



The preservation paradox and natural capital[☆]

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ABSTRACT

Many ecological economists have argued that some natural capital should be preserved for posterity. Yet, among environmental philosophers, the preservation paradox entails that preserving parts of nature, including the items denoted by natural capital, is impossible. The paradox suggests that nature is a realm of phenomena independent of intentional human agency, and that preserving and restoring nature require intentional human agency. Therefore, no one can preserve or restore nature (without making it artificial). While this article argues that the preservation paradox is more difficult to resolve than ordinarily recognized, it also concludes by sketching a positive way forward to understand what it means to preserve natural capital during the Anthropocene.

1. Introduction

The concept of natural capital denotes a rich variety of active, modifiable, and economically valuable production processes afforded to human agents, *gratis*. Parts of nature, such as ecosystems, not only afford human agents with passive materials and raw resources to be improved by labor but endows them with production processes that generate economically valuable goods and services in a manner that is relatively detached from intentional human agency.

For decades, ecological economists and their life scientist colleagues have insisted that some parts of nature denoted by the concept of natural capital ought to be preserved (or conserved) for posterity. However, no ecological economist has questioned the possibility of this project. Environmental philosophers, on the other hand, have a long tradition of scrutinizing this question. The so-called ‘preservation paradox’ expresses a general skepticism towards preserving parts of nature, including the items denoted by the concept of natural capital. The paradox consists of the following three propositions: (1) nature is that realm of phenomena that is independent of intentional human agency; (2) preserving and restoring nature require intentional human agency; (3) therefore, no one can preserve or restore nature without making it artificial.

Some environmental philosophers have argued that the preservation paradox is false and, therefore, preserving nature is possible (Sylvan, 1998; O’Neill et al., 2008). Against these views, this article argues that the preservation paradox is more difficult to resolve than ordinarily recognized.

To make my case, I propose several distinguishing features of

artificial objects, and argue that restored and preserved ecosystems possess all of them. Artifacts are (1) designed or planned; (2) possess a function attributed to them by an intentional agent (or a group of agents); and, (3) have been modified by an intentional agent. While it is rather straightforward to see that merely preserving natural ecosystems involves (1) and (2), it is less obvious that it involves modifying them. Nevertheless, I will argue that when the continued expression of a natural ecosystem is counterfactually dependent on some human agent intentionally *omitting* their actions from the ecosystem, and this omission is a ‘serious possibility,’ then it counts as modifying the natural ecosystem. Thus, the preservation paradox seems warranted: no one can preserve parts of nature without making them artificial.

Nevertheless, because this negative conclusion will strike most ecological economists and their life scientist colleagues as unacceptable, Section 8 briefly sketches a promising way to resolve the paradox.

2. Preserving natural capital and the preservation paradox

Natural capital denotes a rich variety of economically valuable production processes afforded to human agents by nature, *gratis*. These parts of nature, which include ecosystems and the biodiversity contained therein, not only afford human agents with passive materials to be improved by human labor, but endows them with production processes or ‘natural machines’ that generate goods and services in a manner that is relatively detached from human agency. The most well-known study on natural capital and ecosystem services suggests that the Earth’s entire biosphere, including a wide range of services generated

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by natural capital, such as the purification of water, nutrient cycling, and the detoxification of wastes, is worth between \$14 and \$54 trillion dollars, annually (Costanza et al., 1997, 2014).

Arguably, preserving natural capital for posterity is *the* mainstay of strong sustainability, a widely held view associated with the earlier work of Pearce et al. (1989) and Costanza and Daly (1992).¹ The proponents of this view argue that because natural and manufactured capital (including machines, factories, and tools) are rarely substitutes, sustainable development requires that *each* stock of capital be non-declining over time. In the very least, most advocates of strong sustainability agree that there is a subset of natural capital – critical natural capital – that has no substitutes (Neumayer, 2003). If the proponents of this view are correct, then some minimal stock of natural capital is essential to sustainability. This position explains why so many ecological economists and others have been particularly concerned with preserving natural capital and ecosystem services. For decades, the received view has been that while preserving natural capital might be politically fraught, the project is possible.

The ‘preservation paradox’ challenges the received view. Without labelling it as such, the philosopher Bernard Williams (1995) hints at the paradox when he states:

What many conservation interests want to preserve is a nature that is not controlled, shaped, or willed by us, a nature which, as against culture, can be thought of as just there. But a nature which is preserved by us is no longer a nature that is simply not controlled. A natural park is not nature, but a park; a wilderness that is preserved is a definite, delimited, wilderness. The paradox is that we have to use our power to preserve a sense of what is not in our power. Anything we leave untouched we have already touched.

