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**Fire on the Mountain:  
Ecology Gets its Narrative Totem**

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**Abstract**

Aldo Leopold's essay 'Thinking Like a Mountain' was more than a parable about a redemptive personal moment; it was the fruition of a larger effort on Leopold's part to effectively communicate the fundamentals of a 'land ethic'. I explore striking narrative antecedents to Leopold's 'green fire' moment, including writings by Henry David Thoreau and Ernest Thompson Seton, and articulate why wolves provided the quintessential totem animal for communicating a larger ecological 'drama'. Both these literary antecedents and the essay's ongoing—sometimes surprising—impacts are worth exploring, not just because of the high regard in which the essay itself is held but because Leopold succeeded in navigating a problem that persists in our own time: the gap between scientifically informed understandings of the world and effectively communicating those understandings to the public.

**Keywords**

green fire, ecological worldview, wolves, narrative myth, biosphere, Henry David Thoreau, Ernest Thompson Seton.

*Introduction*

During his post-Forest Service career, particularly in the late 1930s, Aldo Leopold entered a new phase in his literary output. Prior to this period, Leopold had written on occasion for professional conservation journals and popular magazines, but he was known more for his scientific

contributions to the fields of forestry and game management. The latter was a field that would in his lifetime, and in no small measure because of his influence, evolve into wildlife ecology. When Leopold assumed a professorship at the University of Wisconsin-Madison in 1933, and particularly after his family began to restore a degraded piece of farmland in rural Wisconsin two years later, he started to pull his thoughts and past writings together for a series of essays. The resulting book, published posthumously in 1949 as *A Sand County Almanac and Sketches Here and There*, has become an environmental classic.

One predominant theme that emerges in *A Sand County Almanac* is Leopold's search for images to communicate succinctly to the general public the dynamics of ecology and a broader understanding of what he called the 'land-community' (Leopold 1989 [1949]: 204). His primary contribution, drawn largely from the work of British ecologist Charles Elton<sup>1</sup>—who became a close friend—may have been the 'biotic pyramid', Leopold's favored model for demonstrating the structure of and interdependencies between different trophic levels within food webs (see Figs. 1 and 2).<sup>2</sup>

1. Elton referred to this as the 'Pyramid of Numbers'. In short, the Pyramid of Numbers—also referred to as the 'Eltonian pyramid'—is based on the observation that the higher reproductive rates of smaller animals ensure that 'the animals at the base of a food-chain are relatively abundant, while those at the end are relatively few in numbers, and there is a progressive decrease in between the two extremes' (see Elton 2001 [1927]: Chapter 5, esp. pp. 68-70). For further commentary on Leopold's friendship with Elton and his use of the biotic pyramid, see Flader 1994 [1974]: 2, 24, 30-31; Meine 1988: 282-84, 387; and especially Newton 2006: 136-44, 188-207.

2. Leopold commented on the need for such an image explicitly in several places in his writings. For example, in 'A Biotic View of the Land', much of which was re-worked and included in 'The Land Ethic' in Part III of *A Sand County Almanac*, Leopold objected to some of the misconceptions that may be the product of the two-sided, scale-like model of 'the balance of nature'. He then asked, 'If we must use a mental image for land instead of thinking about it directly, why not employ the image commonly used in ecology, namely the biotic pyramid?... With a truer picture of the biota, the scientist might take his tongue out of his cheek, the layman might be less insistent on utility as a prerequisite for conservation, more hospitable to the "useless" cohabitants of the earth, more tolerant of values over and above profit, food, sport, tourist-bait. Moreover, we might get better advice from economists and philosophers if we gave them a truer picture of the biotic mechanism' (1991 [1939a]: 267).

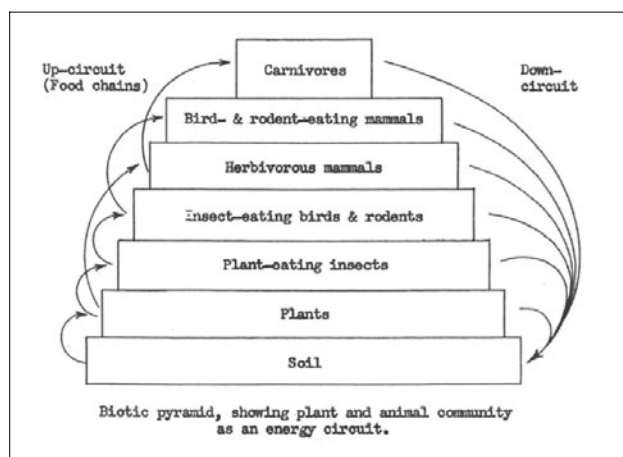


Figure 1. Aldo Leopold's biotic pyramid illustration, by Aldo Leopold.  
 Courtesy of the Aldo Leopold Foundation, [www.aldoleopold.org](http://www.aldoleopold.org).

No doubt the notion of a biotic pyramid has been influential. A sampling of popular environmental studies textbooks shows that it continues to dominate as a way to visually depict the interrelated hierarchies of energy, nutrient, and biomass transference. What the general public needed to grasp the ethical implications of an ecological worldview more fully, however, was not a geometric model but an enduring myth. The essay 'Thinking Like a Mountain', a three-and-one-half page narrative that falls roughly in the midpoint of *A Sand County Almanac*, filled this role.

Leopold's genius was that he took a powerful icon and target of predator eradication—wolves—and invested these animals with potent ecological *and* symbolic meanings. Through the corrected lenses of hindsight, 'Thinking Like a Mountain' was structured as Leopold's own conversion to broader ecological perception and so became more than a parable about the redemptive personal moment of one man staring into the eyes of a dying mother wolf; it was the narrative culmination of a larger effort on Leopold's part to effectively communicate the fundamentals of a 'land ethic' in story form. As both writer and ecologist, Leopold may have intuited that a nonhuman animal was needed to en flesh more abstract ethical concerns. Wolves provided the ecological lessons of the story with moral weight and psychological heft.

