

# What “Wilderness” in Frontier Ecosystems?

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Wilderness, for seventeenth-century Puritan colonists in America, was hideous and howling. In the eighteenth century, Puritan preacher and theologian, Jonathan Edwards, began the process of transforming the American wilderness into an aesthetic and spiritual resource, a process completed in the nineteenth century by Ralph Waldo Emerson. Henry David Thoreau was the first American to recommend wilderness preservation for purposes of transcendental recreation (solitude, and aesthetic and spiritual experience). In the twentieth century, Theodore Roosevelt and Aldo Leopold advocated wilderness preservation for a different kind of recreation (hunting, fishing, and primitive travel) in order to preserve the putatively unique American character and institutions. Of these three historic conceptions of wilderness preservation, the third is the best model for frontier ecosystems at the austral tip of the Americas.

## INTRODUCTION

Some nouns are common names, having a simple word-object relationship. The word *table* unambiguously names a familiar artificial object that has an elevated horizontal surface used to support, among other things, dinner plates and drinking glasses. Many similar words name common features of the natural world: *river, mountain, lake, forest, cloud, sun, moon*. Such words have unambiguous referents and exact counterparts in other languages. So too, the English word *woman* simply names a female member of the human species and doubtless there is an equivalent word in most every other human language. For a long time, I assumed that *wilderness* was such a common name, a word with a simple, unambiguous relationship to a natural referent. But I don't think so any longer. For one thing, few languages have an equivalent word. Actually, *wilderness* is more analogous to *lady, chick, babe, broad, or battleaxe* than to *woman*. It puts a spin on a natural object—a townless, roadless region consisting of forest, mountain, lake, and river; or desert, canyon, butte, and arroyo. It colors that region and makes it available for some uses and precludes others. Historically, the way *wilderness* colors a region of the world diametrically changed, then diverged into two clashing hues, and is presently undergoing yet another transformation in the midst of the sixth great extinction and the rise of the flux-of-nature paradigm in postmodern ecology. Furthermore, the term is currently hotly contested.

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### THE NORTH AMERICAN PURITAN AND POST-PURITAN WILDERNESS IDEAS

Roderick Nash points out that the word *wilderness* occurs frequently in the English translation of the Holy Bible.<sup>1</sup> There, *wilderness* refers to a desolate place of hardship and travail, usually desert (which of course derives from *deserted*), that functions symbolically as a place of both exile and refuge, of both moral temptation and spiritual rejuvenation. Thus it seems no accident that when the English language gained a foothold in North America it would be used by the bible-besotted Puritan colonists to describe the terrifying place in which they had set up shop. North America was, in the perfervid Puritan imagination, a "hideous and howling wilderness." The wilderness was full, in their estimation, of vicious animals and even more vicious human beings, who were all believed to be the minions of Satan.<sup>2</sup> That would make good Puritan sense: after all, there are but two Powers struggling to rule the world, God and Lucifer; clearly, the Indians were not worshipping God; but they were worshipping something, if their diabolical rituals, dances, and ceremonies were any indication; so there was only one alternative remaining.

With their thrift and Protestant work ethic, the seventeenth-century Puritan colonists succeeded in building a "shining city upon a hill."<sup>3</sup> Indeed, more than one. They tamed the wilderness. That is, they built towns; they converted forests to open fields; they extirpated the large carnivores; and they sickened (albeit inadvertently), murdered, or drove away the Indians. Deprived of his brutal instruments of terror and his heathen acolytes, the Devil moved to town—and fanned the flames of urban sin: drinking, fornicating, gambling, and such. By 1692, the good people of Salem believed their witches still went into the woods to conjure and to be known, to serve and to be possessed by the Devil, but a new conception of wilderness was about to dawn, after that sordid watershed episode in American history. The biologically and

<sup>1</sup> Roderick Nash, *Wilderness and the American Mind* (New Haven: Yale University Press, 1967).

<sup>2</sup> Ibid. See also, J. Baird Callicott, "That Good Old-Time Wilderness Religion," in J. Baird Callicott and Michael P. Nelson, eds., *The Great New Wilderness Debate* (Athens: University of Georgia Press, 1998), pp. 337–66; and J. Baird Callicott and Priscilla Solis Ybrarra, "The Puritan Origins of the American Wilderness Movement," <http://nationalhumanitiescenter.org/tserve/nattrans/ntwilderness/essays/puritan.htm>.

<sup>3</sup> The phrase is adapted from John Winthrop, governor of the Massachusetts Bay Colony, in "A Modell of Christian Charity," written in 1630 on the *Arbella* en route to New England. See Robert C. Winthrop, *Life and Letters of John Winthrop* (1884; reprint ed., Whitefish, Mont: Kessinger Publishing, 1864/2006), p 19. Winthrop actually wrote "City upon a Hill." The phrase became a favorite of American presidential aspirants including John F. Kennedy and Walter Mondale, but especially Ronald Regan, who added "shining." Most recently, I heard it used by John McCain following his victory in the 2008 New Hampshire Republican primary. Winthrop used it as a simile for the colonists themselves, who, like a city upon a hill, would be conspicuously visible as they conducted their errand into the wilderness. The well-educated and literate Kennedy's use of it was faithful to Winthrop's original meaning as well as phrasing. It was Regan who, likely familiar with it only second hand, transmogrified the phrase in such a way that it became a symbol of his own imagined epitome of American social virtue and affluence.

ethnically cleansed margins of the New England towns, farmsteads, and fields were starting to look like Eden to one eighteenth-century Puritan theologian. Jonathan Edwards found "images or shadows of divine things" in God's creation, not in the now-tarnished cities on hills; and he was acutely sensitive to "the beauty of the world"—consisting of "colours of flowers" and "singing of birds," among many other earthly delights.<sup>4</sup> The man who found shadows and images of divine things in Nature would also be the same man who raved about "sinners in the hands of an angry God."<sup>5</sup> Indeed, a cornerstone of Puritan doctrine was the "total depravity" of human nature, born in "original sin." After the Fall, after all, man was banished from Eden, as the bible starkly attests. Any presence of fallen, depraved, sin-soaked humanity in Edenic Nature would sully and soil its pristine, virginal character.

