Ecological Objects for Environmental Ethics

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1 Expanding our moral world

The emergence of theoretical ecology during the twentieth century advanced our understanding of what kinds of things might exist in our world. In particular, it suggested that objects like "ecological communities" and "ecosystems" might exist. In developing those ideas, ecology offered a new set of things we might care about or care for, and that development has both stimulated and challenged environmental ethics. Here, I consider how ecological objects like these may serve as objects of moral concern, and what questions about them deserve further investigation.

Questions about what kinds of things in the world one might be morally concerned about are relatively new. The dominant ethical traditions of the nineteenth and twentieth centuries were those broadly in the tradition of Immanuel Kant and forms of utilitarianism, in particular as developed by Jeremy Bentham and John Stuart Mill. Kantians argued that we ought to respect and protect "rational agency" (being capable of willing rationally about what to do). So, the question of whether a *thing* deserved our moral concern was determined by the empirical question of whether it possessed rational agency. For utilitarians like John Stuart Mill, happiness stood out as that which is good in itself, and the question of what we ought to care for could again be settled by answering an empirical question, the question of what things are capable of experiencing happiness. While Kantians assumed that only human beings were capable of rational agency, utilitarians, most conspicuously Jeremy Bentham, accepted that some animals could suffer and feel happiness, and that we should take this into account when making moral decisions. Recent scientific work in cognitive science and ethology, in particular, has confirmed Bentham's view that some non-human animals experience pleasure or happiness, and even that they are capable of reasoning, This has led to more widespread acceptance of the idea that individual sentient animals are objects of moral concern, whether they are human or non-human. If these beings are the focus of moral concern, however, other things such as habitats are of interest just because of their relationship to valuable animals. This can certainly ground a kind of environmental ethic: one focused around protecting the environment to benefit individual sentient organisms. However, this view differs from more traditional, anthropocentric ethics only in what things it understands as meeting its criteria for valuation.

Twentieth century ecology, however, offered new kinds of things, in the form of communities and ecosystems, and thus provoked the question whether any of them might warrant moral consideration. By "warranting moral consideration" I mean this: when we look around the world, we find that there are entities that we ought to take into account when we decide what to do. Kenneth Goodpaster (1978) described this group of things as what is "morally considerable." Twentieth century ecology, by describing new kinds of things, raised the question whether any of them—communities, ecosystems, and anything else—belongs in that group. Let us call these "ecological objects": non-phylogenetic things described by ecology that contain more than an individual organism and its parts. Might we have reason to value any such ecological objects in themselves? That is, might we have grounds for valuing them other than that we value the individual organisms within them? Are there reasons that any things other than individual organisms might deserve our moral consideration?

2 Moral considerability

To assess this question, we need to identify criteria for moral considerability. It is useful to partition this project into moral and ecological projects, though they must interact to answer it satisfactorily. The moral project is to identify reasons we might have for valuing ecological objects of a certain kind. The ecological project is to identify what kinds of ecological objects exist. Spanning these projects and not resolvable by either, in the domain of a field recently called philosophy of ecology, is the question of whether any ecological objects exist in such a way that they can be candidates for moral consideration.

Consider an Oak-Hickory forest community in lower New York, USA. It is composed of populations of White and Northern Red Oaks, Red Maples, and some dozens of other trees, as well as Grey Squirrel, Spotted Salamander, Black-capped Chickadee, and dozens of other plants, vertebrates, and invertebrates. Is this an object that is a candidate for moral consideration?

We must first ask whether it is an object at all. There are grounds for doubt about whether this community counts as "an object." Though it is composed of things we ordinarily think of as objects, it may not count as an object itself. We normally think of objects as things located in one place, like a sculpture in a garden, and we think of things located in many places as counting as many objects. Yet, if a sculpture is dismantled in order to be moved, and its pieces are shipped separately, it is still an object, though its parts are in many places. Now consider in contrast whether there could be an object whose parts are Charles Darwin's favorite pen and the tallest tree in South America. If the parts of objects can be in many places, it is hard to think of a reason why, in principle, this pen and tree cannot be considered an object, and indeed philosophers have generally agreed that it *could* count as an object in some sense. Still, it may strike us as missing something objects usually have—something besides spatio-temporal connection.