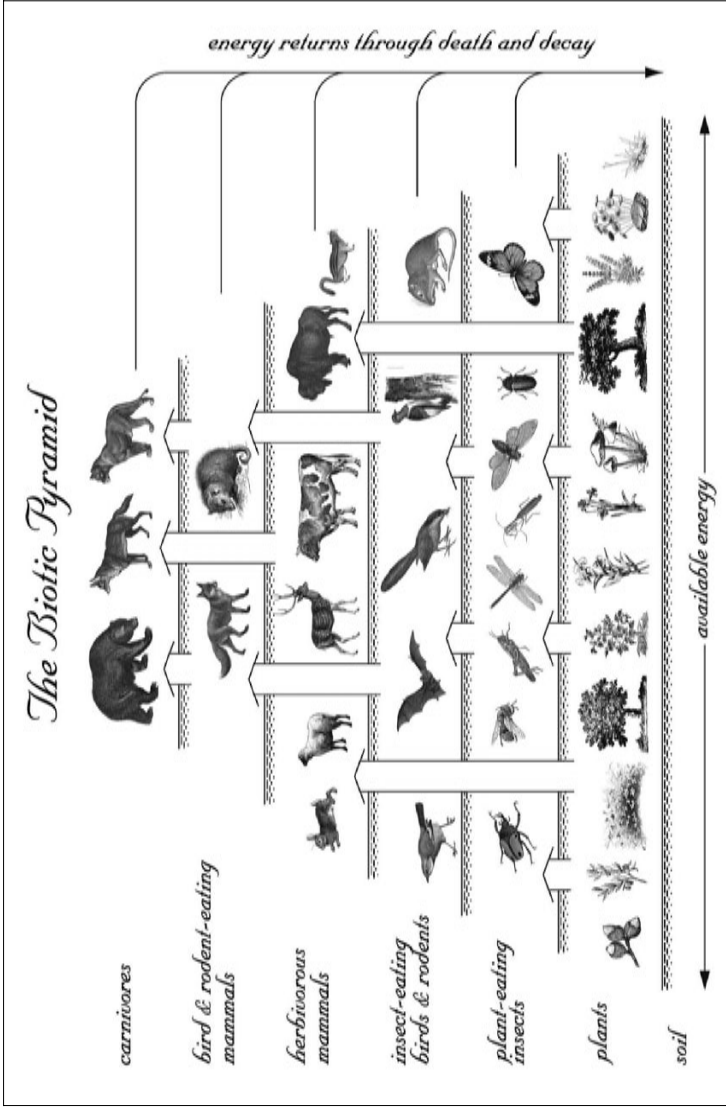


Figure 2. Elaborated biotic pyramid illustration, by artist Benjamin Terres.  
 Courtesy of Dana Graphic Design.

One of the basic precepts of ecology is that no organism exists in isolation. Within an evolutionary framework, these interdependencies take on the characteristics of a story, or a 'drama' as Leopold frequently put it, in 'the pageant of evolution' (1989 [1949]: 199; see also pp. 30, 32, 83, 96, 105, 109). In terms of being composed of many interrelated parts, which are elaborated upon over time, popular cultural narratives may be similar. As one might expect, 'Thinking Like a Mountain' had its narrative and scientific antecedents. Leopold did, however, draw upon his experiences to powerfully highlight and repurpose these antecedents. The resonance of the story reveals the ways in which Leopold succeeded in navigating a problem that persists in our own time: the gap between scientifically informed understandings of the world and effectively communicating those understandings to the public.

*Fire on the Mountain: A Disturbing Ecology*

Leopold's career officially began with the U.S. Forest Service in 1909. When he stepped off the stagecoach in Springerville, Arizona, the USFS itself was a fledgling institution, jockeying for position and funding for managing the United States' public forestlands. Initially, the focus of the USFS was on quantifying and managing public lands for timber extraction, livestock grazing, huntable game animals, and watershed protection. Early on, however, the Forest Service also threw its weight behind sanitizing the lands under its protective care from the apparently destructive forces of fire and predator animals. Leopold had imbibed the Forest Service's management philosophy and was eager to apply this approach in the field.

Not coincidentally, the setting of 'Thinking Like a Mountain' reaches back to this time of youthful zeal, when Leopold, like his fellow government employees, considered predatory animals 'varmints' that did little except detract from the economic benefits the forests provided to the public.<sup>3</sup> The persistence of the view that wolves (as well as other predators) and fire were evils that needed to be suppressed if not eliminated

3. The American Society of Mammalogists (founded in 1919) included several scientists that comprised the main voice of opposition to government policies of predator extermination. While most of these scientists did not go so far as to advocate the elimination of predator control, they did seek to reign in the bureaucratic rush toward the complete elimination of predator species. One of the first arguments in the United States for selective control, as oppose to indiscriminate killing, came from Yellowstone ranger Milton Skinner in 1924 (Skinner 1995 [1924]). For an excellent history of these early government eradication campaigns in the West, see Robinson 2005.

was enshrined in official Forest Service rhetoric until the late 1960s (Stephens and Ruth 2005). The image (Fig. 3) included here is particularly notable in that it visually conflates the threat of wolves with a wildfire, as well as the threat they might pose to nationalistic aims during World War II.



Figure 3. U.S. Forest Service Poster, 1942.

Courtesy of Special Collections, National Agricultural Library.

Leopold worked in the Southwest during the time when the remnant wolves (and other large predators) were being poisoned and trapped out of Arizona and New Mexico. The shooting of the wolf that he described in 'Thinking Like a Mountain' conformed to the spirit of this more comprehensive predator elimination campaign. Through a process of documentary triangulation, historian and Leopold biographer Curt Meine, and a number of colleagues, deduced that the most likely period for the events described in 'Thinking Like a Mountain' was the fall of 1909, shortly after Leopold went to work for the Forest Service in the Southwest (Meine 1988: 91-94, 543 n. 10). This placed Leopold in the area of the Blue Range (located in the Apache National Forest of east-central Arizona) where he was leading a crew on its first timber reconnaissance.

Meine's deduction was confirmed in 2009, when a letter that Leopold wrote to his mother, dated 22 September 1909, came to light. In the letter, Leopold described the timber survey and noted the killing of two 'timber wolves'. That the event did not leave much of an impression on the

young Leopold—he spent more time lamenting the loss of his pipe, which he cheekily called the ‘greatest of sorrows’—reveals the degree of change in his later attitudes, which is of course well expressed in the final essay itself.<sup>4</sup>

In ‘Thinking Like a Mountain’, the mature Leopold traced his ‘conviction’ about the ‘deeper meaning’ of wolves to the series of events he only briefly mentioned in the letter. He and a group of colleagues were eating lunch above a river (known now to be the Black River) in eastern Arizona. Their interest was piqued when they spied what they thought was a doe fording the stream. They soon realized their mistake: below them, a mother wolf and her pups were greeting one another, oblivious to the government workers above.

‘In those days’, Leopold reflected, ‘we had never heard of passing up a chance to kill a wolf. In a second we were pumping lead into the pack, but with more excitement than accuracy... When our rifles were empty, the old wolf was down, and a pup was dragging a leg into impassable slide-rocks’. When Leopold and his crew arrived, they bore witness to a ‘fierce green fire’ as it died in the mother wolf’s eyes, a moment that impressed itself upon his memory and later led him to reflect upon its deeper significance: ‘I realized then, and have known ever since, that there was something new to me in those eyes—something known only to her and to the mountain. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters’ paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view’ (1989 [1949]: 129-30).

In order to ‘think like a mountain’, Leopold declared, one had to consider the wolf’s integral role in the larger landscape. In the absence of natural predators, deer would denude the mountain, encouraging erosion that, if left unchecked, would compromise the entire ecosystem. ‘I now suspect’, he wrote, ‘that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer’ (1989 [1949]: 130). This experience was undoubtedly related to Leopold’s assertion, stated later in the book, that humans have a moral responsibility—not to assume a self-defeating ‘conqueror role’ but to be merely a ‘plain member and citizen’ of the biotic community (1989 [1949]: 204).

These lessons did not come easily or immediately for Leopold. ‘Thinking Like a Mountain’ was written in 1944, some thirty-five years after the incident described in the narrative. In the interim, Leopold left the Forest

4. I am grateful to Curt Meine for providing this letter to me, and for noting Leopold’s pipe-related quandary.

Service; made a major geographical move with his family from the Southwest to the Midwest; became a professor of first game, then wildlife management at the University of Wisconsin; and gained years of field experience that were filtered through the burgeoning science of ecology.<sup>5</sup> 'Thinking Like a Mountain' was the product of a mature Leopold, a conscious reconstruction of his experience, and a compression of themes into a single story that captured the resonances of an ecological worldview.