So, after about a century and a quarter, the idea of wilderness in the North American mind was poised to undergo a diametrical transformation, a polar reversal of valence—from a negative to a positive charge. In the early seventeenth century, the "wilderness" was the very manifestation and embodiment of evil. By the middle of the eighteenth century, a new wilderness idea was being adumbrated. That idea consists of two complementary conceptual elements: (1) Edenic nature is infused with an essence that is pure and divine and beautiful; (2) and it is violated by any lasting physical presence of essentially depraved and sinful man. A God-fearing and righteous man might venture into pristine and pure Nature, but only as a solitary sojourner and only in a state of rapture. (I use the word *rapture* here carefully and deliberately intending to evoke both its secular and current evangelical sense.)

Edwards' eighteenth-century nature theology became a nature deology (to coin a word) in the nineteenth-century work of Ralph Waldo Emerson. Emerson was a Unitarian, not a Presbyterian, preacher; and he was a Transcendentalist, not a Calvinist.<sup>6</sup> But there is, nevertheless, a migration of the new Puritan wilderness idea implicit in Edwards' thought into Emerson's, where it becomes explicit: "In the wilderness I find something more dear and connate than in the streets and villages."<sup>7</sup> But how can "man" be in the wilderness without thereby defiling it; indeed, how can it not be rendered, by man's very presence, no longer a wilderness? The answer is first via solitude, for if there were only one man in the wilderness it could scarcely be overwhelmed with a human taint and stain. Moreover, solitude itself is a valuable thing which only wilderness can supply, according to Emerson: "To go into solitude a man needs to retire as much from his chamber as from society.

<sup>4</sup> Jonathan Edwards, "Images and Shadows of Divine Things," "Christian Doctrine of Original Sin Defended" and "Sinners in the Hands of an Angry God," excerpted in Callicott and Nelson, eds, *The Great New Wilderness Debate*, pp. 23–27.

<sup>5</sup> *Ibid.*, p. 25.

<sup>6</sup> More generally Perry Miller, *Errand into the Wilderness* (Cambridge, Mass.: Harvard University Press, 1956), traces the way Transcendentalism evolved from Putitanism.

<sup>7</sup> Ralph Waldo Emerson, *Nature*, excerpted in Callicott and Nelson, *The Great New Wilderness Debate*, p. 30.

I am not solitary whilst I read and write, though nobody is with me."<sup>8</sup> Second, a man can be in the wilderness without thereby defiling it via a kind of metaphysical vanishing act, which Emerson expresses quite rapturously: "Standing on the bare ground,—my head bathed by the blithe air, and uplifted [that is, raptured] into infinite space,—all mean egotism vanishes. I become a transparent eye-ball. I am nothing. I see all. The currents of Universal Being circulate through me. I am part or particle of God."<sup>9</sup> Val Plumwood notes, in terms reminiscent of Emerson's own, that this Emersonian vanishing act remains at the heart of the contemporary wilderness experience:

The presence and impact of the modern adventure tourist is somehow "written out" of focus in much of the land called wilderness. "Hike the many trails through a virgin land," says a hotel brochure, not only propounding but profiting from this contradiction. The modern subject somehow manages to be both in and out of this virginal fantasy, appearing by wilderness convention as a disembodied observer (*perhaps as the camera eye*) in a landscape whose virginity is somehow forever magically renewed, despite the hotel, the campground, the comfort stations and the ever-widening trails which bear witness to the pounding feet.<sup>10</sup>

It was Emerson's younger friend, Henry David Thoreau, who first called for wilderness preservation:

I think that each town should have a park, or rather a primitive forest, of five hundred or a thousand acres, either in one body or several—where a stick should never be cut for fuel—nor for the navy, nor to make wagons, but to stand and decay for higher uses—a common possession forever, for instruction *and recreation*.<sup>11</sup>

#### RECREATION: THE RECEIVED NORTH AMERICAN WILDERNESS IDEA

Yes, recreation was the higher use to which wilderness might principally be put. But what kind of recreation? That which Edwards and Emerson described. Not a vulgar kind of carnal recreation, but a solitary, unobtrusive, spiritual kind of recreation. John Muir took the art of what one might fairly characterize as transcendental wilderness recreation to an unprecedented pitch of perfection and commended it to the general public:

Briskly venturing and roaming. . . . washing off sins and cobweb cares of the devil's spinning in all-day storms on mountains, sauntering in rosy pinewoods or in gentian meadows, brushing through chaparral, bending down and parting sweet flowery sprays;

<sup>8</sup> *Ibid.*, p. 28.

<sup>9</sup> *Ibid.*, p. 29.

<sup>10</sup> Val Plumwood, "Wilderness Skepticism and Wilderness Dualism," in Callicott and Nelson, *The Great New Wilderness Debate*, pp. 684–85 (emphasis added).