We can think about what it is missing by recognizing that, to warrant moral considerability, it is normally maintained that an object must also have *interests*. By this I do not mean that an object must be consciously interested *in* anything. I mean rather that there are things that can be good and bad for it, ways it can be affected positively or negatively (Goodpaster, 1978). If it is not possible to make something worse off, or

to harm it, it would seem odd to think that it matters morally. Our arbitrary pen and tree pair does not apparently have any significant interests. Why? I suggest that it does not have interests because it is not *causally integrated.* If a group of things is not causally connected to one another such that modifying one of them cannot affect the others, those things can have no *collective* interests worth considering, apart from any individual interests they might have. They cannot therefore form an object with interests of its own. Having interests, for an object, therefore requires causal integration. The pen and tree, even if they can be considered an object in *some* sense, cannot have interests because they are not causally integrated to any significant degree. It is for that reason that the possible object consisting of them is not even a candidate for moral consideration.

So, I have just suggested that causal integration is *necessary* for having interests. But is this all that's required? What is *sufficient* for having interests? Our general question about what kinds of things are morally considerable has become more focused. We should now ask, What *kinds* of causal connections among things are sufficient to yield ecological objects with interests?

In our Oak-Hickory community, for instance, Palm Warblers—songbirds that winter far to the south and breed far to the north of the forest—visit only during a period of a few weeks on their Spring and Fall migrations, and only a fraction of the eastern population visits the community. But during these brief visits, Palm Warblers serve as significant insectivores. Their causal relationship to the forest—the degree to which they exert changes on it—is dramatically greater than that of a Snowy Owl that passes overhead once on migration without landing. Given their limited, but non-negligible influence, are they part of the community? Is the owl? Our question about each potential community member therefore becomes: Are they causally connected to others in ways that generate an object with interests? And to answer that question, we must ask: What kinds of causes can play the role of connecting them in the right way?

3 Communities as ecological objects

I have mentioned this sample forest community as an example of a possible ecological object, but the questions raised about communities apply equally to other possible ecological objects like ecosystems, associations, guilds, and even the biosphere. In so far as ecosystems consist of unified causal processes, they can be more neatly delineated than communities, which are connected by a wide variety of causal relationships. However, both communities and ecosystems face the question of how much can be added to or subtracted from them without compromising their identities (Odenbaugh, 2007). Recognizing that there are other kinds of ecological objects, including ecosystems, in what follows I will focus on communities, mainly because a significant discussion has developed about them among environmental ethicists, environmental historians, and ecologists. In this continuing discourse, each group has repeatedly framed the question of the status of communities in terms of the theories of the early twentieth-century vegetation ecologists Frederic Clements and Henry Gleason, and I will argue that that has been a mistake.

The plant ecologies of Clements and Gleason will be familiar at least in outline to most readers of this chapter, in that they are widely used in textbooks and courses to in-

troduce not only plant succession but also community ecology more generally. Briefly, then: Clements's ecological theory has been associated with a pair of related claims: (1) that vegetation develops in any given area according to a pattern which is comparable to—or literally identical with—the development of an individual organism; (2) that the development of vegetation in any given area necessarily results in a predetermined type of vegetation, called that area's "climax," which is determined by the area's climate. Gleason's ecological theory has been associated with the rejection of these two claims, and has been identified with an alternative he called the "Individualistic Concept of Ecology." This theory has been represented as the view that individual plants disperse and establish independently of others, so that plant communities are merely unstructured aggregates of independent plants. The individualism is often taken to apply to populations, such that the claim is that communities are unstructured aggregates of populations.

Ecologists, historians of ecology, and environmental historians have often presented the historical trajectory of these views as an eclipse. Ronald Tobey (1981), for instance, presents Clements's view as the dominant plant-ecology paradigm of the 1910s and 20s, before it was replaced in the 1930s by Gleason's theory. Cementing the triumph, the latter half of the twentieth century saw the emergence in ecology of non-equilibrium theory on a nominally Gleasonian model. Though presented as theories of vegetation, Clements's and Gleason's accounts have been extended by others to describe communities more generally, incorporating animals and other taxa. Clements's view is typically presented as naïve and holistic, invoking mysterious causal connections between the components of communities, and Gleason's as sophisticated, reductionist, and causally unassuming. Thus, the standard narrative is a story of scientific progress.

