

Climate Engineering and the Playing God Critique

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Climate engineering, also known as geoengineering, involves deliberate, large-scale manipulation of the earth's atmosphere to counteract some of the effects of global climate change. The most extreme options for climate engineering are the most controversial, from seeding the ocean with iron on a massive scale in order to stimulate phytoplankton blooms that would absorb excess carbon to brightening the clouds for maximum reflectivity by spraying sulfate aerosols, mimicking the globe-cooling effect of a massive volcano (with the proviso that one must repeat the procedure regularly in order to maintain the effects). Continued warming trends and ever more dire modeling by climate scientists have in recent years shifted geoengineering from a taboo to a hotly debated topic for activists, policymakers, and scholars at both the national and international level. Geoengineering is no longer something out of science fiction, but has become a part of the international political wrangling surrounding global solutions to climate change. Critics point out that there are many good reasons not to engage in such climate engineering.¹ For starters, it raises a host of practical and political questions: Who would govern it? Who would pay for it? What happens if it has unintended effects? Who is to blame if those effects are harmful?

Apart from these very real practical and political concerns, climate engineering also invites other types of critique. As philosopher Dale Jamieson points out, "The use of this term [geoengineering] alerts us to the fact that a proposed intervention in the climate system is one that, in the opinion of the speaker, requires a heightened level of scrutiny."² In other words, climate engineering interventions are

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seen, by definition, as strange, unfamiliar, untested, and risky. And because such measures seem morally presumptuous and hubristic, they are not uncommonly described as “playing God.”³ It is this vulnerability to the playing God critique that I wish to address here.

Those scientists and policymakers who would take steps to engineer the climate are accused of playing God in multiple arenas, from Clive Hamilton’s book *Earthmasters*, to the pages of *Foreign Policy*, to the everyday opinions collected by environmental researcher Wylie Carr’s interviews in Alaska, Kenya, and the Solomon Islands.⁴ Rather than attacking politicians and scientists, journalist Paul B. Farrell specifically targets “billionaires” who will “play God on climate” in order to protect their investments in fossil fuels.⁵ Regardless of who is the actual agent, many commentators agree that climate engineering transgresses humanity’s proper limits. “This is God’s stuff we’re messing with,” warns an Alaska Native in Carr’s article: the climate is the realm of the divine, not that of humans.⁶ Princeton political scientist Simon Donner agrees. In his essay “Domain of the Gods” he notes that nearly every religion or indigenous worldview involves a story of the separation of land from sky in which humans may influence the land but the sky belongs to the deities.⁷ The very idea that humans might influence the climate is therefore hard to grasp, he argues: “This ability to influence the climate represents a major paradigm shift, arguably on the order of the Copernican Revolution.”⁸ No wonder the idea that humans have altered the climate unintentionally—let alone the idea that we might alter it intentionally—is met with resistance by many religious individuals. Even if such religious views represent a minority among global elites, government actors, and scientists, Carr is convinced that “religion will play a role in public support for, or opposition to, geoengineering research in many countries.”⁹ Climate engineering brushes up against “deeply held beliefs about the proper place and role of humans in the order of the cosmos,”¹⁰ and so perhaps it should come as no surprise that language of “God” figures prominently in responses to it at the local, national, and international level. Understanding and analyzing the playing God critique, then, is essential for any policy decisions related to climate engineering.

In this article I describe the foundations of the playing God critique and situate this critique alongside a secular counterpart in a general category of responses to climate engineering—what I call “the overreach critiques.” Though certain versions of this critique seem easy to disprove or discount, I discuss certain attempts to reclaim it; that is, perhaps there is an appropriate role for humans that includes

something like playing God. More importantly, however, I claim that the playing God critique may be interpreted as a symbolic rather than a literal claim; that it is a rhetorical move that privileges evocative analogy over logical argument. As such, playing God and other overreach critiques highlight virtue ethics and proper human agency with respect to fittingness and responsibility. I use two twentieth-century thinkers, Aldo Leopold and H. Richard Niebuhr, to discuss this theory, imaginatively answering the following question: What might they have said about climate engineering? In light of its implications for virtue ethics and an ethics of human agency, climate engineering proponents would do well to pay attention to the concerns embedded in the playing God critique.

THE OVERREACH CRITIQUES AND THEIR RESPONSES

Not uncommonly, the advent of a new technology brings with it skepticism about whether humans ought to be possessed of such powers over nature. From nanotechnology to genetic modification of humans, new technology often yields accusations of “playing God.”¹¹ These accusations indicate discomfort with human powers, implying that those who wield them are guilty of hubris, of pridefully assuming powers that should belong to God or to nature. As Christian ethicist Cynthia Crysdale notes, “The counterpart of the admonition that we ought not to play God is the positive injunction to ‘let nature take its course.’”¹² A similar critique, then, emerges in philosopher Georgiana Kirkham’s phrase “vexing nature.” Kirkham argues that some secular perspectives use nature in a role similar to that of God—generative, powerful, authoritative.¹³ Indeed, Adam Corner et al. found that in the largely secular United Kingdom, interviewees were most concerned that climate engineering might amount to “messing with nature,” a concern that echoes both Kirkham’s phrase and the classic playing God critique.¹⁴ In response, I examine the rhetoric of playing God *and* of vexing nature in parallel but distinct investigations of these two “overreach critiques,” though I focus primarily on the former. The way they are used and the way they play out are quite similar, but they should remain distinct given the significant differences between their underlying presuppositions and relative usefulness.

If Playing God Were an Argument

When the phrase “playing God” is used, is it an argument? Ethicist Pak-Hang Wong refers to it as such in his article about Confucian environmental ethics and climate engineering.¹⁵ But the word “argument” entails a logical conclusion

based on particular premises, and the phrase “playing God” is rarely deployed in this manner. It does, however, show up in Hamilton’s book *Earthmasters* in the following form: “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.”¹⁶ Hamilton also writes that “playing God entails humans crossing a boundary to a domain of control or causation that is beyond their rightful place.”¹⁷ To formalize this argument, (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.

A similar set of assumptions emerges from Jamieson’s nature-based argument. He writes that climate engineering “fails to show respect for nature, and attempts to manipulate nature in order to make it conform to our desires rather than shaping our desires in response to nature.”¹⁸ Thus, (1) nature is worthy of respect, not manipulation; and (2) manipulating nature is therefore doing wrong in some way. (The rest of Jamieson’s article elaborates upon a parallel to number 3 above—the worrisome consequences that will result from undertaking this level of control over nature.)

