

## Debunking Myths About Aldo Leopold's Land Ethic

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## **Abstract**

Aldo Leopold's land ethic has been extremely influential among people working in conservation biology, environmental ethics, and related fields. Others have abandoned the land ethic for purportedly being outdated or ethically untenable. Yet, both acceptance of the land ethic and rejection of the land ethic are often based on misunderstandings of Leopold's original meaning – misunderstandings that have become so entrenched as to have the status of myths. This essay seeks to identify and then debunk six myths that have grown up around the land ethic. These myths include misunderstandings about how we should understand key terms like "stability" and "biotic community" as well as the scope and main message of the land ethic. Properly understanding Leopold's original meaning, a meaning derived from ideas he developed after a lifetime of scientific theorizing and hands-on practical knowledge, prevents hasty rejection and provides a sounder basis for conservation policy.

**Keywords:** biotic community; ecosystem; environmental ethics; interdependence; Leopold; stability

## 1. Introduction: Aldo Leopold's Influence

Aldo Leopold (1887-1948) – a forester, wildlife manager, conservationist, and professor – has been extremely influential in conservation biology and environmental ethics as well as related fields such as forestry, wildlife management, and restoration ecology. A few typical quotes illustrate this point. For example:

Leopold's classic essay 'The Land Ethic' in *A Sand County Almanac* is probably the most widely cited source in the literature of environmental philosophy. His view of the moral consideration of the land-community is the starting point for almost all discussions of environmental ethics (Katz 1995, 113).

Here is another example:

Leopold's original contribution was to combine this ethical conservation with practical experience in resource management, and then to inform both with scientific expertise...[He] began to change fundamental assumptions not only about the best use of natural resources but also about the nature and purpose of ecological studies. These changes opened the door for the development of a value-driven approach to science and conservation, *without which the field of conservation biology could not have emerged...* Today many conservation biologists see themselves as heirs of Leopold's legacy to restore ethics and value to the science of conservation (Fred Van Dyke 2008, 41; emphasis added).

The degree of Leopold's influence is perhaps not surprising. His writings melded his scientific knowledge, his hands-on practical experience, his breadth of expertise across conservation sub-fields, and his respect for the natural world. In *A Sand County Almanac* as a whole and in the essay "The Land Ethic" in particular, he sought to inspire not only action but reflection, recognizing that values drive actions and that facts alone would not be sufficient for conservation. But the book did not come out of nowhere. *A Sand County Almanac* came from a lifetime of his own reflections, reflections that resulted in hundreds of written works produced for a variety of audiences: scientific, practical, and political. His lifetime of reflecting on these values informed his science and his science informed his values, producing groundbreaking results in both, anticipating many issues that remain live today.

Yet a number of misunderstandings have grown up around Leopold's land ethic.<sup>1</sup> These misunderstandings are so entrenched as to have the status of myths.<sup>2</sup>

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<sup>1</sup> In the essay "The Land Ethic," Leopold remarks that the land ethic is a product of social evolution, noting that all such products are tentative because evolution is ongoing. Thus, other people might seek (and have sought) to develop the land ethic further or in other directions. However, in using the phrase "Leopold's land ethic," this essay refers to the version that Leopold described and developed, even as he used the thinking of others as building blocks for its development.

<sup>2</sup> The use of the term "myth" is meant only to indicate the widespread persistence of these mistaken beliefs over time and their transmission from person to person; the term has other connotations and associations (such as an association with traditional cultures), but those connotations and associations should not be inferred by the reader in this instance.

This essay seeks to cast doubt on these entrenched myths; the myths, concerning Leopold's supposed "summary moral maxim," his use of the terms "biotic community" and "stability," his views on the rights of individuals and the role of humans, and the grounding for his land ethic, are described in Section 2.<sup>3</sup> If we think that Leopold had profound insights about ethics and the natural world that are still important today, those insights should be understood correctly. There may be more for Leopold to teach us; indeed, one claim of this essay is that there *is* more, and that what Leopold actually was trying to teach us is more defensible and more consistent with contemporary science than what some have thought he was trying to teach us. The result is an ethical basis for our conservation policies that is more well-informed and defensible.<sup>4</sup> To illustrate this relevance, Section 3 describes a case where restoration and land use (arguably successful) are consistent with Leopold's land ethic, a fact that the myths would conceal. Section 4 concludes the essay.

