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SYMPOSIUM

Ecological Humility and Geoengineering the Earth

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Abstract
The prospect of geoengineering the Earth—the deliberate, large-scale intervention in Earth's climate system to help mitigate the negative impacts associated with climate change—forces us to confront more than just scientific and technological questions. It challenges us to examine questions about our character. While some scholars have argued that geoengineering the Earth would be an act of arrogance, we develop a new account of ecological humility that is grounded in evidence from environmental psychology and argue that, under some conditions, this virtue is consistent with geoengineering the Earth.

Keywords: environmental philosophy; geoengineering; environmental virtue ethics; ecological humility

1. Introduction

Current climate trajectories are alarming, with rising global temperatures, extreme weather events, and looming tipping points threatening ecosystems and human communities alike (Marlon et al., 2025; NASA, 2025; Wolf et al., 2025). The prospect of geoengineering the Earth—the deliberate, large-scale intervention in Earth's climate system to help mitigate the negative impacts associated with climate change—forces us to confront more than just scientific and technological questions. It challenges us to examine questions about our character. What should be said about the character of those who would geoengineer the Earth? While the public discourse on geoengineering has tended to emphasize the technological risks associated with geoengineering, this article examines geoengineering through the lens of environmental character, with a special focus on ecological humility. Is geoengineering the Earth consistent with this environmental virtue?

While ecological humility is widely discussed among environmental virtue ethicists, detailed accounts of this virtue are scarce. Matthew Pianalto (2013) is the exception. Pianalto argues that ecological humility involves several characteristic dispositions, such as acknowledging and accepting that one is part of nature and dependent upon it. Moreover, the ecologically humble person is open to learning from nature, appreciates the intrinsic value of nature, and is motivated to adopt ways of living that minimize impact on the natural world to preserve the intrinsic value of nature. The ecologically arrogant, on the other hand, are characterized by the impulse to dominate and control the nonhuman world (Whyte 2017; 2018). For the ecologically arrogant, there are no limits on the human will. Human beings are often assumed to stand atop the hierarchy of life on Earth, and they are the only creatures truly worthy of moral consideration. Nonhuman species and abiotic parts of the environment may be valuable, but only insofar as they contribute to human well-being.

This article builds on Pianalto's (2013) account of ecological humility and considers whether the virtue is consistent with geoengineering. Our new account is grounded in both philosophy and

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environmental psychology. On this account, ecological humility is what Nancy Snow (1995) refers to as existential virtue. The ecologically humble recognize and take seriously the limitations and vulnerabilities associated with human existence, especially in relation to nonhuman parts of nature. We will show that psychologists have investigated components of ecological humility, linking them to greater concern for, and action to ensure the protection of the environment. Although psychologists have yet to measure ecological humility directly, individuals who, for instance, espouse biospheric values also experience awe, reverence, and care toward their ecological communities (Wang et al., 2021; Yan & Jia, 2021), adopt non-anthropocentric beliefs (Lou et al., 2025), and act to promote the flourishing of both human and nonhuman members (Bouman et al., 2020; Wang et al., 2021). Importantly, this includes intentional actions and omissions that confer benefits and emphasize care over strict noninterference. Conceptually, we argue that the virtue of ecological humility is linked to care via self-respect, recognition of one's own vulnerability, and attentiveness to interdependent ecological relationships. By emphasizing care, vulnerability, and community flourishing rather than minimizing one's impact on nature, we argue that ecological humility is consistent with human interventions that contribute to ecological flourishing, which may include geoengineering the Earth.

Our article proceeds as follows. Section 2 considers the problem of anthropogenic climate change and geoengineering the Earth. Section 3 scrutinizes ecological humility in the environmental ethics literature and argues that there is no satisfying account of this environmental virtue. Section 4 develops a new account of ecological humility and Section 5 argues that, under some conditions, geoengineering the Earth is consistent with this virtue. Section 6 considers potential objections and concludes.

2. Anthropogenic Climate Change and Geoengineering the Earth

The current state of anthropogenic climate change is alarming (Marlon et al., 2025; Ripple et al., 2024; Wolf et al., 2025). Global temperatures continue to rise, with 2024 recording some of the hottest days ever. Greenhouse gas emissions (GHGs), primarily from fossil fuels, are at an all-time high (Ripple et al. 2024). This state of affairs has led to more frequent and severe weather events, such as heatwaves, wildfires, and hurricanes, causing widespread damage and suffering (NASA, 2025). We are dangerously close to several climate tipping points, thresholds beyond which certain changes become irreversible and can lead to catastrophic impacts on ecosystems (Armstrong et al., 2022). For example, the Greenland and West Antarctic ice sheets are at risk of collapsing, which would significantly raise sea levels. Coral reefs are also under threat, even at current levels of warming. If global temperatures rise by 2°C above preindustrial levels, large parts of the Amazon rainforest could turn into savannah, disrupting ecosystems and releasing more carbon into the atmosphere (Ripple et al. 2024).

The latest Intergovernmental Panel on Climate Change (IPCC) assessment report, AR6, highlights five shared socioeconomic pathways (SSPs). Among these, the high emission scenarios (SSP3–7.0 and SSP5–8.5) project a continued escalation of CO_2 emissions throughout the twenty-first century, reflecting recent trends. According to the IPCC (2023), these pathways make a temperature increase of +4°C by 2081–2100 "very likely" (probability of 66–100%. Experts warn that such warming could lead to significant loss of life and staggering economic impacts, potentially culminating in societal collapse or what some term "climate collapse" (DesRoches et al., 2026; Kemp et al., 2022; Steel et al., 2022).