Leopold articulated a shift in perspective that was to become common in ecological studies in the second half of the twentieth century. Like fire, wolves as apex predators, once feared and suppressed, would begin to be embraced as beneficial agents of 'disturbance' within the systems to which they were adapted. Leopold was among the first in the Forest Service to raise questions about the standards of both fire and predator management practices.<sup>6</sup> The bookending of this intellectual journey, however, is perhaps most clearly expressed in 'Thinking Like a Mountain', where Leopold reversed the conflation of wolves and fire as destructive forces, and instead fused them into the life-generating image of 'green fire'.<sup>7</sup> For Leopold, 'green fire' was clearly no destructive force. Rather, it was the pulsing energy of the sun transmuted through the biota by photosynthesis—the 'motive power', Leopold referred to elsewhere,

5. One critical event in the evolution of Leopold's thinking was a three-month visit to Germany in 1935 to study forestry practices. Reflecting on the experience, Leopold commented that Germany forestry exhibited 'the unfortunate result of what might be called a too purely economic determinism as applied to land use. Germany strove for maximum yields of both timber and game, and got neither. She is now, at infinite pains, coming back to an attitude of respectful guidance (as distinguished from domination) of the intricate ecological processes of nature' (in Meine 1988: 356). Flader writes that the Germany trip 'challenged some of his most basic assumptions about the ultimate possibility of environmental control' (1994 [1974]: 30).

6. On fire suppression, see Leopold 1991 [1924]; on early doubts about predator eradication, see Flader's helpful analysis of a letter Leopold wrote to a colleague in 1929 expressing a hunch that barren female deer were overpopulating their range because of a lack of larger predators (1994 [1974]: 93-96; cf. 153-54). For commentary, and for Leopold's hesitations about advocating controlled burning on certain types of land, see Flader 1994 [1974]: 45-49, and Newton 2006: 66-70.

7. I would like to express my thanks to Josh Bellin for discussing this image reversal with me at the Aldo Leopold Summer Institute in Prescott, Arizona (June 2009). In *A Sand County Almanac*, Leopold also frequently commented on the way in which competition and natural ecological disturbances formed an alliance for beauty and resilience. This applied to the cyclical and 'perpetual battle within and among species' by which they 'achieve collective immortality' (Leopold 1989 [1949]: 7), and he also noted—for instance, in the chapter 'Bur Oak'—the indispensable work of fire in creating the prairies of Wisconsin.



‘which plants pump through that great organ called the fauna’ (1989 [1949]: 151). Wolves—whom Leopold once referred to as a kind of ‘thermostat’ in relation to deer (1991 [1939b]: 257)—dramatically embodied this concept, both transmitting and regulating the living flame of the biota.

*Are Wolves’ Eyes Really Green?*  
*The Making of an Ecological Myth*

Since wolves had long borne the brunt of animosity toward predators and other ‘useless’ animals in the United States, they were also the ideal animals to symbolically embody the coming sea-change in public sentiment. As a forester and wildlife manager seasoned by his own successes and failures over nearly four decades, Leopold came to see something more significant than the death of an individual wolf in the personal encounter he described. His experience revealed to him that poor use of the land—through overgrazing, rampant road-building, overzealous fire suppression, and unmanaged timber cutting—could have detrimental impacts upon entire ecosystems.

But he knew the public did not share his understanding, and no doubt wondered how he might more effectively communicate such ecological concerns to the public. Other than Leopold’s own direct experiences, there were two important models, and one important friend, that may have provided the inspiration to elevate wolves as the appropriate totem animal for Leopold’s ‘green fire’ narrative.

Before looking at the two narrative models that likely shaped ‘Thinking Like a Mountain’, it is worth noting that the essay may never have been written were it not for the persistent prompting of one of Leopold’s former students, Albert Hochbaum. A multi-talented artist and ecologist, Hochbaum was initially selected by Leopold to provide the illustrations for *A Sand County Almanac*, but it was his dialogue with Leopold about the essay drafts, not Hochbaum’s drawings for the book, that would prove most significant.

Meine portrays Hochbaum as a constructive critic, who was even-handed but unrelenting when it came to pushing Leopold to be more candid about his own personal journey to ecological perception (Meine 1988: 453-59; see also Ribbens 1987: 94-97). Well aware of Leopold’s early participation in wolf eradication, Hochbaum singled out this portion of Leopold’s life as most relevant to showing that ‘in the process of reaching the end result of your thinking you have sometimes followed trails like anyone else that led you up the wrong alleys’ (in Meine 1988: 456). Hochbaum further advised, ‘And about the wolf business, whatever you

decide, I hope you will have at least one piece on wolves alone, for a collection with so much of the wilderness and yourself in it I think certainly would be incomplete without giving wolves a place all to themselves' (in Meine 1988: 157).

Leopold was persuaded and 'Thinking Like a Mountain' was the result. In many ways, it was a unique essay in Leopold's extensive corpus of work. As historian Susan Flader notes, the essay 'remains the most graphic piece in [*A Sand County Almanac*] and the only one in which Leopold acknowledges a major change in his thinking over the years' (1994 [1974]: 4; see also, pp. 34-35). As personal in tone as the essay is in places, there were some unacknowledged literary precedents that Leopold likely drew upon to construct it.

#### *Green Fire Antecedents: Thoreau*

Comparisons between Thoreau and Leopold, two of America's most recognized natural history writers, have been frequent. It is difficult to say, however, how much of a *direct* influence Thoreau's writing had upon Leopold.<sup>8</sup> Leopold did receive an 11-volume set of Thoreau's journals as a wedding present, and during a period of forced inactivity early in his career while he was recovering from a near-fatal illness, it seems that he turned to these volumes as well as other natural history authors for solace and inspiration (Flader 1994 [1974]: 9-10; Meine 1988: 128, 16). It is also evident that Thoreau's now-famous essay 'Walking' left a deep impression upon Leopold.

The connection is an interesting one, for in 'Walking' Thoreau personifies, or rather animalizes, nature as 'this vast, *savage, howling mother* of ours' and laments how society has been 'weaned' from her, the final outcome of which—he predicted—would be its own dissolution (2001: 248, emphasis added). Indeed, for Thoreau, the Roman myth of Romulus and Remus was 'not a meaningless fable' but a reminder that culture must remain tethered to its wild rootage.<sup>9</sup> Thoreau's ruminations have

8. See, for example, Flader 1994 [1974]: xv, 11; Tallmadge 1987: 112-16, 122; Knight and Riedel 2002: 9, 58. Early hints of Thoreau's stylistic influence on Leopold is evident in the letters Leopold wrote home while in prep school (e.g. Thoreauvian phrases like 'a-blackberrying'), as Meine notes (1988: 60). Some measure of Leopold's continuing admiration for Thoreau can also be adduced in other writings; for instance, Leopold credited Thoreau as the 'father of phenology in this country' (Leopold 1947: 675), a practice for which Leopold shared a deep interest—particularly later in life with his family at 'The Shack'—and on which he occasionally wrote.

