

**IS IT POSSIBLE TO CARE FOR ECOSYSTEMS?
POLICY PARALYSIS AND ECOSYSTEM MANAGEMENT**

Robert K. Garcia and Jonathan Newman

Ethics, Policy & Environment, Forthcoming.

This is a penultimate draft. Please cite the final version.

Author Information:

Robert K. Garcia
Texas A&M University
robertkgarcia@gmail.com
www.robertkgarcia.com

Jonathan Newman
University of Guelph
jnewmaoi@uoguelph.ca
<http://www.uoguelph.ca/~jnewmaoi/>

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Citation Information:

Garcia, R. and Newman, J. (Forthcoming). "Is it Possible to Care for Ecosystems? Policy Paralysis and Ecosystem Management", *Ethics, Policy & Environment*.

**IS IT POSSIBLE TO CARE FOR ECOSYSTEMS?
POLICY PARALYSIS AND ECOSYSTEM MANAGEMENT**

Robert K. Garcia (Texas A&M University) and
Jonathan Newman (University of Guelph)

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Abstract

Conservationists have two (non-mutually exclusive) types of arguments for why we should conserve ecosystems, instrumental and intrinsic value arguments. Instrumental arguments contend that we ought to conserve ecosystems because of the benefits that humans, or other morally relevant individuals, derive from ecosystems. Conservationists are often loath to rely too heavily on the instrumental argument because it could potentially force them to admit that some ecosystems are not at all useful to humans, or that if they are, they are not *more* useful than alternative configurations of those ecosystems. Consequently, conservationists often resort to an intrinsic value argument, contending that ecosystems are objectively valuable *as ends in themselves, rather than merely as means to an end*. If ecosystems have intrinsic value, then they have moral standing, which means that we must consider their needs and interests in any decisions we make about them. This paper concerns the significance of this move for individual and collective action on behalf of ecosystems. We show that even if there *were* ecosystems that had moral standing, we would lack adequate practical reasons to act on their behalf.

Keywords:

precautionary principle, ecosystem management, holism, ecoholism

Introduction

Ecosystems are said to provide functions and services for the wellbeing of humans and other individuals. However, not all ecosystems are important in these ways, and even if they are, they may not be *more* important than alternative uses or configurations. Relying on such instrumental values can logically commit conservationists to policies that are seemingly at odds with other parts of the conservationists' agenda, e.g. species additions, species removals, and wholesale alterations of ecosystems if such changes enhanced the usefulness of those systems to humans (or possibly to other sentient organisms). Conservationists might argue that such alterations would never result in more valuable functioning. That is an empirical argument that in principle could be evaluated. Even if we accept, for the sake of argument, that such alterations will *rarely* result in higher functioning, if it were true in even one instance, a conservationist who relied on the instrumental defense would be committed to a policy of alteration for that instance.

Faced with the unpalatability of these commitments and the realization that conservation will not always be more economically valuable (in the broadest sense) than development, most conservationists adopt a view called 'Ecoholism', or simply 'Holism'. According to Holism, ecosystems are objectively real and have objective intrinsic moral value. These two components of Holism merit clarification.

First, Holism involves the substantive ontological premise that ecosystems are *objectively real* in that they "exist as such in nature" and must be "found and identified instead of being defined and delimited" (Jax 2006, p. 243). This component of Holism will be crucial for our discussion, so it will be useful to give it a name:

Independent Existence: At least some things we call 'ecosystems' are real natural entities that exist independently of our mental conceptions.

In other words, on Holism, ecosystems are not mathematical models or conceptual apparatuses for predicting or understanding what is going on in a given spatiotemporal

region. Rather, like planets, people, and particles, ecosystems exist independently of whether we think or care about them.

Second, in addition to taking ecosystems to be objectively real, Holism takes ecosystems to have objective intrinsic moral value. Their moral value is 'objective' in the sense that an ecosystem has moral value regardless of whether or not the ecosystem happens to be valued by individual valuers. If the value of an ecosystem were not objective in this sense, then it would be dependent on the tastes and preferences of individual valuers—tastes that are demonstrably inconsistent, and therefore lack any form of moral force. The moral value of an ecosystem is said to be 'intrinsic', or 'final', in that an ecosystem has moral value as an end in itself. And, finally, it should be emphasized that on Holism, an ecosystem *itself* is among the bearers of final value—rather than some *property* the ecosystem might have, such as health, integrity, etc. In what follows, 'intrinsic value' is elliptical for 'objective intrinsic moral value'.