Such arguments have appeal, but are quite easy to refute. Both the playing God argument and the vexing nature argument presuppose a bright line between the realm of human activity and divine activity, or between humans and nature. Only with such a clear line may one criticize a measure such as climate engineering as “overstepping” the proper boundaries. Such dualities, however, are troubling. Many environmentalists argue that humans should identify with nature, not see ourselves as separate.¹⁹ Arguably, the very worldview of separation between humans and nature is what precipitated our current environmental crisis.²⁰ A response to Jamieson, then, may point out that one may manipulate nature and still respect it, as in the case of an indigenous farmer who cares for the land while manipulating it with organic fertilizers in order to harvest more and better food. The line between humans and nature, and between manipulation and respect, are muddier than his statement implies.

In a similar vein, many Christian theologians argue that while God and humanity are not the same, divine action and human action may nevertheless overlap. Humans may embody God or co-create with God. Humans are creative, just as God is creative, and our co-creation with God can be a manifestation of praise and admiration for God’s work.²¹ The popular slogan of the Evangelical

Lutheran Church in America—*God’s work, Our hands*—highlights this idea of human empowerment to embody God’s action in the world.²² On this understanding, those human hands that spray sulfate aerosols into the atmosphere to cool the sun’s heat might well be doing God’s work of sustaining creation.

A view premised on a strict separation between humans and God envisions a “God of the gaps,” a God who rules only where humans are not in control or do not understand something. On this view, God reigns where humans cannot, and typically (as Donner notes, above) the weather, skies, and “heavens” have been God’s realm, not that of humans. God is in the mystery, in the uncontrolled. But any thoughtful believer will recognize that if God primarily exists in mystery, then progressive scientific discovery that erases mystery erodes God. Most religious people would dispute this: God is not so vulnerable. As human control expands, God does not contract. Rather, God is coexistent with all of creation and does not merely reside in the gaps created by human finitude.²³

Therefore, playing God, and to a lesser degree vexing nature, simply does not work as a moral argument. In the words of the U.S. Presidential Commission for the Study of Bioethical Issues, the language of “playing God” is “unhelpful at best, misleading at worst.”²⁴ It seems, at most, an oblique way to express a concern about the consequences of increased human power over nature.

Playing God as Laudatory or Required

Arguments against playing God are further weakened by those who see playing God as positive, or even as an obligation. For example, certain Muslim perspectives see playing God—in the sense of imitating God—as a laudable spiritual practice. Scholar of Islam Kaiser Shahzad writes, “In the Islamic spiritual tradition, a concept akin to ‘playing God’ is that of ‘assuming the divine attributes,’ embodied by a famous saying attributed to the Prophet of Islam, *viz.* ‘assume the character-traits of divine names.’”²⁵ Sharing God’s attributes such as “life, knowledge, will, power, hearing, sight, and speech” underscores humans’ role as the *khalifa* (successor or steward) for creation. Above all, according to Shahzad, such a role comes with an “obligation to love God.”²⁶ God’s action is not starkly separated from human action, but rather humans may mimic, mirror, embody, or manifest God’s action in the world. Climate engineering, then, if it could be construed as a loving, knowledgeable, wise, compassionate action, might be playing God in the good sense.

Perhaps we should say, then, with bioethicist Joseph Fletcher, “Come, Let Us Play God.”²⁷ One must, of course, adhere to certain standards. For Shahzad,

the basis is love: loving as God loves. For Christian bioethicist Allen Verhey, God's action is healing. When humans heal each other, he writes, we are "playing God the way God plays God."²⁸ At least some Christian and Muslim thinkers, then, admit the possibility of a positive way to play God. For these religions, however, God is not necessarily domineering and power hungry. On the contrary, God has special concern for the poor and weak, according to both Christianity and Islam (a notion they share with many other religions). Verhey suggests that when we undertake action that may be construed as playing God, we should ask ourselves, "Does [the proposed action] fit the story of one who takes the side of the poor and powerless?"²⁹ Shahzad would agree, emphasizing God's generosity and mercy, and the need to mirror this in human action.³⁰ Note here that the view of God is not one of an omnipotent, distant, partisan despot, but rather of a personal, loving power that seeks justice for the poor. We see some criteria, then, for positive practices of playing God: If climate engineering might in fact take the side of the poor and powerless, it might qualify as a worthy instance of laudably playing God. But the emphasis on relationality and love complicates this: How could a large-scale deliberate manipulation of the atmosphere—something known as "engineering"—be personal and loving?

In an article about the place of religion in the geoengineering debate, theologian Forrest Clinger and ethicist Kevin O'Brien recognize that playing God functions to "condemn human hubris," but also serves as "a theological justification of human skill."³¹ For example, geoengineering supporter and scientist Mark Lynas calls playing God "good for the planet." "Playing God," he writes, "is essential, if creation is not to be irreparably damaged or even destroyed by humanity unwittingly deploying its new-found powers in disastrous ways. At this late stage, false humility is a more urgent danger than hubris."³² Lynas exhorts humans to embrace our unprecedented power with courage and leadership, swooping in to save the planet before it is too late. Like it or not, he argues, we humans must move beyond traditional stewardship toward more extensive power and control, in order to prevent catastrophe.

Perhaps climate engineering would fit Verhey's and Shahzad's criteria of being personal and loving. If humans seek to author and frame ecosystems (including the atmosphere) in order to save themselves from the ill effects of human folly, we may be playing God "the way God plays God"—by preserving creation. Additionally, it may be argued that climate engineering supports the poor and downtrodden by avoiding the harms that climate change visits on the worst off:

we engineer the climate because we care about the poor.³³ Given climate engineering's association with high-tech players and powerful, wealthy political actors, however, the burden of proof rests with its promoters: Can such an enterprise really be reconciled with the actions of a loving, merciful God of the downtrodden and poor?

PLAYING GOD AS SYMBOLIC RHETORIC

Since the playing God critique as formulated above can be so easily undercut on its own terms, and even turned around to argue the opposite (that we *should* play God), then perhaps it should not be treated as a rational argument at all. Humans rarely make moral choices based on rationality. Indeed, theological ethicist H. Richard Niebuhr sees humans as “*symbolic* more than . . . *rational* animals.”³⁴ In this vein, I suggest that the playing God critique functions symbolically, similar to the symbolic rhetoric of narrative, myth, and fable. The story of Icarus is paradigmatic here. When someone says “we should not play God,” this indicates discomfort in two distinct but intersecting dimensions: (1) a feeling of nostalgia for comfortable dualisms; and (2) a feeling of concern about the character (or virtue) of one who might undertake new levels of power.