9. Given the historical elimination of wolves from New England, as well as his own critical misgivings about a 'culture merely civil' (2001: 225), Thoreau—always the social gadfly—found in wolves a symbol for the virility of the natural world that he

been deemed 'the earliest pro-wolf statement' by an American (McIntyre 1995: 23). Leopold, too, of course utilized a 'howling mother' wolf totem to represent the 'wildness' of the natural world as he lamented its loss. Also like Thoreau—though less explicitly in 'Thinking Like a Mountain'—Leopold critiqued the cultural attitudes that led to the decimation of the United States' wolf populations.

There is yet another more direct connection between the two essays. Perhaps one of the more frequently cited quotes in modern conservation history is Thoreau's declaration, '...in Wildness is the preservation of the world', which is extracted from 'Walking'. Perhaps the only time Leopold directly quoted Thoreau in his published writing was in the final paragraph of 'Thinking Like a Mountain', and it was this quote—modified by one word—that he cited.

Though only a single word, the alteration is significant. Leopold, summing up the moral to his story (the 'hidden meaning' he learned from the dying wolf) writes, 'In wildness is the *salvation* of the world'. It could be that Leopold, working from memory, inadvertently slipped at this point in the essay. More likely, however, is that this word substitution was neither a slip of the mind or the pen. Leopold's meticulous character and his penchant for continually re-drafting and editing his essays, especially those included in *A Sand County Almanac*, suggest that Leopold was carefully choosing his words while quoting from such a revered source.<sup>10</sup> Whether to jolt the reader with the 'mistaken' word, because of the suggestive redemptive connotations, or both, by using 'salvation' instead of 'preservation', Leopold underscored his own conversion experience in the essay *and* implied that the 'hidden' knowledge of what

believed was endangered: 'From the forest and wilderness come the tonics and barks which brace mankind. Our ancestors were savages. The story of Romulus and Remus being suckled by a wolf is not a meaningless fable. The founders of every State which has risen to eminence have drawn their nourishment and vigor from a similar wild source. It was because the children of the Empire were not suckled by the wolf that they were conquered and displaced by the children of the Northern forests who were' (2001: 239).

10. Leopold's editing process and solicitation of feedback from friends, professional associates, and family is well documented by Meine (1988). By at least 1947, Thoreau's quote was also emblazoned on the letterhead of the Wilderness Society (founded 1935). As one of the founding members and later the Society's vice-president (1945–48), it is unlikely this escaped Leopold's notice (see Zahniser 1947). One other piece of evidence that may indicate Leopold consciously altered the quoted text was that he kept a journal of quotes that he considered important, in which he wrote down several from 'Walking', including Thoreau's 'wildness' aphorism as Thoreau originally wrote it (Leopold n.d.: 14).

has 'long [been] known among mountains'—wildness keeps the landscape functionally healthy—requires a similar *cultural conversion*.<sup>11</sup>

Leopold perceived that superficial changes in conservation management practices would not suffice. Something more was needed. As he noted later in *A Sand County Almanac*, a conservation ethic was yet to be born because 'philosophy and religion have not yet heard of it' (1989 [1949]: 210). Without 'internal change' that reached into the deepest personal and societal commitments, conservation would remain, as he put it, 'trivial'. By this point in his life, Leopold had moved beyond the conventional managerial goal of controlling the landscape for the sake of a handful of useful products. Ecological processes, their linkages, the land's regenerative powers—in a word 'wildness'—meant accepting or at least carefully considering the way in which the system maintained its health. This required a shift in thinking and practice that went further than *preservation*; it called for a deeper, perhaps more costly, humility, reflected in the stronger term 'salvation'.

Still more remarkable than Leopold's misquotation, however, are the affinities between the 'green fire' phraseology in 'Thinking Like a Mountain' and a passage from *Walden*—appropriately, from the penultimate chapter 'Spring'. In this chapter, Thoreau was at his most animistic.<sup>12</sup> Walden Pond itself was personified as sensate as the ice cracked with the coming of warmer weather—'it stretched itself and yawned like a waking man' (2004: 291). The pond also became an expression of the Earth's sensitivity: 'Who would have suspected so large and cold and thick-skinned a thing to be so sensitive? Yet it has a law to which it thunders obedience when it should as surely as the buds expand in the spring. The earth is all alive and covered with papillae' (2004: 291-92). In another memorable passage from the same chapter, Thoreau described the vegetative and physiological shapes assumed by the silt and clay of a thawing railroad bank, extrapolating from this that 'there is nothing inorganic', because Earth, like 'living poetry', melts and flows into the shapes of trees, rivers, the human body, and even cities (2004: 298).

11. Another possibility is that Leopold recognized that preservation (something that may have made more sense in Thoreau's time) was no longer enough; rather, the salvation and restoration of the land was necessary to conserve it. In other words, taking a holistic view of the dramatic changes and linkages between systems, land management could no longer rely upon preserving choice pieces of wilderness. My thanks to Julianne Warren for pointing out this additional meaning embedded in Leopold's word choice.

12. For other strongly animistic passages from Thoreau's work, and an astute summary of his 'naturalistic animism', see Taylor 2010: 50-58, 232-34.

The energy Thoreau perceived underlying it all, so evident with the advent of Spring, caused him to break into revelry. For Thoreau, this energy was most manifest in the greening of the landscape, and in the following passage the resonances with Leopold's depiction of 'green fire' are apparent:

*The grass flames up on the hillsides like a spring fire...as if the earth sent forth an inward heat to greet the returning sun; not yellow but green is the color of its flame;—the symbol of perpetual youth, the grass-blade, like a long green ribbon, streams from the sod into the summer...and from year to year the herds drink at this perennial green stream, and the mower draws from it betimes their winter supply. So our human life but dies down to its root, and still puts forth its green blade to eternity (Thoreau 2004: 300; emphasis added).*

In his poetic rapture, long before ecologists began to quantify the fixing of carbon or the photosynthetic efficiency of plant-life, Thoreau's paean to solar radiation did all but actually put the words 'green' and 'fire' adjacent to one another. The spirit of the passage, if not the phrasing, parallels Leopold's own metaphor of a green-hued, circulating solar energy that made itself visible not only in the grasses that covered the mountain but in the wolf that acted as their protector. For Leopold, if one could properly read the land—if one 'converted' to an ecological worldview—then wolves' predatory 'disturbance', while seemingly damaging to proximate interests, could be discerned as ultimately essential to the system as a whole.

#### *Green Fire Antecedents: Seton*

That the experiences depicted in 'Thinking Like a Mountain' follow the pattern of a conversion narrative is apparent (see Tallmadge 1987: 124). That Leopold admired Thoreau and was inspired by his effusive prose about wildness is clear. Less well known—indeed, I have never seen the connection made in print—is that in writing his 'green fire' narrative Leopold nearly plagiarized portions of the widely read nature essayist Ernest Thompson Seton's 'Lobo, King of the Currumpaw'. Wolves, green fire, and a redemption narrative all figure into Seton's essay—the parallels are remarkable, and the differences worthy of comment. This narrative antecedent to 'Thinking Like a Mountain' sheds light on the religious implications of Leopold's essay and provides additional reasons as to why wolves figured so prominently in it.

The Canadian-born naturalist Ernest Thompson Seton (1860–1946) was among the first North American writers to depict wolves in a favorable light. His influence on public sympathy toward wild animals at the turn of the twentieth century cannot be underestimated, as several scholars

have argued (e.g., Dunlap 1988; Lutts 1990; McDonald 1998; Isenberg 2002). A testimony to the popularity of his writing, the book within which his 'Lobo' story was included, *Wild Animals I Have Known* (1898), went through nine printings in the year and a half following its release.

