and art exhibits, including two in the NSF building in Washington, DC. Publications document the overall thrust of the programs and highlight examples of many LTER sites (Goralnik et al. 2015, 2016; Swanson 2015; Leigh et al. 2021). Spring Creek has also teamed with the online journal [Terrain.Org](https://www.terrain.org) to publish profiles of arts/humanities programs at several LTER sites.

Two studies of programs across the 28-site LTER network reveal that a strong majority has had significant engagements of the arts and humanities (Goralnik et al. 2015, 2016; Leigh et al. 2021). Surveys found that 19 of 24 sites surveyed agreed or strongly agreed that arts/humanities efforts were important and relevant to their mission, including fostering outreach and inspiring creative thought. This work engenders a sense of empathy, promoting earth stewardship, and enabling pro-environment attitudes and behaviors.

32.5 Final Points: The Path Forward

In its first 50 years, the Andrews Forest research findings revealed the incredible complexity of native ecosystems and helped society connect with ancient forests, streams, and the vast array of species therein. Through the 1970s and 1980s, basic research on these ecosystems rose from obscurity in the context of their conversion to tree plantations to become pivotal in social and environmental controversies that terminated the policy. Public values for federal forests shifted from exploitation for wood products to valuing biodiversity and other ecosystem attributes. Arts and humanities inquiry did not become a formal part of the Andrews Forest program until the 2000s, and the wealth of works and synergies among artists, writers, and scientists has grown steadily.

The outcomes of this work have never been formally assessed, but its enthusiastic persistence and growth, and the proliferation of similar programs at other field sites, attest to their value. The experience that Andrews Forest basic research on old growth and northern spotted owls took 20 years to go from irrelevant to hyper-relevant signals the importance of patience—the time for deeper societal relevance

of the Reflections Program will come. A test of the relevance of this values inquiry may appear when federal forest land planning takes place in the coming few years—how will values be considered in that context?

The Andrews Forest community has important work to do in conceptualizing, articulating, and acting on our biocultural ethic, especially in relation with Indigenous people. Our plan for the future is to continue this public humanities work, which is consistent with the Omora Park mission to connect people with nature and to capitalize on the power of place. These two programs face exciting challenges and opportunities in times when a strong and broad sense of biocultural ethics is desperately needed. Only through shared understanding rooted in humanities, traditional knowledge, the arts, and environmental sciences can societies begin to address the social and environmental challenges here and now—and that lie ahead.

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