Dualism and Nostalgia

“When nature was autonomous,” writes philosopher Allen Thompson, “human beings were free from the existential burden of bearing moral responsibility for some of the basic conditions supporting all life on Earth.”³⁵ Thompson has encapsulated the nostalgia and dualism inherent in the playing God critique as it applies to climate engineering.³⁶ Those who invoke “playing God” are often nostalgic for a worldview in which human responsibilities were smaller in proportion to the rest of the world. That worldview rested on a comforting dualism, which involved clearly knowing the human place in nature's order.³⁷ As theologian Willem Drees notes, “The fear of playing God is not the fear of doing what is wrong, which is an issue on our side of the boundary [between what is given and what we may alter], but rather the fear of losing a grip on reality through the dissolution of the boundary.”³⁸ Proposals such as climate engineering invoke feelings of disorientation and dislocation. It feels like a shift in the nature of reality, the erosion of a line that organized our sense of self in the world. We may know that the line between humans and God, or between humans and nature, is not as stark as it seems; nevertheless, we long for some of the clarity that such dualisms bring.

As Verhey puts it, such shifting boundaries cause some people to “lament a ‘humanity come of age’ and long to go back to a former time, a time of our childhood.”³⁹ In other words, rather than being children nurtured by a mother (earth), we are grown, and our mother (earth) is now ailing and in need of our care. Verhey argues that we cannot go back to that innocent time when God took care of everything and we had clearly circumscribed responsibilities, because its very existence was an illusion based on false dualisms. However, the emotional appeal of this view—let God be in charge—has undeniable power for many people.⁴⁰

As with God, so with nature. Although scholars familiar with postmodernism may agree that nature is a socially constructed concept, there remains a persuasive argument that nature—and wilderness in particular—amounts to something special, something “other,” something that should not be under human control. Philosopher Eric Katz, known for his contention that ecological restoration creates a human artifact, not a natural ecosystem, applies this same thinking to climate engineering. Of climate engineering, he writes that “it will change irrevocably the meaning of the human relationship to nature—‘nature,’ indeed, will cease to exist.”⁴¹ Katz worries that undermining the line between humans and nature by essentially domesticating the entire globe under a managed climate will undermine all ecological preservation.⁴²

He may be right. According to geoenvironmental advocate and Harvard scientist David Keith, large-scale deliberate manipulation of the Earth’s atmosphere is “not the end of nature—but it is the end of wildness—or at least our idea of wildness. It means consciously admitting we’re living on a managed planet. . . . The fact is, whether we want to admit it or not, we’re living in a zoo. And we’re both the animals and the zookeepers now.”⁴³ Similar to Verhey’s account of “humanity come of age,” Keith and others recognize with some regret that something of value is lost when humans take charge of a realm previously reserved for nature alone. Nature has lost, in Jamieson’s terms, a certain degree of autonomy, and therefore is no longer free from human domination.⁴⁴ It is appropriate, then, to mourn this loss, to feel nostalgia for the days before humans were such a powerful and dislocating force on this planet. The playing God critique recognizes the tragedy here, and registers the bewilderment that comes with assuming a new role with respect to the natural world. What is that new role in nature and how appropriate or fitting is it that we humans have assumed it? These questions of human agency are addressed below, but because proper human agency involves certain virtues, I first turn to virtue ethics.

Playing God as a Concern for Virtue Ethics

Questions of appropriateness and fittingness often fall under virtue ethics, since virtues are socially expressed and sensitive to context. Indeed, the presence of virtue language in discussions about geoengineering—hubris, humility, pride, prudence—indicates that a virtue ethics perspective is needed here. Georgiana Kirkham analyzes “playing God” and “vexing nature” using a virtue ethics framework. “Some objections of this kind,” she writes, “while masquerading as straightforward deontological objections, are better understood as fundamentally concerned with the virtue of the agent performing the moral act and thus amount to an objection based on virtue ethics.”⁴⁵ In other words, when we object that geoengineering amounts to playing God and therefore is inadvisable, perhaps we do not mean that doing so breaks a rule (namely, the rule about staying on the “human” side of the boundary between humans and God). Perhaps what we really mean is that a truly virtuous person would not do this. It may be a question of scale: the virtuous person knows what counts as overreach and what is fitting and appropriate. Or it may be a question of motivation: the virtuous person is not self-serving and hubristic, but accepts a certain lack of control over the conditions of life. On this view, truly virtuous people intuitively know the limits of human action and observe them with scrupulousness, prudence, and ease.

Virtue accounts of humility and modesty apply well to climate engineering. Kirkham and others propose humility as a useful virtue in the face of the playing God critique; rather than playing God by engaging in geoengineering, we should be humble. Lynas, for example, with his exhortation to save the planet by playing God, seems far from humble in this case (in fact he accuses those who hesitate to engineer the climate of expressing “false humility”).⁴⁶ This lack of humility in Lynas would be a red flag for Kirkham and others applying virtue theory.⁴⁷

Moreover, beyond humility, modesty is an even more helpful virtue in this case. To play God by engineering the climate is to be immodest with our powers. Better to cultivate modesty, a multistep virtue that applies to many environmental problems.⁴⁸ Modesty resembles humility in its boundary observation and orientation toward what is small and unassuming. However, modesty includes a concern for one’s effect on vulnerable others, and so yields interesting environmental insights. In other words, would-be climate engineers who are modest recognize that they have the power to change the climate, but they restrain themselves from doing so out of an awareness of the vulnerability of others (both human and nonhuman) to physical harm (if it has unintended bad effects) and moral

harm (via the so-called moral hazard, in which the “quick fix” undercuts the will to do the right thing). This virtue, then, can also be directly applied to climate engineering.

Confucian virtues of harmony and wisdom also may apply to climate engineering. Pak-Hang Wong contends that arguments about playing God mean little to a nontheistic tradition such as Confucianism. However, Confucianism does have a strong sense of nature’s order and value. The human role is neither separate from nature nor completely identified with it. According to Wong, the goal is harmony between humans and nature, not separation. He writes, “harmony (*he*) . . . is *the* normative standard in Confucian thought.”⁴⁹ Harmony, as Wong describes it, means interrelation without domination; it involves diversity and dynamism.⁵⁰ On this understanding, to behave otherwise would amount to “vexing nature,” in Kirkham’s words. Interestingly, Confucianism supports a certain degree of human alteration of nature. But this task “should be reserved *only* to those who are deeply virtuous.”⁵¹ Even geoengineering might be permissible, Wong admits. However, “since there will not be many deeply virtuous persons in reality, those who genuinely have, or can have, the role to engineer the climate will be extremely limited. In reality, therefore, it is doubtful that Confucians will agree to engineer the climate.”⁵²

All of these positions share a virtue perspective on climate engineering. Large-scale deliberate alteration of the climate lends itself to hubris and disharmony; if the climate were to be engineered at all, it should only be done by the wise, the kind, the modest, and the careful among us, but those who meet these criteria are unlikely to see such measures as appropriate and fitting. As bioethicist Paul Ramsey famously wrote, “Men ought not to play God before they learn to be men, and after they have learned to be men they will not play God.”⁵³ In other words, wise people, people who know their place, do not play God. Virtue arguments imply, then, that anyone who wishes to engineer the planet may lack the virtue qualification to do so.