Although our situation is grave, our purpose is not to engage in fear-mongering. Nor do we predict that anthropogenic climate change will result in catastrophic outcomes. Instead, we leave climate science to the climate scientists.

Our only purpose here is to emphasize that the best evidence available indicates that, under the high emissions scenarios, severe impacts associated with climate change are likely. Urgent action is needed to mitigate the risks of worst-case outcomes. While such actions include reducing GHGs,

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protecting and restoring ecosystems (carbon sinks), improving energy efficiency, carbon sequestration, and transitioning from fossil fuels to renewable energy sources (wind and solar), we focus on one large-scale and contentious intervention: geoengineering the Earth.

Geoengineering has been defined as "the deliberate large-scale intervention in the Earth's climate system, in order to moderate global warming" (The Royal Society, 2009, ix). The two main approaches to geoengineering are carbon dioxide removal and solar radiation management (Finus, 2023). Carbon dioxide removal aims to reduce the amount of carbon dioxide in the atmosphere, while solar radiation management aims to reduce the amount of solar radiation that reaches the Earth's surface (Lee et al., 2025). Carbon dioxide removal techniques include afforestation, ocean fertilization, and direct air capture. Afforestation involves planting trees to absorb carbon dioxide from the atmosphere, while ocean fertilization involves adding nutrients to the ocean to stimulate the growth of phytoplankton, which absorbs CO_2 (Delval et al., 2025; Robinson et al., 2025). Direct air capture involves using machines to remove carbon dioxide directly from the air (Xu et al., 2024. Solar radiation management techniques include cloud brightening, stratospheric aerosol injection, and space-based reflectors. Cloud brightening involves making clouds more reflective so that they reflect more sunlight back into space (Määttänen et al., 2024). Stratospheric aerosol injection involves injecting reflective particles into the stratosphere to reflect sunlight back into space. Space-based reflectors involve placing large mirrors or other reflective surfaces in space to reflect sunlight away from Earth (Gristey & Feingold, 2025).

For this article, we take 'geoengineering' to denote solar radiation management, particularly stratospheric aerosol injection, a form of geoengineering that is particularly contentious among scientists.[1] Arguably, this conception of geoengineering is the best case for our purposes because many forms of carbon dioxide management, such as afforestation, pose no particular moral challenge to ecological humility. But what is ecological humility?

Before attempting to answer this question in Section 3, we must clarify a few things. For this article, we set aside arguments for or against geoengineering the Earth.[2] In other words, we make no recommendations about geoengineering. Instead, our focus is on the character of those who would engage in such a global intervention designed to prevent the worst effects associated with climate change. Second, while it is reasonable to question whether ecological humility is a virtue and how it might be cultivated, we mostly set aside such questions and follow the environmental virtue ethics literature, which assumes that ecological humility is an environmental virtue.[3]

Given that Neo-Aristotelian naturalistic approaches to the virtues, along the lines developed by Rosalind Hursthouse (2002), is the most widely employed, we too will also employ it.[4] On this approach, a virtue is generally taken to be a character trait or component of an individual's character that benefits its possessor, makes its possessor perform better at living the characteristic life of a member of its species, and is acquired or cultivated over time. Moreover, virtues require and support practical wisdom, and they are, on their own, neither necessary nor sufficient for eudaimonia or human flourishing. Our main objective is to explore the sort of virtue ecological humility may be, by following the environmental virtue ethics and environmental psychology literature. The next section reveals that while ecological humility is a prominent feature of the environmental virtue ethics literature, accounts of this virtue are scarce.

[1]500 scientists recently signed an appeal for a solar geoengineering nonuse agreement that stipulated no public funding, no deployment, no patents, no experiments, and no support in international forums (Biermann et al., 2022).

[2]For an overview of such arguments, see Clark (2023).

[3]In this article, we do not raise the question about the cultivation of ecological humility, but there is a growing literature on this topic. See Kirkham and Letheby (2024); Martin et al. (2008); Hoffman (2020); Pulkki (2023); Verbos and Humphries (2014); Bishop (2023).

[4]We suspect that it would be equally defensible on other approaches, such as Christine Swanton's (2003) pluralistic target-centered account, among others.

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3. What Is Ecological Humility?

Environmental virtue ethicists are generally concerned with environmental character, how people are disposed to think, act, and feel toward their environments, including human and nonhuman elements (Rolston, 2012; Sandler, 2007). Those who write about ecological humility rarely provide an explicit account of this virtue with necessary and sufficient conditions, but stress the importance of recognizing "our place" within the natural world, our dependency upon ecological systems, and recognizing our limited value in relation to the whole, of which we are a part. They generally advocate for a humble approach to environmental actions and decisions—ones that resist arrogance and acknowledge our limitations. As an initial step to help illuminate the virtue of ecological humility, this section considers the difference between humility *simpliciter*, intellectual humility, and ecological humility. We then scrutinize the most detailed account of ecological humility on offer, which makes way for our new proposed account of this environmental virtue in Section 4.

What is the difference between humility simpliciter and ecological humility? Moreover, what is the difference between ecological humility and the more familiar kind of humility among contemporary epistemologists—epistemic or intellectual humility?