John O’Neill et al. (2008, 139) have described the preservation paradox as follows: “nature ... is what exists outside of any intentional human intervention. Protection or restoration, on the other hand, requires intentional human intervention in order to put it into effect. So, how can it be possible to protect or restore, by intentional human agency, something that is supposed to be independent of intentional human agency?” On this account, the preservation paradox consists of three propositions:

- P1. Nature is that realm of phenomena that is independent of intentional human agency.
- P2. Preserving or restoring nature require intentional human agency.
- P3. Therefore, no one can preserve or restore nature without making it artificial.

P1 is clear enough. ‘Nature’ is that part of the universe, which remains detached from intentional human agency. This concept of nature drives a wedge between intentional human agency and everything else. For the purpose of this article, the only parts of nature that concern us are those typically denoted by the concept of natural capital *and* those which remain relatively detached from intentional human agency. I will simply refer to these parts of nature as ‘natural ecosystems.’

For P2, I will accept the Society of Ecological Restoration’s definition of ecosystem restoration as, “the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed” (Sarkar, 2012, 132).² On this account, restored ecosystems are

¹ ‘Weak sustainability,’ on the other hand, is traditionally associated with the work of Robert M. Solow (1986, 1993). This view requires that the *total* stock of capital is held constant across time or between generations. On this view, there is nothing special about the stock of natural capital, which can be depleted so long as it is supplanted by a sufficient quantity of manufactured capital (Stern 1997).

² José M. Rey Benayas et al. (2009, 1121) offer a similar definition of ecological restoration. This activity involves, “the recovery of an ecosystem that has been degraded damaged, or destroyed, typically as a result of human

ecosystems that have been intentionally returned to some previous reference state valued by human agents. Preserving ecosystems, by contrast, requires *no* such active human intervention. Instead, preserved parts of nature, including ecosystems, are geographical areas or reserves that are protected from certain kinds of activities that are prohibited or discouraged. Clearly, preserving nature in this sense does not entail that it must remain identical or unchanging over time.

Is the preservation paradox warranted? Some scholars, namely, John O’Neill et al. (2008) and Richard Sylvan (1998) have argued that the paradox is false.³ As will be explained below, in Section 7, O’Neill et al. have argued that there is at least one way to restore nature without turning it into an artifact, and Sylvan dismisses the possibility that merely preserving nature makes it more artificial. First, however, Sections 3–6 argue that the preservation paradox is more difficult to resolve than ordinarily recognized.

3. What is an artifact?

The preservation paradox claims that by restoring or preserving parts of nature, one turns them into artifacts or makes them more artificial than they would be otherwise. What is an artifact?⁴ Reflecting on the preservation paradox specifically, John O’Neill et al. propose that “something is artificial if and only if it is what it is at least partly as the result of a deliberate or intentional act, usually involving the application of some art or skill” (2008, 128–9). This is a good start because it recognizes artifacts as intention dependent objects and dovetails with the concept of nature presupposed by the paradox. Beyond O’Neill et al.’s account, however, we can add three features that distinguish artifacts from natural objects. Artifacts (1) are designed or planned; (2) possess a function attributed to them by an intentional agent or group of agents; and (3) have been modified by an intentional agent. None of these features should bewilder the artifact theorist. In fact, all three are widely accepted as necessary conditions that must be satisfied for any object to qualify as an artifact.

First, Randall Dipert (1993) argues that, unlike natural objects, artifacts are necessarily objects that are designed and made by an intentional agent.⁵ Planning or designing artifacts normally precedes the construction of the artifact itself. Vermaas and Houkes (2003) concur, suggesting that design is “a planned activity to contribute to a user plan for achieving certain goals” (2003, 288). According to Vermaas and Houkes, any satisfactory theory of artifacts must focus on the design of the object at hand.

Second, it is widely accepted that *all* technical artifacts possess a function (or purpose) attributed to them by an intentional agent. Lynn Rudder Baker states that unlike natural objects, which come into existence without human intervention, artifacts are intention dependent phenomena that are “made for a given purpose” (2008, 2–3). Risto Hilpinen (2011) also defines artifacts as essentially “objects that are intentionally made or produced for a certain purpose.” Dipert (1993), too, agrees that artifacts are, invariably, made for a certain purpose while adding the further claim that an artifact’s function is to be grounded on the use and design of artifacts (Perlman, 2004). In the case of ordinary technical artifacts such as tables or chairs, all such items

(footnote continued)
activities.”

³ Robert Elliott (1982) and Eric Katz (1992, 2012) have made similar claims by arguing that restored nature is artificial and that, because of this, it has less value than its wild counterpart does. This article makes no claim about the diminished *value* of restored nature.

⁴ This article is only concerned with ‘technical artifacts,’ which includes everyday physical objects such as tables, chairs, and houses, all of which have a practical use for intentional agents. Technical artifacts generally exclude works of art, including paintings and sculptures.