In the field of environmental ethics, Holism is one of several competing views about the scope of the moral community, as shown in Figure 1.

[Figure 1 is displayed on the next page.]

Figure 1. A hierarchy of moral views. Sentient animals are those that can consciously experience pain and pleasure. Research suggests that these include all vertebrate animals and possibly cephalopods, but probably exclude other invertebrates, and definitely exclude plants, fungi, bacteria and archea (Varner 2002). Non-living parts of the natural world would include ecosystems, species, populations, habitats, etc. While things like species are comprised of living organisms, the collective, ‘species’, is not itself a living thing, neither are ecosystems. Figure adapted from Varner (2002).

Counts morally?	Moral Views			
	Anthropocentrism	Sentientism	Biocentric Individualism	Holism
Humans	Yes	Yes	Yes	Yes
Sentient animals	No	Yes	Yes	Yes
All living things	No	No	Yes	Yes
Non-living parts of the natural world	No	No	No	Yes

If Holists are right that ecosystems exist independently and have objective intrinsic moral value, then ecosystems have *moral standing*. This would mean that moral agents such as ourselves ought to take into account the needs and interests of ecosystems when we make decisions affecting those systems. Thus, if there are good reasons for thinking that Holism is true, then such reasons provide conservationists with a powerful argument—one that holds even for ecosystems that have no instrumental value.

In this paper we assess the Holist's case for motivating and justifying individual or collective action on behalf of ecosystems.

Epistemic vs. Pragmatic Cases For Holism

As noted, in addition to *Independent Existence*, Holism is committed to the thesis that ecosystems have moral standing. Of course, the question of standing is moot if *Independent Existence* is false.¹ Accordingly, we will focus on *Independent Existence*.

The traditional distinction between epistemic and pragmatic reasons allows us to pose two questions. First, are

¹ A referee observes that one might hold that ecosystems both (i) exist *mind-dependently* in that they are individuated (metaphysically and not merely epistemologically—see Lowe (2003, p. 75-77)) by our (say) theoretical interests, and (ii) have intrinsic moral value in virtue of *mind-independent* facts about the world. The conjunction of (i) and (ii)—call it the 'hybrid view'—is similar to how one might think about artwork. For example, one might think that something's *being a sculpture* (rather than being a mere lump of clay) is dependent on the minds of those in the art community, yet one might also hold that the sculpture's *being beautiful* is an objective fact about it. The hybrid view marks an interesting position in the logical space of views about ecosystems and merits more attention that we can give it here. However, the hybrid view is flatly incompatible with Holism—at least the standard version of Holism under consideration here. Indeed, we would consider this paper a success if it compelled conservationists to retreat from Holism to the hybrid view. Nevertheless, we doubt that such a retreat would be attractive to conservationists. For starters, it is unclear what sort of moral obligation we would have—if any—to conserve or protect ecosystems if they are entities whose very existence depends on our own theories or ways of classifying the world. At the very least, conservationism would enjoy significantly less moral force on the hybrid view than on Holism.

there good reasons to think that the *Independent Existence* thesis is true or probably true? In other words, are conservationists correct in believing that there really are ecosystems? We call this the Epistemic Case for Holism. Second, even if we lack convincing reasons to *believe* that *Independent Existence* is true, are there compelling reasons to *behave (act) as if* it is true? In other words, are there pragmatic reasons for acting as if there are ecosystems (even while suspending judgment as to whether they exist)? We call this the Pragmatic Case for Holism. Below we will suggest that the Epistemic Case is problematic and at best disputable. Unless the challenges to the Epistemic Case can be met, Holism must rely on the Pragmatic Case. We argue, however, that the Pragmatic Case fails to be *action guiding*, and therefore we do not have good practical reasons to behave *as if* there really are ecosystems.