Humility simpliciter has religious connotations and is typically associated with terms such as "modesty" or "meekness." When construed as a virtue, humility is generally flanked by two familiar vices, arrogance and diffidence, and is characterized as an appropriate sense of one's self-importance (not exalted or lowly) in relationship to other people. Intellectual humility, on the other hand, is thought to be a mindset, disposition, or personality trait that guides our reactions to evidence as we seek to pursue the truth and avoid error. According to Nathan Ballantyne (2023), 200), there are at least three different categories of intellectual humility: attitude management accounts typically track the extent to which people are willing to reconsider their views; realistic self-assessment accounts, which depicts humility as having a realistic evaluation of one's epistemic capacities; and low self-concern accounts of intellectual humility, which regulate low concern for one's own intellectual self-importance and mixed accounts.

While intellectual humility is typically understood as an epistemic virtue, relating to one having an honest assessment of their limited cognitive capacities, environmental virtue ethicists highlight a different matter: character flaws related to the kind of creatures we are and the ways in which people interact with the human and nonhuman or "natural" world—namely, with arrogance toward nature or members of our ecological community. Unlike intellectual humility, which concerns the limitations to our cognitive ability, knowledge, and perhaps how we ought to manage uncertainty, ecological humility is a broader, limiting virtue that concerns the limitations inherent in our nature as human beings and calls for those limitations to shape our actions, our dispositions to act, and our emotional responses in relation to the natural world (Nadelhoffer & Wright, 2017). We are not omnipotent, omnipresent, or omniscient. Instead, we are fallible, vulnerable, and needy creatures who depend on a range of environmental conditions for our continued existence and flourishing. Ecological humility is an *existential* virtue, a kind of virtue that we ought to have because we are human beings (Snow, 1995).

To help us further distinguish between intellectual or epistemic humility and ecological humility, consider the argument formalized by Barker and Lettner's (2017), p. 301), which they apply to potential uses of agricultural technology.

(1) If

(a). You are considering whether to support the use of technology X, and
(b). You have good reason to believe that an attitude of domination and control in people with the power to shape X's use will probably be a significant cause of how X is used, and
(c). Historically since the industrial revolution, an attitude to dominate and control nature has often been a hubristic cause of using agricultural technologies in ways that led to grave environmental problems,

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Then there is a defeasible moral reason, issuing from the virtue of humility, to *not* now support the use of technology X.

(2) (a), (b), and (c) are true.

(3) There is a defeasible moral reason, issuing from the virtue of humility, to *not* now support the use of technology X.

Clearly, this argument primarily relates to the limitations of one's own knowledge about uncertain and potentially harmful technological interventions. More specifically, it concerns what we are warranted to believe about the use of some technology X, given available evidence. Moreover, the argument appears to suggest that our actions with uncertain technologies should somehow track our own epistemic limitations. If we do not heed such reasoning, then using technology X is arrogant or hubristic, which is a vice.

Our purpose in raising the Hubris Argument is not to evaluate its soundness. Instead, we raise it as an example of an argument from epistemic humility about the use of technology so that we may contrast it with another kind of argument about the use of technology from ecological humility.

Suppose we adapt the Hubris Argument to the case of geoengineering the Earth. So long as (a), (b), and (c) are false, there would be no defeasible moral reason, issuing from humility, against geoengineering the Earth. However, this is only an argument from intellectual or epistemic humility, not ecological humility. An argument from ecological humility might conclude that, even if (a), (b), and (c) were false, then it would still be ecologically arrogant to use technology X.

Several environmental philosophers have emphasized the significance of ecological humility, including Henry David Thoreau. As Corsa (2021) explains, Thoreau encourages his readers to acknowledge their human limitations in relation to wildness, fostering a deeper humility before nature. By highlighting the indeterminacy of wild nature and our inability to fully control, categorize, or comprehend it, Thoreau "encourages us to recognize and take seriously our own limitations" (Corsa, 2021, p. 7). Similarly, Rachel Carson famously emphasizes environmental humility in *Silent Spring*, observing that the "control of nature" is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man. She notes that "the extraordinary capacities of life have been ignored by the practitioners of chemical control who have brought to their task… no humility before the vast forces with which they tamper" (Carson, 1962, p. 13). Thoreau and Carson both appear to not only recognize that epistemic and ecological humility can be intertwined, but also highlight the ethical necessity of respecting nature's complexity and limits.

Other environmental philosophers, including Arne Naess (1973), Rolston (2012), and Thomas E. Hill (1983) have also acknowledged ecological humility as a virtue, even if they do not consistently use this terminology. Naess is perhaps best known for developing the framework of "deep ecology," a philosophical perspective that emphasizes the inherent worth of all living beings and the interconnectedness of ecosystems. Within this view, humility is central to recognizing human limitations and fostering a respectful, non-dominating stance toward nature. Holmes Rolston III also underscores the role of humility in recognizing the intrinsic value of nonhuman life and ecosystems. Like Naess, he calls for a more modest and ethically grounded approach to human interactions with the environment.

