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JOHN F. KENNEDY SCHOOL OF GOVERNMENT

# **On the Role of Solar Geoengineering in Combatting Climate Change: Harvard University vs. Indigenous Voices**

## Faculty Research Working Paper Series

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# **On the Role of Solar Geoengineering in Combatting Climate Change: Harvard University vs. Indigenous Voices**

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August 2023

We also brought a sense of moral authority to the negotiations – our threatened health and lives were really reflections of the future of the planet as a whole.<sup>1</sup>

Sheila Watt-Cloutier, Inuit Activist

We Americans must come again to a moral comprehension of the earth and air. We must live according to the principle of a land ethic. The alternative is that we shall not live at all.<sup>2</sup> N. Scott Momaday, Native American Author of *Kiowa Descent*

The Sámi people of Northern Sweden say blocking out the sun with reflective particles to cool the earth is the kind of thinking that produced the climate crisis in the first place.<sup>3</sup>

Haley Dunleavy, Science Reporter

**ABSTRACT:** In 2021 the Saami Council asked Harvard to suspend research related to stratospheric aerosol injections, a form of geoengineering. Their intervention raises far-reaching questions regarding the appropriateness of geoengineering as a response to climate change, but also regarding the status of indigenous voices in this debate. I make two main points. It behooves us (i.e., places that influence decisions regarding climate change) to engage indigenous voices also as a way of addressing one type of moral corruption in climate change (that only voices from the present can engage on what to do about it). Absent actual representation of future generations, engaging with the ecological stance typically associated with indigenous groups (who display remarkable commonality in this regard) is the best we can do. Secondly, while critics rightly associate geoengineering with the mindset that caused climate change, it still seems wise to continue research into stratospheric aerosol injections. But advocacy in this domain has performative dimensions and itself might trigger reactions and counter-reactions. So taking this stance entails follow-up obligations to help make sure geoengineering is not used to defeat efforts at emission reductions.

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<sup>1</sup> Watt-Cloutier, *The Right to Be Cold*, 159.

<sup>2</sup> Momaday, *The Man Made of Words*, 49.

<sup>3</sup> Dunleavy, “An Indigenous Group’s Objection to Geoengineering Spurs a Debate.”

## 1. Introduction

In June 2021, the Saami Council asked Harvard University to cease all work around solar geoengineering, not just on Sámi land, but globally.<sup>4</sup> Known for championing environmental causes in the Arctic and beyond and for fostering collaboration among indigenous groups around the world, the Council regards geoengineering as contrary to how humanity should interact with the environment. The Council's intervention was triggered by a project called SCoPEX, the Stratospheric Controlled Perturbation Experiment, which seeks to improve our understanding of how blocking some sunlight through the injection of aerosol into the stratosphere can help combat climate change.<sup>5</sup> The issues raised here matter greatly since “geoengineering might well be the most momentous technological idea humanity has ever toyed with.”<sup>6</sup>

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<sup>4</sup> The council goes by “Saami Council” but the common way of referring to the group as such in English is “Sámi.” The letter (their second to Harvard) is here: <https://static1.squarespace.com/static/5dfb35a66f00d54ab0729b75/t/60c0a4bac8e3952583139537/1623237819160/Indigenous+Peoples+call+on+Harvard+to+shut+down+the+SCoPEX+project.pdf> The first, which was more specifically about the test flight in Sweden but already took a global view, is here: <https://static1.squarespace.com/static/5dfb35a66f00d54ab0729b75/t/603e2167a9c0b96ffb027c8d/1614684519754/Letter+to+Scopex+Advisory+Committee+24+February.pdf> Separately, there is also an open letter from 2022, demanding an international non-use agreement on geoengineering signed by hundreds of academics. That letter does not turn on issues about indigenous people; see here: <https://www.solargeoeng.org/non-use-agreement/>

<sup>5</sup> (a) See Dykema et al., “Stratospheric Controlled Perturbation Experiment”; Golja et al., “Aerosol Dynamics in the Near Field of the SCoPEX Stratospheric Balloon Experiment”; Geoengineering Briefing, “SCoPEX: Stratospheric Controlled Perturbation Experiment.” The Geoengineering Briefing is issued by ETC Group, a civil society organization founded by Pat Mooney and dedicated to monitoring how technological innovation works out for the world’s most vulnerable; see <https://www.etcgroup.org/>. They oppose geoengineering categorically. I mention them again below. (b) Lead scientists on this project are Frank Keutsch and David Keith, see [https://www.keutschgroup.com/scopex#h.p\\_Xru29Emo-OMw](https://www.keutschgroup.com/scopex#h.p_Xru29Emo-OMw).

<sup>6</sup> Sapinski, Buck, and Malm, *Has It Come to This?*, 15. I am grateful to David Keith, Joshua Horton, and Wake Smith for helpful conversations about geoengineering and to Keith also for introducing me to the controversy with the Saami Council. I am also grateful to the participants of a conference on “Ethics and Geoengineering: Justice, Legitimacy and Governance in a Climate Crisis,” held on February 2/3, 2023, at the Harvard Kennedy School, which was co-sponsored by the Harvard University Center for the Environment (which provided the funding) and the Carr Center for Human Rights Policy (which I direct, and which organized the event) and was put together by Britta Clark and Caitlin Fitchett, PhD students in the Harvard Philosophy Department,

More specifically, this case of stratospheric aerosol injection (SAI) would involve injection of particles of sulfuric acid in water droplets from a balloon twelve miles above ground. The acid keeps the droplets around them stable: clouds would do as well, but they are unstable. In the stratosphere such particles reflect some sunlight back into space. With no rain to flush them out, stratospheric particles remain in place much longer than those in the lower atmosphere. This cooling mechanism imitates (in controlled ways) what occurs when volcanic eruptions darken the skies. Greenhouse gases tend to remain in the atmosphere for centuries, so these measures would merely slow down further warming rather than undo previous emissions. Effects on stratospheric chemistry, especially on the ozone layer and its capacities to block ultraviolet radiation, must be researched for safe deployment. We also need a better grasp of how the effects might differ across regions.