PLAYING GOD AS RAISING QUESTIONS ABOUT PROPER HUMAN AGENCY

If the opposite of playing God is demonstrating virtue, and if virtue means knowing our proper place, what then is the scope and scale of appropriate human agency? Two important American thinkers of the twentieth century had similar

answers to this question, though they worked in very different fields. Theologian H. Richard Niebuhr (1894–1962) and conservationist Aldo Leopold (1887–1948), though they were contemporaries, seem never to have crossed paths or responded to each other’s work. Leopold was not particularly religious; Niebuhr was not particularly interested in questions of environmental conservation. Nevertheless, both thinkers had strikingly parallel visions of proper human agency in the world, exhorting readers toward a contextual, communal, and humble approach to action that is fitting and responsible. Neither imagined a future in which climate engineering would be possible, yet their ideas are nevertheless applicable to the issue at hand.

Leopold, a forester, nature writer, and author of *A Sand County Almanac*, outlines a view of human agency that is paradoxical but practical. In his writing, he values wilderness and wildlife and seems to wish humans could leave nature alone; yet he understands that if humans are to live, we must interact with “the land” (his blanket term for the biosphere or ecosystem). While he defends wilderness, and was instrumental in the establishment of the Gila Wilderness in New Mexico, Leopold knows that some land must be used for human ends. Overall, he wants humans to use the land sparingly and to use it well. As historian Curt Meine has noted, Leopold is the only U.S. conservationist to have both a wilderness area and a center for sustainable agriculture named after him.⁵⁴

Leopold expresses particular concern about technology, and his insights hold relevance for the question of climate engineering technologies. He notes that “the European races acquired machines for dominating land before they had evolved the social inhibitions requisite for their safe use,”⁵⁵ and he worries about the “creed” of “*salvation by machinery*” when it comes to land use: Too many steam shovels and tractors doing “violence” to the land causes trouble in the long run.⁵⁶ Beyond its implications for long-term productivity, Leopold worries that an overly dominating, overly violent relationship with the land has aesthetic and moral implications for civilization itself. “We are remodeling the Alhambra with a steam-shovel, and we are proud of our yardage,” he laments.⁵⁷ Leopold does not insist a steam shovel has no use, but he does propose the need for “gentler and more objective criteria for its successful use.”⁵⁸ Leopold’s term “objective” here points to his desire to shape his readers’ perception of land and its value. The detailed and nuanced descriptions of natural phenomena that make up the bulk of *A Sand County Almanac* may be seen as a tutorial in

perception: Leopold guides the reader to recognize what is happening to the land, and what it means, from a perspective both humble and responsible.⁵⁹

These habits of perception lead to Leopold's notion of *communal virtue*, which blends humility and responsibility into something akin to Wendell Berry's "membership" concept.⁶⁰ According to Leopold, humans need to see themselves not as rulers of the land but as "plain member[s] and citizen[s] of it."⁶¹ His communitarian vision *includes* humans, but does not privilege them: he longs for "a universal symbiosis with the land" and "a state of mutual and interdependent cooperation between human animals, other animals, plants, and soils."⁶² Humans are part of something large, complex, and harmonious; we need to respect the land community by restraining our power to destroy it.

Does the creed of salvation by technology, coupled by the desire to remodel the Alhambra with a steam shovel, entail playing God? Leopold does not say so. But he is certainly concerned with the overreach that results from a view of human agency that is more influenced by machines than by nature. The perspective from the cockpit of a steam shovel is quite different from the perspective that Leopold's careful nature writing inculcates. The steam shovel driver's view is distorted by the heady power of the technology and the mechanistic worldview it represents.⁶³ The notion of a proper perspective on nature, unhindered by the power of technology, applies quite well to the question of climate engineering. If "plants, animals, men, and soil are a community of interdependent parts, an organism," then certain forms of violent technology are simply not fitting in nature.⁶⁴ The grand scale and expansive control of climate engineering seems to elide the nuances of the different land communities affected by it; engineering the climate requires a viewpoint of generalization and standardization, not membership in a land community. Rather, we should act to "preserve the stability, integrity, and beauty of the biotic community" whenever possible.⁶⁵

Niebuhr's ethics, like Leopold's, were formed in the first decades of the twentieth century and in response to an overly controlling and overly optimistic era of human "progress."⁶⁶ Unlike Leopold, Niebuhr did not decry the human imprint on the land, but he was concerned about humans overstepping the boundaries of what is fitting, particularly in international politics. In *The Responsible Self*, Niebuhr formulates a threefold typology of human agency. Humans through the ages have seen themselves as makers, concerned with the results and outcomes of their efforts, and as citizens seeking rules and policy structures that seem morally right. However, the most apt model for humanity, as Niebuhr sees it, is not as

maker or citizen but as *responder*.⁶⁷ “What is implicit in the idea of responsibility,” he explains, “is the image of man-the-answerer, man engaged in dialogue, man acting in response to action upon him.”⁶⁸ Against the grain of his individualistic era, Niebuhr promotes a model of the human as deeply embedded in a community, dialogically connected with multiple other people in the exercise of responsibility.

Niebuhr’s model of responsibility is deeply contextual, providing an ethics that does not begin with abstract rules or stated goals but rather responds to the situation as it is. Like Leopold, Niebuhr tutors his readers in perception by positing an ethical theory that begins with the question “what is going on here?” and moves on from there. Rather than seeking “the good” or “the right,” this responsibility ethics is concerned with “the fitting”; prioritizing appropriateness, responsiveness to context, and the quality of relationships.⁶⁹ Responsibility, then, is not about causality (am I responsible for climate change?) as much as it is about *response* (how ought I respond to climate change?). The question “what is going on here?” which sets the stage for discerning a fitting response, relies heavily on awareness, perception, and interpretation.⁷⁰ Responsibility also anticipates a response. Just as we respond to what we perceive to be the case, we expect others to respond to our own actions in a discursive, relational arrangement—as Niebuhr puts it, “in a continuing community of agents.”⁷¹ Niebuhr recognizes, as should all those who promote climate engineering, that any response to a problem (such as climate change) does not occur in a vacuum. If the U.S. government, for example, injects sulfate aerosols into the stratosphere, we anticipate that there will be responses from the whole world community—that “continuing community of agents” with whom we are in conversation and to whom we are responsible.