Arguably, the locus classicus for modern environmental virtue ethics is Hill (1983) "Ideals of Human Excellence and Preserving Natural Environments," where he argues that the absence of environmental humility involves considering all of nonhuman nature as a mere resource to be used for any purpose, a nature that ought to be dominated at every turn. Hill states, "The Alps, a storm at sea, the Grand Canyon, towering redwoods, and 'the starry heavens above' move many a person to remark on the comparative insignificance of our daily concerns and even of our species, and this is

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generally taken to be a quite fitting response. What seems to be missing, then, in those who understand nature but remain unmoved is a proper humility" (Galvagni, 2023; Hill, 1983, p. 219). For Hill, environmental or ecological humility is inconsistent with assigning nature instrumental value alone. Moreover, the one who is ecologically humble rejects dominating nature "at every turn." Ecological humility appears to require that people approach the world with a certain mindset, including correct beliefs about the world, including our interdependence with the natural world, emotional dispositions, and corresponding actions.

While many environmental philosophers have emphasized ecological humility in their writing, explicit accounts of this virtue remain scarce. One exception is Matthew Pianalto (2013). From this point forward, we will narrow our focus to Pianalto's account of ecological humility, which is the most detailed account available. Pianalto (2013, p. 143) argues that ecological humility is constituted by the following three dispositional characteristics:

1. "Acknowledgement and acceptance that one is part of nature and essentially dependent upon it.
2. Openness to learning from nature, and to an appreciation of intrinsic values in nature (namely, to seeing entities in nature as having features worthy of attitudes of awe, reverence, love, respect, aesthetic appreciation, etc.).
3. Motivation to adopt ways of living that are not merely sustainable (from the perspective of human interests), but which minimize impact on the natural world in order to preserve natural intrinsic value; thus, willingness to change and adapt, and to allow entities in nature freedom from unnecessary interference."

On this account, ecological humility is partly constituted by what might be described as a knowledge condition. The ecologically humble person knows something about "their place" in the grand scheme of things, as a mortal creature and member of ecological communities who persists only through space and time by standing in the right kind of relation to their environment. The ecologically humble person acknowledges that we are the sorts of creatures that are deeply integrated and dependent upon our environment. For anyone acquainted with the scientific worldview, this first dispositional characteristic is a platitude. After all, few would deny that we must be causally hooked up to our environments in some ways (rather than others) for our flourishing and continued existence (DesRoches, 2019). Even the ecologically arrogant would be willing to accept that *some* kind of environmental conditions must be obtained for these purposes. Clearly, while Pianalto's first dispositional characteristic, or something like it, is essential for ecological humility, it is also insufficient. After all, what follows from accepting the descriptive claim that we are finite and vulnerable creatures who live interdependently with a myriad of other human and nonhuman beings on Earth?

Pianalto's second dispositional characteristic is intended to answer this question. The ecologically humble not only learn from observing nature but reacts to it in specific ways by forming fitting attitudes, and not others. In particular, according to Pianalto, the ecologically humble appreciate the intrinsic or noninstrumental values in nature. Moreover, he adopts certain fitting attitudes in response to (at least some parts of) nature, including awe, reverence, and respect. The phrase "learning from nature" is significant here because it reinforces the first dispositional characteristic of ecological humility. The careful observer not only appreciates the parts of nature worthy of appreciation but, through general observations, recognizes the transient and finite nature of their own existence as it relates to the whole. Be that as it may, Pianalto's second dispositional characteristic also entails that the ecologically humble must accept the claim that nature possesses intrinsic value, or ought to be assigned intrinsic value. This premise poses a challenge for the account because it seems to entail that those who adopt anthropocentric views, such as environmental pragmatists, could never be ecologically humble. In Section 4, we suggest that this putative challenge yields more heat than light.

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Finally, Pianalto's third characteristic disposition emphasizes that the ecologically humble are motivated to "minimize impact on the natural world." One striking feature of this phrase is that the virtue of ecological humility appears to be exclusively concerned with the *natural* world. Yet, it remains unclear what the concept of 'nature' denotes. If such concepts are intended to denote parts of the Earth that are completely detached from intentional human agency, then they may denote an empty set. After all, as argued below, there is no longer any part of the Earth's surface that is completely detached from humanity during the so-called "Anthropocene."

Our objective is clear. We need an account of ecological humility that scrutinizes the artificial-natural distinction, the intrinsic value of nature, and the phrase "minimize impact on the natural world." Moreover, we shall insist that a defensible account of ecological humility should be informed by relevant empirical evidence in environmental psychology. We turn to this task now.

4. A New Account of Ecological Humility

Our point of departure is to consider the psychological attitudes of ecological humility based on empirical evidence found in environmental psychology. Among environmental psychologists, theorized components of ecological humility, such as awe toward nature (Vasi & Paez-Arellano, 2025), feelings of connectedness with nature (Barragán-Jason et al., 2022), gratitude for what nature provides (Tam, 2022), and a sense of responsibility to protect nature (Syropoulos & Markowitz, 2022), can all be understood as dispositions that orient agents toward regarding the natural world with reverence, gratitude, and care (Nadelhoffer & Wright, 2017). More broadly, ecological humility is theorized to reflect a non-anthropocentric worldview (Lengieza et al., 2023), an orientation that resists placing humans above other species, and that stands opposed to speciesism (Stel & Unterweger, 2025). These attitudes are not merely psychological correlates, but expressions of a deeper orientation—one that disposes individuals to protect, conserve, and preserve the conditions of life (e.g., Syropoulos et al., 2026). Ultimately, those with ecological humility appear to be people most willing to exert great effort to protect nature, especially in times of urgency, and would be inclined toward environmental solutions that are risk-averse. We will return to this theme in Section 5, when discussing the prospect of geoengineering the Earth. For now, it will suffice to acknowledge that many of these findings appear to be consistent with Pianalto's (2013) account of ecological humility.