Several things make a proper understanding of Leopold timely. First and foremost is the multi-faceted global environmental crisis we are experiencing, one that is almost entirely (or entirely, period) the result of human actions. To address it, we want all good ideas on the table for consideration. As is discussed below, some authors state that they reject Leopold's views, but those rejections are based on misunderstandings and not Leopold's actual views. The rejections are thus hasty. On the other hand, the picture of the land ethic that emerges after debunking its myths is one that is appealing and practical. Second is what has been described as "The Battle for the Soul of Conservation Science" (Kloor 2015), which contrasts the traditional view in conservation biology as preservationist (often associated with Leopold) with one in which humans play a more active and even constructionist role. The view of Leopold presented here will show that there is another alternative to these two extremes. Third, the perceived need for prioritizing ecosystems (again, a view associated with Leopold) is sufficiently high as to have spawned a new journal, *The Ecocentric Citizen*. An opinion piece co-authored by editors of the journal characterizes ecocentrism as a view that holds that "human needs, like the needs of other species, are secondary to those of the Earth as the sum of its ecosystems" (Gray et al. 2017). But was this Leopold's view, as some have suggested, and are there other plausible alternatives? By debunking the myths surrounding Leopold, this article will reveal another path, one that is sympathetic to ecocentrism as defined by Gray et al. (2017) in some respects but which finds a middle ground.

## 2. Myths Concerning Aldo Leopold's Land Ethic

The following six myths have grown up around Leopold's land ethic:

- **Myth 1:** There is a two-sentence "summary moral maxim" of the land ethic.
- **Myth 2:** When Leopold said "biotic community," he meant "ecosystem."
- **Myth 3:** Ecosystems are the only entities of value in the land ethic.

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<sup>3</sup> For other work reflecting on the way that Leopold has been interpreted over the years, see Stegner (1987), Noss (2002), Meine (2004), .

<sup>4</sup> For more on the conservation implications of Leopold's thinking, see Meine (2014).

- **Myth 4:** The central message of the land ethic is to set aside human-free ecosystems.
- **Myth 5:** By “stability,” Leopold meant something like “balance” or “dynamic equilibrium.”
- **Myth 6:** Leopold's ethics are derived from Charles Darwin's “protosociobiological” perspective on ethical phenomena.

Each myth will be described in further detail below.

## 2.1 Myth 1: There is a two-sentence “summary moral maxim” of the land ethic

It is claimed that the following quote from Leopold is the “summary moral maxim” of the land ethic:<sup>5</sup>

A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise (Leopold 1949, 224-225)

The implication is that the essence of the land ethic can be gleaned from these two sentences. Even without the phrase “summary moral maximum,” these two sentences are often *treated* as a summary of Leopold’s land ethic. For example, Tom Regan quotes these two sentences and from them alone infers that the “implications of this view include the clear prospect that the individual may be sacrificed for the greater biotic good” (Regan 1983, 361). Having made that quick inference, Regan just as quickly rejects the land ethic for endorsing “environmental fascism”.

Similarly, Ned Hettinger and Bill Throop (1999) quote the same two sentences as a “summary maxim” of the land ethic, and from there, proceed directly to a criticism of Leopold’s use of the term “stability.” They equate “stability” with “equilibrium” and “balance,” but then argue that contemporary ecology is an ecology of *instability* that rejects equilibrium and balance.<sup>6</sup> So, like Regan, Hettinger and Throop reject Leopold’s land ethic on the basis of two sentences alone.