⁵ Dipert’s (1993) *Artifacts, Art Works, and Agency* is among the first analytic explorations into artifacts (see Perlman, 2004).

possess specific functions that have been attributed to them, not by nature, but by an intentional human agent or a group of such agents. It is only by virtue of being intention dependent objects that tables are for eating meals, chairs are for sitting, etc.⁶

The third and final feature that distinguishes natural objects from artifacts is that the object must have been modified – in some way, shape, or form – by an intentional agent. Hilpinen has argued that artifacts necessarily have a maker or author, and he outlines the following *Dependence Condition* that must be met for any object to be considered an artifact:

The existence and some of the properties of an artifact depend on an author's intention to make an object of a certain kind (Hilpinen, 1992, 65).

This widely accepted condition is normally interpreted as requiring that the author of an artifact must, in some minimal sense, actively modify, transform, or improve some object before it is considered to be a *bona fide* artifact.⁷ This condition also helps to explain why not everything that merely happens to be produced by human agents is an artifact. The agent who intends to build a hammer with a wooden handle and a steel head, a technical artifact that is first designed and then made for striking hard surfaces, does not also intend to cast a shadow against the wall of the building where he works, nor does the agent intend to produce a plume of sawdust when cutting the wood to fashion the handle. The latter two events are not the result of intentional actions, but mere *happenings*. In other words, there is a conceptual distinction to be made between objects that are made by intentional human agents and those things that are merely caused by human activity. Hilpinen's dependence condition explains why the hammer is a technical artifact while the shadow and the sawdust are not.⁸

4. Is the preservation paradox warranted?

So, how do the restored and preserved ecosystems denoted by the concept of natural capital measure up to these three features of artifacts? Are they designed or planned? Do they possess a function? Has an intentional agent modified them? If restoring and preserving natural ecosystems involves planning, attributing them with a function, and intentionally modifying them in some way, then such objects are artificial, and the preservation paradox seems warranted.

First, it should be evident that the activity of restoring ecosystems, the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed in order to bring about some desired effect, requires making a plan or design. In his *Nature by Design: People, Natural Process and Ecological Restoration*, Higgs (2003) argues that “restoration is fundamentally about design.” Planning a restored ecosystem not only requires determining the targeted historical reference state that happens to be preferred or desired by human agents, but it also requires establishing the most effective means for attaining the final product: a restored ecosystem. Without a plan or design, even if it is imperfect or incomplete, that precedes the actual restored ecosystem it is difficult to see how any ecosystem could, in fact, be restored. Planning in this sense, even if the plan ultimately fails, is not merely required for restored ecosystems but for preserving ecosystems as well. While preserving natural ecosystems does not involve active human

⁶ How might such objects acquire a function attributed to it by an intentional agent? See John Searle (1995; 2010).

⁷ Siipi implicitly accepts Hilpinen's dependency condition when she states, “an entity *x* is an artifact if and only if *x* has been intentionally brought into existence by causing the artifact *x* to have certain properties” (2003, 417).

⁸ Hilpinen's dependence condition may not exclude all the animal artifacts made by non-human creatures (Hilpinen, 2011). On his account of animal artifacts, James L. Gould (2007) supplants intentionality as a necessary condition for making artifacts with its mere usefulness for a creature.

intervention, it does involve minimal planning whereby specific intentional activities must be cordoned off from adjacent areas (not preserved by human agents).

Second, ecosystems that have been denoted by the concept of natural capital possess a function attributed to them by human agents: to produce economically valuable goods and services to human agents. It is worth emphasizing, however, that restored and preserved ecosystems are sufficiently different from ordinary technical artifacts to be considered a special class of technical artifacts. Unlike ordinary artifacts, such as tables and chairs, that do not possess a function independent of those attributed to them by intentional agents, ecosystems (and other biological phenomena) may possess non-intentional natural functions (Odenbaugh, 2010; Sperber, 2007).

Finally, restored and preserved ecosystems have been modified by an intentional agent. This claim requires an extended argument, particularly with respect to natural ecosystems that are merely *preserved*.

Recall from the previous section that Hilpinen's dependence condition requires that the selected properties of an artifact depend on an author's intention to make an object of a certain kind. The first thing to recognize is that this condition is causal and that it is normally interpreted as requiring that the author of an artifact *actively* modifies some natural object. Interpreted in this way, the author of an artifact must modify some object *vis-à-vis* intentional activity for that object to be considered an artifact. If this were the only way to interpret Hilpinen's dependence condition, then my claim that *preserving* natural ecosystems turns them into artifacts would be problematic since natural ecosystems are, by definition, relatively detached from intentional human activity. In fact, under the standard interpretation of the dependence condition, natural ecosystems are not artifacts at all, but something else.