Recall that the artificial–natural distinction runs through Pianalto's account of ecological humility. Pianalto (2013) argues that the ecologically humble accept that they are part of *nature*, appreciate the intrinsic value of *nature*, and are disposed to minimize their impact on *nature*. However, during the so-called "Anthropocene," it remains unclear what, if anything, the concept of "nature" denotes (Inkpen and DesRoches 2019; DesRoches, 2019; DesRoches, 2020).

Few classical authorities on the artificial–natural distinction rival John Stuart Mill [1874] (2006). In *Three Essays on Religion*, Mill explores several concepts of "nature" before reducing them to two. He states:

> In one sense, [nature] means all powers existing in either the outer or inner world and everything which takes place by means of those powers. In another sense, it means, not everything which happens, but only what takes place without the agency, or without the voluntary and intentional agency, of man ([1874] 2006: p. 375).

In the first sense, nature encompasses all that is actual or possible—including human beings and their intentional actions. The second sense draws a clear line between intentional human agency and phenomena that remain untouched by it. On this account, humans and their intentional activities are, in some sense, special; they appear to exist "outside" or beyond nature.

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Mill's second concept of nature faces a clear challenge today: there is no longer any part of the Earth's surface that remains untouched by human technology (Bensaude-Vincent & Newman, 2007; McKibben, 1990; Wapner, 2010). The notion of the "Anthropocene," is increasingly prevalent in ecological and geological literature, and it asserts that human presence is so pervasive that it defines a new geological epoch (DesRoches, 2019; Bensaude-Vincent & Newman, 2007; Steffen et al., 2007; Sarkar, 2012; Church & Regis, 2012; Vogel, 2015). Estimates suggest that 75 percent of ice-free land has been transformed by human activity, altering ecosystem patterns and processes across the terrestrial biosphere (Ellis et al., 2013; Ellis & Ramankutty, 2008; Vitousek et al., 1997).

Mill's two concepts of nature appear to present a dilemma. Mill's second concept implies that everything on Earth is, in some sense, artificial, given the pervasiveness of human activity on the planet. The notion of a purely 'natural' realm unaffected by humans is, for all practical purposes, untenable. Mill's first concept, however, includes humans and their actions as part of nature but does not appear to select the objects relevant to Pianalto's ecological humility. How are we to understand the artificial-natural distinction as it relates to ecological humility?

We propose adopting a pragmatic approach whereby the concept 'nature' is operationalized to denote items that remain relatively detached from human agency—that is, phenomena that do not exhibit significant features produced intentionally by humans. Following Sahotra Sarkar, even if humans and their activities are part of nature, we can still coherently distinguish anthropogenic from non-anthropogenic features. Sarkar states, "There is at least an operational distinction… one that we can straightforwardly make in practical contexts" (Sarkar, 2012: p.19). This approach effectively reconciles Mill's two concepts of nature. The first concept is most fundamental and denotes *all* phenomena—including atomic bombs, computers, and jumbo jets—while the second allows us to label intentionally modified items as artificial *for practical purposes.* Given that no phenomenon on the surface of the Earth appears to be fully insulated from human agency in the Anthropocene, the distinction between natural and artificial becomes a continuum of sorts. The most natural objects are relatively untouched by humans; the most artificial are intentionally created.

Our point is that there is no fundamental or *sui generis* difference between the natural and artificial. Instead, objects are entangled blends of natural and artificial. This continuum preserves meaningful distinctions: city centers and heavily modified landscapes are artificial, while remote, recently formed islands in the Pacific Ocean remain largely natural. When it comes to the virtue of ecological humility, the artificial–natural distinction is conceptually problematic as a binary, but it remains practically useful when understood pragmatically, and as a matter of degree. On this view, there is nothing inherently normative about the concept of nature. The ecologically humble person may have equally good reasons for preserving 'natural ecosystems' (ones that remain relatively detached from intentional human agency) and 'artificial,' restored, or regenerated ecosystems (that require significant planning and intentional human agency to engender desired effects, whether aesthetic or utilitarian).

Earlier, we described Pianalto's first characteristic disposition as the epistemic condition of ecological humility. Arguably, believing that one is part of nature and dependent upon it is the least controversial of all the characteristic dispositions Pianalto proposes. We accept that something like this characteristic disposition is indeed essential to ecological humility. The Earth can be organized and structured in many different ways that are consistent with human flourishing and the continued existence of our species, but it cannot be arranged in all possible ways. The ecologically humble are disposed to recognize themselves as small parts of a whole, and, they can often engender, through acts and omissions, benefit to other parts and the whole. We are creatures who must be "hooked up" to the world in some ways, rather than other kinds of ways, even if such causal routes are multiply realizable (DesRoches, 2019).