Even scholars who are sympathetic to the land ethic seemingly endorse this myth. For example, Holling and Meffe (1996) use the “summary maxim” as a jumping-off point to develop what they call a “Golden Rule” of resource management. They replace “stability” with “resilience,” but otherwise maintain that the “summary maxim”

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<sup>5</sup> The claim is originally due to Callicott (1987), and it has been repeated many times since by many authors, with the phrase “summary moral maxim” producing 70 “hits” on Google Scholar as of July 2017. Indeed, as will be seen further below, a number of these myths have their origins in Callicott’s work, even though he himself has subsequently sought to debunk at least one of them (namely, Myth 3). Callicott, who has published numerous essays and books on Leopold, has been called the “leading philosophical exponent of Aldo Leopold’s land ethic” (Norton 2002, 127) (with no challenges to that ascription of which I am aware) and he has, for example, had an entire book devoted toward discussing his views on Leopold (*Land, Value, and Community: Callicott and Environmental Philosophy*). But to be clear, the point of this essay is not to criticize Callicott but rather to rectify widespread and persistent misunderstandings concerning Leopold.

<sup>6</sup> Whether this understanding of contemporary ecology is fully correct – and I have my doubts – is separate from the point at hand.

constitutes “sound advice.”

Despite the ubiquity of the belief that these two sentences are a good summary of the land ethic, this belief is a myth that should be rejected. Leopold published approximately 500 distinct items over the course of his lifetime; these are two sentences out of one essay out of one book, published posthumously, with Leopold dying before intended revisions to the book could be done (Meine 2010). We need to consider the rest of the essay, the context of Leopold’s life experiences, and his statements elsewhere. When one does so, it becomes clear that Leopold expanded on these themes in a variety of ways and in a variety of contexts, sometimes using different words and in some cases changing his views as he reflected on his experiences, and this casts a different light on the words appearing in those two sentences. This contextual interpretative practice is standard in the history and philosophy of science, but it is less common in environmental ethics and conservation biology.<sup>7</sup>

For example, it might appear from these two sentences that *anything* that benefited the integrity, stability, or beauty of a biotic community would be ethically right, even if it meant sacrificing the rights of individuals to do so. For this reason, Leopold has been accused of endorsing “environmental fascism.” However, Section 2.3 will show that other statements Leopold made do not support this interpretation; it is itself a myth. Or some readers see the words “stability” and “biotic community” as central to the purported summary moral maxim but fail to find explicit definitions of the terms within “The Land Ethic.” They then seek to interpret Leopold in light of meanings used by ecologists of Leopold’s time or ecologists of today. But such readers overlook the wealth of other places (where “other places” includes other sections of “The Land Ethic” itself) they can look to divine Leopold’s meaning; Section 2.2 discusses the meaning of “biotic community” and Section 2.5 discusses the meaning of “stability.” Finally, some readers might think, since the summary moral maxim doesn’t mention humans explicitly, that we are not included. But again, this would overlook the extensive attention that Leopold gave to human practices and their role in biotic communities; this is discussed in Section 2.4.

But these are more than four individual mistakes. The overall mistake is the assumption that the two sentences exhaust the land ethic without need for any further interpretive work. Once you reject this myth (Myth 1), then Myths 2, 3, 4, and 5 are quickly cast into doubt with just a bit of further examination. Myth 1 is in this sense a “keystone” myth.

## **2.2 Myth 2: When Leopold said “biotic community,” he meant “ecosystem”**

Leopold’s purported “summary moral maxim” refers to the “biotic community,” and it is widely believed that by “biotic community,” Leopold meant “ecosystem.” For example, J. Baird Callicott, while acknowledging the influence of Charles Elton’s community concept on Leopold, suggests that it is ultimately “the physics-born ecosystem model” that Leopold turns to in “The Land Ethic” (Callicott 1989: 107). There are other authors who write as though Leopold was referring to ecosystems as

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<sup>7</sup> For authors who *do* follow this interpretative practice for understanding Leopold, see, e.g., Flader (1994), Meine (2010), Berkes et al. (2012), and Warren (2016).

the focus of the land ethic (such as Hettinger and Throop 1999, Knight 1996, and Vucetich et al. 2015), and for these authors, it is less clear why they equate “biotic community” with “ecosystem”. Perhaps these authors are simply interpreting the purported “summary moral maxim” in what they take to be contemporary terms (similar to the what seems to have happened with “stability”; see Section 2.5). Yet, when one rejects Myth 1 and instead interprets the meaning of “biotic community” in light of what Leopold said elsewhere, a more complex picture emerges.