<sup>11</sup> Henry David Thoreau, "Huckleberries," excerpted in Callicott and Nelson, *The Great New Wilderness Debate*, p. 45 (emphasis added).

tracing rivers to their sources, getting in touch with the nerves or Mother Earth; jumping from rock to rock, feeling the life of them, learning the songs of them, panting in whole-souled exercise, and rejoicing in deep long-drawn breaths of pure wildness.<sup>12</sup>

To quote Emerson, one "impression made by" the wilderness idea on "manifold natural objects"—such as roadless, townless regions of forests, mountains, lakes, and rivers; or of desert, canyons, buttes, and arroyos—is to make of them places suitable for transcendental wilderness recreation.<sup>13</sup> With the closing of the North American frontier came another "impression made by" the wilderness idea on such "manifold natural objects." During the last quarter of the nineteenth century, the remaining free Indians were conquered and the great bison herds on the Great Plains were reduced to near extinction and the transcontinental railroads were completed, all making for one, big English-speaking North American nation, stretching from the Atlantic Ocean to the Pacific, lying between sub-Arctic Canada and sub-tropical Mexico. In 1893, Frederick Jackson Turner read a paper titled "The Significance of the Frontier in American History" at the meetings of the American Historical Association in Chicago. Beginning by citing the census of 1880, which pointed out that there was no longer a North-American frontier (between the borders of Canada and Mexico), Turner went on to argue that what made Americans Americans—what forged the unique American character—was the interaction, over many generations, of European peoples and cultures with the unfettered freedom and challenge of a progressively westward-advancing frontier.

Turner himself did not regard the frontier-forged American character as an unalloyed good thing. He thought that the frontier experience produced a democratic, individualistic, self-reliant, anti-government-control, even anti-social American. Turner did, however, roundly celebrate the "striking characteristics" of the "American intellect":

That coarseness and strength combined with acuteness and inquisitiveness; that practical, inventive turn of mind, quick to find expedients; that masterful grasp of material things, lacking in the artistic but powerful to effect great ends; that restless, nervous energy; that dominant individualism, working for good and for evil, and withal that buoyancy and exuberance which comes with freedom—these are traits of the frontier, or traits called out elsewhere because of the existence of the frontier.<sup>14</sup>

Nor did Turner himself ask the question that was soon asked by others: once the (temperate) North American frontier irreversibly disappeared, how could the vaunted American character be perpetuated? Answer: by wilderness preservation. Thus, the untouched forested parks, envisioned by Thoreau, left to stand and decay forever, might be expanded in size and serve a different brand of recreational higher use.

<sup>12</sup> John Muir, *Our National Parks*, excerpted in Callicott and Nelson, *The Great New Wilderness Debate*, p. 48.

<sup>13</sup> Emerson, *Nature*, p. 29.

<sup>14</sup> Frederick Jackson Turner, "The Frontier in American History" *Report of the American Historical Association for the Year 1893*, p. 225.

While perpetuating the American character would certainly seem to be a higher use—or at least it did, unquestionably, at the turn of the twentieth century—the kind of recreation that perpetuating the American character entailed was different from and incompatible with transcendental wilderness recreation. Perhaps it can best and least tendentiously be called woodcraft wilderness recreation, although hook-and-bullet wilderness recreation might be a more honest as well as more apt characterization.

Turner gave explicit, precise, sustained, and well-documented formulation to an idea that had already been in the air, so to speak, for more than a quarter century. In *Walking*, Thoreau, for example, treats movement toward the west as a national symbol: “We go eastward to realize history and study the works of art and literature, retracing the steps of the race; we go westward into the future, *with a spirit of enterprise and adventure.*”<sup>15</sup> Not only the American spirit, but also American political institutions owe a debt to the frontier, according to Thoreau: “The Atlantic is a Lethan stream, in our passage over which we have had an opportunity to forget the Old World *and its institutions.* . . . In society, in the best institutions of men, it is easy to detect a certain precosity.”<sup>16</sup>

Turner’s so-called “frontier thesis” was received as a revelation by the intelligentsia of the United States and soon percolated into the early twentieth-century national zeitgeist. When that happens to a carefully crafted, nuanced, and complex historical theory, such as Turner’s, simplified and personalized variations of it begin turning up in lots of different places. Especially foundational to the nascent twentieth-century wilderness movement in North America were variations on Turner’s theme played by Theodore Roosevelt and Aldo Leopold.

In 1894, Turner sent a copy of his frontier thesis to Roosevelt, who was at the time known as a historian—author of the massive, four-volume *The Winning of the West*, (1889–1896)—and rising Republican politician.<sup>17</sup> (Roosevelt would not become President until 1901.) In that study, Roosevelt had arrived at conclusions similar to Turner’s, but his conception of the frontier-forged American character was more openly racist, masculinist, bellicose, and imperialistic. As to openly racist, Roosevelt frequently compares the industry and thrift of the “Nordic” and “Teutonic” pioneers and settlers to the indolence and squalor of the “savages” they replaced.<sup>18</sup> As to the rest, Nash’s summary is hard to beat:

The study of American history and personal experience combined to convince Roosevelt that living in wilderness promoted “that vigorous manliness for the lack of which in a nation, as in an individual, the possession of no other qualities can atone.” Conversely, he felt, the modern American was in danger of becoming an “overcivilized

<sup>15</sup> Henry David Thoreau, *Walking* excerpted in Callicott and Nelson, *The Great New Wilderness Debate*, p. 34.

<sup>16</sup> *Ibid.*, pp. 34, 40 (emphasis added).

<sup>17</sup> See Nash, *Wilderness*; Theodore Roosevelt, *The Winning of the West*, 4 vols. (New York, G. P. Putnam’s Sons, 1889–1896).