The story of 'Lobo' was inspired by a memorable period of time that Seton spent in northeastern New Mexico as a wolf-trapper. Like Leopold, his direct contact with wolves gave him pause over whether they should be hunted to extinction. When Seton wrote about his experiences in the late nineteenth and early twentieth centuries, his stories were not mere adventure tales; they were moralistic eulogies in which wolves were headlining actors in a tragic drama.

'Lobo: The King of the Currumpaw' was among Seton's most famous stories. In it, he describes his trials and tribulations with catching one of the wildest wolves in the West. After several of Seton's attempts are foiled by the canny Lobo and his gang of cattle-killers, Seton finally captures Lobo's mate, Blanca, kills her, and then uses her scent to bait Lobo into a carefully hidden passel of steel-toothed leg traps. With wording presaging Leopold's 'green fire' narrative, Seton described the struggling Lobo's defiance:

His eyes glared green with hate and fury, and his jaws snapped with a hollow 'chop', as he vainly endeavored to reach me and my trembling horse... We threw to our victim a stick of wood which he seized in his teeth, and before he could relinquish it our lassos whistled through the air and tightened on his neck. Yet before the light had died from his fierce eyes, I cried, 'Stay, we will not kill him; let us take him alive to the camp' (1998 [1898]: 57, emphasis added).

Lobo's 'stay' was short for he died shortly after capture, but in Seton's story, he went to his grave as a sacrificial, Christ-like figure. The description of Old Lobo's final moments is even reminiscent of Jesus' silence before Pilate:

We tied his feet securely, but he never groaned, nor growled, nor turned his head. Then with our united strength were just able to put him on my horse. His breath came evenly as though sleeping, and his eyes were bright and clear again, but did not rest on us. Afar on the great rolling mesas they were fixed, his passing kingdom, where his famous band was now scattered... I set meat and water beside him, but he paid no heed. He lay calmly on his breast, and gazed with those steadfast yellow eyes away past me... [W]hen the morning dawned, he was lying there still in his position of calm repose, his body unwounded, but his spirit was gone—the old King-wolf was dead (1998 [1898]: 57-58).

In Thoreau's writing, the color green was symbolically representative of the animating, irrepressible life force of the earth. In Seton's work, this

force is embodied in the dramatized Lobo and his ‘fierceness’, which are an expression of the wild forces of nature. Though Leopold quoted Thoreau’s wildness aphorism in ‘Thinking Like a Mountain’, he seems much more indebted to Seton for the imagery and structure of his narrative. In the original but unpublished draft foreword to *A Sand County Almanac*, he acknowledged the impact this particular essay had upon him:

As a boy, I had read, with intense sympathy, Seton’s masterly biography of a lobo wolf, but I nevertheless was able to rationalize the extermination of the wolf by calling it deer management. I had to learn the hard way that excessive multiplication is a far deadlier enemy to deer than any wolf. ‘Thinking Like a Mountain’ tells what I now know (but what most conservationists have still to learn) about deer herds deprived of their natural enemies (1987 [1947]: 284).

Notably, Seton and Thoreau were among the authors Leopold praised in the unpublished foreword.<sup>13</sup> He commended the two writers for elucidating ‘the drama of wild things’ but observed that they did so ‘before ecology had a name, before the science of animal behavior had been born, and before the survival of faunas and floras had become a desperate problem’ (1987 [1947]: 287).

Despite the remarkable similarities in language between ‘Lobo’ and ‘Thinking Like a Mountain’, Leopold made the story his own. The distinctiveness of Leopold’s narrative was due to more than just his ecological reading of the event. Within the context of the *Almanac*, Leopold’s story also called for a change in worldview:

Conservation is a pipe-dream as long as *Homo sapiens* is cast in the role of conqueror, and his land in the role of slave and servant. Conservation becomes possible only when man assumes the role of citizen in a community of which soils and waters, plants and animals are fellow members, each dependent on the others, and each entitled to his place in the sun (1987 [1947]: 282).

Seton called the death of Lobo ‘inevitable’; Leopold called his own act a ‘sin’.<sup>14</sup> While Seton’s narrative was certainly religious in tone, for reasons both historical and cultural it never was a narrative meant to

13. Seton and Leopold may have crossed paths more than once physically, maybe as early as a lecture Seton gave 13 December 1905 while Leopold attended forestry school at Yale (Meine 1988: 52; Aldo Leopold Archives 1905: 94).

14. For Seton’s own comments on this ‘inevitable’ demise, see Lutts 1998. Leopold remarked that the common view that ‘the only good predator was a dead one’ had a ‘punitive’ quality to it, and eventually, when the deer herd in the Gila ‘multiplied beyond all reason...my sin against the wolves caught up with me’ (1987 [1947]: 287).

inspire conversion. At best, Seton sought to instill in his readers admiration for a species *rightfully doomed* to be displaced by humans (1998 [1898]: 46). Leopold saw it this way early in his career, too, but by the time he wrote 'Thinking Like a Mountain', the green fire was something he saw as worth conserving, something which demanded a shift in human understandings in which all creatures—including wolves—were entitled to their places in the sun.

*An Evolutionary Cosmology, an Ecological Totem*

With such vivid images of green fire connected to wolves, one might wonder, why *green* fire when wolf eyes commonly range from shades of brown to golden yellow (Kreeger 2003: 197)?<sup>15</sup> But whether or not a mountain can literally 'think' or a wolf's eyes can 'glow' with green fire is beside the point; the language of Leopold's essay evokes themes beyond physical description, powerfully expressing a mythic sensibility and worldview.

Some scholars have referred to 'Thinking Like a Mountain' as a parable (see, e.g., Tallmadge 1987: 123-27), meaning that it conveys a moral lesson by using metaphorical imagery drawn from the everyday world. It certainly has such qualities but it is also more than a parable, for underlying the narrative construction is an evolutionary cosmology of mythic proportions. Environmental studies scholar Bron Taylor has examined this aspect of Leopold's writing explicitly: 'In Leopold's perceptions we see the main elements of dark green religion: a critique of Abrahamic religion and a feeling that all species have a right to be here, a sense of belonging and connection to nature, and a consecration of the evolutionary story... Indeed, for Leopold, the evolutionary story is not *only* a scientific narrative, it is an *odyssey*—an epic, heroic journey—and for many, this assumes a sacred, mythic character' (2010: 32).<sup>16</sup>

For Leopold, the evolutionary story was an explanatory narrative that cohered with an ecological perspective. It provided the connective tissue through time for the interactions he saw taking place on the ground. An

15. Wolf eyes can also be blue, but they would not appear green except under special circumstances. Like other animals whose eyes are adapted to nocturnal activity, wolves' eyes may reflect light from an outside source, causing them to appear greenish-yellow at night—an effect caused by the *tapetum lucidum* (Harrington and Asa 2003: 96).