Leopold does tell us that land “is not merely soil; it is a fountain of energy flowing through a circuit of soils, plants, and animals” and that “[f]ood chains are the living channels which conduct energy upward; death and decay return it to the soil (1949, 216). By including abiotic components as well as matter and energy flow, there is indeed *some* reason to think that for Leopold, “biotic community” was just another way of saying “ecosystem”.<sup>8</sup>

However, this myth should be rejected because Leopold *also* states that a biotic community is composed of interdependent species – that the biotic pyramid is composed of a complex tangle of lines of dependency for food and other services. And this makes his view sound similar to what today would be called an ecological or biotic community concept. Since interdependence plays a central role in the land ethic, there is no reason to think that Leopold has “turned away” from the community concept, as Callicott suggests; a more plausible reading is that Leopold utilizes a concept that incorporates aspects of *both* an ecosystem concept and a community concept. It is also worth noting that the term “community” nicely conveys the idea of an entity that we are a part of and connected to – and thus have moral obligations to – in a way that the term “system” does not. That is, the idea of “community” has the moral connotations that Leopold was seeking. So, Leopold does not “turn away” from the community concept; instead, he enhances it.

Leopold’s term “biotic community” thus blends the ecosystem concept of ecosystem ecology and the community concept of community ecology (Millstein forthcoming). That he does so makes sense when one considers that in the late 1930s and 1940s, both concepts were still fresh, emerging, evolving, and beginning to intersect with each other.<sup>9</sup> Thankfully, Leopold used the term “land community” interchangeably with “biotic community,” and so, we can use the term “land community” to refer to the blended concept, reducing confusion. Moreover, there are contemporary analogues that combine ecosystem and community concepts that can be used to further elaborate Leopold’s land community concept (Millstein forthcoming).

Here a concern might be raised over Leopold’s use of a Clementsian-inspired term like “community,” given what is seen as a competing and perhaps superseding approach from Tansley/Gleason, challenging the claim made here that Leopold’s land community is consistent with a contemporary understanding.<sup>10</sup> However, Eliot (2011) has given good reason to think that Clements’ commitment to communities as organisms has been overstated, and that Clements and Gleason, both having been

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<sup>8</sup> The term “ecosystem” was coined by Tansley (1935).

<sup>9</sup> I thank an anonymous reviewer for this point.

<sup>10</sup> I thank an anonymous reviewer for raising this concern.

interpreted in extreme terms, are actually not all that far apart in their views. In particular, Eliot demonstrates that for Clements, communities aren't literally organisms, but rather, *comparable* to organisms in certain (not very controversial) respects and not comparable in other respects. Moreover, by the end of his life, Leopold was de-emphasizing the community-as-organism view, where it plays very little role in *A Sand County Almanac*. So, although community-as-organism might be an interesting idea for someone to pursue in thinking about environmental ethics and conservation biology, it is not a necessary aspect of the land community or something that contemporary community ecologists who claim to study communities subscribe to. The necessary component is only that there are interactions and interdependencies between components of the land community (Millstein forthcoming), and even the most Gleasonian of ecologists acknowledges the existence of those.

It is important to reject this myth because its rejection implies that in our conservation policies we should not just seek to preserve matter and energy flow, but also important ecological interdependencies and relationships, such as predator / prey, pollinator / pollinated, etc. Keystone species, if any, become of particular importance.

### 2.3 Myth 3: Ecosystems are the only entities of value in the land ethic

As noted in the discussion of Myth 1, some believe that according to the land ethic, biotic (land) communities are the *only* entities of value, giving rise to the understanding of the land ethic as a holistic ethic.<sup>11</sup> Again, taken at face value and out of context, the supposed "summary moral maxim" seems to define "what is right" entirely in terms of how we treat biotic (land) communities. Thus, it appears to endorse the sacrifice of individual organisms for the sake of the whole; for that reason, it has been called "fascist," as noted in Section 2.1.