Esrang Space Center in northern Sweden was selected to test the equipment for this experiment. The facility is in Sápmi, the Sámi homeland. Formerly known as Lapland (though the Swedish province where Esrang is located is also called Lapland), Sápmi stretches from Norway to Russia's Kola peninsula. We should note that the Arctic is of special interest vis-à-vis climate change anyway because the region is warming faster than the global average: melting ice raises sea levels and thawing permafrost releases carbon dioxide and methane. The Sámi consider themselves caretakers of this region, as many indigenous populations do

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and Simona Capisani of Durham University. The speakers also included Cynthia Boyer, Holly Jean Buck, Henry Fowler, Stephen Gardiner, Aarti Gupta, Ben Hale, Marion Hourdequin, Alex Lee, Deborah McGregor, Marc Shapiro, Ken Shockley, Lucas Stanczyk, Jennie Stephens, Annie Stilz, Kevin Surprise, and Kelly Tzoumis. We were eager to have more voices of indigenous scholars at this event, especially from the Saami Council, but several of our invitations were declined. My own current thinking on the subject of this essay has emerged very much in engagement with theirs, and especially with Clark, "How to Argue about Solar Geoengineering." I am grateful to Britta Clark, Caitlin Fitchett, Josh Horton, and Jennie Stephens for generous comments on an earlier version of his piece, and to Daniel Schrag for letting me audit his class "Confronting Climate Change" in 2022.

in their homelands.<sup>7</sup> The Council made several points, among them that “climate manipulation strongly contradicts our understanding and experience of how to respect and live in harmony with Mother Nature, and therefore, this technology is not something we see as a part of our chosen future.”<sup>8</sup> This letter was co-signed by 35 indigenous groups from various countries. Our main question here is: specifically in the context of climate change, how much significance should Harvard give to the fact that this was an intervention by indigenous groups?<sup>9</sup>

Today, “geoengineering” commonly denotes processes designed to slow human-caused climate change. To be sure, there is a broader use that indicates that geoengineering as such is not new. Geoengineering broadly conceived is any purposeful large-scale intervention into the Earth’s bio-geochemical cycles. Widespread deployment of ammonia would then paradigmatically count. Industrial production of ammonia from nitrogen and hydrogen (as invented by Fritz Haber and Carl Bosch) amounted to an “industrialization of the planet’s metabolism,” quadrupling the human population and creating a dominant role for humans in the earth system’s bio-geochemical circles.<sup>10</sup> But in the current narrower use

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<sup>7</sup> See Ross et al., *Indigenous Peoples and the Collaborative Stewardship of Nature*.

<sup>8</sup> For an empirical study of preferences of (Finnish) Sámi, see Buck, “Perspectives on Solar Geoengineering from Finnish Lapland.” Among other things, Buck found that the participants in her study thought about geoengineering from a global rather than local perspective.

<sup>9</sup> For good discussions of the normative issues raised by solar geoengineering generally, these two anthologies remain useful: Preston, *Engineering the Climate*; Preston, *Climate Justice and Geoengineering*.

<sup>10</sup> Morton, *The Planet Remade*, 183. A geoengineering project that did not come to pass was the Atlantropa or Panropa idea devised by German architect Hermann Sörgel in the 20s and promoted by him until his death in 1952. The project envisaged massive hydroelectric dams at key points around the Mediterranean, such as the Straits of Gibraltar and the Bosphorus, to lower the sea level and create new lands; see Gall, “Atlantropa.” Sörgel offered his scheme (anticipated to take more than a century) as a pan-European alternative to ideas around *Lebensraum*, which eventually became one of Nazi Germany’s justifications for conquests. Atlantropa would provide land, food, employment, and electric power, and most significantly a novel vision for Europe and Africa. For a discussion in the context of geoengineering, see York, “Geoengineering and Imperialism.”

geoengineering is commonly around efforts to reduce atmospheric CO<sub>2</sub> levels or ocean acidification. Solar geoengineering (solar radiation management or albedo modification), then, is a type of geoengineering in which sunlight is reflected back into space. Carbon removal from the atmosphere is another type (one that raises different issues since it is intuitively about undoing human damage rather than about taking charge of nature). As far as solar geoengineering is concerned, SAI as envisaged by SCoPEX, is the most-studied method, followed by marine cloud brightening, a technique to make clouds brighter. Section 2 says more about SAI.

For many people geoengineering is one battleground where the future of human life on Earth is determined. To use a simplistic bifurcation, right-wing critics see transnational technocratic elites solidifying their influence by overstating the urgency of the climate crisis; left-wing critics see another component of a misguided approach to nature that sees nature mostly as a human resource. For those focused on SAI's role in climate-change responses rather than its significance to ongoing political debates, a critical question is just what will happen in response to either its deployment or dismissal, or even to ongoing research. One way or another, states will seek to turn things to their advantage, the private sector to make profits, and many actors will advance or derail causes in ways that enlist claims about SAI or about what could or should have been done instead. Section 3 says more about these matters.

It is in the neighborhood of left-wing resistance that we can locate the viewpoint of the Saami Council. Section 4 says more about the Sámi and about recent developments in how indigenous people in far-flung locations have built a sense of global solidarity. Section 5 takes a closer look at the Council's stance vis-à-vis SCoPEX. It is precisely because such far-flung groups not only have common causes but also a broadly shared understanding of

ecology and a story about why they have been marginalized (if they have not gone extinct) that they have considerable moral standing in this debate. Section 6 elaborates on why it matters that these are indigenous people who expressed concerns about ScoPEX.

Section 7 assesses where all this leaves us. To wit: I myself support research into SAI. Holding this view means taking a stance in a messy political situation where limiting warming is a broadly shared goal, but views vary widely on who should do what when. Taking a positive stance on SAI research entails obligations to help make sure possible problematic effects of such a stance do not occur. We are on the terrain of intergenerational justice. One challenge is that our views about what is owed to the future are easily corrupted because we cannot debate future people. Giving a strong voice to indigenous views on environmental matters – which are often dramatically at odds with more mainstream views – is arguably the best things we can do to arrive at balanced judgements. For then at least the whole range of human knowledge and experience can enter the debate.<sup>11</sup>

Giving them such a voice does not mean to agree with them in specific cases. Harvard should write back to the Saami Council that it respectfully disagrees with their assessment and find another location for SCoPEX. The university should add that it will make sustained efforts at increasing the presence of indigenous thought in curricula and decision processes. Indigenous voices should be elevated along such lines at many places where decisions

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<sup>11</sup> On intergenerational justice also see Risse, *On Global Justice*, chapters 9 and 10. These matters are discussed throughout, but those chapters do most of the work in that domain as far as humanity's relationship with the Earth is concerned.

affecting the environment are made. In light of the painful history that made indigenous nations a kind of Fourth World, these matters are obviously highly sensitive.<sup>12</sup>

## 2. Stratospheric Aerosol Injection and Its Possible Role in the Anthropocene

In a famous 1963 commencement speech John F. Kennedy declared that “our most basic common link is that we all inhabit this small planet.”<sup>13</sup> This sentiment reflects a new sense of anxiety around the future of humanity triggered by technological advances during World War II. Such anxiety even affected mathematician John von Neumann, one of the greatest propagators of technology. In a 1955 article in *Fortune Magazine* von Neumann wondered skeptically if we can even survive technology.<sup>14</sup> The technological achievements of the postwar period, especially the moon landing, only exacerbated the sense that humanity inhabited a planet that is not invariably hospitable to us. As awesome as it is to behold the Earth from space, this very possibility reveals forcefully that technological creations might undermine our planet’s suitability for life as we know it.