Ecosystem Ontologies

In assessing the *Independent Existence* claim, we meet an initial two-fold complication. First, as noted by Kurt Jax, “*there has been no clear convergence of [ecosystem] definitions throughout the decades*” (2006, p. 246). Rather, as illustrated in Figure 2, at present there is a rich diversity of putatively competing ecosystem concepts. Second, there are different *interpretive stances* one can take towards any given ecosystem concept. The far-right column of Figure 2 shows the *intended stance* — this is the interpretive stance taken by the author(s) of each ecosystem concept. Frequently, the intended stance is anti-realist — the author(s) takes her ecosystem concept to be a useful fiction, simply a way to divide up nature into smaller chunks for the purposes of study or description. In some cases, the intended stance is realist — the author takes there to be at least one mind-independent natural entity answering to her ecosystem concept. And, as noted by Jax (2006), for many ecosystem concepts, the intended stance is unclear. Of course, there is nothing mandatory about the intended stances. Depending on how you assess the relevant considerations, you might, in principle, take a realist or anti-realist stance towards *any* of these ecosystem concepts. In some cases, this might involve *rejecting* the author’s intended stance. Furthermore, one might take different interpretive stances to different ecosystem concepts. For example, one

might take a realist stance towards Lindeman ecosystems and an anti-realist stance towards Dunbar ecosystems.

This twofold complication — the diversity of extant ecosystem concepts and the different possible interpretive stances — yields a number of *overall* positions one might take. Call any such overall position an ‘ecosystem ontology’.

[Figure 2 is displayed on the next two pages.]

Figure 2. Figure and definitions adapted from Jax (2006). Boundary criteria: **Topography** indicates that the boundaries of the ecosystem should be drawn by features more or less visible directly in space, either through differences in features like land/water boundaries, or between more or less homogeneous patches of organisms and abiotic variables, and includes cases where the boundaries are completely arbitrary. **Process** indicates that the boundaries of an ecosystem should be drawn based on interactions between components of the ecosystem. **Statistical** denotes that the boundaries are determined by observing the distribution patterns of the elements of ecosystems. **Functional** denotes that the boundaries are determined by observing the interactions between the elements of the ecosystems. Functional relationships can be seen as necessary to call an ecological unit an ecosystem. These relationships can take different forms and degrees. On the one extreme, the elements of a unit may not need to display any interrelations at all, or they might require: self-regulation, equilibrium states, and relative functional autonomy. Note that Jax calls the realist status ‘ontological’ and the anti-realist status ‘epistemological’. What conclusions ought one draw from this plethora of ecosystem concepts? Jax concludes: “Given the history of the concept “ecosystem” (Hagen 1992; Golley 1993; Jax 1998) and the epistemological status of ecological units (Jax 2006), there is not a single “right” definition for the term “ecosystem”. There can be different useful definitions for different purposes.” (Jax 2007). Sagoff is less charitable: “What are called natural ecosystems ... are so mixed up, contingent, fractious, intractable, unexpected, protean, erratic, changeable, unpredictable, fickle, variable, and dodgy ... [even ecologists find them hard to pin down].” (Sagoff 2014, pg. 253, James 2013, pg. 264).

Author	Boundary Criterion, Type	Degree of Internal Relationships	Author's Stated or Implied Ontological Status
Tansley (1935)	Process, Functional	High, unspecific	Anti-realist
Rowe (1961)	Topography, Statistical	Low	Anti-realist
Stöcker (1979)	Process, Functional	Unimportant	Anti-realist
Likens & Bormann (1995)	Topography or interactions, functional	Medium	Anti-realist
Lindeman (1942)	Topography, Functional	Low	Unclear
Odum (1953)	Process, Functional	Intermediate, low specificity	Unclear
Klijn & Udo de Haes (1994)	Topography, Statistical	Low	Unclear
Dunbar (1972)	Topography, Functional	High	Realist
Jørgensen et al (1992)	Process, Functional	Unclear	Realist
Odenbaugh (2010)	Unclear	High	Realist