However, this myth flies in the face of many other statements that Leopold made. For example, he clarified that the "land ethic... implies respect *for his fellow-members*, and also respect for the community as such" (Leopold 1949, 204; emphasis added). This is an explicit denial of the claim that only the biotic community matters; rather, individuals and the community *both* deserve our respect. Similarly, he maintained that individuals (wildflowers, songbirds, predators) need not have an economic value or even a functional value in the land community in order to continue as a matter of "biotic right" – that "no special interest has the right to exterminate them for the sake of a benefit, real or fancied, to itself" (Leopold 1949, 211).

Furthermore, in "The Land Ethic," Leopold states that he saw the history of ethics as a history of "accretions," beginning with relations to individuals, then expanding to include the relation between individuals and society; the land ethic, Leopold suggests, would be a third accretion. He also refers to the land ethic as an "extension of ethics" (1949, 128). Leopold's wording here implies that our ethical obligations would not

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<sup>11</sup> Callicott (1987, 196) states that not only does the land ethic have "a holistic aspect" but that "it is holistic with a vengeance." In a subsequent work, Callicott recants this view, stating that Leopold never meant the land ethic to completely override all of our duties to other humans (Callicott 1999). However, the earlier paper may have had some lingering influence despite Callicott's recanting.



supersede our obligations to individuals, but rather, it would add to them. Again, this challenges the accuracy of Myth 3.

Rejecting this myth prevents the overly quick rejection of the land ethic as fascist.<sup>12</sup> However, it does make our conservation policies harder to craft because we will have to balance the rights of individuals against the rights of the entire land community as a whole. If Leopold is right, that is a balance worth striving for, even if sometimes impossible to fully achieve in practice.

#### **2.4 Myth 4: The central message of the land ethic is to set aside human-free ecosystems**

Some seem to believe that the central message of the land ethic is to set aside human-free ecosystems. For example, Laura Westra sees the land ethic as applying to “largely undiminished and unmanipulated natural systems” (Westra 2001, 263). Rohlf and Honnald state that “[t]o Leopold, wilderness was the land ethic’s ultimate expression – an interdependent biotic community unimpaired by human manipulation” (Rohlf and Honnald 1988, 254). Guha (1989) seems to have understood Leopold similarly.

However, this myth should also be rejected. Leopold was explicit in including humans as parts of many food chains in many land communities; he emphasized human interdependence with other species and with the abiotic components of the land community (Leopold 1949). Indeed, Leopold spent much of his career trying to institute sound forestry, wildlife management, and farming practices, and, furthermore, working to integrate these practices (Meine 2010). This is clear even in the essay “The Land Ethic” itself, where, for example, Leopold discusses the need for farmers to value the land – including privately owned land – and to feel an obligation toward the land in order to institute and *maintain* practices that preserve the soil. Forestry is also discussed explicitly. Thus, the land ethic encompasses all of these human practices, emphasizing how we should live on the land and not merely trying to set it aside.

In rejecting this myth, it becomes clear that the main point of the land ethic is *not* to set aside reserves where no humans tread, although Leopold did argue that there are reasons to do that in certain regions. He recognized that “[m]any of the diverse wildernesses out of which we have hammered America are already gone” (1949, 121) but thought that there were remnants of varying sizes and degrees of wildness, and that a “representative series of these areas can and should be kept” (1949, 122). He gave several reasons for preserving wilderness: 1) for recreation, in order to perpetuate “in sport form, the more vital and primitive skills in pioneering travel and subsistence (1949, 123); 2) for science, in order to have a “base datum of normality, a picture of how healthy land maintains itself as an organism” (1949, 125), so that our conservation and restoration efforts have a greater chance of success and so that we know what “success” looks like; and 3) for wildlife, which requires large areas, larger than the national parks