Dipert (1993), for one, would disagree with my claim that preserved natural ecosystems are artifacts. He would argue that if such an ecosystem were simply discovered and intentionally used for some purpose, it would not be an artifact but an ‘instrument.’⁹ For Dipert (1993, 23–7), instruments are items that have been intentionally used but that do not possess sufficient characteristics or qualities to render them genuine artifacts. Dipert explains:

for an object to be intentionally used by an agent, the agent has to have conceived of one or more of these properties, deliberated about whether this or another object could better fulfill the purpose because of these properties, and concluded that the object will make a net positive contribution to the agent's purpose and that it will do better than, or as well as, other objects that are considered and equally available (1993, 25).

According to Dipert, instruments are generally middle-sized and moveable objects that, unlike artifacts, are not modified but are merely found or discovered and used “as is” – natural objects that are used for some goal or purpose. For example, a fallen log that is found and then intentionally used by some human agent to serve as a seat or a foot stool qualifies as an instrument, not a genuine artifact, on Dipert's account. The same is true of a stone that is found and then intentionally used by some agent to strike one's foe. Dipert gives the example of the stone that David used to slew Goliath. He states, “we might guess that an object's merely being deliberately used in intentional activity, such as the handy stone with which David slew Goliath, is not sufficient to make it an artifact. What, after all, did David *do* to the stone to make it an artifact? How does it differ from a stone that was not used intentionally?” (1993, 21; *emphasis added*). According to Dipert, David must *do* something to the stone in some way before it can be considered a genuine artifact.

⁹ Similarly, Hilpinen (2011) recognizes a category of items that are between natural objects and artifacts. Following anthropologists and others, Hilpinen refers to such items as ‘naturefacts.’ Naturefacts are items that are simply found and used. Because they have not been intentionally modified or improved, naturefacts are not artifacts.

Namely, he must actively and intentionally modify it. Thus, under Di-
pert's account, instruments are like artifacts in the sense that they are
used by intentional agents but they are different in the sense that in-
struments are merely found and used, whereas artifacts are always
modified or improved by intentional activity. In other words, Hilpinen's
dependence condition, or something like it, is required for any object to
qualify as an artifact.

Since restoring ecosystems requires active and intentional human
intervention to bring about some desired state of affairs or intended
effect, I will take it as a matter of course that restored ecosystems are
objects that satisfy Hilpinen's dependence condition. The more chal-
lenging case is to insist that merely preserving natural ecosystems turns
them into artifacts. If I am to uphold this claim, then I will need to show
that the dependence condition can be interpreted differently than is
normally the case. I will argue that the dependence condition can be
interpreted as the properties of an artifact that are dependent upon an
author's intention to make an object of a certain kind by intentionally
omitting their activity and that such an omission can count as genuine
causation. When Hilpinen's condition is interpreted in this way, by
omission rather than action, we can see that there are circumstances
when merely preserving natural ecosystems turns them into artifacts. If
I am right, then unlike the existence of ordinary technical artifacts, such
as tables and chairs, which require that such objects have been actively
modified for some purpose, the existence of ecosystem artifacts can
depend on intentionally omitting human activity as well.

5. Causation by omission

To understand how causation by omission is plausible, consider
James Woodward's (2003) manipulability theory of causation. Wood-
ward states that "X is a ... cause of Y if and only if there is a possible
intervention on X that will change Y or the probability distribution of
Y" (2003, 51). He defines an intervention variable *I* and putative cause
and effect *X* and *Y* only if *I* meets the following four conditions (2003,
98):

1. *I* causes *X*.
2. *I* acts as a switch for all the other variables that cause *X*. That is,
certain values of *I* are such that when *I* attains those values, *X* ceases
to depend on the values of other variables that cause *X* and instead
depends only on the value taken by *I*.
3. Any directed path from *I* to *Y* goes through *X*. That is, *I* does not
directly cause *Y* and is not a cause of any of *Y* that are distinct from
X except, of course, for those causes of *Y*, if any, that are built into
the *I*-*X*-*Y* connection itself; that is, except for (a) any causes of *Y*
that are effects of *X* (i.e., variables that are causally between *X* and
Y) and (b) by any causes of *Y* that re between *I* and *X* and have no
effect on *Y* independently of *X*.
4. *I* is (statistically) independent of any variable *Z* that causes *Y* and
that is on a directed path that does not go through *X*.

On this manipulationist account, a causal relationship not only
obtains whenever some factor is manipulated, and some effect is real-
ized. A causal relationship also obtains when the following holds: if the
factor were to be manipulated, then the effect would be realized. In this
sense, Woodward's theory shares many features with counterfactual
theories of causation, including that proposed by David Lewis (1973).¹⁰

¹⁰ This article takes no final stand on the correct or true universal theory of
causation, each of which appears to be subject to counterexamples (Reiss,
2009). My argument below assumes Woodward's manipulability theory, which
I take to be the most popular theory of causation among contemporary philo-
sophers of science. With that said, I expect that the conclusion reached under
Woodward's theory holds under David Lewis' (1973) counterfactual theory as
well. Such a comparative analysis is beyond the scope of this article. For a