One ecosystem ontology is what we will call *global anti-realism*, which takes an anti-realist stance towards *all* ecosystem concepts. On this view, *Independent Existence* is false: strictly speaking, there are no ecosystems of any kind that exist mind-independently. Opposed to global anti-realism is *realism*, which affirms *Independent Existence* and takes a realist stance towards at least one ecosystem concept. Realists agree that there is at least one kind of mind-independent ecosystem. Realists disagree, however, over *how many* kinds of those ecosystems there are. A *pluralist* takes a realist stance towards two or more ecosystem concepts and holds that these are conceptions of fundamentally different kinds of ecosystems, all of which exist mind-independently. A *monist* holds that there is only one kind of ecosystem that exists mind-independently. There are two ways to be a monist. An *exclusivist* is a monist who takes a realist stance towards exactly one ecosystem concept and an anti-realist stance towards the rest. An *inclusivist* is a monist who takes a realist stance towards two or more ecosystem concepts, but argues that these are different concepts of the same kind of natural entity. For example, an inclusivist might take a realist stance towards both Lindeman and Dunbar ecosystems, but hold that these are different ways of conceptualizing the very same kind of natural ecological unit.

Because Holism requires some version of realism, the Epistemic Case for *Independent Existence* turns on this question: How good are the reasons favoring a realist ecosystem ontology, whether monist (exclusivist or inclusivist) or pluralist?

The Epistemic Case

Ecological science has given rise to the variety of ecosystem concepts, so it is important to ask to what extent the scientific considerations favor a realist ecosystem ontology. The current state of thinking in the field of ecology is probably best summed up by Jax (2007):

Given the history of the concept “ecosystem” (Hagen 1992; Golley 1993; Jax 1998) and the epistemological [anti-realist] status of ecological units (Jax 2006), there is not a single ‘right’ definition for the term

‘ecosystem’. There can be different useful definitions for different purposes.

The different definitions of ‘ecosystem’ mark various research traditions in ecology, each working with its own preferred ecosystem concept. Naturally, those working within a particular tradition tend to prefer their own ecosystem concept over the others. This preference, however, is based more on the particular research interests of an ecologist than on objective empirical grounds or compelling scientific arguments (de Laplante, pers. com.). For those interested, we note that a similar conceptual equivalence is at play among the 26+ concepts of ‘species’ (see Pigliucci 2003).

Indeed, the conceptual diversity displayed in Figure 2 indicates that the empirical evidence is consistent with a range of conflicting views about the ontological status of ecosystems. As shown in Figure 2, with respect to their intended stances, most ecosystem concepts are either unclear or explicitly anti-realist. A relative minority have an explicitly realist intended stance, but, as Jax notes, the realism overreaches the empirical data and is based on speculative metaphysical assumptions (Jax, 2007, p. 244). Put differently, with respect to the successes of ecological science, the explanatory power of realism is at least matched by that of global anti-realism: neither ontology has a reasonable claim to being the *best* explanation of the successes of ecological science. Thus, the Epistemic Case is unconvincing: the evidence fails to make realism more likely than global anti-realism. In fact, we think the evidence makes realism *less* likely than global anti-realism. But set that aside. For our purposes, we only need the following weaker thesis:

Underdetermination: The empirical considerations underdetermine the choice between a realist and anti-realist ecosystem ontology.

In other words, given the available evidence, realism and global anti-realism are equally likely to be true.²

² Note that we are not using the so-called Principle of Indifference here. Roughly, this principle says that in the total absence of evidence you should assign equal probability to each mutually exclusive possibility. The argument does not depend on this

We take *Underdetermination* to be a relatively uncontroversial verdict on the Epistemic Case.³ However, our primary aim is not to provide a comprehensive defense of *Underdetermination* but to assess the prospects of the Pragmatic Case. To this end, the thesis is important because it shows that the Pragmatic Case is both necessary and possible.

On the one hand, if the Epistemic Case were convincing, the Pragmatic Case would be unnecessary. In other words, if we had good reasons for *believing* that ecosystems were real, then we wouldn't need further reasons for *acting as if* they were real. Thus, because the Epistemic Case fails, the Holist must resort to pragmatic considerations to motivate action on behalf of ecosystems.