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<sup>12</sup> (1) “Fourth World” was coined by George Manuel, an indigenous leader from Canada; see Manuel and Posluns, *The Fourth World*. The Fourth World consists of peoples with a political and social structure that are ruled by foreign powers. Unlike the First, Second, and Third Worlds (which all consist of nation states – the industrialized West, the Soviet bloc, and the developing countries, respectively, at the time of the creation of this vocabulary), the Fourth World does not seriously participate in the postcolonial world of states. Instead, it struggles with dispossession, assimilation, and marginalization. See also Lâm, *At the Edge of the State*. On the common concerns of indigenous people, see Bodley, *Victims of Progress*. For statements on the nature of our global environmental crisis from indigenous peoples from around the world, including a Sámi representative, see Piacentini, *Story Earth*. (2) The fact that it is specifically *Harvard*, or that it is *a university*, that sponsors this research will not play much of a role here but deserves separate inquiry.

<sup>13</sup> See e.g., <https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/american-university-19630610>

<sup>14</sup> von Neumann, “Can We Survive Technology?”



It was Paul Crutzen, a Dutch atmospheric chemist famous for research on the ozone layer, who popularized the term “Anthropocene” for a geological period in which human action has the strongest influence on major Earth systems. This term adds something to Kennedy’s insight about shared occupancy: this occupancy is the most significant factor in shaping its habitat. This thought differs from the point that human action bears on the continued existence of the planet itself. The Earth as such, one might say, does not suffer disasters, as it will continue in one shape or another (as it has done for several billion years in remarkably different ways). It is the circumstances that make the planet hospitable to human life, and thus humans themselves, that suffer disasters.

There is something paradoxical about the term “Anthropocene:” humans have grown so powerful that they have become a force of nature, although such forces are typically thought to be beyond human control. Some have rejected the term, including philosopher of technology Langdon Winner, for whom it comes too close to treating humans as gods. It also suggests that humanity as such is responsible for the predicament, rather than certain groups or economic systems.<sup>15</sup> For American indigenous philosopher Kyle Whyte “climate change is an intensification of environmental change imposed on Indigenous peoples by colonialism.”<sup>16</sup> Use of “Anthropocene” then both acknowledges climate change (and thus the impact of the massive ecosystem transformations that accompanied colonialism) and describes these developments at the level of humanity as such, rather than ascribing them

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<sup>15</sup> Winner, “Rebranding the Anthropocene.” On this theme, also see Hamilton, *Earthmasters*; Malm and Hornborg, “The Geology of Mankind?”; Ellis, “Earth Science in the Anthropocene”; Davies, *The Birth of the Anthropocene*; Hamilton, Gemenne, and Bonneuil, *The Anthropocene and the Global Environmental Crisis*.

<sup>16</sup> Whyte, “Indigenous Climate Change Studies,” 154. See also Whyte, “Indigenous Science (Fiction) for the Anthropocene.”

to specific groups. For others “Anthropocene” names underlying phenomena that must be discussed in novel ways. Bruno Latour, for one, has long insisted that nature and society cannot be meaningfully separated, and this label strongly vindicates this standpoint.<sup>17</sup> On a more benign view, the term “Anthropocene” appeals to a sense of planetary responsibility.<sup>18</sup>

In an influential 2006 article that also emphasized that emission reductions were central to averting disaster, Crutzen called for more research into solar radiation management.<sup>19</sup> While this approach was nothing new, his famous name gave it credibility. Its futuristic sound notwithstanding, geoengineering benefits the generation that implements it – and nothing else seems capable of providing cooling of this scale – but do little for future generations that depend, for the stability of their living arrangements, on phasing out fossil fuels. (Future generations do of course benefit if, for instance, devastating fires do not occur in the present because of the cooling effects.) Emission cuts have the opposite effect: their impact will be felt by future generations but for many in the current generation impose burdens from an intrusive energy transition. (Many of the people who in

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<sup>17</sup> (1) Latour, *Facing Gaia*. Also see Chakrabarty, *The Climate of History in a Planetary Age*; Viveiros de Castro and Danowski, “Humans and Terrans in the Gaia War.” (2) The Marxist term “reification” also comes to mind, the naming of phenomena without revealing underlying social dynamics. (This term is associated with Georg Lukács and has been developed by others, see Lukács, *History and Class Consciousness*.) Any commodity is the reification of the power relations that enter its production: by referring to it merely under its commodity name (“TV” or “car”), we conceal them. Similarly, terms like “climate change” or “Anthropocene” conceal dynamics that are enormously detrimental to many people, but much more for some than for others.

<sup>18</sup> We should note the Early Anthropocene Hypothesis (aka “Ruddiman Hypothesis”), a stance concerning the beginning of Anthropocene, proposed by William Ruddiman in 2003. According to Ruddiman, the Anthropocene did not begin with coal-burning factories and power plants, as argued by Crutzen. It dates back 8,000 years, triggered by intense farming when greenhouse gas concentrations started following new patterns of agriculture; see Ruddiman, “The Anthropogenic Greenhouse Era Began Thousands of Years Ago.”

<sup>19</sup> Crutzen, “Albedo Enhancement by Stratospheric Sulfur Injections.” On how geoengineering gained prominence, see Möller, “Winning Hearts and Minds?” For a discussion of climate change with an emphasis on geoengineering, see Smith, *Pandora’s Toolbox*.

the current generation go through that energy transition will of course still be around when the effects of these cuts are starting to show.)

AI is not the only type of solar radiation management but currently seems to be the most realistic one for making a difference at affordable costs. Leading up to the 2020 U.S. presidential election, Democratic hopeful Andrew Yang proposed a climate action plan that included geoengineering, claiming that within decades China would deploy it anyway.<sup>20</sup> In addition to emphasizing that SAI has no military applications, advocates typically stress that it is both simple and cheap, with cost estimates ranging from single-digit to lower double-digit billions per year.<sup>21</sup> By contrast, the costs of a global transition to renewable energy will amount to trillions annually. To be sure, it is notoriously hard to assess just what to count as costs (and benefits). For instance, if one includes costs of governance and monitoring and also adds compensation to countries harmed by SAI (let alone harm caused by the omission of emission-reduction measures not taken because of actual or envisaged deployment of SAI), the situation will be different than if one merely counts costs for injections.<sup>22</sup>

Crutzen's imprimatur notwithstanding, geoengineering research is currently not broadly supported on either the left or the right. Geoengineering brings out various often conflicting worries people have about meddling with nature. Unlike Yang, most politicians

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<sup>20</sup> See Kaufman, "A Longshot 2020 Candidate Wants to Push Geoengineering into the Climate Debate."

<sup>21</sup> Smith, "The Cost of Stratospheric Aerosol Injection through 2100." Smith does not include the costs I am about to mention in this estimate.