Because a sufficient condition for some *X* to cause or have a causal
effect on *Y* is that some change in the value of *X* produced by an in-
tervention is associated with a change in the value of *Y*, omissions can
be causes as well (Woodward, 2009). Unlike process theories of cau-
sation that do not generally view causation by omission as being genu-
inely causal, Woodward's theory can account for intuitively plausible
causal claims such as "I killed the plant by not watering it" (Beebe,
2004).¹¹ Why does this qualify as a genuine causal relation under
Woodward's account? Since a change under an intervention in whether
the person in charge of watering the plant is associated with a change in
the value of the variables measuring whether the plant dies, the state-
ment 'I killed the plant by not watering it' is a genuine causal claim.¹²
In this case, causation by omission is no different in kind from the
following causal claim: 'I killed the plant by uprooting it and tossing it
into the dustbin.'

A central challenge for theories of causation that sanction omissions
as genuine causes is to restrict the number of genuine causal claims so
that they do not diverge too far from our intuitions. Woodward gives
the example of a Doctor *D*. Suppose it was standard practice for doctors
to administer antibiotics when they notice patients displaying symp-
toms of fever. Suppose further that *D* noticed that his patient *P* had a
fever and he administers *no* antibiotic. Woodward's (2003) manipu-
lability theory of causation supports the judgement that the failure of *D*
to administer the antibiotic to *P* causes *P* to die. Why? Since manip-
ulating the values of the variable *A* (which reflects whether or not the
antibiotic is administered) will change the value of the variable *S*
(which reflects whether or not the patient dies), *D* causes *P* to die. Thus,
much like the case whereby a person is judged to have killed the plant
by failing to water it, *D* causes *P* to die.

Now, suppose that some random person *X* could have administered
the antibiotic but does not and it seems correct to claim that *X* did not
cause *P* to die. *X* is not a doctor, and he lives in a far-off land without
any responsibility for the care of the patient who is displaying signs of
fever. Suppose further that *X* goes into the exact hospital where the *P* is
located, and he can actually see that *P* is developing a fever. Not only
does *X* witness *P* in such a grim state but, as it turns out, *X* has also
recently learned that administering antibiotic to patients who were in
such a circumstance is the correct response required to keep *P* alive. In
this case, we can say that *P*'s survival is counterfactually dependent on
whether *X* administers the drug to the patient. However, relative to the
first case, it is not so clear that *P* causes *X* to die. In fact, Woodward
argues that we are not normally inclined to claim that *X* causes the
patient's death. In both cases, the patient dying is counterfactually
dependent on someone – *D* or *X* – failing to administer the antibiotic. In
the first case, when *D* fails to administer the antibiotic, we more readily
accept the causal claim that *D* killed *P*. In the second case, we are more
likely to reject the claim that *X* killed *P*. But, why do we tend to accept
some omissive causal judgements (*D* killed *P*) while rejecting others (*X*
killed *P*)?

To explain this difference, Woodward appeals to the notion of
'serious possibility.' Given everything we know about Doctor *D*, random
person *X*, and patient *P*, Woodward states, "there seems no reason at all
to take the possibility seriously that *X*'s failure to do these things causes
the patient's death" (2003, 88). Other things being equal, 'X killed *P*' is
not a serious possibility and, therefore, should not be judged as genuine
causation. Woodward acknowledges that it is unlikely that there is any
algorithm for determining whether a putative omissive causal

(footnote continued)

detailed comparison of Woodward's manipulationist theory and Lewis' coun-
terfactual theory of causation, see Woodward (2003, 133-45).

¹¹ Process theorists, such as Salmon (1984) and Dowe (2000), do not consider
causation by omission to be genuinely causal.

¹² For more on causation by omission or absence causation, see Hall (2000)
and Schaffer (2000).

relationship ought to be taken seriously. Instead, he suggests a multitude of factors that can influence our willingness to take omissive causal claims seriously, including our interests, purposes, expectations, and norms.¹³

6. When preserving natural ecosystems turns them into artifacts

With some understanding of Woodward's account of causation by omission, we can return to our question: does preserving parts of nature denoted by natural capital satisfy Hilpinen's dependence condition? Remember, this condition is normally interpreted as requiring that at least some of the properties of an object are dependent upon the intentional activities of a maker. By contrast, I am suggesting that the condition can be interpreted as requiring that at least some properties of an object are dependent upon an author's intentionally omitting their activity from the object. In our case, the object at hand is a natural ecosystem that is being preserved by some intentional agent or group of intentional agents. If Hilpinen's dependence condition has been met in this way, then preserving natural ecosystems turns them into artifacts (assuming they also have the other two features of artifacts delineated in Section 3).¹⁴

My central claim is that, for those cases of preservation where the expressions of natural ecosystems are counterfactually dependent on omitting human activity, and the omission is a serious possibility, then such omissions are a cause of the continued natural expression of the natural ecosystem. In all such cases, the natural expression of a natural ecosystem depends, in part, on the agent's intention to make an object of a certain kind by omitting their activity from that natural ecosystem.