On the other hand, the Pragmatic Case requires a context of epistemic uncertainty. This is because the most natural and promising way to construct a pragmatic case for Holism is by appealing to the so-called *precautionary principle*.⁴ In a catch-phrase, the principle says "better safe than sorry" (Sunstein 2003). The principle is applicable only in a context of epistemic uncertainty, where "*we either lack probability information, or have reason to distrust the information we have*" (Gardiner 2006, p. 49). According to *Underdetermination*, the Holist finds herself in exactly this

controversial principle. In fact, it would not apply here because, as noted, *there is evidence for both realism and global anti-realism*. So, the principle of indifference does not apply in this context. The main argument only requires the thesis that realism and global anti-realism are equally likely to be true.

³ Exactly how compelling must an epistemic case be for it to provide sufficient grounds for accepting realism? Fortunately, for our purposes we do not need to provide a *specific* answer to this

⁴ Our working assumption is that the strongest and most promising extant version of a pragmatic case for Holism is one that appeals to a precautionary principle. Although space forbids a comprehensive defense of this assumption here, perhaps we may be permitted to note that it seems entirely unclear how a viable case for Holism could avoid a precautionary approach that relies (even if tacitly) on a precautionary principle. Notwithstanding this point, readers who think that there is a viable non-precautionary pragmatic case for Holism are welcome to see our aim here as restricted—to show the failure of an important *kind* of pragmatic case for Holism. Whether a viable pragmatic case for Holism can be constructed without appealing to a precautionary principle remains to be seen.

type of context. The thesis does not say that the Epistemic Case fails so utterly as to tip the scales towards global anti-realism. Rather, it assigns equal probability to the two ontologies. This epistemic uncertainty makes the Pragmatic Case possible since, after all, if we had good reasons to think that ecosystems are not real, then there would be no point in acting *as if* they might be. Thus, although *Underdetermination* says that the Epistemic Case fails, it also indicates that the Pragmatic Case is both necessary and possible.⁵

It seems, then, that the Holist has a great deal riding on the Pragmatic Case.⁶ We take this up next, and here we will see the main thesis of our argument: *A context in which the Pragmatic Case is both necessary and possible is also a context in which the Pragmatic Case cannot succeed.*

The Pragmatic Case

If ecosystems are independently existing things and they possess objective intrinsic moral value (i.e. if Holism is true), then it must be possible to harm an ecosystem in a morally

⁵ Note that the version of the precautionary principle being discussed here is not the extreme version that has been widely rejected in the literature. The implausible version of the principle is the sort that can be used to recommend precaution based on mere possibilities. As an example, one might use the latter principle to argue that, for all we know (it is possible that) there is an invisible person in the building, so we shouldn't demolish it. But the argument here is not deploying this version of the principle. The claim isn't that there is an absence of any evidence or indications regarding the truth of realism or global anti-realism. Rather, as noted, there *is* evidence for each, but the evidence is (or, for the sake of argument, can be presumed to be) counterbalanced and thus underdetermining with respect to those two theories. So, the argument here does not require the extreme version of precautionary principle.

⁶ It may be that using the precautionary principle to range over ecosystem ontologies is an unusual application of it. But to depict holism as using the principle in this way is not to construct a strawman of the view. After all, precautionary principles are widely used in environmental arguments. And, if the holist is not using (albeit tacitly) a precautionary principle, then it is not clear how the holist can rely on the Pragmatic Case. The alternative decision-making tools are generally acknowledged to be Cost-Benefit Analysis or Risk Assessment, and neither seems applicable here.