<sup>22</sup> See Reynolds, Irvine, and Parker, "Five Solar Geoengineering Gropes That Have Outstayed Their Welcome." For the governance of geoengineering, see Reynolds, *The Governance of Solar Geoengineering*.

stay clear of it. At the time of writing there is still little systematic research on it.<sup>23</sup> We are years away from being able to deploy SAI safely. Several potential risks arise even if SAI is deployed with the best intentions in globally coordinated ways, such as ozone loss, acid rain and air pollution from the particulates coming down, monsoon failures, increased ocean acidification, less rain and more drought, damage to agriculture from lack of sunlight, less solar power, and less predictable weather. In addition, use of SAI might become disputed among countries: there could be outright climate wars, and differential deployment and control could increase inequality. The various risks accrue differentially around the world, and the result could be further disempowerment of the marginalized and vulnerable.<sup>24</sup>

Climate scientists have studied SAI in increasingly sophisticated models. One of the lead scientists in SCoPEX and one of the more outspoken advocates for more intense research to understand SAI outside of models, David Keith has become a prominent target of criticism of solar radiation management. He has proposed phased testing, from small to increasingly large scenarios, to grasp scope and limits of its potential, especially any environmental risks and accompanying costs of human life. Keith sees SAI as part of a portfolio whose center piece must be emissions reduction. Once emission cuts have begun at a large scale (and so political commitments are firm), SAI and then also carbon removal would start. We would subsequently reach zero net emissions (and thus peak concentrations) sooner than without geoengineering. At that stage, temperatures and accompanying climate risks stabilize.

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<sup>23</sup> This might be changing, though, see Hiar, “White House Cautiously Opens the Door to Study Blocking Sun’s Rays to Slow Global Warming.”

<sup>24</sup> This list is from Keith, “The Peril and Promise of Solar Geoengineering.” For the basics, see Keith, *A Case for Climate Engineering*; Smith, *Pandora’s Toolbox*.

Eventually SAI can be phased out (though presumably carbon removal would have to continue for much longer), and humanity will live on this planet largely without fossil fuels.<sup>25</sup>

Keith proceeds under the assumption that in a fortunate turn of events, countries actually pursue the Paris Climate Accord goals (or otherwise honor their obligation to reduce emissions). There are two reasons to include SAI under this assumption. To begin with, SAI might buy us time to accomplish the required energy transition. Societies would have more time to assess how to replace fossil fuels with renewables in ways that do not generate major problems elsewhere. Political turmoil might result if too many people lose jobs without being able to find different work or because regions lose industries whose profitability depends on fossil fuels without having alternatives. Secondly, once we reach a point where temperatures no longer rise, we must still learn how to live with the warming that will have occurred by then. Heat waves, storms, heavy rainfall concentrations, and elevated sea levels have come to stay. SAI will help mitigate these effects and give countries time to adapt.

The considerations in the previous paragraph are indeed based on the assumption that countries are serious about combatting climate change and so comply with their obligations in pursuit of this goal.<sup>26</sup> Under such conditions we ask what philosophers call questions of *ideal theory*, which arise when everybody is both motivated to do their moral duties and capable of doing so. But what makes sense under such circumstances might not

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<sup>25</sup> This is the proposal in Keith, "The Peril and Promise of Solar Geoengineering." Keith also argues for SAI research based on something like an assumption that all relevant parties will comply with the climate-change-related obligations; see Keith, "What's the Least Bad Way to Cool the Planet?" There are considerable complexities here when it comes to the order in which different climate-change responses are implemented, also depending on just when the first of these measures is actually started at a large scale. For instance, if SAI is only deployed once policies around emission cuts are already firmly established, the risk is much smaller that SAI will slow down (let alone derail) such policies than if SAI is deployed at an earlier stage.

<sup>26</sup> For why countries have duties to combat climate change, see Risse, *On Global Justice*, chapters 9 and 10.

make sense if some parties are either unwilling or unable to do what they ought to do (*non-ideal theory*). If it takes four people to perform a rescue that is hard on everyone but does no lasting damage and I already see that three are on their way and no one else is around, I ought to join. Saying that much, however, says little about a scenario when nobody is moving. But while questions about non-ideal scenarios are not automatically answered through ideal scenarios, the discrepancies are not always as stark. Sometimes even if not everyone honors their obligations, for some parties to comply still gets us closer to a required goal. Keith and Joshua Horton have also argued for the potential usefulness of geoengineering in the absence of full compliance, insisting that in this context the ideal-theory case does carry over to non-ideal theory. Their point is that geoengineering can help the global poor. One way or another, the cooling brought about by SAI will help developing countries, by buying them more time to do emission cuts or by preventing certain natural disasters like storms or fires to occur in their region.<sup>27</sup>

### **3. Objecting to Solar Radiation Management**

Typically objections to SAI proceed in broadly two ways (which are not logically exhaustive but capture the current debate reasonably well). To begin with, there are concerns to the effect that such measures are inherently problematic, and secondly there are objections to SAI's role in responses to climate change. To be sure, SAI has only become relevant in the context of climate change. Still, some criticisms foreground features that put SAI in line with

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<sup>27</sup> Horton and Keith, "Solar Geoengineering and Obligations to the Global Poor." For this type of argument, see Gardiner, "Is 'Arming the Future' with Geoengineering Really the Lesser Evil?" Also see Hourdequin, "Climate Change, Climate Engineering, and the 'Global Poor.'"

other measures that affect the environment whereas other objections foreground climate change. Among the more inherent objections, one can (admittedly crudely) distinguish right-wing and left-wing criticisms. From a right-wing perspective, any kind of solar radiation management is one more overreaction to climate risks. As far as left-wing criticism is concerned, such measures put us in a wrong kind of relationship with nature (and perpetuate the wrong kind of relationship with other people that already persist).

For right-wing critics geoengineering is just one more measure through which transnational technocratic elites expand power. Such objectors may or may not assume that this elite deliberately exaggerates threats or really believes that only they can save us. Some versions connect to conspiracy theories. For instance, advocates of the chemtrail theory (“chemtrailers”) regard SAI as aligned with government or industry efforts at secretly adding toxic chemicals to the atmosphere from aircraft in ways that form visible plumes (condensation trails) in the sky. Various motivations have been alleged for such spraying: sterilization or reduction of life expectancy for the sake of population control, mind control, or weather control.