<sup>18</sup> Roosevelt, *Winning*.

man, who has lost the great fighting, masterful virtues." To counter this trend toward "flabbiness" and "slothful ease" Roosevelt in 1899 called upon his countrymen to lead a "life of strenuous endeavor." This included keeping in contact with wilderness: pioneering was an important antidote to dull mediocrity. "As our civilization grows older and more complex," Roosevelt explained, "we need a greater, not less development of the fundamental frontier virtues." . . . The wilderness preserves would serve this purpose by providing a perpetual frontier and keeping Americans in contact with primitive conditions.<sup>19</sup>

Leopold's conception of the frontier-forged American character was closer to that developed by Turner; and his style of expressing it so rings of Turner's that it seems obvious that Leopold too was familiar with the essay itself:

There is little question that many of the attributes most distinctive of America and Americans are the impress of the wilderness and the life that accompanied it. If we have such a thing as an American culture (and I think we have), its distinguishing marks are a certain vigorous individualism combined with an ability to organize, a certain intellectual curiosity bent to practical ends, a lack of subservience to stiff social forms, and an intolerance of drones, all of which are the distinctive characteristics of successful pioneers. These, if anything, are the indigenous part of our Americanism, the qualities that set it apart as a new, rather than imitative contribution to civilization.<sup>20</sup>

Leopold virtually alludes to Turner in going on to his next point: that the frontier experience—confrontation with wilderness—shaped not only the American character, but also American political institutions. Like Roosevelt, Leopold proposes wilderness preservation as the means of preserving those institutions:

Many observers see these qualities not only bred into our people, but built into our institutions. Is it not a bit beside the point for us to be so solicitous about preserving those institutions without giving so much as a thought to preserving the environment which produced them and which may now be one of our effective means of keeping them alive.<sup>21</sup>

Leopold was also very clear that the means of keeping them alive was a form of recreation. The frontier experience would be reprised in his proposed "wilderness playgrounds" not for real, but as a kind of play or sport.<sup>22</sup> Wilderness recreation would be to real pioneering what football is to war; and the bourgeois wilderness adventurer would be to "Hanno, or Lewis and Clark" what the bourgeois sport-hunter "with his setter-dog in pursuit of partridges" is to "his Neolithic ancestor in

<sup>19</sup> Nash, *Wilderness*, pp. 150–51.

<sup>20</sup> Aldo Leopold, "Wilderness as a Form of Land Use," reprinted in Callicott and Nelson, *The Great New Wilderness Debate*, p. 79.

<sup>21</sup> *Ibid.*, pp. 79–80.

<sup>22</sup> Aldo Leopold, "The River of the Mother of God," in Susan L. Flader and J. Baird Callicott, eds., *The River of the Mother of God and Other Essays by Aldo Leopold* (Madison: University of Wisconsin Press, 1991), p. 126.

single combat with the Auroch bull."<sup>23</sup> Leopold even specified the size of a suitable wilderness area in terms of recreation, not in terms of acreage: "The term wilderness, as here used, means a wild, roadless area where those who are so inclined may enjoy primitive modes of travel and subsistence."<sup>24</sup> The primitive modes of travel that Leopold envisioned were pack-train and canoe. By subsistence, Leopold had in mind hunting and fishing. In his first paper advocating wilderness preservation, Leopold was even more specific: "By 'wilderness' I mean a continuous stretch of country preserved in its natural state, open to lawful hunting and fishing, big enough to absorb two weeks pack trip, and kept devoid of roads, artificial trails, cottages, or other works of man."<sup>25</sup>

Combined with the art of woodcraft, which was at the core of the early-twentieth-century boy-scout movement, the kind of recreation that Leopold lionized was hard on wilderness areas.<sup>26</sup> Woodcraft is the art of living off the land, equipped only with simple tools, such as knives and hatchets—gathering fruits and vegetables, catching fish and shooting game, gathering firewood and starting fires with flint and steel, cutting down saplings and building rude shelters.<sup>27</sup> Obviously, this woodcraft-hook-and-bullet form of wilderness recreation that Roosevelt and Leopold espoused is very different from and incompatible with the transcendental wilderness recreation espoused by Thoreau and Muir. Those playing at being pioneers and enjoying primitive modes of travel and subsistence are not transparent eye-balls rapturing up into infinite space, feeling the currents of Universal Being flowing through them, and becoming a particle of God. They manhandle nature. That's one of the reasons that Leopold was so keen on getting wilderness set-asides in the national forests. Hunting was not lawful in the national parks (nor is it now). These two incompatible forms of wilderness recreation could thus be segregated from one another. Transcendental wilderness recreation could be pursued in the national parks—which were selected, in part, because of the transcendental values they embodied.<sup>28</sup> The woodcraft-hook-and-bullet form of wilderness recreation could be pursued in the areas of the national forests dedicated to that purpose.

The common element, however, of transcendental wilderness recreation and the woodcraft-hook-and-bullet form of wilderness recreation is wilderness recreation. Recreation, in short, is what, in the American mind, wilderness is mainly good for. The early-twentieth-century woodcraft tradition of wilderness recreation has given way to the high-tech, take-only-photographs-leave-only-footprints late-twentieth-

<sup>23</sup> Ibid, p. 125. The football to war comparison is found in "Wilderness as a Form of Land Use."

<sup>24</sup> "Wilderness as a Form of Land Use," p. 135.

<sup>25</sup> Aldo Leopold, "The Wilderness and Its Place in Forest Recreational Policy," in Flader and Callicott, *River of the Mother of God*, p. 79.

<sup>26</sup> See James Morton Turner, "From Woodcraft to 'Leave No Trace': Wilderness, Consumerism, and Environmentalism in Twentieth-Century America," *Environmental History* 7 (2002): 462–84.