Consider an example, *Vulcan*. Suppose there is a planet, Vulcan, that was discovered in the Milky Way.¹⁵ Vulcan is a jungle planet that has never been touched by intentional creatures, including human beings. A group of human beings, the United Federation of Planets, analyzed Vulcan remotely and possessed the technological means to transform the surface of the planet. Soon after Vulcan was discovered, however, the Federation forbade anyone from landing on the planet or interfering with it in any way. The Federation declared that Vulcan was to become one giant nature preserve, the purpose of which was to produce a desired aesthetic effect. The Federation enforced its edict strictly and successfully. If the Federation had not chosen to turn Vulcan into nature preserve, then it would have chosen the only other option available: it would have transformed Vulcan into a parking lot for the space crafts owned by members of the Federation. In fact, this was standard practice. The Federation tended to develop, in some way, every untouched planet it discovered. This was the norm.

Has Vulcan become more artificial (than it would be otherwise)? Was there genuine causation by omission in this case? If the natural processes on Vulcan would have continued *no matter what*, then it seems that Vulcan would not have been rendered more artificial by the Federation's omission. However, the omission is a serious possibility and counts as genuine causation. Why? If the Federation had not left the planet untouched, then it would have chosen the only other available option. Vulcan would have been transformed into a parking lot. Moreover, this outcome was to be expected, given the Federation's standard practice of developing every untouched planet it encountered. The Federation's omission is a cause of Vulcan's continued natural

¹³ Henne et al. (2017) report experimental evidence to support the claim that norms influence omissive causal judgments in the way that Woodward (2003) suggests. While one might suppose that reliance on subjective factors represents a significant shortcoming of Woodward's theory, any theory of causation that attempts to accommodate omissive causal relations must address the issue of 'serious possibility' in some way.

¹⁴ Similarly, in his essay entitled "The Incarceration of Wilderness: Wilderness Areas as Prisons", Thomas Birch (1990) argues that wilderness areas are artificial since they are products of human power (Katz, 2012).

¹⁵ Thanks to Kevin D. Hoover for an earlier version of this example.

expression.

One might object by insisting that this omissive causal claim is a non-serious possibility or counterintuitive at best and, therefore, should be rejected. After all, it seems absurd to suggest that knowing Vulcan exists and leaving it untouched is sufficient to make the planet more artificial. This objection would fail to grasp the justification for accepting the causal claim as genuine, however. Vulcan has been made more artificial not only because the Federation knows that Vulcan exists and leaves it untouched, but because the Federation also chooses to omit their intentional activity from the planet when their only other option, the one they would have chosen otherwise, was to turn Vulcan a parking lot. The Federation's omission is a serious possibility and counts as genuine causation.

To accentuate this point, consider a non-serious possibility. Suppose that a random group of intentional creatures located on the other side of the Milky Way also omitted their activity from Vulcan. This second group knew about Vulcan, had the technological means to transform it, but had no interest in the planet, period. The group simply ignored the planet. This was their standard practice – to neglect all planets, except for their home planet. Unlike the Federation's omission, which actually contributed to Vulcan's continued natural expression, the random group's omission does not. In this case, the random group's omission is a non-serious possibility in the same way that the random Person X's omission (from the previous section) was a non-serious possibility.

Consider another example, *Hydroelectricity*, that is structurally identical to *Vulcan*. Suppose that a group of human beings, 'The Valley People,' must choose between two available options: (1) preserve some natural ecosystem located in a valley by intentionally omitting their activity from the area, or (2) flood the area where the natural ecosystem is situated to produce hydroelectricity for the local citizens. (To be clear: The Valley People know that (1) and (2) are the only live options and, moreover, this group has the capability to choose either option). If the Valley People select option (1), then the ecosystem will continue to express itself in a manner that is relatively detached from intentional human agency. If the Valley People select option (2), then the natural ecosystem will be completely destroyed (submerged under water). The natural ecosystem will not continue to express itself.

After deliberating, the Valley People choose option (1). This is striking because standard practice for the Valley People is to turn every valley capable of producing hydroelectricity into a reservoir to serve that purpose. We know *ex hypothesi* that if the group had not preserved the natural ecosystem by omitting their intentional activity from the area, the group would have chosen option (2). In this example, the ecosystem's continued natural expression is counterfactually dependent on whether the Valley People omitting their activity from the ecosystem to produce the ecosystem's continued natural expression. Similar to *Vulcan*, the continued natural expression of the ecosystem depends causally on the Valley People intentionally omitting their activity from the natural ecosystem. This omission is not only a serious possibility, but an instance of genuine causation.