significant way. In traditional ego-based normative ethical theories, harm amounts to failing to respect the independent interests of the individual who possesses the intrinsic value. Identifying the independent interests of an ecosystem is a philosophically difficult task.⁷ Anthropomorphisms aside, there is certainly nothing that an ecosystem *cares* about, and even taking the broader view of interests as ‘welfare interests’, it is difficult to identify what it means for an ecosystem to fair ill or well that is independent of the welfare (or conscious) interests of the individual plants and animals that comprise the ecosystem. If it is not possible to morally harm an ecosystem, then ecosystems do not possess intrinsic value and we moral agents are not obligated to consider ecosystems in our decisions, except insofar as they affect other moral patients. But the latter consequent is flatly at odds with Holism. As we said in the ‘Epistemic vs. Pragmatic Cases For Holism’ section, Holism requires both that ecosystems have intrinsic value, and that *Independent Existence* is true. We said that if the latter is false, then the question of intrinsic value is moot. Let us assume, for the sake of argument, that it is possible to identify the independent interests of an ecosystem. Whatever those interests are, it seems unlikely that they will be identical for all ecosystems. For example, a prairie ecosystem is unlikely to have the same welfare interests as a pond ecosystem. To anticipate what we say below, it also seems unlikely that fundamentally different *kinds* of ecosystems—such as Dunbar and Lindeman ecosystems—will have the same welfare interests. For our purposes, however, we do not need the thesis that it is unlikely that different kinds of ecosystems will have different welfare interests. Rather, we only need the following weaker thesis:

Varied Interests: For all we know, if there are ecosystems, then it is false that all ecosystems share all and only the same welfare interests.

In effect, *Varied Interests* says that we are in no position to rule out the possibility that fundamentally different kinds of ecosystems will have (perhaps fundamentally) different welfare interests.

⁷ See the discussion in Varner (1991).

In many situations where the epistemic case is uncertain, there will be a moral argument for behaving *as if* the epistemic case were certain. For example, the problem of animal sentience is epistemically uncertain. We can never know with certainty that, for example, dogs are capable of consciously experiencing pain. The best we can do is make a weight-of-evidence argument that they can and that they do.

If a dog can consciously experience pain, then it would be morally wrong to cause a dog pain for no good reason. As an ethical position, we apply a form of the Precautionary Principle and take the pragmatic position that we ought to act *as if* dogs can consciously feel pain, because of what is at stake if we demand epistemic certainty before we extend moral consideration to dogs. In this case the pragmatic argument has the following form:

With respect to animal sentience, it doesn't matter whether the evidence makes it more likely than not that dogs are sentient. For all we know, dogs are sentient. And, if dogs are actually sentient and we fail to treat them as such, then they will suffer significantly. Thus, we should treat dogs as if they are sentient because of what's at stake.

In what follows, we ask whether we can extend the same kind of precautionary approach to the case of ecosystem existence. In other words, even if we lack convincing reasons to believe that there are ecosystems, should we behave (act) as if there are ecosystems? Before moving on to this case, a few general comments about the Precautionary Principle are in order.

'The' Precautionary Principle

The plausibility and exact formulation of the precautionary principle is the subject of considerable debate, including recent articles in this journal.⁸ Our aim is not to settle these debates, but to consider whether and how precaution might motivate action on behalf of ecosystems.⁹ As it is often

⁸ Hartzell-Nichols (2013) and Steel (2013).

⁹ Precautionary approaches to ecosystem conservation are alive and well. To cite but one example, witness this recent remark in *Trends*

noted, there is no single Precautionary Principle, but many closely related ideas.¹⁰ Sandin (1999) counts 19 different statements of the Precautionary Principle, but perhaps the most well-known is the one used in the 1990 UN Economic Conference on Europe (later adopted verbatim as Principle 15 of the Rio Declaration in 1992):

“Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”

This statement is sometimes known as ‘the weak precautionary principle.’ It is occasionally phrased more generally as: “lack of full certainty is not a justification for preventing an action that might be harmful.”

This more general form of the Precautionary Principle has been deployed in environmental ethical arguments for decades.¹¹ For example, Precautionary Principle arguments were deployed from the earliest days of arguments about anthropogenic climate change. The arguments took the form:

With respect to policy P, it doesn't matter whether the evidence makes it more likely than not that climate change is anthropogenic. For all we know, climate change is anthropogenic. And, if climate change is actually anthropogenic and we fail to enact P, then many will suffer significantly. Thus, we should enact P because of what's at stake.

in Ecology & Evolution: “These facts argue for a precautionary principle of conservation and restoration. Rather than embracing invasion-driven ‘novel ecosystems’ as a ‘new normal’ [...], we should seek to reestablish—or emulate, insofar as possible—the historical trajectory of ecosystems, before they were deflected by human activity, and to allow the restored system to continue responding to various environmental changes.” (Murcia *et al.*, 2014, p. 549).