Niebuhr’s ultimate criterion for the rightness of a response, then, seems to be fittingness. For Niebuhr, “our responsive actions [should] fit into a process of interaction.”⁷² A response should fit like “a note into a chord in a movement in a symphony”⁷³ Niebuhr’s musical metaphor echoes Leopold’s architectural image of the Alhambra: both thinkers recognize humans as a small part of a larger, intricate, beautiful whole. This recognition entails responsibility—to perceive the beautiful, awe-inspiring context properly and to act in a way that fits rather than violates this larger whole.

Niebuhr adds an additional transcendent dimension to the aesthetic criterion of fittingness. He believes that humans are not only responding to the human and nonhuman world around us but are also responding to God. One important

dimension of the question “what is going on here?” is the question “what is God doing?”⁷⁴ Sometimes God’s action is best interpreted as punishment, according to Niebuhr’s view of World War II,⁷⁵ and I would argue that climate change may also be seen in this light. For Niebuhr, when humans act, they act in anticipation of a response from nature and humans, but also in anticipation of a response from God. This is a dialectical vision of human interaction with a God who influences human history, but one who also responds to human initiative. It means that appropriate human action blends some degree of the co-creation impulse—we are, after all, in dialogue with God—with a degree of the humility requirement because God is often punishing, correcting, and lamenting human faults. Does this mean climate engineering is permitted? There is no short answer: Niebuhr can only indicate the appropriate process, which should involve contextual deliberation (for fittingness) and responsive, responsible dialogue with all parties (including God).

In sum, Niebuhr’s view of the self as relational, responsive, and operating in community offers a view of responsibility that is much more fruitful than a thin exposition of responsibility as causality.⁷⁶ And it echoes Leopold’s understanding of the human operating within a biotic community. Leopold also exhorts his readers to understand the context in order to choose a fitting response (though his context is broader than Niebuhr’s, since it includes the land community). Catholic ethicist Joseph Incandela describes a contextual ethics that echoes both Niebuhr and Leopold. He writes, “When we do ethics, therefore, we ask where we belong; we try to place ourselves in our proper location.”⁷⁷ For a topic such as climate engineering, which is so disorienting and dislocating, an ethics that draws upon fittingness, context, and community seems appropriate. The playing God critique implies that an individual or a group has overreached the proper context; a contextual ethics of belonging and “proper location,” by contrast, avoids this pitfall. Leopold and Niebuhr, then, both embrace a model of human agency as contextually aware responsive responsibility.

OVERREACH, VIRTUE, AND HUMAN AGENCY IN CLIMATE ENGINEERING

In its symbolic formulation, the playing God critique arises as a result of discomfort with human agency; it indicates a disorienting erosion of the line between humans and God, and brings up serious concerns about lack of virtue. I have

proposed a response, inspired by Leopold and Niebuhr, that counsels contextual awareness (to assuage and re-root the disorientation brought about by expansion of human powers) and responsive responsibility (to reaffirm the communal nature of the issue and human embeddedness in, and responsibility to, the community of life). In what follows I imagine how this contextually aware responsive responsibility might play out for political decision-makers engaging the prospect of climate engineering.

Regarding contextual awareness, a responsible response to climate engineering requires fully reckoning with climate change. Thus, decision-makers who do not fully understand the problem or have not undertaken a deep encounter with the magnitude and scope of its meaning are vulnerable to the nostalgia for simple dualisms as described above. They may retreat into denial, blame others, or content themselves with half measures rather than fully face the moral and emotional implications of anthropogenic climate change. But Niebuhr would urge decision-makers to truly understand “what is going on here” before making any impactful decisions.

Kevin O’Brien also calls for careful deliberation when he writes that “no discussion of climate engineering among privileged peoples is complete unless it raises the question of what could make us trustworthy to make decisions about managing the atmosphere in collaboration with others.”⁷⁸ For O’Brien, the first steps toward trustworthy decision-making on climate engineering include repentance for changing the climate, which he defines as “admitting the problem, lamenting its results, and converting away from the behaviors that have caused it.”⁷⁹ He emphasizes the need for serious, collective, public apology and repentance before any action on climate change is even considered. Though O’Brien does not mention the role of mitigation efforts, such as reducing carbon emissions or cultivating carbon sinks, presumably “converting away” from climate-changing behaviors implies that mitigation measures must be a part of any full repentance. Only after such a process would decision-makers be qualified to move forward on actions such as climate engineering proposals—which may themselves be viewed as an extension of the repentance that the situation requires. Indeed, some would see climate engineering itself as “a serious attempt to make amends” and as “an admirable attempt at ecological restoration.”⁸⁰ But O’Brien would caution against rushing into such amends before genuine repentance has occurred, since such repentance changes the conversation in significant ways.⁸¹ “Perhaps,” he admits, “climate engineering will be the best we can do to repair the damage

we have caused,” but “we will not know until we have honestly assessed it, after honestly assessing ourselves.”⁸² This call for honest assessment helpfully echoes Niebuhr’s question: “What is going on here?”

Leopold and Niebuhr both emphasize the collective and discursive nature of human action. Playing God implies that an individual is acting recklessly, whereas responsibility for climate change, while not evenly distributed among all humans, is nevertheless collectively held. Certain climate engineering measures such as ocean iron seeding and cloud whitening could be accomplished by one (powerful) individual actor, but Leopold and Niebuhr, with their collective orientation, would urge caution because of the potential harm of such an approach.⁸³ For one thing, “lone wolf” climate engineering actions do not benefit from collective wisdom and discursive decision-making processes. To use Leopold’s phrasing, it is surely time for those of us in the industrialized world to abandon the driver’s seat of the steam shovel that is remodeling the Alhambra, to distance ourselves from the distorted perceptions that allowed this tragedy to occur, and to listen to other sources of wisdom.