Prominent environmental ethicists and environmental historians have embraced the eclipse narrative but resisted its characterization as progressive, to the point of raising alarm about its threat to environmental ethics. The putative threat arises from the presumed dependence of environmental ethics on a Clementsian understanding of communities. Baird Callicott, for instance, has argued that there are "residual traces of the early twentieth-century Clementsian super-organism paradigm" in Aldo Leopold's land ethic and in the environmental ethics tradition following him (Callicott 1996, 358). The alignment between Leopold's land ethic and Clements's ecology entails that the waning of the latter threatens the former. In this, Callicott follows environmental historian Donald Worster (1990). Callicott describes the "intellectual watershed" moment when,

> Donald Worster debuted his essay, 'The Ecology of Order and Chaos,' in which he summarized and documented, for the community of environmental humanists, the ethically untoward and disturbing shift in ecology from the mid-century 'balance of nature paradigm' to the fin-de-siècle 'flux of nature paradigm' (as the principal proponent of the latter, Steward Pickett, styles them)—the ecology of order and the ecology of chaos, respectively, of Worster's title. (Callicott 1999, 15)

Environmental historian Andrew Isenberg similarly aligns the undermining of Clementsian ecology with the embrace of "chaos" and non-equilibrium ecology:

> Although one's impression of the western plains depends largely on the

> breadth of one's view—the last 10,000 years or the last 200—such changes contradict the notion of self-regulating equilibrium inherent in the early twentieth-century ecologists' concepts of 'climax community' and 'ecosystem.' In recent years, particularly as 'chaos theory' has become an important part of scientific study, ecologists have shifted away from the idea of self-regulating equilibrium in nature and toward a conception of nature as prone to unpredictable change. (Isenberg 2001, 11)

And historian Paul Sutter similarly finds a threat to wilderness-preservation in ecologists' adoption of flux instead of equilibrium:

> The ecological critique of wilderness is premised on shifting scientific understandings of how nature works. Where ecologists once saw order, harmony, equilibrium, and purpose in the natural world, many now see stochasticity, competition, and pervasive disturbance. Utilizing the insights of this new ecology, one group of critics has suggested that the complexity of natural processes invariably complicates attempts to preserve wilderness. To preserve wilderness, ecologists tell us, is not to keep nature in a timeless equilibrium. Rather, it is to draw boundaries around a world in flux. (Sutter 2002)

It is strange to think of competition as a current interest opposed to order, harmony, and equilibrium, as it has been discussed and regarded as consistent with those qualities by ecologists extending back to Darwin. But more generally, in terms recalling ancient philosopher Heraclitus's view that everything in nature is in flux, Sutter offers a vision of recent ecology undermining nature-preservation by replacing the orderly, causally-integrated, equilibrial community with chaos and disorder.

One patent flaw in these and similar claims is that chaos theory does not embrace flux and disorder. These environmentalist authors are concerned about disorder, while chaos theory, in contrast, describes a kind of mathematically-describable order in seemingly-disordered systems—unstable, aperiodic behavior in deterministic, nonlinear systems. Moreover, employing chaos theory to describe systems presupposes that such systems can be isolated for description, which is the very assumption supposed to be threatened by chaos. This confusion is a relatively minor problem because it is terminological. Even so, it reflects an inattentive engagement with ecological science that is also at the heart of a second, more significant problem with these claims.

4 The Clements/Gleason spectrum revisited

The environmental ethicists and historians above argue that ecologists embracing a Gleasonian understanding of communities have undermined a Clementsian interpretation of communities on which nature-preservation conceptually depends. However, this contrast supposes that the populations that make up Clementsian communities are causally connected in a way that populations in Gleasonian communities are not.

This picture misrepresents both Clements and Gleason. I have elsewhere argued from analyses of their explanatory efforts (Eliot 2007 and Eliot 2011) that while Clements and Gleason differ in the emphasis they place on certain causes, they agree that

vegetation is a function of the environmental sorting of potential immigrants. I will reiterate a few of the key points here. The main one is that though Clements attaches a stronger causal role to the environmental sorting, and Gleason to the patterns of distribution of immigrants, there is no kind of cause Clements employs in his explanations of vegetation that Gleason does not also employ in his. Consequently, Clements does not suggest any special connection among plants or other members of a community that Gleason does not also assert. In both theories, potential immigrants are subject to environmental sorting, and that is the sum of the kinds of cause explaining vegetation.