<sup>27</sup> See Edward Breck, *The Way of the Woods: a Manual for Sportsmen in Northeastern United States and Canada* (New York: Putnam, 1908), and Horace Kephart, *The Book of Camping and Woodcraft* (New York: Outing, 1906).

<sup>28</sup> See Richard West Sellars, *Preserving Nature in the National Parks* (New Haven: Yale University Press, 1997).



century tradition. But recreation remains the hard core of the "received wilderness idea"—the idea of wilderness that coalesced in colonial and post-colonial North America. Leopold was one of eight founding members of the Wilderness Society, formed in 1935 to promote wilderness preservation. Their anthropocentric, recreational idea of wilderness was institutionalized in the U.S. Wilderness Act of 1964.<sup>29</sup> As a result, most designated wilderness areas have been selected because they are fit for one or the other or both kinds of recreation. An area must be either a place of spiritually inspiring scenic beauty or a place through which one may travel with the right balance between encountering a physical challenge, but a challenge that can be overcome without too much hardship or danger. They are, after all, "wilderness playgrounds" in Leopold's candid characterization. Thus, some biomes are severely underrepresented in the U.S. wilderness system—especially grasslands, wetlands, and scrublands.

#### THE ALTERNATIVE ECOLOGICAL WILDERNESS IDEA

During the first half of the twentieth century, a new and very different wilderness idea was conceived by ecologists. During the first half of the twentieth century, ecology was dominated by an essentially Clementsian paradigm. Clements thought that the objects of ecological study were what might be called third-order organisms, organisms of the third kind, or superorganisms.<sup>30</sup> The first organisms—first-order organisms—were single-celled. Through close symbiotic association, single-celled organisms evolved into multi-celled organisms—second-order organisms. Likewise, through close symbiotic association, multi-celled organisms evolved into third-order organisms—superorganisms. Until the invention of the microscope, we could not perceive single-celled organisms—because they are too small—nor did we even know that they existed. Neither do we perceive superorganisms, as organisms, because they are too big. The invention of ecology, however, provides a conceptual, if not a physical, lens by means of which they may be discovered and studied. By this conceptual device—this paradigm—Clements was able to organize and subdivide the science ecology by analogy with organismal biology. Taxonomic ecology would identify types of superorganisms, such as piñon-juniper and post-oak cross timber forests, long- and short-grass prairies, sphagnum-tamarack bogs and tupelo-cypress swamps. Ecological ontogeny would trace how—after catastrophic, usually anthropogenic disturbance—such superorganisms return to their "mature" or "climax" condition through the process of succession, Clements's own speciality.<sup>31</sup> Physiological ecology would study the functions of the various components

<sup>29</sup> See "The Wilderness Act of 1964," in Callicott and Nelson, *The Great New Wilderness Debate*, pp. 120–30.

<sup>30</sup> Frederic E. Clements, *Research Methods in Ecology* (Lincoln, Nebr.: University Publishing Company, 1905).

<sup>31</sup> Frederic E. Clements, *Plant Succession: An Analysis of the Development of Vegetation*. Publication no. 242 (Washington, D.C.: Carnegie Institution, 1916).

of such superorganisms—how tree roots hold soil, how bacteria and fungi reduce detritus to minerals ready to be taken up again by plants, how predators prevent the irruption of prey populations, and so on. As all organisms, superorganisms were conceived to be closed, homeostatic, and self-regulating. Human beings were regarded as external to them and the principal source of disturbance to them.

In 1935, Arthur Tansley criticized and rejected the superorganism paradigm in ecology and introduced the ecosystem concept to replace it, but he too thought that ecosystems were at least “quasi-organisms” and that those that exhibited the greatest degree of stability and dynamic equilibrium had evolved by natural selection.<sup>32</sup> In the 1960s, Eugene P. Odum returned ecology to its Clementsian roots by attributing even more sophisticated and subtle equilibria to “mature” ecosystems, such as a ratio of 1 between biomass production and respiration and between nutrient uptake and release.<sup>33</sup>

Accordingly, some ecologists wanted to preserve representative ecosystems, free from exogenous human disturbance, as objects of ecological study. Just as art historians, because they have a professional interest in antiquities, might lament the decay of marble sculptures caused by anthropogenic air pollution and advocate various means of preserving them, some ecologists lamented the destruction of pristine ecosystems due to anthropogenic causes—hunting, lumbering, mining, plowing, paving, and the like—and advocated a means of preserving them: designated wilderness areas (although they didn't call them that). Chaired by Victor Shelford, the Ecological Society of America (ESA) established the Committee for the Preservation of Natural Conditions (CPNC) in 1917. Shelford was a thoroughgoing Clementsian organicist, who collaborated with Clements to write a book that integrated plant ecology, Clements's orientation, with animal ecology, Shelford's.<sup>34</sup> In 1926, the CPNC published *The Naturalist's Guide to the Americas*, which attempted to identify all the pristine areas left in North America and other parts of the Western Hemisphere.<sup>35</sup> Of particular and professional concern to some zoologists was the precipitous loss of wildlife at the end of the nineteenth century, due mainly to unregulated commercial hunting. Joseph Grinnel and Tracy Storer, followed by George Wright and others, suggested that the national parks could serve as habitat for endangered wildlife, especially for those species that do not well coexist with human settlement and activity.<sup>36</sup>

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<sup>32</sup> A. G. Tansley, “The Use and Abuse of Vegetational Concepts and Terms,” *Ecology* 16 (1935): 284–307.

<sup>33</sup> Eugene P. Odum, “The Strategy of Ecosystem Development,” *Science* 164 (1969): 262–70.

<sup>34</sup> See, F. E. Clements and V. E. Shelford, *Bio-Ecology* (New York: Wiley, 1939).