Pianalto's second characteristic disposition requires appreciating the intrinsic value of nature, an element of ecological humility that seems consistent with relevant empirical evidence. For example,

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intrinsic appreciation of nature may provide the most direct foundation for ecological humility, and for action to protect the environment (Whitburn et al., 2020; Syropoulos et al., 2026).[5]

Be that as it may, appreciating the intrinsic value of nature as an essential element of ecological humility requires further refinement. The problem is not that certain parts of nature are unworthy of attitudes of awe, reverence, love, respect, and aesthetic appreciation, as Pianalto suggests, but that the nature of intrinsic value is deeply contested, especially among environmental philosophers (O'Neill, 1992). Pianalto (2013) follows Katie McShane (2007) and explains that when he invokes the term 'intrinsic value,' he simply means that claims about the intrinsic value of X are claims about the distinctive way that it makes sense to care about X. Our concern is not with this specific account of intrinsic value, but an apparent consequence of making intrinsic value essential to ecological humility. After all, the move suggests that those widely believed to be unwilling to accept that nature is intrinsically valuable—including anthropocentrists or environmental pragmatists—cannot be ecologically humble (Norton, 1986; Minteer, 1998). Yet, environmental pragmatists might reasonably claim to harbor attitudes of awe, reverence, and respect for the parts of nature worthy of those attitudes, all the while rejecting a deep metaphysical commitment to intrinsic value. And yet, one might reasonably ask: can one feel genuine reverence, care, awe, or love for parts of nature one views as having only non-intrinsic or instrumental value? Surely, it would be justified to question whether one feels or experiences genuine reverence, care, awe, or love for other people if they only assigned instrumental value to them. Should we be equally skeptical about such claims when it comes to valuing nature?

Ben M. Minteer (2001) has argued that there is a sense in which the intrinsic value of nature is not only relevant to environmental public policy, but acceptable to environmental pragmatists. While environmental pragmatists are widely known to reject what they would consider to be non-naturalistic metaphysically mysterious accounts of intrinsic value, they remain open to the prospect that some people value nature non-instrumentally. What remains critical for environmental pragmatists, especially the Deweyan variety, is that claims about the intrinsic value of nature are always embedded in human communities. Instead of being timeless moral truths, they are contextual and practical. Thus, so long as we are sufficiently flexible with our account of intrinsic value, then there is no good reason to conclude that environmental pragmatists cannot also possess ecological humility.

Finally, consider Pianalto's third characteristic disposition of the ecologically humble. He claims that the ecologically humble is motivated to adopt ways of living that minimize impact on the natural world in a manner that preserves natural intrinsic value. Moreover, they are willing to change, adapt, and allow beings the freedom from unnecessary interference. Aside from acknowledging that some environmental conditions are required for human flourishing and the continued existence of our species, and that the ecologically humble person harbors fitting attitudes toward parts of nature, how is the ecologically humble person characteristically disposed to act?

Our suggestion, supported by evidence in psychology, is that the ecologically humble person is disposed to act (and omit their actions) in a manner that contributes to the flourishing of their ecological communities. Such individuals recognize themselves to be members of these communities, adopt fitting attitudes, and are disposed to act in ways that sustain or promote ecological flourishing. Indigenous scholars often describe this orientation as a kincentric worldview, one that is concerned with and extends consideration to "all of our relations." Individuals high in ecological humility can be motivated to advance ecological flourishing by a plurality of reasons, some intrinsic (e.g., love, respect, or reverence), others non-intrinsic (e.g., responsibility, prudence, or duty). This plurality of motivations helps explain why ecological humility does not predetermine specific stances on environmental issues. For instance, greater environmental concern has, in some cases,

[5]That said, non-intrinsic concerns—such as economic or instrumental reasons—also predict support for conservation and protection of the natural world (Himes et al., 2024).

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predicted support for geoengineering (Brutschin et al., 2024). Following this argumentation, those high in ecological humility—or in traits associated with humility—may, under certain circumstances, support geoengineering initiatives when these appear rational, proportionate, or relatively low-risk. What matters, then, is not a single substantive judgment about which environmental interventions are permissible, but rather the characteristic disposition to seek ecological flourishing through proper motivations. Instead of minimizing their impact on "nature," pace Pianalto, the ecologically humble aim to *harmonize* with their environments and, whenever feasible, directing caring attention to the various beings that constitute their ecological communities, whether through intentional action or the intentional omission of their actions.

Indeed, there is a conceptual connection between the virtue of ecological humility and care. In fact, there are at least three ways that ecological humility entails care: by the vice of self-deprecation (which flanks ecological humility), the vulnerable and needy character of human existence, and by the recognition that nonhuman nature or parts of the environment matter morally.

The first conceptual connection between humility and care is made palpable through self-deprecation, which involves belittling, undervaluing, or a sense of carelessness that is directed towards oneself as a being that is not worthy of sufficient care or attention. Arrogance and inattentiveness are assuming and acting as if you and your own kind are all that matters—caring only for oneself and those around you. If the vice of undervaluing oneself involves caring less than is fitting for oneself, then the virtue of humility would seem to contain some minimal level of care toward oneself. If that is right, then one cannot possess humility simpliciter without also caring toward oneself, self-respect, and attention to self and others.