On the left many see SAI as a misguided approach to climate change, the sheer possibility of which will inevitably or anyway likely derail or delay efforts to address root causes. Geoengineering presents a merely temporary and illusionary technical fix that discourages real reform (and, unsurprisingly, seems to be supported largely by male advocates). Corporate interests are set to exploit geoengineering for profit, cementing the status quo (if only by enabling us to avoid the costs associated with a radically warmer world whilst continuing to emit large quantities of greenhouse gasses). Since the 60s, the environmental left has fostered certain preferences about good policy: they favor local over

global solutions, changes in production over waste treatment, and social over technological solutions. Geoengineering fails on all counts.<sup>28</sup>

Suppose we find suitable responses to both right-wing and left-wing objections and resolve to deploy geoengineering as part of a climate-change strategy. Then we are back with the ideal/non-ideal distinction. What role SAI can play in a sensible climate-change portfolio depends on what we expect to happen, most importantly on whether we can trust that actors across countries will cut emissions. Recent work by Britta Clark shows how difficult it is – for both critics and supporters of SAI research – to have a coherent view of the use of geoengineering in the climate change domain over time.<sup>29</sup>

Recall the Keith-Horton argument in support of SAI research: even under widespread non-compliance (when it comes to emission reductions) some benefit for the global poor is likely to arise from geoengineering. But one problem is that we must believe then that, although countries do not act as required to stop climate change, the availability of SAI will not stop them from cutting emissions altogether (considerably reducing the benefits for the poor from geoengineering). We must also believe that, although we deal with countries that currently do not honor moral obligations regarding climate change or the global poor, they would subsequently support the poor. But these additional beliefs are implausible. That is, if one argues for more research into SAI based on present non-compliance, one must ponder how else an underlying willingness to dodge obligations might resurface later.

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<sup>28</sup> For a discussion of environmental policies grounded in such a perspective that still finds room for geoengineering as embedded into a larger set of social practices, see Buck, *After Geoengineering*.

<sup>29</sup> Clark, “How to Argue about Solar Geoengineering.”



A similar point applies to those who reject further research because they believe that meeting the Paris targets is still socially and politically feasible but worry that even research into SAI subsequently makes certain failures much more likely. Among these failures we find that SAI is overestimated and so mitigation is slower than needed; that after a period of deployment, SAI would stop prematurely, with negative consequences from “termination shocks;” that research into SAI makes it likely that SAI is deployed prematurely; that a commitment to SAI further alienates humans from nature by giving us yet more of a sense of superiority; that we cannot develop global-governance mechanisms to prevent SAI from getting utilized in climate wars; or that this technology further increases global power-imbalances.<sup>30</sup> For anyone to worry about any of these scenarios, however, one must believe that although societies will deal with climate change, they will be unwilling or unable to address these other matters. But once societies do deal with climate change in earnest and commit to disempowering corporations, phasing out fossil fuels and investing in people and communities to minimize injustice, it is plausible that they will also address these additional challenges. That is, if one argues against more research into SAI based on present or future compliance with obligations regarding emission cuts, one must think through how else such compliance might manifest itself later (and how therefore certain problems anticipated based on non-compliance would not arise).

To rebuff inherent criticisms of SAI one needs to refute the substantive assertions from the right or left or argue that SAI does not fit the offending patterns. To rebuff

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<sup>30</sup> For these points, see McKinnon, “The Panglossian Politics of the Geoclique”; McKinnon, “Sleepwalking into Lock-In?”; Katz, “Geoengineering, Restoration, and the Construction of Nature”; Surprise, “Stratospheric Imperialism”; Stephens and Surprise, “The Hidden Injustices of Advancing Solar Geoengineering Research”; Stephens et al., “The Risks of Solar Geoengineering Research.” See also Schneider and Fuhr, “Defending a Failed Status Quo”; McLaren, “Recognizing the Injustice in Geoengineering.”

challenges to integrating SAI into a coherent climate strategy one needs plausible assumptions about the basic orientation of international politics towards moral obligations in this domain (i.e., will there be compliance or not?), use them consistently, but also realize that any advocacy around SAI has *performative* dimensions that generate obligations. As far as international politics is concerned, Clark assumes (sensibly) that global powers will not comply, instead acting in accordance with their politically dominant view of what suits their interests. We get something like this then if we spell out the options around SAI:

**SAI Research Moratorium:** Suppose scientists forgo SAI research. Fossil fuel interests nonetheless continue to slow mitigation. Average temperature subsequently rise beyond 1.5 degrees (likely much higher), causing mass migration and increasing conflict, heat waves, severe storms, wildfires, etc. Mitigation and adaptation take place but are insufficient. Adaptation prioritizes the wealthy. Without SAI, there is no hope to ameliorate these impacts in the short term.

**SAI Research Continues:** SAI is extensively funded but is used to stall the energy transition. Mitigation proceeds even more slowly than in the first scenario. SAI is deployed to maximize economic output of wealthy nations. Other impacts remain unaddressed. Risks of termination shock and global conflict increase. One extreme version of this option is what Surprise calls Stratospheric Imperialism (which he thinks the U.S. already practices, with Harvard's assistance).<sup>31</sup>

Things might turn out differently. But neither termination nor continuation of SAI research is decisive here. Both would trigger chains of reactions and follow-up reactions embedded into dynamics of international politics. Therefore, any advocacy of either termination or continuation will be performative in nature: that is, by itself any such advocacy is an act others will respond to – if only via agreement or advocacy of their own – as part of the ensemble of actions that moves things forward. (“Any” advocacy, meaning any

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<sup>31</sup> Surprise, “Stratospheric Imperialism.” The proposals are minor variations of what is outlined by Clark, “How to Argue about Solar Geoengineering.” For the complex political realities in the U.S. in which decisions about geoengineering would be made, see Buck, “Prospects of Climate-Engineering in a Post-Truth Era.”

stance on these matters that actually reaches people and thereby bears on the decision making, if only marginally.) But then, in virtue of being performative in this sense, such advocacy comes with obligations. Advocates of the option that prevailed have follow-up obligations to make sure (to the best of their capacities) their preferred option works out favorably in the struggle against climate change. That is, they have an obligation to make sure the additional beliefs they are committed to, and that render their advocacy sensible to begin with, come true.<sup>32</sup>

#### **4. The Sámi and Indigenous Organizing at the International Level**

Etymologically, “indigenous” people are those born into a territory. Indigeneity often distinguishes between people already in a territory and invasive groups: use of the term only makes sense because this is the norm. Since global history in recent centuries has been shaped by European colonialism, often the invaders are European. It is also a consequence of European expansionism that much nomenclature of people and locations captures the perspective of European “discoveries.” Native Americans are “Indians” because Columbus thought that is where he was. If we call them “Native Americans,” we still refer to them by contrast with others who arrived millennia later, doing so centuries after the events that rendered it meaningful to speak this way. Moreover, we refer to them by way of honoring Amerigo Vespucci, whose claim to fame is that he realized that far-flung territories West of

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<sup>32</sup> There is some complexity to this, as over time one’s estimates of what is likely to happen or possible will change in response to what takes place in the world. And what takes place in the world might well then include reactions to what one has done oneself, or reactions to such reactions. So, no one should be committed *indefinitely* to making sure that certain beliefs come true that one once held. For present purposes my point is just to articulate that there are such follow-up obligations that arise from the performative dimensions of contributions to debates, and not to pursue such questions that arise from this view (which I think are very much worth pursuing).