<sup>35</sup> Victor E. Shelford, editor, *The Naturalist's Guide to the Americas* (Baltimore: Williams and Wilkins, 1926).

<sup>36</sup> Joseph Grinnel and Tracy I. Storer, “Animal Life as an Asset of the National Parks,” *Science* 44 (1916): 375–80; George Wright, Ben Thompson, Joseph Dixon, *Fauna of the National Parks of the United States: A Preliminary Survey of Faunal Relations in the National Parks* (Washington, D.C.: Government Printing Office, 1933).

Here then, in the early twentieth century, was conceived the germ of a new wilderness idea. Wilderness areas should be selected not for their recreational attributes—either the transcendental wilderness recreation attributes or woodcraft-hook-and-bullet form of wilderness recreation attributes—but for two other attributes: (1) representative ecosystem type and/or (2) habitat for threatened species of wildlife.

By the 1940s, the logical-positivist membership of the ESA increasingly worried that if the society officially sanctioned an advocacy group, the CPNC, the disinterested scientific objectivity of ecology—already a suspect and marginalized science struggling for legitimacy and credibility—would be questioned. Positivist pressure caused the ESA to disown the CPNC. In 1946, the erstwhile members of the CPNC formed their own independent organization, the Ecologists' Union, resolving to take "direct action" to preserve natural areas. In 1950, the union changed its name to The Nature Conservancy, one of the largest, most successful, and well-respected environmental NGOs, which still exists for the purpose of preserving natural areas, representative ecosystems, and habitat for threatened species.<sup>37</sup>

Leopold had a master's degree in forestry from the Yale Forest School, but in 1933 he assumed a professorship in game management at the University of Wisconsin (without benefit of a Ph. D.).<sup>38</sup> He became, in effect, a self-educated applied ecologist; and, indeed, he was even elected, much to his own surprise, president of the ESA in 1946.<sup>39</sup> Thus, Leopold was aware of an organization other than the Wilderness Society advocating wilderness preservation, the ESA's CPNC, albeit motivated by a completely different set of values and ideas. Leopold attempted to effect an alliance of the Wilderness Society with the CPNC, but was rebuffed by Shelford.<sup>40</sup> It is not clear why Shelford was unreceptive to Leopold's overtures, but I am inclined to think that it was because he, if not Leopold, was aware of the incompatible goals of the two organizations. Doubtless influenced by the new, thoroughly twentieth-century wilderness idea that was then current among ecologists, Leopold himself formulated a novel scientific argument on behalf of wilderness preservation in 1941:

The recreational value of wilderness has been often and ably presented, but its scientific value is as yet but dimly understood. This is an attempt to set forth the need for wilderness as a base-datum for problems of land health. . . .

A science of land health needs, first of all, a base-datum of normality, a picture of how healthy land maintains itself as an organism.

<sup>37</sup> See Bill Birchard, *Nature's Keepers: The Remarkable Story of how The Nature Conservancy Became the Largest Environmental Organization in the World* (San Francisco: Jossey-Bass, 2005).

<sup>38</sup> See Curt Meine, *Aldo Leopold: His Life and Work* (Madison: University of Wisconsin Press, 1988).

<sup>39</sup> *Ibid.*

<sup>40</sup> See Julianne Lutz Warren, "Science, Recreation, and Leopold's Quest for a Durable Scale," in Michael P. Nelson and J. Baird Callicott, editors, *The Wilderness Debate Rages On* (Athens: University of Georgia Press, 2008), pp. 97–118.

We have two available norms. One is found where land physiology remains largely normal despite centuries of human occupation. I know of only one such place: Northern Europe. It is not likely we shall fail to study it.

The other and most perfect norm is wilderness.<sup>41</sup>

The explicit organicism that Leopold evinces in this essay, "Wilderness as a Land Laboratory," is striking. It might be explained, at least in part, as a direct appeal to the Shelford's own ecological commitments. Leopold's scientific argument for wilderness preservation is, however, ultimately anthropocentric and management-oriented. Good forestry and other forms of resource extraction and good agriculture should maintain land health—stable and fertile soil, well-modulated movement of water, diversity and stability of plant and animal populations. Wilderness serves as a control area—a base-datum of normality—in reference to which land managers can measure the ecological functioning of humanly inhabited and exploited land. Nevertheless, the practical upshot of this was perfectly aligned with the goals of the CPNC: preserving representative ecosystems—whether or not they are suitable for either transcendental wilderness recreation or the woodcraft-hook-and-bullet form of wilderness recreation—for the purposes of scientific study. As Leopold expressly noted: "One cannot study the physiology of Montana in the Amazon; each biotic province needs its own wilderness for comparative studies of used and unused land."<sup>42</sup> Half a decade earlier, furthermore, Leopold had publicly registered a plea for preserving wild habitat for threatened species, especially large carnivores, thus aligning himself with the other main goal of the ecological advocates of wilderness preservation.<sup>43</sup>

After the passage of the Wilderness Act of 1964, the North American wilderness movement stood at a crossroads. Would it follow the path blazed by Grinnell and Shelford and blessed by the later Leopold or would it take the path blazed by Roosevelt and the early Leopold and later blessed by the Wilderness Society and the Sierra Club? According to James Morton Turner,

In one direction lay a wilderness system protected by strict visitation limits, dedicated largely as a biological reserve, and demanding a great deal of self-restraint on the part of the wilderness community. In the other direction lay a wilderness system that compromised the biological integrity of wilderness, prioritized human recreation, and promised to command political popularity. By the mid-1970s, it became clear that the wilderness advocacy community, along with a number of hikers, had chosen the latter path.<sup>44</sup>

<sup>41</sup> See Aldo Leopold, "Wilderness as a Land Laboratory," in Flader and Callicott, *River of the Mother of God*, pp. 287, 288; originally published in *Living Wilderness* 6 (1941): 3. *Living Wilderness*, now just *Wilderness* is a publication of the Wilderness Society.