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<sup>12</sup> For philosophical defenses against the “fascism” charge, see, e.g., Nelson (1996), Marietta (1999), and Callicott (1999). Meine’s (2010) thorough discussion of Leopold’s life and work, political beliefs and activities, and familial and ethical background, makes clear that there is no historical substance to the fascism charge.

in the U.S. So, Leopold clearly did think that some wilderness should be set aside. The point of this section – why this myth should be rejected – is rather that setting aside wilderness is not the central or sole focus of the land ethic.<sup>13</sup>

When we reject the myth that setting aside human-free ecosystems is the central focus of the land ethic, it becomes clear that *all* of our human practices matter – that we always need to think about our effects on other species and their effects on us. Modifying our human practices can be important conservation efforts, too, that need to be reflected in policy.

### **2.5 Myth 5: By “stability,” Leopold meant something like “balance” or “dynamic equilibrium”**

The fifth myth, which was discussed briefly in the context of Myth 1, is that by “stability,” Leopold meant something like “balance” or “equilibrium.” As Eric Freyfogle (2008) points out, many commentators quote the purported “summary moral maxim,” but few try to figure out what *Leopold* meant by “integrity,” “stability,” and “beauty.” With respect to stability in particular, Freyfogle suggests that these authors simply assume that Leopold meant that land communities should be static or unchanging,<sup>14</sup> or, like Callicott, they try to assimilate Leopold’s meaning to that of other ecologists.

However, Leopold did not use “stability” the way other ecologists of his time did. Leopold explicitly studied changing ecosystems, e.g., effects of fire and drought (Meine 2010). And he often contrasted slow, mild changes that land communities could adjust to, with rapid and drastic changes that led to dust-bowl type situations; this contrasting can be found within the “Land Ethic” essay itself.

Instead, as Julianne Warren (2016) persuasively demonstrates, by “stability” Leopold meant something closer to “land health”: the ability of the land to cycle nutrients efficiently and continuously over long periods of time, via long and diverse food chains, so that the land continues to sustain life over time and is capable of self-renewal. And this moves Leopold’s understanding of “stability” a lot closer to contemporary terms like “sustainability” or “resilience.”<sup>15</sup>

This improved interpretation avoids the hasty rejection of the land ethic for purportedly using an outdated notion of “stability.” It also directs us to consider actions that preserve or enhance self-renewal and thus land health, such as preserving soil health, preventing the extinction of species (preserving “integrity”), performing appropriate restorations, and making any changes *carefully*: all policy-relevant prescriptions.

### **Myth 6: Leopold's ethics are derived from Charles Darwin's “protosociobiological”**

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<sup>13</sup> See Meine (2010) for further discussion that traces Leopold’s changing views on the issues discussed in this section.

<sup>14</sup> This might seem an unlikely view for any biologist to hold, and indeed, dynamic equilibrium is probably a more common view, but it is not unheard of. See, e.g., Whittaker (1999).

<sup>15</sup> See Berkes et al. (2012) for an extended discussion of Leopold’s concept of “land health” and its connection to resilience.

## **perspective on ethical phenomena**

The sixth and last myth is the claim that Leopold's ethics are derived from Charles Darwin's "protosociobiological" perspective on ethical phenomena. According to an influential interpretation by Callicott (1987; see also 2013), Leopold, drawing on Darwin's account of ethics in the *Descent of Man*, believed that humans evolved to have bonds of "affection and sympathy" toward human non-relatives because it conferred advantages on communities who contained such individuals. Upon becoming ecologically literate, these "moral sentiments" would be "automatically triggered" toward the biotic community, thus conferring moral value on biotic communities.

This myth, like the others, should be rejected. Callicott's primary evidence that Leopold is drawing on Darwin's account of the evolution of ethics in the *Descent of Man* is Leopold's use of the phrase "struggle for existence." However, "struggle for existence" is an idea developed in the *Origin of Species*, not the *Descent of Man*; it's the title of Chapter 3 of the *Origin*, where Darwin discusses the interdependencies among organisms in the struggle for existence (Millstein 2015). Struggle for existence is more commonly associated with the competition between organisms for survival, but in the *Origin*, Darwin clarifies that this struggle for life is broader than competition, including, for example, a struggle to survive in the face of difficult climatic conditions. Darwin further points out that organisms (usually the more distantly related ones) that are engaged in a struggle for existence in fact *depend* on each other for survival, as does a bumblebee and a flower. Interdependence in this sense is a core theme of "The Land Ethic," and many of Leopold's phrases echo Darwin's from the *Origin* (Millstein 2015).