Europe formed a continent entirely unknown to Europeans. Inevitably, connotations of historical defeat and secondary status attach to being “discovered” (and thus to indigeneity).

Contemporary use of “indigeneity” is wider. For one thing, it is not only Europeans who have created lasting conflict by taking territory. The Uyghurs are indigenous people overpowered by Han Chinese. Yet other conflicts do not originate in invasions at all, nor are they associated with different timeframes in which various peoples arrived; instead, they involve a domineering population (whose claims are now anchored in participation in global political and economic systems) and others whose way of life has secondary status. Think of African peoples like the San in Namibia, the Tuareg across the Sahara, or the Maasai in Tanzania. Many such groups also inhabit a vast area in South and South-East Asia known as Zomia, which has historically been beyond regular government control.<sup>33</sup> This area includes the highlands of North Vietnam, all of Laos, parts of Thailand, Northern Myanmar, and Southwest China, as well as Northeast India. Accordingly, a broader notion of indigeneity has emerged, associated with multiple criteria, such as cultural distinctiveness, non-dominance, attachment to land and resources, but also exploitation, marginalization, and dispossession.

Owing to such complexities, endeavors to define indigeneity, especially for legally binding claims, have been contentious ever since indigeneity got international recognition, and often are suspended altogether.<sup>34</sup> Definitional complexities notwithstanding, it is remarkable that such far-flung groups can be meaningfully classified under indigeneity. In the many millennia it took humanity to claim the planet, basic ways of making a life in natural

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<sup>33</sup> On Zomia, see Scott, *Seeing Like a State*.

<sup>34</sup> Alternatively writers focus on one aspect; for instance, to Daniel Wildcat, indigenous peoples are “peoples or nations who take their tribal identities as members of the human species from the landscapes or seascapes that gave them their unique tribal cultures,” Wildcat, *Red Alert!*, 32.

habitats emerged. Subsequently, as human living arrangements have evolved, to paint in broad strokes, a dominant global culture eventually evolved from life in such habitats and has over time claimed the whole planet (“Western colonialism”). In recent decades, certain peoples have “reconnected” in ways that contrast with that dominant culture and foreground commonalities that had emerged in the original spread around the planet. Indigenous people have increasingly articulated their interests internationally, first within the International Labor Organization (ILO) and tentatively in the League of Nations, later in the UN system.

Within the UN, 1982 was a breakthrough year in which the UN Economic and Social Council established the Working Group on Indigenous Populations (WGIP). More than 100 indigenous groups got involved. In 1994, the General Assembly launched the International Decade of the World’s Indigenous Peoples, increasing its commitment to indigenous rights. Since 2000 the Permanent Forum on Indigenous Issues has given these matters a firmer grounding in the UN. Indigenous cultures received additional recognition through the 2007 UN Declaration on the Rights of Indigenous Peoples (UNDRIP). UNDRIP took decades of preparation, and its drafting involved unprecedented collaboration between states and NGOs. UNDRIP gives prominence to collective rights to a degree unparalleled in human rights law. It articulates minimum standards for survival, dignity, and well-being of indigenous peoples, elaborating on human rights standards as they apply to their situation.<sup>35</sup>

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<sup>35</sup> On the history of indigenous engagement within the UN (with an eye on the role of the Sámi) see Minde, *Indigenous Peoples*. See also Dunbar-Ortiz, “The First Decade of Indigenous Peoples at the United Nations”; Thompson, *The Rights of Indigenous Peoples in International Law*; Jentoft, Minde, and Nilsen, *Indigenous Peoples*; Minde, “The Making of an International Movement of Indigenous Peoples”; Baer, “The Rights of Indigenous Peoples – A Brief Introduction in the Context of the Sámi”; Dahl, *The Indigenous Space and Marginalized Peoples in the United Nations*; Crossen, “Another Wave of Anti-Colonialism”; Daes, “An Overview of the History of Indigenous Peoples”; Lightfoot, *Global Indigenous Politics*; Niezen, *The Origins of Indigenism*. On indigenous peoples in international law generally, see Anaya, *Indigenous Peoples in International Law*. Specifically on UNDRIP, see Pulitano, *Indigenous Rights in the Age of the UN Declaration*; Morgan,

The Sámi traditionally inhabit the northern parts of Norway, Sweden, Finland, and Russia's Kola Peninsula.<sup>36</sup> They live across countries whose political and economic structures were designed by others who have adjusted their way of life over time. By contrast, the Sámi do not have their own country and still see their traditional ways as central to their culture (even though most of them no longer make a living that way). Germanic peoples seem to have migrated into Southern Scandinavia separately from Sámi migrations into northern regions. For a long time interactions seem to have been “based on cooperation and mutual respect and cooperation rather than exploitation and harassment.”<sup>37</sup> However, in modern times the Sámi faced assimilation efforts (e.g., Swedification, Norwegianization), cultural suppression, and religious conversion. Expansionist neighbors often encroached upon them from different directions. But over time, both through domestic contestation and through international engagement as part of the developments just mentioned, the Sámi made progress in getting their causes recognized.

Sámi languages are part of the Uralic family that also includes Finnish and Hungarian. Their several languages are related but mutually unintelligible. Still, the Sámi have a distinct cultural identity. As semi-nomadic herders they traditionally rely on reindeer for sustenance, clothing, and tools. They practice fishing, hunting, and small-scale agriculture. Colonizing efforts from neighbors notwithstanding, the Sámi managed to maintain traditional ways in

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*Transforming Law and Institution*; Charters and Stavenhagen, *The UN Declaration on the Rights of Indigenous Peoples*; Engel, “On Fragile Architecture”; Champagne, “UNDRIP (United Nations Declaration on the Rights of Indigenous Peoples) Human, Civil, and Indigenous Rights.” Also see Office of the United Nations High Commissioner for Human Rights, *Making the Declaration Work*.

<sup>36</sup> See Hansen, *Hunters in Transition*; Kent, *The Sámi Peoples of the North*; Lehtola, *The Sámi People*.

<sup>37</sup> Price, *Ancient Scandinavia*, 311.

their Arctic environment.<sup>38</sup> Eventually, in the 19<sup>th</sup> and 20<sup>th</sup> centuries, nation-state borders – a form of political organization they did not partake of – divided them into different countries. Linguistic boundaries of Sámi languages deviate from these borders, and most Sámi now use the majority language of their country. Accordingly, all Sámi languages are endangered or have perished.

Today, their population is estimated at around 70,000 to 100,000 (depending on how one determines membership, a source of some contention), with the majority living in Norway, followed by Sweden, Finland, and Russia. In all four countries and with different degrees of official recognition, the Sámi have some political representation. They strive to protect their languages, traditional knowledge, and way of life, especially their rights to practice reindeer herding and manage ancestral lands. They still face land rights disputes, environmental threats from development, and the impact of climate change. Cultural assimilation remains a concern, especially in cities.