16. As is intimated here, and as Taylor explores more thoroughly in *Dark Green Religion*, Leopold's writings—and particularly the 'green fire' narrative—have been understood as expressing a biocentric alternative to Abrahamic narratives. Especially interesting is the way that 'green fire' has been used to represent an animistic kinship ethic among radical environmentalists (Taylor 2010: 33-35, 78-80; see also Taylor 2002: 30-32, 39-40).



awareness of evolution also should provide the requisite humility, he believed, to 'think like a mountain', to perceive a larger story behind the death of a single wolf. As the writer and farmer Wendell Berry appreciated, Leopold was 'a man on his feet' who knew that scientific abstractions needed to be embodied. According to Berry, how wolves are related to their ecosystems is a question a scientist would ask, but 'What happened to the old dying wolf?' is a 'question a mystic would ask'.<sup>17</sup>

In 'Thinking Like a Mountain', Leopold fused scientific observation with narrative myth. That he did so effectively can be seen in the ways that 'Thinking Like a Mountain' has been referenced, anthologized, and used as a motivational tool to spur interest in wilderness protection, conservation, wildlife, and, more broadly, land ethics as a whole.

### *The Green Fire Metaphor and Wolf Reintroduction*

The green fire metaphor has had lasting impacts since 'Thinking Like a Mountain' was written. These I take up in this and the following two sections. The first involves the links that have been drawn between Leopold's experience, green fire, and the recent wolf reintroduction efforts in the southwestern United States.

One expression of the enduring power of Leopold's essay can be found in its use among wildlife and conservation advocates. Following Leopold's lead, many have asserted that dismantling or disorganizing the self-regulating capacity of ecological systems, including eradicating wolves from the places of which they have historically been a part, corrupts the free flow of 'green fire'. In this context, Leopold's narrative has been viewed as an explicit call to restore this sort of fire to the mountain.

In the context of wolf restoration efforts, Leopold's narrative has leapt from the page to the mind to the ground. Wolf restoration has been hailed as the fruition of Leopold's 'green fire' experience: a willingness to accept a humbler human role as part of the larger biotic community. Bruce Babbitt, for example, who served as U.S. Secretary of the Interior during the reintroduction of gray wolves to the Northern Rockies and the more diminutive subspecies of Mexican gray wolves to Arizona and New Mexico, commented that

Leopold's story of the dying green fire touched me, in part, because it happened in mountains I had explored countless times and thought I knew quite well. I knew wolves once roamed the canyons, and knew my family

17. This quote is from an address Berry gave at the Society of Environmental Journalists annual meeting in Madison, Wisconsin (11 October 2009).

had played a role in ridding the land of predators. But at the time, I didn't quite grasp the importance of their presence—or the shame of their absence (1995: 9).

Not uncommon among wilderness and wildlife advocates, though less common for persons in as elevated a political position as he was, Babbitt concluded that restoring wolves was an act of reigniting the fire that Leopold had, in his ignorance, helped extinguish: 'Throughout America, the green fire that Leopold saw in the eyes of a wild gray wolf will live again. And the fact of its existence, even if we might never see it for ourselves, can challenge and change us all' (1995: 10).

Playing a role in restoring 'green fire' is not lost on wilderness advocates, but neither is it lost on the scientists who have contributed directly to the wolf recovery program. David Parsons, for example, the first U.S. Fish and Wildlife Service Mexican wolf recovery team coordinator (1990–1999), titled an article for the *Wildlife Society Bulletin*, "'Green Fire' Returns to the Southwest: Reintroduction of the Mexican Wolf' (1998). In it, Parsons noted that Leopold's epiphany involved a Mexican wolf killed near the location of their reintroduction in the Blue Range.

When asked if he ever thought about the historical relationship between Mexican wolf reintroduction and Leopold's work, Parsons responded, 'Oh yeah. There was that sense, that sense of having come full circle from the green fire incident through his transformation and understanding the role of predators, actually putting them back in the same place where he helped take them out—very much a sense of that having come full circle and that it might be a new beginning in public acceptance' (interview, 16 July 2007, Albuquerque, NM).

Heightening the drama of this reintroduction was the reality that Mexican gray wolves (*Canis lupus baileyi*) had come perilously close to extinction in the late 1970s.<sup>18</sup> There was also another, quite intentional,

18. Except for five Mexican wolves who were captured between 1977 and 1980 (perhaps ironically by government-hired trapper Roy McBride, who was one of the most skilled wolf hunters throughout the mid-twentieth century), Mexican gray wolves were believed to have been completely exterminated from the wild by the time wolves were released in 1998, and likely long before, existing only in fragmented populations in Mexico. The captive breeding program began in the late 1970s (the first official litter was born in 1978), with the knowledge that preserving genetic diversity would be critical to any future chances Mexican wolves might have in the wild. While the captive population steadily grew during the 1980s and 1990s, a halting process of government research and political wrangling began in order to identify suitable areas for reintroduction as mandated by the Endangered Species Act (1973). Though recommendations were offered by a recovery team as early as 1982, it was not until 1998 that captive-bred Mexican wolves were released into the wild.

sense in which reintroducing wolves was 'coming full circle'. As the time approached for the initial reintroduction ceremony in 1998, Trish Stevenson, a granddaughter of Aldo Leopold, was called upon to be present for the release.

According to Parsons, 'We [the recovery team] had to have a Leopold family representative. We went out and recruited. His children were too old for the walk with a wolf crate or even to make the trip, so we got the granddaughter' (interview, 16 July 2007, Albuquerque, NM). Stevenson's physical presence was of obvious symbolic importance, but her remarks at the ceremony made the connection explicit. 'It was the land of his first job', Stevenson said to the small crowd, referring to Leopold's early work as a forester in the Blue Range. 'The mountain and the wolf showed him something new, that the Earth is here not only for the use of people, but also that the Earth is a whole organism... The wolf reintroduction program is part of rebuilding the organism' (in Moody 2005 [1998]: 166). Jamie Rappaport Clark, director of the U.S. Fish and Wildlife Services at the time, commented that when the wolves were released she thought of Leopold's essay and 'could feel the mountains breathe a sigh of relief' (2002: 142).

Others are not so sure the mountains are breathing easily yet. Stephen Capra, the president of the New Mexico Wilderness Alliance, understood wolf recovery as an ongoing struggle to carry Leopold's torch. In 2007, he commented, 'Today we carry on with [Leopold's] work and, not surprisingly, there still are people fighting the truth. Wild nature calls for wild wolves; a healthy environment requires wolves. We will continue to fight for the wolf—the mountain demands it' (Capra 2007: 8-9). In appealing to the mountain's apparent expectations, Capra echoed Leopold's assertion that 'only the mountain has lived long enough to listen objectively to the howl of a wolf' ([1989] 1949: 129). For Leopold, the broad implication of such listening was that a more accurate perception of land health—the ability to judge whether a biotic community was flourishing and self-renewing—was enabled only by a perspective that extended beyond a human lifetime. Wolves, even when they do not contribute to economic bottom lines, certainly may contribute to 'the integrity, stability, and beauty of the biotic community' (1989 [1949]: 224-25), which provides multiple reasons 'to fight for the wolf'.