The same is true for ecological humility. One vice that flanks ecological humility is ecological arrogance or inattention to those around you, which is commonly associated with rash behaviors that aim to control and dominate, caring only about oneself and perhaps one's own kind. Geoengineering appears to involve controlling and shaping the Earth, and the project has been construed by environmental virtue theorists as merely caring about human interests. The other vice that flanks ecological humility involves caring less than one should about oneself and other parts of the natural world, or the other members of one's ecological community—a community that extends to what many Indigenous scholars refer to as *all our relations*, our kin. Those with ecological humility have a fitting degree of care and attention for the other members of their ecological community, including human and nonhuman beings. Detailing the Indigenous conception of care, which is consistent with a fitting degree of care, Kyle Powys Whyte and Chris Cuomo (Whyte & Cuomo, 2015, pp. 6–7) emphasize the importance of awareness of one's place in a web of different connections spanning many different parties, including humans, nonhuman beings, and entities, understanding moral connections as involving relationships of interdependence that motivate reciprocal responsibilities and valorizing certain skills and virtues, such as attentiveness to the environment, and Indigenous stewardship practices.

The second conceptual connection between humility and care is through vulnerability. Those with ecological humility recognize that they live in a highly contingent nexus of interdependent relationships with other people and nonhuman nature, relationships that are essential to human well-being and the continued existence of our species (Pianalto's first dispositional characteristic). When these critical relationships are weak, then our collective flourishing is threatened, and in such cases, the fragility of our condition is revealed. The virtue of humility springs in part from recognizing this vulnerability—that we are not all powerful and independent beings—but limited and needy creatures that depend upon a host of interdependent relationships from which we detach ourselves at our own peril. As suggested above, ecological humility is an existential environmental virtue in that it concerns the kind of creature that we are in relation to everything else. Individuals experience what Nancy Snow (1995) describes as existential humility when they recognize and take seriously not their personal limitations and weaknesses as individuals, but rather the limitations they possess insofar as they are human (Snow, 1995, p. 208). Snow states, "human limitations in general are then thrown into relief by contrast with a more complex and valuable reality" (1995: p. 208), we might come to appreciate our

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human limitations by considering the "grandeur of nature," our knowledge of which is "limited by our human abilities" (Snow, 1995, p. 208; quoted in Corsa, 2021, p. 7).

Third, most environmental virtue ethicists would argue that it is not merely within our self-interest that we should tend to and care for the relationships upon which we depend. Attentiveness to our vulnerability to our natural relations means that those with ecological humility express a caring attitude toward nonhuman parts of nature. If one believes they are invulnerable, they can be inattentive to the needs of those around them. Kathleen Dean Moore (2004) argues that inattentiveness stems from a lack of humility and respect for the natural world. But the acknowledgment of our vulnerability and interdependence commands attentiveness to the particularities of our surroundings and caring for the welfare of other beings. The idea of attentiveness to the particularities of the land communities was reinforced by exemplars of ecological humility, Aldo Leopold and Robin Kimmerer, who both eloquently discuss loving attention and restoring the land that has been damaged by humans.[6] Having a caring attitude toward other members of one's community is what it means to be a good member of one's ecological community. Good community members are attentive to the needs of others in their community, both human and nonhuman, and therefore should act based on caring for their interests as well as our own.

Environmental virtues are character traits that contribute to human flourishing within an ecological context. What evidence do we have for believing that ecological humility contributes to such flourishing? Although ecological humility has not yet been psychometrically defined and measured directly via self-report, several closely related constructs have been extensively studied within psychology that suggest an ecological humility—human flourishing link. Dimensions such as connectedness to nature, environmental identity, experiences of awe toward the natural world, and motivations to protect it all reflect facets of an underlying orientation of humility before ecological systems. Importantly, each of these constructs has been shown to not only foster prosocial and pro-environmental attitudes but also to predict individual flourishing, as indexed by higher levels of psychological well-being and life satisfaction (e.g., Hinds & Sparks, 2009; Monroy & Keltner, 2023; Pritchard et al., 2020; Van Tongeren et al., 2016). This convergence suggests that the virtue of ecological humility, although conceptually distinct, since it shares a notable overlap with these concepts, will probably result in the same dual benefits—orienting individuals toward ethical concern for the more-than-human world while simultaneously enhancing their own mental health and flourishing. In this way, the study of ecological humility sits at the intersection of moral psychology, environmental philosophy, and positive psychology, highlighting its potential to illuminate both the ethical and eudaimonic dimensions of human–nature relations.

5. Geoengineering Is Consistent with Ecological Humility

What does our new account of ecological humility suggest about the prospect of geoengineering (solar radiation management *vis-à-vis* stratospheric aerosol injection) the Earth? Unlike Pianalto's (2013) account, our account of ecological humility does not entail that the one who possesses this

[6]Arguably, Kimmerer (2013) and Aldo Leopold (1949) are moral exemplars when it comes to the virtue of ecological humility. Kimmerer's life and work embody deep respect, care, gratitude, and reciprocity toward the natural world. Her example helps us understand how humility can guide human relationships with the environment in more ethical and sustainable ways. Aldo Leopold is widely regarded as a moral exemplar of ecological humility because his life, writings, and philosophy embody a deep respect for the natural world and a profound awareness of humanity's limited role within it. Leopold's land ethic redefines humans not as conquerors of the land but as "plain members and citizens" of the biotic community. This ethic calls for humility in how we see ourselves in relation to the natural world. "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect" (Leopold, 1949). Leopold's ecological perspective was rooted in a humble recognition of nature's complexity. He frequently warned against simplistic or short-sighted human interventions, noting that ecosystems are intricate and interconnected in ways we may not fully understand. His approach appears to reflect both epistemic and ecological humility.