The rejection of this myth reveals that the land ethic is not dependent on the vagaries of human sentiment.<sup>16</sup> Rather, the basis for the land ethic derives from our interdependencies with other organisms, suggesting (again) that the focus of our conservation efforts should be on understanding, preserving, and (when relevant) restoring the interactions between organisms in a land community in order to maintain, promote, or restore land health.

### **3. Implications for conservation: The example of the Yolo Bypass**

A thorough discussion of the conservation implications of Leopold's land ethic would require a more elaborate and complete discussion of the land ethic than has been given here; the goal of this essay has been the more modest one to debunk the common myths that surround it. Still, an illustrative example can be provided, showing how the debunking of each myth has particular conservation implications (Myth 1 will not be discussed, since the conservation implications of rejecting it can best be seen through the rejection of some of the other myths).

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<sup>16</sup> Of course, Leopold thought that our feelings toward other organisms and toward the land community were relevant to how we would in fact behave toward it; he makes this point a number of times and in a number of places. My claim is only that there is no evidence that he thought that those moral sentiments formed the *basis* for our obligations – that is, there is no evidence that he thought that without those sentiments, we would have no ethical obligations. Rather, the textual evidence suggests that Leopold thought that our interdependence with other members of the land community forms the basis of our obligations towards it, regardless of our feelings (but again, our feelings do serve to motivate us to act).

Consider, for example, the Yolo Bypass in northern California's Sacramento Valley, close to the University of California, Davis, where I work. The Yolo Bypass is an engineered floodplain on the same location as the historical, natural floodplain of the Sacramento River. Part of a network of weirs and bypasses, it is intended to "mimic the Sacramento River's natural floodplain functions" (Sommer et al. 2001, 7). It is typically flooded during the winter months (the rainy season in California). The Yolo Bypass serves a variety of functions: it has provided flood control that has "saved valley communities numerous times" (Sommer et al. 2001, 9); it has allowed for seasonal agriculture in the late spring and summer, with crops such as sugar beets, rice, safflower, and corn (Sommer et al. 2001); it includes large areas of wetlands that are managed to provide habitat for migratory waterfowl and which also provide habitat for various species of shorebirds, raptors, songbirds, and mammals, including threatened species (Sommer et al. 2001); it is used for recreation and education (bird-watching, hiking, guided tours); and it provides key aquatic habitat for 42 fish species, including 15 native fish species, some of which are threatened or endangered (Sommer et al. 2001). Recent studies have focused on whether winter's flooded rice fields can serve as a rearing area for juvenile salmon; results are promising thus far (Katz et al. 2017).

Of course, the Yolo Bypass isn't "perfect." Proponents acknowledge improvements could be made to Yolo Bypass's design, and also, that the approach would not work in all regions (Sommer et al. 2001), although others maintain that "the potential of managing a working agricultural landscape for the combined benefits to fisheries, farming, flood protection, and native fish and wildlife species...should have broad applicability for the management of floodplains throughout California and beyond" (Katz et al. 2017). In any case, it seems to be an exemplar of restoration and conservation, with multiple benefits to humans and non-human species.

And yet, the myths identified in this essay would lead one to believe that the land ethic would be irrelevant to, or not support, this conservation effort.

With respect to Myth 2, clearly an ecosystem perspective is important to understanding the dynamics of the Yolo Bypass, given the central role of water to the whole system, and yet a community perspective that emphasizes trophic relationships, such as those between salmon and its main prey, dipterans and zooplankton, or between egrets and herons and their salmon prey, is also important (Sommer et al. 2001). Leopold's blended community/ecosystem land community concept, which becomes visible by rejecting Myth 2, thus captures both aspects of the Yolo Bypass. As Leopold emphasized, although "[m]ost animals merely circulate food within the terrestrial or aquatic circuit which is their habitat," many animals do "tap aquatic food chains and restore food to terrestrial circuits" or vice versa (1941, 19-20). Thus, "[s]oil and water health are not two problems, but one" (Leopold 1941, 22), with trophic interactions between organisms constituting the interconnected circulatory systems.