¹⁰ See, for example, Ahteensuu, M. & Sandin, P. (2012).

¹¹ Indeed, the precautionary principle has been heralded as “the fundamental principle of environmental protection policy” (Jordan & O’Riordan 1999, p. 22).

The uncertainty here is around the question of whether or not changes in our climate are caused in part by our own actions.

In the absence of a convincing Epistemic Case for Holism, it is natural to consider whether a precautionary argument might justify individual or collective action on behalf of ecosystems. In schematic form, such a precautionary argument might go as follows:

ACT: With respect to acting on behalf of some putative ecosystem *e*, it doesn't matter whether the evidence makes it more likely than not that *e* exists. For all we know, *e* exists. And, if *e* actually exists and we fail to act on behalf of *e*, then *e* will suffer significant harm. Thus, we should act on behalf of *e* because of what's at stake.

Unfortunately, in attempting to motivate action on behalf of an ecosystem, any such appeal to the precautionary principle will fail in virtue of two further theses which we will now defend: *Plenitude* and *Disparity*. As we will see, these theses vex the Pragmatic Case with paralysis.

The Plenitude Thesis

Our first thesis involves the notion of 'plenitude.' We will say that there is a *plenitude* of ecosystems if for each ecosystem X, there is a great number of other ecosystems—the Ys, such that X and the Ys form a set of ecosystems whose members are variously overlapping and nested, both spatially and temporally. As noted by Jax (2006) and Odenbaugh (2010: 245, 248), ecologists typically conceive of ecosystems in such a way that, on a realist interpretation, there *would be* a plenitude of ecosystems. For example, if there are watershed ecosystems, there is almost certainly a plenitude of them. This is illustrated in Figure 3.

[Figure 3 is attached to the end of this document.]

More generally, for each ecosystem concept listed in Figure 2, it is reasonable to think that if there are *any* real ecosystems answering to that concept, then there is a

plentitude of them. For our purposes, however, we only need a weaker thesis:

Plenitude: For all we know, if there are ecosystems, then for each kind of real ecosystem, there is a *plenitude* of ecosystems of that kind.

In effect, *Plenitude* says there is a *realist presumption for plenitude*.

The Disparity Thesis

Above we granted that although the Empirical Case fails to convince, it doesn't fail so utterly as to justify global anti-realism. So in this section, for the sake of argument we will assume that there *are* ecosystems and will consider how the pragmatic case fares on this assumption.

As shown in Figure 2, there are numerous ecosystem concepts currently employed by ecologists. Moreover, as the discussion in Jax (2007) makes clear, although certain ecosystem concepts may have been superseded or fallen out of favor, there is no *single* ecosystem concept that is significantly more empirically adequate than all the others. Thus, given the ambiguity of the evidence, if one is going to be a realist, one should *not* be an exclusivist. Put differently, even assuming that there are ecosystems, one would not be justified in taking a realist stance towards a single ecosystem concept while taking an anti-realist stance towards the rest. Instead, it would be more reasonable to take a realist stance towards *several* ecosystem concepts and thus be either an inclusivist or a pluralist. However, although the evidence rules out exclusivism, it also underdetermines the choice between inclusivism and pluralism. Thus, the assumption that there are ecosystems together with the evidence fails to settle the question of how many kinds of ecosystems there are. Even if we assume that there *are* ecosystems, the evidence doesn't make inclusivism more likely than pluralism, much less rule out pluralism. We thus arrive at our second thesis:

Disparity: For all we know, if there are ecosystems, then (pluralism) there is a

disparate group of fundamentally different kinds of ecosystems.

In effect, *Disparity* says there is no realist presumption for monism.