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virtue is disposed to minimize their impact on nature or the environment, which would seem to preclude widescale interventions, such as geoengineering the Earth. One might, therefore, be inclined to think that, on our account of ecological humility, anything goes, including geoengineering the Earth. However, the ecologically humble are not given a carte blanche. They act from virtuous motives and recognize themselves to be members of an ecological community that includes human and nonhuman beings, and are ultimately concerned with the continued flourishing of this community.[7] There may come a time when the prospect of negative impacts associated with climate change becomes so severe that geoengineering is not motivated to control or dominate out of one's own self-interest—which would be an act of ecological arrogance—but the felt need to *protect* life on Earth and provide human beings with the opportunity to restore better relations with the other species with whom we share this planet. Protection is a crucial element within a larger framework of care, and care, as we argued in the previous section, is essential to the virtue of ecological humility. By emphasizing care, vulnerability, and community flourishing, the ecologically humble is a characteristic disposition that, among other things, is guided by the felt need to protect, whether through intentional action or omission, what they believe to be valuable or even precious.

6. Conclusion

We began this article by recognizing the precarity of our situation. Anyone acquainted with recent climate science knows that, under business as usual, the predicted climate trajectories are alarming, with rising global temperatures, extreme weather events, and looming tipping points, all of which threaten ecosystems and human populations. While there are many different kinds of actions humanity can take to mitigate the harmful effects of climate change, we focused on geoengineering the Earth and asked: is geoengineering consistent with the environmental virtue of ecological humility? We then scrutinized the most detailed account of ecological humility available, which is due to Pianalto (2013). Pianalto characterized the ecologically humble as one who recognizes themselves as part of nature, appreciates nature's intrinsic value, and acts to minimize their impact on nature. While we accept the first characteristic disposition—or something like it—as essential to any defensible account of ecological humility, we refined the second and third elements. We argued that there is sense in which the intrinsic value requirement of ecological humility is acceptable to environmental pragmatists and, moreover, that minimizing human impact on "nature" becomes conceptually problematic during the Anthropocene, where human influence pervades nearly all ecosystems.

[7]Perhaps the primary argument against geoengineering the Earth, grounded in the virtue of ecological humility, is the so-called "No Playing God" argument (Hamilton 2013; Hartman, 2017; Wong, 2015). Hartman (2017) reconstructs this argument as follows: (1) certain tasks are reserved for God, not humans; therefore, (2) if humans undertake these tasks, they are doing wrong in some way, that is, they are "playing" God without actually being God; and (3) bad consequences will likely result. This reconstruction is inspired by Clive Hamilton's *Earthmasters*, where he claims, "There are certain qualities that humans cannot and should not aspire to, both because they are beyond us and because aspiring to them invites calamity," and that "playing God entails humans crossing a boundary to a domain of control or causation that is beyond their rightful place" (Hamilton 2013, p. 176). The "No Playing God" argument implicitly involves a premise from ecological humility. Some activities are off the table by virtue of the kinds of creatures that we are. To "play God" smacks of ecological arrogance. Some activities are not live options precisely because of the kind of beings we are and the limits that status imposes. On this view, even if geoengineering the Earth were technologically feasible and could be deployed without the risk of grave harm to vulnerable communities, it would still be morally unacceptable from the standpoint of those—such as Hamilton—who defend ecological humility as a limiting virtue. However, virtues are dispositions to act in ways that express that virtue, but this does not entail that, for example, a just or generous person will express their justice or generosity by means of the same actions, whatever the circumstances. When circumstances differ, what it is to act generously or justly often changes, too. The same is true of ecological humility and the prospect of geoengineering the Earth. Geoengineering may be undesirable, but it is not inconceivable that a person or group of people could seriously consider geoengineering the Earth from virtuous motives. However, unlike environmentally arrogant individuals, the ecologically humble would never do so purely from an exclusive concern for their own good.

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Our account reframes ecological humility as an attitudinal and motivational orientation supported by empirical work in environmental psychology. Ecologically humble people generally experience awe, reverence, and care toward their ecological communities, adopt non-anthropocentric beliefs, and tend to act in a manner that promotes the flourishing of human and nonhuman beings. Significantly, this includes intentional actions and omissions that confer benefits. We operationalized the artificial–natural distinction pragmatically, treating it as a continuum rather than a strict binary, enabling ecologically humble actors to engage responsibly in interventions without being ecologically arrogant. Conceptually, we argued that care is essential to humility via self-respect, recognition of vulnerability, and attentiveness to interdependent ecological relationships. Unlike other proponents of ecological humility who advocate preserving nature by leaving it untouched, our account emphasizes the need for active restoration and caregiving for healing the Earth and our relationship to it.

One might object to our argument by claiming that there are good scientific, technological, and moral reasons against geoengineering the Earth. This objection would be misplaced, however. After all, we have not been engaged with the question of whether we should geoengineer the Earth.[8] Instead, we have only been concerned with the question of environmental character, with a special focus on ecological humility. Our account of this virtue reveals that, under the right conditions, one might still support such a global intervention all the while being ecologically humble, being motivated by the felt need to protect life on Earth.

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[8]It's almost certainly appropriate to adopt some version of the precautionary principle. For a leading decision theoretic account of the precautionary principle, see Bartha and DesRoches (2021), Steel and Bartha (2023), Steel et al. (2025), and DesRoches et al. (2026).

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