<sup>42</sup> *Ibid.*, p. 289.

<sup>43</sup> Aldo Leopold, "Threatened Species," in Flader and Callicott, editors, *River of the Mother of God*, pp. 230–34.

<sup>44</sup> Turner, "Woodcraft," pp. 472–73.

### IMPLICATIONS FOR TWENTY-FIRST CENTURY INTERNATIONAL CONSERVATION OF FRONTIER ECOSYSTEMS

By the end of the twentieth century, the ecological wilderness idea had been virtually forgotten. Should it be revived and used to guide the conservation of frontier ecosystems in the twenty-first century, such as those at the austral tip of the Americas? In my opinion the answer is a resounding, clear, and unambiguous "yes" and "no."

Yes, twenty-first-century frontier ecosystems should be conceived as candidates for "biological reserves," to borrow Turner's felicitous phrase, or as "biodiversity reserves," as I have elsewhere suggested.<sup>45</sup> Over the last quarter of the twentieth century and into the twenty-first, we have become more fully and acutely aware of the enormity of the current episode of abrupt mass species extinction—an event of such pace and magnitude that it ranks with the five other major mass extinction events in the whole past history of life on Earth.<sup>46</sup> We are in the midst of the sixth great extinction; and biodiversity reserves are the most important and effective means of mitigating it. Transcendental wilderness recreation and the kind of high-tech, low-impact, leave-no-trace, form of adventure recreation, into which the woodcraft-hook-and-bullet form of wilderness recreation has morphed, might be permitted in biodiversity reserves—or frontier wilderness ecosystems—but only to the extent compatible with the primary purpose of such reserves. As Turner suggests, in such wilderness areas we must get our priorities right and put first things first: biodiversity conservation. As he succinctly puts it, such wilderness areas must be "protected by strict visitation limits"—not only in terms of numbers of visitors per units of time, but also where exactly recreating visitors may go and what exactly they may do. Of lowest priority is preserving the American national character, which, in any case, is meaningless outside the United States, and even there, now, a century after its heyday (if it were not also then), is an obnoxiously racist and nationalistic notion.

No, frontier wilderness ecosystems should not be thought of as ecologists thought of them during the first half of the twentieth century—as superorganisms or as "quasi-organisms." Organisms are "closed systems" that have permeable but selective barriers between inside and outside, like skin, to regulate the ingress and egress of fluxes of external material, energy, and other organisms. Organisms are self-organizing, homeostatic, and self-regulating. They are robust entities subject to natural selection. Ecologists from Clements to Odum thought that ecosystems had similar characteristics. Further, as noted, *Homo sapiens* were conceived to be external to such systems and a source of exogenous disturbance or perturbation. According to Odum, for example, the strategy of ecosystem development is

<sup>45</sup> J. Baird Callicott, "Should Wilderness Areas Become Biodiversity Reserves?" in Callicott and Nelson, *The Great New Wilderness Debate*, pp. 585–94.

<sup>46</sup> See Terry Glavin, *The Sixth Extinction: Journeys among the Lost and Left Behind* (New York: St. Martin's Press, 2007).

Increased control of or homeostasis with the physical environment in the sense of achieving maximum protection from its perturbations. . . . An important trend in successional development is the *closing* or tightening of the biogeochemical cycling of major nutrients, such as nitrogen, phosphorous, or calcium.<sup>47</sup>

A new paradigm in ecology was consolidated in the last quarter of the twentieth century and is firmly entrenched in twenty-first-century ecology. Ecosystems have no developmental strategy or aim; they are not biological objects subject to natural selection (indeed, that they are robust biological entities at all is the subject of much dispute); they are open to fluxes of invasive organisms and ambient materials; they are subject to periodically recurring natural disturbances (disturbance regimes); they may be affected for better or worse by distant forces and processes; and nearly all have been subject to human influence or disturbance for many hundreds of years.<sup>48</sup> Thus, to preserve and protect frontier wilderness ecosystems, "strict visitation limits" are not enough. Local and regional efforts must be made to control invasive species, such as the North American beaver in Patagonia. International efforts must also be undertaken to reduce air- and water-borne pollutants. And—the greatest challenge of all—global efforts must be undertaken to mitigate global climate change, which is having the greatest impact on the high latitudes that are among the last frontiers on the planet.<sup>49</sup> Frontier ecosystems must also be understood to be home to the peoples and cultures that helped shape and sustain them by means of gathering, hunting, fishing, burning, and cultivation. Finally, such ecosystems must be actively managed, in consultation with their indigenous inhabitants, to prevent untoward change by the invasive species and pollutants from near and far that evade our best efforts to exclude them.

These last aspects of the new paradigm in ecology—the incorporation of human as well as natural disturbance and the concomitant concept of community-based ecosystem management—warrants emphasis by way of conclusion. In the post-colonial United States and Australia, the wilderness idea enabled non-indigenous Americans and Australians, self-deceptively, to erase from memory a genocidal heritage.<sup>50</sup> Robert Marshall, for example—with Leopold and others, one of the founders of the Wilderness Society—claimed that "When Columbus effected his immortal debarkation, he touched upon a wilderness which embraced virtually a hemisphere."<sup>51</sup> He also declared himself to "use the word *wilderness* to denote a

<sup>47</sup> Odum, "Strategy," pp. 262, 265 (emphasis added).