The Paralysis Problem

In recent discussions of the precautionary principle, it has been shown that in some contexts the precautionary principle recommends both action and abstention. In such a context, efforts to be precautionary will be paralyzing (Sunstein 2002). Unfortunately, *Varied Interests*, *Disparity*, and *Plenitude* together create a paralyzing context for Holism. In such a context, efforts to be precautionary on behalf of ecosystems will be paralyzing. To see the problem, reconsider the above argument from precaution, *ACT*. Paralysis vexes *ACT* in light of the following counter-argument:

ABSTAIN: If we act on behalf of ecosystem *e*, then a realistic outcome could be that some other intrinsically valuable ecosystem *e** will suffer significant moral harm. Thus, we should not act on behalf of *e*.

The paralysis stems from this. According to *Disparity*, for all we know, if there are ecosystems, then there are several fundamentally different kinds of ecosystems. According to *Plenitude*, for all we know, if there are ecosystems, then for each kind of ecosystem, there is a plenitude of ecosystems of that kind. And, according to *Varied Interests*, for all we know, if there are ecosystems, then it is false that all ecosystems have all and only the same welfare interests. Putting these together, we see that, for all we know, if there are ecosystems, then there are many fundamentally different kinds of ecosystems, and a great number of each kind, variously overlapping and nested, both spatially and temporally, where these different kinds of ecosystems have different welfare interests. In such a context, it seems impossible to rule out that acting on behalf of one ecosystem will not come at the expense of another. In other words, given *Varied Interests*, *Disparity*, and *Plenitude*, the Holist cannot rule out *ABSTAIN*. Hence the paralysis: precaution recommends *both*

acting on behalf of *e* and not acting on behalf of *e*. In this context, the precautionary principle fails to be action guiding.

Conclusion

Conservationists would like to argue that ecosystems have intrinsic moral value, a position called Holism, because it is a more powerful argument than one that appeals to the instrumental value of ecosystems. Holism requires *Independent Existence*, the ontological thesis that ecosystems exist as natural, mind-independent entities. We suggest that the Epistemic Case for *Independent Existence*, and hence for Holism, is unconvincing. This places particular weight upon the Pragmatic Case for Holism, i.e. that we should act *as if* ecosystems are real objects, even though we might not have good epistemic reasons to think so. Unfortunately, such pragmatism is problematic in light of the very reasonable arguments that for all we know, if *Independent Existence* is true, then the following three theses are also true: all ecosystems do not share all and only the same welfare interests (*Varied Interests*); there are several fundamentally different kinds of real ecosystems (*Disparity*); and there is a great number of such ecosystems, variously overlapping and nested, both temporally and spatially (*Plentitude*). *Varied Interests*, *Disparity*, and *Plentitude* together imply that any action we undertake to benefit one ecosystem might morally harm any number of other ecosystems of the same or different kind. Thus, the Pragmatic Case is vexed with paralysis: we *cannot* act on pragmatic grounds. In sum, even if there *are* ecosystems that have moral standing, we lack adequate practical reasons to act on their behalf.

Where does all of this leave the conservationist? If our argument is correct, then conservationists should abandon their Holist position, at least insofar as it applies to ecosystems. Conservationists should stick to instrumental arguments to motivate ecosystem management, even if doing so (occasionally) entails actions that at first blush might seem unpalatable, such as species additions or deletions that improve ecosystem function, or the wholesale conversion of one type of ecosystem into another type if the alternative would be more valuable to us. On the other hand, if conservations remain committed to Holism, then resolving the epistemic uncertainty around *Independent Existence* must

become an absolute research priority. Without such a resolution, ecosystem management is a moral quagmire, vexed with paralysis in that every proposed action may be simultaneously helpful and harmful to different ecosystems, for reasons discussed above. With the choice of the morally right action out of reach, inaction seems to be the only morally safe decision.

Acknowledgements

The authors thank ...

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Figure 3. Shown are three (of many) ecosystems that might reasonably be of management and/or scientific interest. The Kirkland Creek watershed (lower left insert), which is a part of the Conestoga River watershed (lower right insert), which itself is a part of the Grand River watershed (shown in brown on the main map). The figure illustrates that ecosystems may be variously overlapping and nested. This is an illustration of the Plentitude thesis.