Those who accept Myth 3 would look only at the stability of the whole Yolo Bypass system and not acknowledge the importance of the many benefits to individual humans and non-humans outlined in the previous paragraph. In contrast, the revised picture of Leopold presented in this essay implies an endorsement of the extent to which a win-

win-win scenario has been achieved in the Yolo Bypass, providing good outcomes for humans, non-humans, and the land community as a whole.

Those who accept Myth 4 might either see the Yolo Bypass as irrelevant to the land ethic, since it is not a wilderness area, or might object to the Yolo Bypass in favor of returning the area to a natural floodplain. On the alternative reading of Leopold I have suggested, the fact that humans benefit from the managed system of the Yolo Bypass in a way that also benefits other species could be seen as a point in the Yolo Bypass's favor, although it would not remove the need for natural areas elsewhere. It is also notable that the Yolo Bypass seeks to mimic the former natural flooding to the extent possible, an approach that Leopold would likely endorse as one that has the greatest chances of success (and again, knowing what the natural area was like gives us some understanding of what "success" is like).

The relevance of debunking Myth 5 for the Yolo Bypass is less clear, in part because humans are continually intervening, so it might seem as though the land is not "self"-renewing (then again, we are part of the land community, so perhaps that is not a problem after all) and in part because the Yolo Bypass only dates back to the 1930s, so we do not know the extent of its ability to sustain life over a long period of time. But so far its soils seem to be successful in sustaining a diverse biota along with farming practices; that is, it seems to be the sort of restoration that the land ethic would favor, keeping in mind that not all human interventions would do so. (For example, in California there is currently controversy over the environmental sustainability of the "Delta tunnels" promoted by Governor Jerry Brown).

Finally, although Myth 6 would have us extend our moral sentiments toward the Yolo Bypass, in reality such an extension is probably limited. People do love and utilize the Yolo Bypass Wildlife Area, which is a subset of the Yolo Bypass, but for most people it is probably a place to visit rather than a community they feel a part of. And it is probably even less common for people to feel affection toward the Yolo Bypass as a whole. So, those who accept Myth 6 would have a very weak basis (at best) for maintaining the Yolo Bypass. On the other hand, the multiple human uses of the Yolo Bypass (flood control, agriculture, fishing, recreation and education) make our interdependence, which becomes the central focus of the land ethic once Myth 6 is rejected, clear. Interdependence (regardless of moral sentiment) is the reason that we have ethical obligations toward the Yolo Bypass.

#### **4. Conclusions**

Accepting all six myths described above entails accepting a distorted picture of Leopold, one where individuals are sacrificed to the good of the ecosystem, characterized in terms of its matter and energy flows, where the "good" of an ecosystem is understood in terms of outdated and unrealistic concepts of stability. It also means accepting a view where the only goal is to set aside ecosystems completely free of human encroachment, all of which is predicated on humans extending their moral sentiments (fellow feelings) to ecosystems.

Rejecting all six myths and accepting the alternative interpretations presented in this essays entails accepting a picture of Leopold where individuals and the land

communities they are a part of are both valued, with land communities consisting of interacting interdependent organisms, abiotic components, and matter/energy flow, where the “good” of a land community is understood in terms of its health, characterized in terms of its ability to continue the nutrient cycling necessary to sustain life over time, where our numerous goals include maintaining important ecological relationships and matter/energy flows, preserving soil health, and preventing the extinction of species, all of which is predicated on the fact that humans and other species are interdependent with each other, so that their fates are not separable. It presents an appealing, practical, and moderate picture of the land ethic.

In short, a more accurate reading of Leopold yields a more defensible and fruitful ethical basis for conservation policy.

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