In addition to the parliaments or assemblies that represent the Sámi to their countries, there is the Saami Council, an umbrella organization consisting of various member organizations across these countries. According to its website, the Council “renders opinions and makes proposals on questions concerning Saami people’s livelihoods, rights, language and culture and especially on issues concerning Saami in different countries.”<sup>39</sup> Founded in 1956, the Council is among the oldest formal indigenous organizations in the world. Progress at home has benefited from international engagement. For decades Sámi have participated

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<sup>38</sup> On Sámi resistance to assimilation see Kuhn, *Liberating Sápmi*.

<sup>39</sup> <https://www.saamicouncil.net/en/the-saami-council>

regularly in ILO and other UN events related to indigenous issues. They have provided expertise, shared experiences, and raised awareness about challenges faced by the Sámi and other indigenous communities.

## 5. The Two Letters

There are differences in how various stakeholders experience the vastness of the Swedish North. In a manner typical of indigenous people, the Sámi see a landscape that sustains them and relate to it in a spirit of interconnectedness. They take an attitude towards their lands that Native American writer Gregory Cajete captures in the admonition “look to the mountains,” a reminder that “when dealing with the landscape we must think in terms of many thousands of years.”<sup>40</sup> The Sámi consider themselves caretakers, as many indigenous populations do in their homelands (an attitude Cajete calls a “theology of place”).<sup>41</sup> Others whose livelihood draws on different sources and who often relate to nature more instrumentally see a thinly populated region ideally suitable as an impact and recovery area for a launching facility. This is why Esrange Space Center was built in Lapland.

Esrange Space Center is a major rocket range and research center 30 miles east of (but within the municipal bounds of) Kiruna. Kiruna is close to where Sweden meets Norway and Finland, 150 miles above the Arctic Circle. A launching station since the 60s, Esrange has been run by the Swedish Space Corporation since the early 70s. It has witnessed hundreds of balloon-launches over the years. SCoPEX signed an agreement with the Swedish Space

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<sup>40</sup> Cajete, “Look to the Mountain: Reflections on Indigenous Ecology,” 4.

<sup>41</sup> Cajete, 4. Much has been written about the relevance of land for indigenous people, see e.g., LaDuke, *All Our Relations*; Topa and Narvaez, *Restoring the Kinship Worldview*; Burkhart, *Indigenizing Philosophy through the Land*; Versluis, *Sacred Earth*; Deloria, *God Is Red*.



Corporation to test its equipment, with the understanding that the Corporation – and thus ultimately the Swedish government as owner of the Corporation – makes sure the facility causes no offense among local stakeholders. But geoengineering had become prominent in the context of climate change, and so this was no ordinary launch. It seems to have been ETC Group, an organization monitoring how technological innovation affects the most vulnerable, that alerted the Saami Council to SCoPEX.<sup>42</sup> On February 24, 2021, the Council sent a letter of protest to the SCoPEX Advisory Committee, as well as to the Corporation and the Swedish government. SCoPEX reached out, but at that stage did not find the Council responsive. The government subsequently ordered the Corporation to cancel the agreement. On June 4, 2021, the Council petitioned Harvard to suspend SCoPEX entirely. This letter was co-signed by 35 indigenous groups and organizations from different countries, mostly with connections to the Arctic. As of the time of writing, Harvard has not publicly responded.<sup>43</sup>

Across its letters, the Council raises procedural and substantive concerns. Procedurally, they question who gets to decide on SAI research. They criticize that the Saami Council was not consulted on a matter contrary to their view of how humans should relate

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<sup>42</sup> Their website suggests as much, and people involved with SCoPEX also have assumed as much:

<https://www.etcgroup.org/content/saami-swedes-and-civil-society-stop-solar-geoengineering-trial-balloon>

<sup>43</sup> As of August 2023, it was challenging to find the list of co-signers. According to Google's Bard, the list is as follows: "Ainu Association of Hokkaido; Arctic Athabaskan Council; Assembly of First Nations (Canada); Association of Indigenous Peoples of the North, Siberia and the Far East of the Russian Federation; Arctic Indigenous Peoples Secretariat; Canadian Arctic Indigenous Peoples Alliance; Circumpolar Inuit Youth Council; First Nations Confederacy of British Columbia; Grand Council of the Crees (Eeyou Istchee); Inuit Circumpolar Council; Inuit Tapiriit Kanatami; Inuvialuit Regional Corporation; Inuit Tapirisat of Canada; National Congress of American Indians; National Inuit Youth Council (Canada); Northern Athabaskan Cultural Centre; Nunavut Tunngavik Inc.; Saami Council; Sámi Parliament of Norway; Sámi Parliament of Sweden; Sámi Parliament of Finland; United Native Nations (Alaska); Yukon First Nations; Yukon Native Women's Association; Yukon Territorial Government." I was unable to verify this information, and Bard responded to my queries as follows: "The list of 35 indigenous nations that cosigned the letter is not publicly available. It was shared with me by a human expert who is familiar with the issue of solar geoengineering. I am not able to share the source of this information without their permission." I cannot otherwise verify this information and thus cannot be sure that Bard is not hallucinating this. Bard declined to connect me with this expert.

to nature and that literally touched their homeland. They note that the SCoPEX Advisory Committee does not include representation from affected groups. Substantively, the Council draws attention to risks of deployment, including the prospect that climate change mitigation could suffer setbacks from the anticipated availability of SAI. The Sámi also worry that this approach will further concentrate power in the Global North.

Many of these points have also been made by others. For some points in the second letter the Council cites scientific research. What matters is that as indigenous people the Sámi articulate a view about how humans should see themselves in relation to nature that reflects thousands of years of experience and now contrasts with an approach to nature that has created our current predicament. Qua indigenous people the Saami Council articulate an alternative tradition of wisdom that reflects long-standing practice and might now just preserve our future on this planet. It behooves us to pay attention to this alternative wisdom – which is not to say its counsel must always be followed. In fact, in this case it should not be. Let me elaborate.

## **6. What Special Claim Would Indigenous People Have?**

Our question from section 1 was: how much significance should Harvard give to the fact that the letters from the Saami Council were interventions by indigenous people? To develop the answer sketched at the end of section 5 let me give some more philosophical substance (or at least context) to a view that, with a good deal of simplification but still with enough plausibility, we can think of as the indigenous standpoint on humanity's place in nature. I draw on a list of positions on ecological thought formulated by Australian political theorist

Robyn Eckersley.<sup>44</sup> Eckersley distinguishes an anthropocentric ecological from an ecocentric perspective. The former sees nonhuman nature in terms of opportunities for human emancipation and fulfilment in ecologically sustainable societies. The nonhuman world is a storehouse of resources with instrumental value. The latter perspective values the nonhuman world intrinsically. Questions around social and political arrangements can be answered only based on a view of our proper place vis-à-vis the rest of nature.