Now, contrast this claim with a non-serious possibility. As the Valley People decided to omit their activity from the valley, a second group of human beings neglected to transform the valley, too. This latter group knew about the valley and had ability to transform it. While the second group's omission and the Valley People's omission both count as omissions, only the latter omission contributed to the valley's continued natural expression for the same reasons discussed in *Vulcan*. The former, by contrast, is a non-serious possibility.

7. Potential objections

Richard Sylvan (1998) and Robert Elliott (1982) are both critical of the claim that intentionally omitting human activity can be causal in the sense that I have suggested. In his essay entitled "Mucking with Nature", Sylvan dismisses the whole preservation paradox as the "bottom of a barrel of rotten arguments." He is critical of the claim that

“doing nothing counts as doing something, inaction as action, so non-interference itself amounts to interference” (1998, 57). While Elliott concedes that *restored* ecosystems are artificial, he maintains that merely *preserving* nature does not make nature artificial. He states:

The idea is that by placing boundaries around natural parks, by actively discouraging grazing, trail-biking and the like, by prohibiting sand-mining, we are turning the wilderness into an artefact, that in some negative or indirect way we are creating an environment ... But ... what is significant about wilderness is its causal continuity with the past. This is something that is not destroyed by demarcating an area and declaring it a national park. There is a distinction between the ‘naturalness’ of the wilderness and the means used to maintain and protect it. What remains within the park boundaries is, as it were, the real thing (Elliott, 1995, 87 in O’Neill et al. (2008, 139–40).

Elliott suggests that preserving wilderness is preserving the ‘real thing’ since there is causal continuity with the past. Once certain boundaries are established, the place is not made into an artifact but remains part of nature. One problem with this line of reasoning, however, is that *anything* that happens to a wilderness area or natural ecosystem would qualify as having causal continuity with the past. Another problem is that, as argued above, there are cases of mere preservation when the expression of nature or natural ecosystems is counterfactually dependent on omitting human activity. In such cases, the omission causes the continued natural expression of a natural ecosystem in a manner that both Sylvan and Elliott deny. It should also be clear that, contra Elliott’s (1995) worry, I am not suggesting that the mere imposition of a boundary around some natural ecosystem turns that ecosystem into an artifact. Instead, my claim is that Hilpinen’s dependence condition is met when preserving a natural ecosystem involves the intentional omission of human activity.

John O’Neill et al. (2008) have also argued that the preservation paradox is false since there is one distinctive sense in which restoration is possible. To make their case, these authors draw an analogy between biological regeneration on the one hand and the restoration of nature on the other. They begin by observing that certain species can naturally regenerate parts of their bodies, quite independent of human agency. For example, these authors tell us that many lizards have the capacity to re-grow their tails. Similarly, they argue, nature can be restored *when non-human agency alone does the restoration*. Specifically, they claim that “a system that has regenerated entirely ‘naturally’, that is, without intentional or even unintentional assistance of human beings, might be said to have originated naturally, even though it no longer has the particular historical origin it once had. It has restored itself rather than being restored” (2008, 143). On this account, nature’s unassisted agency can restore nature and, therefore, the preservation paradox is false. There is at least one way that nature can be restored without the active intervention of intentional human agents.

While there is a distinction to be drawn between objects that grow up spontaneously, independent of human agents, and those that require active human intervention, it remains unclear what consequence this distinction has for the paradox. Restoration is *essentially* an intentional activity performed by an intentional agent who has the aim or goal of returning some object to a previous condition or reference state. To claim that restoration is possible when consummated by natural or non-human causes alone is to speak metaphorically or attribute intentionality to nature. Neither option seems acceptable. While I am in full agreement with O’Neill et al. (2008) when they claim non-human agency is causally efficacious in the sense that there are non-human causes that operate independent of human intervention (i.e., lizards that are capable of regenerating their tails), unless this causal factor is an intentional agent, it cannot be straightforwardly described as *restoring* itself. If nature was an intentional agent, then it would be conceivable that nature could restore itself independent of intentional human agency. Since the preservation paradox hinges on the concept of

nature as that realm of phenomena that is detached from human agency, any actual restoration of nature by non-human causes would render the paradox false.¹⁶ As it stands, however, there do not appear to be any such examples. No one to my knowledge has persuasively argued that nature is an intentional agent capable of restoring itself. Therefore, since the only intentional agents capable of restoring nature appear to be human agents and these agents are barred from nature *ex hypothesi*, there is further reason to maintain that the paradox appears to hold up under scrutiny.

8. Resolving the preservation paradox – a brief sketch

Until now, the main purpose of this article has been to argue that the preservation paradox is more difficult to resolve than ordinarily recognized. The preservation paradox seems warranted. Yet, to simply accept the paradox might seem absurd or unsatisfying at best, particularly for anyone who takes seriously the project of preserving natural capital and ecosystem services for posterity. Accordingly, before concluding, it seems valuable to sketch a way forward that explains how the paradox might be avoided and what it means to preserve natural capital during the Anthropocene.