Leopold's 'land ethic' in general, and the 'green fire' narrative in particular, are ubiquitous in both popular and scholarly literature about wolves.<sup>19</sup> 'Thinking Like a Mountain' has become a foundational point of

19. One wonders what would fill the narrative vacuum had Leopold not penned his tale. As one representative example, take the interdisciplinary edited volume

reference for environmentalists and others interested in wolf recovery, evoking a holistic view of natural processes and dynamic forces kept in check by their own internal mechanisms. Wolves, as the bearers of ‘green fire’, are thus not only a critical species in an ecological sense;<sup>20</sup> for some persons, wolves have become a barometer by which to measure human cultural attitudes as well. As Defenders of Wildlife president Rodger Schlickeisen contended,

For better or worse, humans are playing the godlike role of determining which species will survive and where... Whether or how society will develop a more holistic and environmentally friendly attitude is not yet clear. But one of the best indicators is our evolving attitude toward wolves... If American society, especially the population living near reintroduction-designated areas, can accept the wolf as a neighbor, it will be a very positive sign of our capacity to elevate our view of wild species and adopt a more ecologically healthy attitude toward the natural world (2001: 61).

For those in favor of wolf reintroduction, wolves, as the essence of ‘wildness’, provide an opportunity to ‘redress past mistakes’, as one government fact sheet put it (U.S. Fish and Wildlife Service 1998: 2). Their presence may also be tangible confirmation that humans, as Trish Stevenson averred—and as her grandfather Aldo Leopold may have been pleased to witness—are learning that they are only one part of a greater Earth organism.

dealing with the feasibility of proposals for wolf reintroduction to the Adirondacks, *Wolves and Human Communities* (2001). Leopold is referenced as an authority repeatedly; he is noted in the introduction to the book (Sharpe, Norton, and Donnelley 2001: 3); his ‘land ethic’ receives some attention (pp. 105, 191-95); the ‘green fire’ story is invoked multiple times (pp. 192, 202, 274), and one section of the book (out of seven) is entitled ‘Thinking Like a Mountain’ (pp. 209-53). See, in particular, Donnelly, who argued, ‘Human individuals and communities endemically need some form of cosmogonic myth, some basic philosophical, moral, and spiritual orientation. Leopold offers us a wild cosmogony to undergird and help explain his land ethic and our ultimate moral responsibilities’ (2001: 193).

20. Conservation biologists have given increasing emphasis to ‘strongly interactive species’ that regulate—disproportionately to their numbers—ecosystem functionality. Strongly interactive species not only include large predators, which on the surface seem the most likely candidates, but also species like prairie dogs, beavers, bison, or plant species that enable insect pollination. The presence of such species can significantly enrich habitat and encourage ecosystem diversification. While the strength of interactions is dependent on context, and therefore never subject to a one-size-fits-all solution, conservation biologists argue that ‘a given species should receive special attention for recovery—beyond mere demographic viability—if its absence or unusual rarity causes cascading, dissipative transformation in ecological structure, function, or composition (Soulé et al. 2005: 170). On wolves as strong interactors, see Ripple and Larsen 2004; Ripple and Beschta 2007.

*The Metaphor of Biospheric Fire*

For scientists, literal understandings of the earth as an organism (or super-organism) are a subject of controversy (see Schneider 2004).<sup>21</sup> Yet there is another way, *sans* wolves, that the 'green fire' of which Leopold wrote has gained metaphorical traction in scientific circles.

In the last few decades of the twentieth century, fueled in part by James Lovelock and Lynn Margulis's 'Gaia hypothesis' (1972), there has been increased interest in a contemporary of Aldo Leopold's, Russian geochemist Vladimir Vernadsky (1863–1945). It is highly unlikely that Leopold and Vernadsky knew one another's work directly. Indeed, with the exception of two short articles, a reliable translation of Vernadsky's magnum opus, *The Biosphere*, was not available in English until 1998.<sup>22</sup>

Vernadsky and Leopold had affinities, however. As the term 'biosphere' suggests, Vernadsky's science was a 'synthetic inquiry', and he 'repeatedly criticizes the position of biologists who, in his opinion, treat organisms as autonomous entities and pay too little attention to those characters of species that exemplify environmental change caused by the activity of organisms' (Ghilarov 1995: 198, 200). Perhaps the most important empirical concept for Vernadsky was that 'life is not merely a geological force, it is *the* geological force' and 'Virtually all geological features at Earth's surface are bio-influenced' (Margulis et al. 1998: 6).

Vernadsky called this unifying, dynamic force 'living matter', a force powered by the sun that has altered the living conditions of the planet over evolutionary time. What interested Vernadsky on a planetary scale—the flow and transformation of energy through living matter—interested Leopold as well, though typically on smaller ecosystem scales (or what Leopold generically referred to as 'the land').<sup>23</sup> For both scientists, organisms were not separate (unless conceptually separated for

21. This unease can be traced to the coining of the term *ecosystem*, a deliberate move by ecologist A.G. Tansley (1935) to find a more scientifically robust term to capture the interactions among organisms and their environments without resorting to what he believed were misleading organismic, quasi-religious metaphors.

22. One interesting convergence, however, is that Leopold served with Yale ecologist George Evelyn Hutchison (and Charles Elton) on the advisory council of the Conservation Foundation (Meine 1988: 495). Hutchison incorporated Vernadsky's concepts into his own work and played an absolutely essential role in getting Vernadsky's work translated into English.

23. For an excellent discussion of Leopold's comprehensive understanding of 'land', see Newton 2006.

convenience) from their surrounding environments. Moreover, organisms co-evolved with these environments, distinctively shaping them.<sup>24</sup>

One can apprehend how such concepts of *life as process* might lend themselves to the 'green fire' metaphor. According to Margulis and American science writer Dorion Sagan

Vernadsky dismantled the rigid boundary between living organisms and a nonliving environment... Emphasizing photosynthetic growth of red and green bacteria, algae, and plants, he saw these expressions of living matter as the 'green fire' whose expansion, fed by the sun, pressured other beings into becoming more complex and more dispersed (1995: 51; see also Chapter 8, esp. the section entitled 'Green Fire').

'Green fire' is a term Vernadsky never used, which makes Margulis and Sagan's merger of Vernadsky's work and Leopold's metaphor all the more interesting.<sup>25</sup> Since Margulis and Sagan never credit the phrase to Leopold, perhaps one could perceive this as an example of convergent phraseology. On the other hand, it may also suggest the degree to which Leopold's story has become part of the scientific ether.<sup>26</sup> There are no wolf eyes in this case; rather, the metaphor has been 'upscaled' to

24. As Margulis and Sagan put it, 'People, for example, redistribute and concentrate oxygen, hydrogen, nitrogen, carbon, sulfur, phosphorus, and other elements of Earth's crust into two-legged, upright forms that have an amazing propensity to wander across, dig into, and in countless other ways alter Earth's surface. We are walking, talking minerals' (1995: 49).

25. Vernadsky came close, and the imagery was often very similar (for examples, see Vernadsky 1998: 57-62, 74-75, 111-13; on p. 59, Vernadsky refers to the 'illuminated green organism' of plant life). As far as I can ascertain, Sagan used 'green fire' in an earlier work (1987) while referencing Vernadsky, and it was then incorporated into a co-authored text by Margulis and Sagan (1995) and picked up by others who subsequently wrote about Vernadsky (e.g., Piqueras 1998). This misattribution includes a book that takes the phrase for its title, *Green Fire: The Life Force, from the Atom to the Mind* (Martínez and Arsuaga 2004), in which the two paleontologist authors claim—without citation—that Vernadsky 'coined the expression' (2004: 195). The lesson they draw from this metaphor is worth quoting more fully: 'All the organisms of our world are descendants of the first living organism that appeared on the face of the planet. From that first spark, the fire of life continued gathering force until it was transformed into a colossal flame. Today it burns everywhere: in the dark ocean depths, on the highest mountain peaks, in the smallest fissures of the Antarctic ice cap, at the bottom of caves, and in the cracks of rocks located dozens of kilometers above Earth's crust. Even though life has grown enormously diversified since its beginning, it has not reinvented itself. As living organisms, we are only transmitters of life from one generation to the next, but we do not generate it *ex novo*. In a certain and very profound sense, as living entities, we all remain an extension of that first organism. We are different flames of the same fire' (Martínez and Arsuaga 2004: 194-95).