Unfortunately, the best defense of this reanalysis is a detailed account of how Clements does explain vegetation while doing without other kinds of causes attributed to his theory. But I note a few points. First, Clements does not assert that communities must be composed of certain particular species. He writes: "In the case of invasion, it is obvious that the failure of the dominants of a particular stage to reach the area would produce striking disturbances in development. Likewise, the appearance of alien dominants or potential climax species would profoundly affect the usual life-history" of a community (Clements 1916, 33). It is consistent with this view that such a situation never arises, but elsewhere Clements remarks that "unlikeness and variation are universally present in vegetation" (Clements 1907, 289). Second, Clements does not understand vegetation to have even the same degree of internal functional integration that microrganisms like paramecia have, for instance, much less that of macrovertebrates. Such organisms have physiologies, while in plant communities, every interaction among plants is indirect, mediated by some intervening medium like air, soil, or environmental nutrients. Third, what determines whether a population is part of community for Clements is the degree to which it causally contributes to creating habitat for other plants or is produced by the same habitat. It is not a function of something like causal bonds such as connect our nervous and circulatory systems.[1]

For his part, Gleason—often presented as embracing disorder—accepts that such indirect causes structure vegetation in exactly the same way. I offer just one indication of what structure Gleason allows. For Clements, all plant succession is produced by four kinds of causes: primary, reactive, ecesic, and stabilizing, and the strongest source of causal connection between organisms in communities consists of what he calls "reactive causes." Reactive causes are those concerning the relationships among individual plants, and in particular those influences of plants on their environments which modify those environments. Such modifications are in turn capable of affecting the fates of nearby plants and potential immigrants. That is, reaction serves, for Clements, as the one kind of causal relationship which unites communities, and which is supposed to be absent in a Gleasonian community. However, here Gleason describes it:

> Nevertheless, these plants have definitely an influence on each other. To select perfectly obvious examples, it is clear that the larger plant affects the light and, through its leaf-fall, the soil environment of the smaller, while the latter intercepts rainwater and reduces the light for seedlings of the larger one. The two plants have intersecting spheres of influence; each interferes with the environment of the other.… Intensifying the influence of either plant within its sphere has a direct effect on the life and well-being

[1] Significantly more detailed analysis can be found in Eliot (2007), Eliot (2011), and Hagen (1988)

> of the other. It may act either favorably or unfavorably. (Gleason 1936a, 444–445)

This exemplifies what Clements calls "reaction." Gleason moreover writes in a different paper from 1936 that "the joint reaction of the whole population is one of the most important factors in maintaining the uniformity and the equilibrium, and therefore the identity of the association" (Gleason 1936b, 44–45). In other words, the one kind of causal relationship supposed to distinguish the Clementsian community is not only accepted by Gleason, but moreover taken by him to be essential to its equilibrium.[2]

So, what does this similarity demonstrate? To recapitulate, our question about what grounds the collective interests of communities produced the question of what kinds of causes might integrate them. This reminded us that ecologists have sometimes expressed aversion towards causal integration or causal structure for communities, and have framed that suspicion as a rejection of Clementsian ecology, adopting a Gleasonian posture. Environmental ethicists have responded with alarm framed in the same terms. However, if the causal commitments of even these two putatively opposite theories resemble one another quite closely, we should be suspicious of the durability of both the aversion and the alarm.

On a more constructive note, this result also suggests that to answer our question about the kinds of causes that can hold communities together, we need not dabble in obscure or mysterious kinds of causes besides Gleasonian ones. Let us notice that some organisms do have considerably more direct interactions than the indirect relationships Clements and Gleason represented (like diminishing the sunlight available to understory plants): some organisms live on one another or consume one another. But that notwithstanding, in the effort to provide environmental ethics with an accurate account of what ecological objects exist, we do not need to contest the terrain between Clements and Gleason. What varies along the spectrum between Clements and Gleason is not kinds of causation, but degree of emphasis on habitat or on properties of organisms themselves. Clements emphasizes the former, and Gleason the latter. If even Clements did not employ other kinds of causation in his explanatory theory, we do not need to, to identify communities. All the kinds of causation needed to identify communities are present at the Gleasonian end. They are the various ways each population affects the numbers of others, both direct (as with consumption) and mediated (as with competition for an abiotic resource). And these are the causes we need to work with to determine identity conditions for communities, for environmental ethics.