On a policy level this means, in the words of legal scholar Brian Citro, “participation and transparency” in making decisions about climate engineering and other climate-related measures.⁸⁴ This idea is simple but its implications are profound: those who have caused climate change need to listen to those who suffer its effects. Indeed, Citro’s “participation” norm could even be strengthened, as he hedges that “this doesn’t necessarily mean vulnerable groups [those most affected by the decisions] should be granted a veto,” but simply that their voices are heard.⁸⁵ But if we seek true justice, surely vulnerable groups deserve more than just “being heard”: they should host the meetings, make the decisions, and call on support from climate change’s perpetrators. The steam shovel driver should step down, remove his hard hat and other accoutrements of the role, and listen as a “plain member and citizen” (in Leopold’s words).⁸⁶ This would be a sign that the climate change perpetrators are learning to repent in the robust sense of the word; that is, repenting in order to exercise responsible responsiveness in a community. As such, no one could justifiably accuse them of playing God.

In practice, however, life is not this simple. In the words of Amitav Ghosh, “The fact is that we live in a world that has been profoundly shaped by empire and its disparities.”⁸⁷ Ghosh has observed that countries with the highest consumption of fossil fuels have the most international power, and that increasing consumption leads to increasing power—with the recent rise of China and India as prime

examples.⁸⁸ This creates a perverse incentive to consume ever more fossil fuels in order to have a place at the negotiating table; and yet, tragically, doing so spells doom for the climate.⁸⁹ Following Ghosh, if consuming fossil fuels means maintaining international power, it is no wonder that most developed nations move so slowly and reluctantly away from them and why developing nations move to consume them at ever greater rates.⁹⁰ Thus, in reality there is no bright line between the perpetrators and the vulnerable, between the driver and the plain citizen, but the metaphor tells us we must strive to push back against the logic that says consumption brings with it a larger voice. This is, of course, difficult. True balance in global carbon emissions would equate to a more even balance of international power, an undesirable outcome for those currently holding the reins. It seems a hopeless situation; calls for justice seem weak in the face of this entrenched status quo.

Ghosh finds hope for climate justice in religious movements, praising Pope Francis's climate ethics and the potential of religious groups to tip this balance of power with their moral authority and calls for greater justice and compassion.⁹¹ In a similar vein, both Niebuhr and Leopold were known to seek solace in something larger or transcendent when faced with human finitude and violence. Leopold appeals to "the land" as a transcendent ideal, a collective and dynamic whole whose wellbeing is influenced by humans but whose life exceeds human finitude.⁹² Similarly, Niebuhr writes that "Responsibility affirms: 'God is acting in all actions upon you. So respond to all actions upon you as to respond to his action.'"⁹³ In other words, perhaps one may avoid playing God in the public sphere by seeking an authority that is higher than human action, whether it is the integrity of the land or the will of a God whose revelations predate the fossil fuel era. As with Citro's call for "participation and transparency," this is a call to humility and listening—procedural elements that may undergird the type of repentance that O'Brien rightly names a prerequisite for decision-making on climate engineering.

CONCLUSION

The playing God critique, while of limited usefulness when taken at face value, yields fascinating insights when examined for its symbolic and emotional implications. The interpretations relating to dualism, virtue, and human agency in particular hold promise for fruitful reflection on climate engineering. In the end, it

seems to be a call for moral sensitivity, and for a contextual responsiveness in community, which Jamieson echoes in his too short exploration of cooperation as an environmental virtue.⁹⁴ Incandela, writing about biotechnology, could just as easily be offering wisdom about climate engineering when he writes, “We approach in wonder, we cross at our risk. In either case, moral sensitivity may be gauged by the precision of our gait and the awareness of where we tread, for we walk in twilight near lines deserving profound ethical respect.”⁹⁵

Climate change itself deserves this profound respect because of its status as a so-called wicked problem. As I have argued elsewhere, wicked problems should not be “tamed” prematurely, because doing so misleads the public into false confidence in partial solutions.⁹⁶ To seek one solution—such as solar radiation management—as the answer to climate change would be to treat this wicked problem as a tame one. As Jamieson rightly points out, “There is nothing defective about the climate of the Anthropocene that needs fixing.”⁹⁷ It may be hostile to human flourishing, and it may lead to other species’ extinctions, but the climate is a powerful, wild system that is responding to its current disturbance appropriately and according to its nature. Our job is less to control it than to ask “what is going on here?” How can we respond fittingly to each other and the Earth system? And what voices, besides those of humans in the industrial world, might offer helpful perspectives on appropriate responses? The conversations and decision-making on this topic should be rooted in contextual awareness and responsive responsibility, so as to avoid the moral overreach described as playing God.

NOTES

¹ See, for example, Dale Jamieson, *Reason in a Dark Time: Why the Struggle Against Climate Change Failed—and What It Means for Our Future* (New York: Oxford University Press, 2014) and Clive Hamilton, *Earthmasters: The Dawn of the Age of Climate Engineering* (New Haven: Yale University Press, 2013).

² Jamieson, *Reason in a Dark Time*, p. 206.

³ See, for example, Hamilton, *Earthmasters*, p. 180.

⁴ Ibid.; Gernot Wagner and Martin L. Weitzman, “Playing God,” *Foreign Policy*, October 24, 2012, www.foreignpolicy.com/2012/10/24/playing-god/; and Wylie Carr, “‘This Is God’s Stuff We’re Messing With’: Geoengineering as a Religious Issue (Opinion Article),” *Geoengineering Our Climate Working Paper and Opinion Article Series* (2014), pp. 1–6, wp.me/pzszRk-aT.

⁵ Paul B. Farrell, “6 Ways Billionaires Try to Play God on Climate,” *MarketWatch*, November 2, 2012, www.marketwatch.com/story/6-ways-billionaires-try-to-play-god-on-climate-2012-11-02.

⁶ Carr, “God’s Stuff,” p. 1.

⁷ Simon D. Donner, “Domain of the Gods: An Editorial Essay,” *Climatic Change* 85, no. 3 (2007), pp. 231–36.

⁸ Ibid., p. 233.

⁹ Carr, “God’s Stuff,” p. 1.

¹⁰ Ibid.