<sup>48</sup> See, Stewart T. A. Picket and Richard S. Ostfeld, "The Shifting Paradigm in Ecology," in Richard L. Knight and Sara F. Bates, eds., *A New Century for Resources Management* (Washington, D.C.: Island Press, 1995).

<sup>49</sup> See Kurt Jax and Ricardo Rozzi, "Ecological Theory and Values in the Determination of Conservation Goals: Examples from Temperate Regions of Germany, the United States of America, and Chile," reprinted in Nelson and Callicott, *The Wilderness Debate Rages On*, pp. 664–91.

<sup>50</sup> See Gary Nabhan, "Cultural Parallax in Viewing North American Habitats" reprinted in Callicott and Nelson, *The Great New Wilderness Debate*, pp. 628–41; and Pluinwood, "Wilderness Skepticism."

<sup>51</sup> Robert Marshall, "The Problem with the Wilderness," reprinted in Callicott and Nelson, *The Great New Wilderness Debate*, p. 86.

region which contains no permanent inhabitants" among other characteristics.<sup>52</sup> So, putting these two statements together: if Columbus touched upon a wilderness that embraced virtually a hemisphere, it was a region that contained no permanent inhabitants. Thus, it should be free for the taking. (Marshall did, of course, acknowledge the presence of American Indians in the Western Hemisphere, but he believed that they were so few in number, so technologically backward, and so environmentally ethical that they did not compromise the hemisphere's total wilderness condition. We now know that that is all so false!<sup>53</sup>) Further, one of the most pernicious effects of the exportation of twentieth-century American wilderness thinking to other regions of the world, both recreational and ecological, has been the eviction from their homelands and dispossession of indigenous peoples. Especially in Africa and South Asia, national-government authorities created national parks by simply coming in and clearing out indigenous peoples.<sup>54</sup> As a result, a global class of conservation refugees has been created.<sup>55</sup> In twenty-first-century international wilderness thinking, wilderness preservation is not only compatible with the presence of indigenous peoples and their cultures, it *requires* either the continuation of such presence or the simulation thereof by professional wilderness managers—if and when the indigenous inhabitants freely decide, on their own, that they want to live somewhere else or do something other than what their ancestors did to make a living.

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<sup>52</sup> Ibid., p. 85.

<sup>53</sup> As to numbers, see William Denevan, "The Pristine Myth: The Landscape of the Americas in 1492," in Callicott and Nelson, *The Great New Wilderness Debate*, pp. 414–42; as to the technologically backward and environmentally ethical, see Nabhan, "Cultural Parallax." For a summary, see Charles C. Mann, *1491: New Revelations of the Americas before Columbus* (New York: Vintage, 2006).

<sup>54</sup> See part two in both Callicott and Nelson *The Great New Wilderness Debate* and Nelson and Callicott, *The Wilderness Debate Rages On* for extensive documentation.

<sup>55</sup> Mark Dowie, "Conservation Refugees," *Orion*, November–December 2005, pp. 16–27.





fundamental to achieve success. IEB must now rapidly learn from other experiences and continue to innovate, strengthen, and broaden this long-term socio-ecological research network to institutionalize the concept in the administrative framework of science and policy in Chile.

Callahan provided an appropriate starting point, laying out the U.S. National Science Foundation's criteria in the original call for proposals to create the first long-term ecological research program.<sup>46</sup> To ensure continuity, proposals were required to demonstrate how leadership would be ensured in the project, how the site's integrity would be guaranteed, and how conflicts over site use would be resolved. Furthermore, it was necessary to determine information generation, storage and use, which today takes the form of data management systems. Finally, proposed sites were expected to meet the challenge of synthesizing and communicating scientific information to generally promote the site to broader audiences. These proposals were made on a site level, as each group would know the best ways to overcome these challenges. To assess the pilot program in Chile, as it relates to these factors, it is useful to take a more detailed look at the three initial sites, which have complementary experiences and as each site largely reflects the context of the time period in which it was founded.

The most northern study site (30°S) is found in Fray Jorge National Park, a protected area created in 1943 to preserve semiarid ecosystems and the northernmost outposts of temperate rainforest, maintained by fog on coastal mountaintops. The area was declared a world biosphere reserve in 1977. The park's long-term ecological research program dates from 1989 and has focused principally around the question of determining the abiotic and biotic factors that regulate the abundance of small mammals, vertebrate predators and plants, and their trophic connections.<sup>47</sup> This goal has been accomplished by one of the world's longest and largest vertebrate exclusion experiments. Furthermore, given the longevity of the project, it has been possible to distinguish three complete cycles of El Niño Southern Oscillation, which have determined pronounced oscillations in rainfall, and consequently annual changes in plant cover and productivity of desert vegetation.<sup>48</sup>

The duration and impact of the Fray Jorge program has been enhanced by local scientists, based at the University of La Serena, having a productive and effective collaboration with colleagues from the United States (Northern Illinois University and University of California, Davis). These collaborations have allowed the leveraging of both national and international funding. Recently, this effort was supported with the creation of the Center of Advanced Studies in Arid Zones

<sup>46</sup> Callahan, "Long-Term Ecological Research."

<sup>47</sup> P. L. Meserve, D. A. Kelt, W. B. Milstead, and J. R. Gutiérrez, "Thirteen Years of Shifting Top-Down and Bottom-Up Control," *BioScience* 53 (2003): 633-46.

<sup>48</sup> J. R. Gutiérrez, M. Holmgren, R. Manriqueá, F. A. Squeo, "Reduced Herbivore Pressure under Rainy ENSO Conditions Could Facilitate Dryland Reforestation," *Journal of Arid Environments* 68 (2007): 322-30.