5 Kinds of communities

So, what causal relationships should we consider among populations, towards establishing what might be morally considerable? We should consider the ways populations directly and indirectly affect the numbers of other populations. Among these, ecologists discuss the familiar suite of mutualism, competition, predation, parasitism, and dependence. Not every community includes all of these relationships, and communities may differ in which of these relationships bind them.

[2]For further analysis of Gleason's theory see Eliot (2011) and Nicolson (1990)

First, imagine a community consisting solely of two populations competing for a limited resource, and not competing with other organisms. This pair represents a community in so far as the numbers of each population causally bear on the fate of the other. If our interest is in long-term forecasting for these taxa, we may pick out this community as a unit because our interest in forecasting focuses our attention on a particular causal relation (competition), and we have identified an object delimited by that relation.

Second, consider the different community we would have to preserve if we wanted to preserve a particular species that is a member of it. We should start by picking out a set of populations connected to the target population by dependence relationships—dependence at least in one direction, whether facultative or obligate. This second community is delimited by a different kind of causal relationship, and may differ in its membership from one determined by another kind of relationship like competition.

I suggest that each of these two communities would be a real object, in so far as its component populations are connected by a particular kind of causal connection. These communities are causally integrated, and so are not arbitrary in the way the pen-and-tree object seems to most people. Though they might overlap in a single place—e.g. within the oak-maple forest in New York—they are recognizable as distinct objects. Though each is real, they are determined by different sets of causes. In this way, what counts as a community may vary depending on what kind of interest we bring to describing it, and still be real. Its boundaries are determined by the set of causal relations relevant to some interest.[3] Among those interests may be its preservation.

6 Conclusion: towards morally significant objects

Ecology offers ethics a variety of candidates for moral considerability. To be a candidate for moral consideration, an object must have interests, and having interests requires some form of causal integration. But what kind of causal integration is sufficient? Some environmentalists have worried that in the case of communities it must be a strong form of causal integration like they ascribe to Clementsian ecology, and have worried that the rise of Gleasonian ecology undermines moral considerability. If, however, Clements and Gleason agree about the kinds of causation that structure communities, as I have suggested, we should not worry that Gleasonian communities are less suitable for moral consideration than Clementsian ones by virtue of lacking some exotic form of causal integration. So, what kind of integration will do? Many kinds are sufficient, I suggest, and each can produce communities that are adequately real objects for moral scrutiny.

That is not to assert that communities or ecosystems are morally considerable. That further conclusion requires work in ethics. I have argued just that as objects, communities are up to the task of being evaluated. They are sufficiently real in the right sort of way. A significant problem remains for communities in that the criteria I have advanced do not sufficiently answer the question Odenbaugh (2007) asks about what additions or subtractions from a community are sufficient to change its identity? A similar question applies to ecosystems. Ecosystems, though I have sidestepped them here, are causally integrated even more clearly than communities are, in that they consist of causal pro-

[3]Lockwood (2011) independently arrives at a similar conclusion and provides useful analysis of insect communities.

cesses, and so are adequate objects for the same reasons. Still, they deserve further analysis. Besides ecosystems, there may also be further kinds of ecological objects deserving moral attention, like associations, guilds, or even the biosphere. And each or all of these kinds of object might have morally-significant properties beyond those I have mentioned or beyond what we know about.

To note what is already on the table in this vein, there may indeed exist causal relationships integrating communities other than direct and mediated Gleasonian causal interactions. Gregory Mikkelson (2004) and Kim Sterelny (2006) have each recently argued that communities have collective causal properties, if, for example diversity—a property of whole communities—causally affects community stability. Sandra Mitchell (2009) has recently argued that identifying emergent properties is fundamental to understanding complex biological systems, and if either such properties, whether community-level or emergent, have causal efficacy, they may determine ecological objects with more potential for moral considerability than those defended here.

I have argued just that ecological objects familiar from twentieth century ecology are sufficient for undergoing moral scrutiny. There are open questions about ecological objects, and fruitful projects remaining for philosophy of ecology. But to do its work of figuring out what arguments can be made for the moral considerability of ecological objects, environmental ethics does not require objects more robust than those ecology already offers.

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