¹¹ This is particularly true for nanotechnology (e.g., Ted Peters, “Are We Playing God with Nanoenhancement?” in Fritz Allhoff et al., eds., *Nanoethics: The Ethical and Social Implications of*

- Nanotechnology* [Hoboken, N.J.: John Wiley & Sons, Inc., 2007]), genetic modification of humans (e.g., John Evans, *Playing God? Human Genetic Engineering and the Rationalization of Public Bioethical Debate* [Chicago: University of Chicago Press, 2001]), and synthetic biology in general (e.g., *Playing God: The World of Synthetic Biology*, BBC Worldwide Ltd. [New York: Films Media Group, 2012]). Some also use the term “playing God” in reference to euthanasia and/or termination of life-sustaining treatment for the terminally ill. While these practices are not new, they are often associated with new technology (ventilators, intensive care units, and so forth).
- ¹² Cynthia S. W. Crysdale, “Playing God? Moral Agency in an Emergent World,” *Journal of the Society of Christian Ethics* 23, no. 2 (2003), pp. 243–59.
 - ¹³ Georgiana Kirkham, “‘Playing God’ and ‘Vexing Nature’: A Cultural Perspective,” *Environmental Values* 15, no. 2 (2006), pp. 173–95, 174.
 - ¹⁴ Adam Corner, Karen Parkhill, Nick Pidgeon, and Naomi E. Vaughan, “Messing with Nature? Exploring Public Perceptions of Geoengineering in the UK,” *Global Environmental Change* 23, no. 5 (2013), pp. 938–47.
 - ¹⁵ Pak-Hang Wong, “Confucian Environmental Ethics, Climate Engineering, and the ‘Playing God’ Argument,” *Zygon* 50, no. 1 (2015), pp. 28–41.
 - ¹⁶ Hamilton, *Earthmasters*, p. 178.
 - ¹⁷ Ibid.
 - ¹⁸ Dale Jamieson, “Some Whats, Whys, and Worries of Climate Engineering,” *Climatic Change* 121, no. 3 (2013), p. 534.
 - ¹⁹ For one of many examples, see Bill Devall and George Sessions, *Deep Ecology: Living as If Nature Mattered* (Layton, Utah: Gibbs Smith, 1985).
 - ²⁰ See Devall and Sessions, *Deep Ecology*.
 - ²¹ For a rehearsal of this view, and a critique of it, see Joseph M. Incandela, “Playing God: Divine Activity, Human Activity, and Christian Ethics,” *Cross Currents* 46, no. 1 (1996), pp. 59–76. He writes, “It may be true . . . that ‘God acts in and through the human,’ but surely a Christian ethicist cannot leave it at that” because doing so opens the door to idolatry: to arrogating human action to the status of divine action (p. 68).
 - ²² See www.elca.org/dayofservice for examples of this.
 - ²³ Allen Verhey, “Playing God’: Invoking a Perspective,” *Pro Rege* 25, no. 1 (1996), pp. 18–28, 22.
 - ²⁴ Presidential Commission for the Study of Bioethical Issues, *New Directions: The Ethics of Synthetic Biology and Emerging Technologies*, Washington, D.C., 2010, www.bioethics.gov.
 - ²⁵ Qaiser Shahzad, “Playing God and the Ethics of Divine Names: An Islamic Paradigm for Biomedical Ethics,” *Bioethics* 21, no. 8 (2007), pp. 413–18, 414. Shahzad describes this ethics as somewhat under-theorized, but holding great potential for applied ethics.
 - ²⁶ Shahzad, “Playing God and the Ethics of Divine Names,” p. 415.
 - ²⁷ Quoted in Verhey, “Playing God,” p. 22.
 - ²⁸ Ibid., p. 26.
 - ²⁹ Ibid. Note the language of “story”—the turn to narrative in these cases is very common and very appropriate, in my view.
 - ³⁰ Shahzad, “Playing God and the Ethics of Divine Names,” p. 415.
 - ³¹ Forrest Clingerman and Kevin J. O’Brien, “Playing God: Why Religion Belongs in the Climate Engineering Debate,” *Bulletin of the Atomic Scientists* 70, no. 3 (2014), pp. 27–37, 32.
 - ³² Mark Lynas, “Geo-engineering, Nuclear Power and Climate Change: Playing God is Good for the Planet,” *Telegraph*, July 12, 2011, www.telegraph.co.uk/news/science/science-news/8631604/Geo-engineering-nuclear-power-and-climate-change-playing-God-is-good-for-the-planet.html.
 - ³³ See David W. Keith, *A Case for Climate Engineering* (Cambridge, Mass.: MIT Press, 2013), p. 137. This is subject to some debate, of course. Many models of SRM, for instance, indicate that such a measure would lead to drought conditions in already poor areas, increasing the suffering of the worst off. But it still may be argued that some forms of climate engineering can be designed to prevent the unjustly cruel effects of a warmed planet on those who already suffer from poverty and deprivation.
 - ³⁴ H. Richard Niebuhr, *The Responsible Self: An Essay in Christian Moral Philosophy* (San Francisco: Harper & Row, 1978), p. 151.
 - ³⁵ Allen Thompson, “Radical Hope for Living Well in a Warming World,” *Journal of Agricultural and Environmental Ethics* 23 no. 1 (2010), pp. 43–59, 55.
 - ³⁶ This nostalgia also extends to some climate deniers, who desperately cling to the idea that humans could not possibly be to blame for the drastic climate changes we are living through.
 - ³⁷ Kirkham, “‘Playing God’ and ‘Vexing Nature,’” p. 182.
 - ³⁸ Willem B. Drees, “‘Playing God? Yes!’ Religion in the Light of Technology,” *Zygon* 37, no. 3 (2002), pp. 643–54, 651.