26. It has also become a touchstone for ritual practices inspired by Deep Ecology; see Seed et al. 1988.

encompass planetary phenomena. It may be that as an awareness of global environmental challenges deepens—particularly with reference to climate destabilization—the ‘upscaling’ of the green fire metaphor will receive further attention.

Whatever the case, the ‘green fire’ metaphor does effectively capture themes that both Vernadsky and Leopold were attempting to articulate: the indivisibility of matter and energy, the interrelations of the organic and inorganic, and the functional roles that various species play in regulating and diversifying life. The green fire courses through the wolves, as Leopold bore witness, but it is ultimately connected to the well-being of the mountain (and its flora and fauna). Or as Vernadsky may have put it, living beings create opportunities for life (see Ghilarov 1995: 197, 202).

### *The Moral Metaphor*

One place where Leopold and Vernadsky diverged, however, was that Leopold was explicit about human ethical responsibilities. Leopold clearly perceived that for better or worse, and at various scales, humans could alter the composition and therefore the durability of ecological systems. Complex relationships among life forms could be attenuated—something Leopold called land ‘sickness’. The ‘green fire’ could be blocked, suppressed, its mediators even eliminated, and if it was, the system as a whole was likely to suffer.<sup>27</sup>

Leopold perceived that this was a moral problem not just a scientific one. People, scientists and laypersons alike, could and did interpret scientific data differently. To communicate energy and biomass dependencies, Leopold could rely on the image of a ‘biotic pyramid’, but to effectively communicate an ecologically based worldview—and its moral imperatives—he needed a narrative. ‘Thinking Like a Mountain’ fits well with Leopold’s focus later in his life with overcoming the ‘senseless barrier between science and art’ (in Meine 2002: 19), bridging the ‘objectivity’ of the sciences with an affective, relational understanding of

27. As Leopold put it, ‘Land, then, is not merely soil; it is a fountain of energy flowing through a circuit of soils, plants, and animals. Food chains are the living channels which conduct energy upward; death and decay return it to the soil. The circuit is not closed...but it is a sustained circuit, like a slowly augmented revolving fund of life... Change does not necessarily obstruct or divert the flow of energy; evolution is a long series of self-induced changes, the net result of which has been to elaborate the flow mechanism and to lengthen the circuit. Evolutionary changes, however, are usually slow and local... One change [to ecological systems in recent history] is in the composition of floras and faunas. Their larger predators are lopped off the apex of the pyramid; food chains, for the first time in history, become shorter rather than longer’ (1989 [1949]: 216-17).

land that he believed should inspire ethical care and responsible interactions with the nonhuman world.

In one of the most straightforward passages about these links, Leopold laid out the relationship between science and ethical action to the students in his Wildlife Ecology course: 'We love (make intelligent use of) what we have learned to understand. Hence this course. I am trying to teach you that this alphabet of "natural objects" (soils and rivers, birds and beasts) *spells out a story, which he who runs may read—if he knows how.* Once you learn to read the land, I have no fear of what you will do to it, or with it. And I know many pleasant things it will do to you' (1991 [1947]: 337; emphasis added).

By the time Leopold wrote 'Thinking Like a Mountain', the science of ecology was well established. But he sensed that statistical analyses or economic justifications did not inspire long-term care or commitment. For this, he sought ways to communicate how humans were participants in a larger story, fellow 'coinhabitants' with other creatures in the 'odyssey of evolution'.

Nature writer Scott Russell Sanders, who has praised Leopold's ability to reach the general public, stated insightfully why narrative might be a key to such efforts:

Science no less than religion is an attempt to draw narrative lines between puzzling dots of data. A physicist and a prophet will find different meanings in a burning bush, yet both will find meaning. The formulas of science are miniature plots; piece by piece they build up a comprehensive story of the universe as wonderful as any myth...[which are] ways of telling the deepest truths—about how the world was created, the purpose of life, the reason for death, the paths for humans to follow (2009: 87).

Leopold circled these 'deeper truths' in 'Thinking Like a Mountain', musing on the 'hidden meaning' of the wolf's howl and the reactions it provoked. Through his own confessional narrative, he encouraged the reader to consider his or her own mistaken beliefs and perceptions, and to learn from them so that they would not be repeated.

As Leopold understood, humans need a 'mental image' to 'supplement and guide' a land ethic (1989 [1949]: 214), even if this image is provisional. 'When the human mind deals with any concept too large to be easily visualized', Leopold wrote, 'it substitutes some familiar object which seems to have similar properties' (1991 [1939a]: 267). Wolves, mountains, deer, fire, and humans were the 'familiar objects' Leopold used to communicate his relational ecology in 'Thinking Like a Mountain'. For him, the land 'spelled out a story', and the integrity of the narrative's fabric—the land itself—was dependent on humans recognizing their place in that story.



*Conclusion: Narrating Science*

In one of his first attempts to address the moral underpinnings of conservation, Leopold acknowledged 'the insufficiency of words as symbols for realities' (1991 [1923]: 95-96). Nevertheless, over the course of his life he labored to find words that would effectively evoke ethical implications of ecological realities. Dramatizing the 'green fire' in 'Thinking Like a Mountain' was a critical part of this task.<sup>28</sup> In the space of a little over three pages, Leopold brought together a conversion narrative, an ecological worldview, the admission of guilt and partial ignorance that led to poor management, and an animal totem that effectively held these pieces together.

It may be misleading that Leopold has come to be so strongly associated with wolves, given that his work and curiosity led him to write about so many different kinds of flora and fauna, perhaps especially those that often go unnoticed, like draba, or Silphium, or bog-birch (1989 [1949]: 26, 44-50; 1991 [1939b]: 260-62). That said, he was well aware of what captured attention, or as he might put it, the 'drama' of the land, as well as the ecologically critical role of predators.

In 'Thinking Like a Mountain', Leopold gave a wolf's howl new ecological resonances that would be increasingly amplified. By narrating his own transition to thinking in terms of ecological systems, Leopold offered up a story that has played a key role in framing predator reintroductions as an ethical responsibility as well as highlighting the importance of ecological linkages that allow a landscape to flourish. In practice, not only the survival of wolves but broader public understandings of ecological science have been decisively impacted. A dying wolf was immortalized in the essay, but it may ultimately be 'the mountain' that has Leopold to thank.

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28. The title of *A Sand County Almanac* was not decided until after Leopold's death. At one point, however, Leopold suggested 'Thinking Like a Mountain' as an accurate 'key to [the book's] contents' (see Flader 1994 [1974]: 4; Meine 2002: 24-25). This provides some indication of how important this essay was to Leopold.

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