Returning to the paradox as stated in Section 2, one option is to negate P1. Nature is *not* a mysterious realm of phenomena hermetically sealed-off from intentional human agency. Indeed, there are empirical and metaphysical grounds for rejecting P1. Empirically, a growing number of scientists and scholars have argued there is no longer any part of the Earth’s surface that remains completely detached from intentional human agency. Indeed, the technology of our species now extends to include the Cydonia (the region of Mars), and beyond. If ‘nature’ is that realm of phenomena that is completely detached from intentional human agency, then the extension of this concept appears to be empty. To insist that there is a realm of phenomena that is completely unaffected by human activity is disconfirmed by the empirical evidence.

Metaphysically, one might argue that while the species *Homo sapiens* possesses features that distinguish it from the rest of nature, since Charles Darwin’s *The Origin of Species* we have known that there is no good reason to suppose that our species is located ‘outside’ or ‘beyond’ nature. Instead, if one supposes a naturalistic view of nature that is contiguous with science, then everything actual and possible, including human beings and their activity, is part of nature.

While denying P1 is one strategy for arguing against the preservation paradox, the concept of nature as everything actual and possible presents a new challenge, however. After all, this concept entails that preserving anything, including atomic bombs and jumbo jets, is nature preservation. Obviously, no ecological economist or environmental philosopher would be content with this outcome.

One promising way forward, as suggested elsewhere, is to accept the naturalistic view of nature as everything actual and possible, while still operationalizing the artificial/natural distinction for pragmatic purposes (Sarkar, 2012).¹⁷ Operationally, the distinction is located along a continuum, with the most natural objects being those that remain relatively detached from intentional human agency, and the most artificial objects being those that have been built by intentional human agents. On this account, everything is, fundamentally, part of nature in the metaphysical sense; yet, for practical purposes, we can still aim to distinguish between anthropogenic (downtown New York City) and non-anthropogenic (the remotest regions of Alaska) features of the environment, an undertaking that is essential to preserving natural capital during the Anthropocene.

¹⁶ Hence, O’Neill et al.’s (2008, 139) claim that the paradox is “more apparent than real.”

¹⁷ For more details on this operational approach as it relates to conserving and preserving natural capital during the Anthropocene, see DesRoches (2018).

9. Conclusion

The preservation paradox has long puzzled environmental philosophers, and perhaps it should puzzle scientists and scholars who aim to preserve nature, too. If nature is a realm of phenomena that exists outside of intentional human agency and preserving nature requires intentional human agency, then how is it possible to preserve parts of nature, including those denoted by the concept of natural capital?

While some environmental philosophers have argued that the preservation paradox is false, this article argued that the paradox is more difficult to resolve than ordinarily recognized. To make my case, I first distinguished between artificial and natural objects, claiming that the former class of objects are planned, possess a function, and have been modified in some way by an intentional agent. While I claimed that it is straightforward to see that merely preserving natural ecosystems satisfies the first and second conditions, it is less obvious that this activity involves the third. After all, preserving natural ecosystems involves the absence of human intervention. Nevertheless, I argued that when the continued expression of a natural ecosystem is counterfactually dependent on some intentional agent or group of agents omitting their actions from the natural ecosystem, and this omission is a serious possibility, then this omission counts as modifying the natural ecosystem. There are circumstances when merely preserving parts of nature satisfies Hilpinen's dependence condition.

Be that as it may, given that the paradox is unsatisfying at best, particularly for those who wish to preserve parts of nature, Section 8 sketched a pragmatic solution to the paradox. To resolve the paradox, I suggested that the first premise should be rejected. As a growing number of environmental philosophers, historians, and scientists acknowledge, nature is not a mysterious realm of phenomena hermetically sealed-off from intentional human agency. During the Anthropocene, one can accept a naturalistic view of nature as everything actual and possible and operationalize the artificial/natural distinction for pragmatic purposes, simultaneously.

I will conclude with an objection and rebuttal. One might insist that the preservation paradox seems irrelevant *from an economic point of view*. After all, whether the paradox is warranted (or not) appears to depend entirely on the artificial-natural distinction and the nature of causation, issues that are completely divorced from the ordinary evaluative concerns of economists. There are at least three responses to this objection. First, because many ecological economists and others are concerned with preserving parts of nature *qua* natural capital, and this policy proposal is thrown into question by the paradox, the paradox has obvious significance, not only for the intellectually curious. Second, natural capital is an interdisciplinary concept. Even if it turned out that the paradox was irrelevant from an economic point of view, it would not follow that the paradox is irrelevant from other disciplinary points of view. Finally, while one might suppose that the artificial-natural distinction is a mere terminological dispute that has no real consequence for economics, the distinction is essential to the debate between weak and strong sustainability, which hinges on the further distinction between natural and manufactured (man-made) capital.

Declaration of Competing Interest

The author declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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