- ³⁹ Verhey, "Playing God," p. 21.
- ⁴⁰ Religious thinkers often settle on a kind of paradoxical resolution to this situation: God's responsibility and human responsibility are not mutually exclusive; we can demand significant responsibility from humans while still asserting that God is ultimately in charge. For further exploration of this paradoxical or dialectical position, see the discussion of H. Richard Niebuhr, below.
- ⁴¹ Eric Katz, "Geoengineering, Restoration, and the Construction of Nature: Oobleck and the Meaning of Solar Radiation Management," *Environmental Ethics* 37, no. 4 (2015), pp. 485–98, 486.
- ⁴² *Ibid.*, p. 490.
- ⁴³ Quoted in Jeff Goodell, *How to Cool the Planet: Geoengineering and the Audacious Quest to Fix Earth's Climate* (Boston: Mariner Books, Houghton Mifflin Harcourt, 2010), p. 45.
- ⁴⁴ Jamieson, *Reason in a Dark Time*, pp. 188–89.
- ⁴⁵ Kirkham, "'Playing God' and 'Vexing Nature,'" p. 175.
- ⁴⁶ Lynas, "Geo-engineering, Nuclear Power and Climate Change."
- ⁴⁷ One may argue that Lynas is displaying other virtues, however. These may include courage to take bold action to address a large problem, or compassion for those who are already being harmed by climate change. Still, most virtue theorists subscribe to an idea known as "the unity of the virtues," which teaches that all the virtues are facets of one unified, overarching virtuous character. Thus, the virtues do not come into conflict with one another. If it seems that humility requires not engineering the climate, but courage requires that we should engineer the climate, there has been a misunderstanding of one or more of the virtues. See Jean Porter, *The Recovery of Virtue: The Relevance of Aquinas for Christian Ethics* (Louisville, Ky.: Westminster/John Knox Press, 1990), p. 121.
- ⁴⁸ See Laura Hartman, "Environmental Modesty: Recovering an Ancient Virtue to Address Contemporary Problems," *Journal of Religious Ethics* 43, no. 3 (September 2015), pp. 475–92. What follows is a summary of the arguments in this article.
- ⁴⁹ Wong, "Confucian Environmental Ethics," p. 31.
- ⁵⁰ *Ibid.*, pp. 31–32.
- ⁵¹ *Ibid.*, p. 37. Emphasis in original.
- ⁵² *Ibid.*
- ⁵³ Paul Ramsey, *Fabricated Man: The Ethics of Genetic Control* (New Haven: Yale University Press, 1970), p. 138.
- ⁵⁴ The Aldo Leopold Wilderness is in Gila National Forest, New Mexico. The Aldo Leopold Center for Sustainable Agriculture is housed at Iowa State University (Curt Meine, "Aldo Leopold," Lecture, NEH Summer Institute, "Extending the Land Ethic," Northern Arizona University, June 20, 2016).
- ⁵⁵ Aldo Leopold, from "Conservation: In Whole or In Part?" (1944), p. 497. All Leopold quotes are from Curt Meine, ed., *Aldo Leopold: A Sand County Almanac and Other Writings on Ecology and Conservation* (New York: Library of America, 2013). Though this theme is underdeveloped in Leopold's written work, he clearly recognized that people of European descent did not have the most useful or well-adapted patterns of land use, and he seems to have learned from his interactions with native and central American land use.
- ⁵⁶ Aldo Leopold, "The Conservation Ethic" (1933), p. 333. Emphasis in original.
- ⁵⁷ Aldo Leopold, "The Land Ethic" (1948), p. 189.
- ⁵⁸ *Ibid.*
- ⁵⁹ I am indebted to L. Sebastian Purcell for this insight.
- ⁶⁰ See, for example, Wendell Berry's "Health Is Membership," in Norman Wirzba, ed., *The Art of the Commonplace: The Agrarian Essays of Wendell Berry* (Berkeley: Counterpoint, 2002), pp. 144–58.
- ⁶¹ Leopold, "The Land Ethic" (1948), p. 173.
- ⁶² Leopold, "The Conservation Ethic" (1933), pp. 333, 326–27. Emphasis in original.
- ⁶³ As bioethicist Maura Ryan notes, the very existence of a technology constitutes pressure to use it. It takes significant personal courage to eschew the use of a technology. Maura A. Ryan, "The New Reproductive Technologies: Defying God's Dominion?" *Journal of Medicine and Philosophy* 20, no. 4 (1995), pp. 419–38.
- ⁶⁴ Aldo Leopold, "The Arboretum and the University" (1934), p. 352.
- ⁶⁵ Leopold, "The Land Ethic" (1948), p. 188.
- ⁶⁶ I wish to note that Dane Scott has an excellent chapter about H. Richard Niebuhr's brother, Reinhold Niebuhr, and applications of his views to climate engineering, in Forrest Clinger and Kevin O'Brien, eds., *Theological and Ethical Perspectives on Climate Engineering: Calming the Storm* (Lanham, Md.: Lexington Books, 2016); see ch. 3, "The Temptations of Climate Engineering."
- ⁶⁷ Niebuhr, *The Responsible Self: An Essay in Christian Moral Philosophy*, pp. 48–54.
- ⁶⁸ *Ibid.*, p. 56.
- ⁶⁹ *Ibid.*, pp. 60–61.

- ⁷⁰ Ibid., p. 63.
- ⁷¹ Ibid., p. 65.
- ⁷² Ibid., p. 97.
- ⁷³ Ibid.
- ⁷⁴ H. Richard Niebuhr, "War As the Judgment of God," *Christian Century*, May 3, 1942, pp. 630–33.
- ⁷⁵ Ibid.
- ⁷⁶ See, for example, Dale Jamieson, *Reason in a Dark Time*, pp. 148–50.
- ⁷⁷ Incandela, "Playing God," p. 60.
- ⁷⁸ Kevin O'Brien, "First Be Reconciled': The Priority of Repentance in the Climate Engineering Debate," ch. 10 in Forrest Clingerman and Kevin O'Brien, eds., *Theological and Ethical Perspectives on Climate Engineering: Calming the Storm* (Lanham, Md.: Lexington Books, 2016), pp. 187–203, 201.
- ⁷⁹ Ibid., p. 192.
- ⁸⁰ Christopher J. Preston, "Re-Thinking the Unthinkable: Environmental Ethics and the Presumptive Argument Against Geoengineering," *Environmental Values* 20, no. 4 (2011), pp. 457–79, 470.
- ⁸¹ O'Brien, "First Be Reconciled," pp. 196–97.
- ⁸² Ibid., p. 200.
- ⁸³ For more on this insight, see Scott, "The Temptations of Climate Engineering," in Clingerman and O'Brien, *Theological and Ethical Perspectives on Climate Engineering*.
- ⁸⁴ Brian Citro, "A Role for Human Rights in the Climate Engineering Debate?" *Forum for Climate Engineering Assessment Blog*, February 9, 2015.
- ⁸⁵ Citro, "A Role for Human Rights."
- ⁸⁶ Leopold, "The Land Ethic" (1948), p. 173.
- ⁸⁷ Amitav Ghosh, *The Great Derangement: Climate Change and the Unthinkable* (Chicago: University of Chicago Press, 2016), p. 146.
- ⁸⁸ Ibid., pp. 142–43.
- ⁸⁹ Ibid., p. 111.
- ⁹⁰ Ibid., p. 143.
- ⁹¹ Ibid., pp. 150–62.
- ⁹² See, for example, Aldo Leopold, "The Round River: A Parable of Conservation" (1941), pp. 458–62.
- ⁹³ Niebuhr, *Responsible Self*, p. 126.
- ⁹⁴ Jamieson, *Reason in a Dark Time*, p. 187.
- ⁹⁵ Incandela, "Playing God," p. 67.
- ⁹⁶ Laura Hartman, "Wrestling with Wickedness: A Response," *Worldviews* 21, no. 1 (2017) pp. 87–95.
- ⁹⁷ Jamieson, *Reason in a Dark Time*, p. 206.