These perspectives generate a spectrum of positions on environmental ethics, with the first most strongly emphasizing the former perspective and the fifth most strongly emphasizing the latter:

**Resource Conservation:** Responsible and sustainable use of natural resources to meet human needs are essential. Such use seeks to balance resource utilization with long-term health and viability of ecosystems. Humans can and should use natural resources and see the value of nature instrumentally. However, they should avoid depletion and environmental degradation to preserve opportunities for future generations.

**Human Welfare Ecology:** Human well-being is at the center of environmental concerns. Conservation efforts should primarily seek to improve human life. Healthy ecosystems enhance human well-being by providing essential resources like clean air, water, and food. Economic growth is seen critically, as is the idea that science and technology alone can save us from the ecological crisis without far-reaching societal adjustments. Nature only matters on a human scale, but it is an enlightened notion of self-interest that is in the background that sees human well-being in a larger context.

**Preservationism:** We should protect nature for its intrinsic value, independently of its utility to humans. Certain landscapes, species, and ecosystems have inherent worth and should be preserved and protected from human interference. These goals should be prioritized if not over all then at least over most human ambitions. That is, human self-interest itself (no matter how enlightened) is constrained in this way since nature matters independently of a human scale.

**Animal Liberation:** This position (hardest to place on a spectrum from the anthropocentric to the ecocentric) centers around the ethical treatment of animals

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<sup>44</sup> Eckersley, *Environmentalism and Political Theory*, chapters 1 and 2.

and advocates for their rights and welfare. Animals have intrinsic value and should not be treated as mere resources for human use. Practices like animal cruelty, factory farming, and animal testing should stop. Vegetarianism or veganism are encouraged.

**Ecocentrism:** The environment is at the center of ethical considerations, all components of ecosystems having intrinsic value. All living beings and natural systems are interconnected, and the health of the entire ecosystem must be prioritized over specific human or animal interests. Ecosystems exist over time and preserving them requires long-term thinking that gives standing to future humans, but only as components of the ecosystem. It is not only individual organisms that matter intrinsically but also aggregates such as populations, species, ecosystems, and the planet as such (Gaia). Humans are caretakers rather than masters of ecosystems.

Ecocentrism requires elaboration to be philosophically respectable. What matters for now is that something like Ecocentrism captures reasonably well how indigenous people around the world relate to nature. That claim, too, requires elaboration and can ultimately be demonstrated only through comparative investigations. But it has become clear from our discussion of indigenous organizing at the international level that, in broad strokes, it makes sense to identify something like an indigenous standpoint on ecology at a global scale, considerable local variations notwithstanding. In addition to the literature already cited, let me quote one assessment from an Anishnaabe perspective. “Environmental justice,” states Deborah McGregor, articulating the Anishnaabe perspective in ways that also indicate how this view is shared among other (as she says) aboriginal groups,

is most certainly about power relationships among people and between people and various institutions of colonization. But environmental justice from an Aboriginal perspective is more than all of these. It is about justice for all beings of Creation, not only because threats to their existence threaten ours but because from an Aboriginal perspective justice among beings of creation is life-affirming. Environmental justice is frequently presented as a relatively new concept, both in North American and internationally. Aboriginal people, however, hold ancient and highly developed ideas of justice that have significant applicability in this area.<sup>45</sup>

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<sup>45</sup> McGregor, “Honouring Our Relations,” 27f. There are important representatives of an ecocentric approach in the Western tradition with similarities to indigenous thinking. One might think of Aldo Leopold (and in his footsteps Baird Callicott), or Arne Naess, among others, see e.g., Leopold, *A Sand County Almanac*; Callicott,

My main point about indigenous Ecocentrism is that *it behooves us* (i.e., everyone involved in making or influencing decisions regarding the environment) to take it seriously *because* it is articulated by indigenous people. We can indeed understand indigenous traditions as the Fourth World outside of the world of states populated by the First, Second, and Third World.<sup>46</sup> It is a set of traditions that has been waylaid (mostly, directly and indirectly) by Western expansionism. “It behooves us:” I do not mean this in terms of rectificatory justice. I do not argue that we should take certain views seriously now because we have oppressed them before (though that is worth pondering). Nor do I mean we should do so as a matter of proper recognition of people to whom such recognition has so far been denied (though that is certainly true). I also do not mean here that Ecocentrism is the correct view of environmental ethics (which is worth pondering, but I would need to argue for it directly). My point here is that taking indigenous views on environmental justice seriously is the best available way of dealing with a type of *moral corruption* in the domain of what intergenerational justice requires vis-à-vis climate change.<sup>47</sup>

The pertinent problem of moral corruption is that only representatives of the present generation decide how to address our environmental crisis even though various options affect present and future generations very differently. But nobody from the future is around

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*Thinking Like a Planet*; Naess, *The Ecology of Wisdom*. But one difference is that indigenous approaches reflect ancient traditions and practices, whereas in the Western cannon these approaches are outliers and have only recently entered. For the relationship specifically between Leopold and indigenous approaches, see Whyte, “How Similar Are Indigenous North American and Leopoldian Environmental Ethics?” See also Callicott and Nelson, *American Indian Environmental Ethics*.

<sup>46</sup> Manuel and Posluns, *The Fourth World*.

<sup>47</sup> On moral corruption and climate change, see Gardiner, *A Perfect Moral Storm*, Part E.

to articulate their perspective. Again, in the millennia it took humanity to claim the planet, basic ways of making a life in natural habitats emerged. Subsequently, a dominant global culture that itself has emerged from life in such habitats but has gone its own way has claimed the whole planet (“Western colonialism”). The ecological views of that culture are thoroughly anthropocentric. Resource Conservation and Human Welfare Ecology represent the ecologically enlightened versions of that view, and as such have entered the Green Movement especially in Europe. On balance, however, the instrumental attitude towards nature built into that culture focuses on short-term consumption. That global culture has created our current predicament.<sup>48</sup>

In recent decades, indigenous peoples, the Fourth World, “reconnected” to each other in ways that contrast with that dominant global culture and foreground the commonalities that had emerged in the original spread around the planet. The best we can do to deal with this particular challenge of moral corruption is to bring back forcefully a perspective that is still around but is so very different from and highly critical of the ruling mainstream. Global mainstream culture and indigenous approaches – and here I ask forgiveness for how much complexity these descriptions submerge – capture much of the wealth of human experience on this planet. Sidelining indigenous insights means excluding much wisdom about humanity’s relationship with nature from bearing on decision-making about the future when it matters most and when mainstream culture has gotten us here to begin with. Since we cannot actively engage with the future (we can only harm or benefit the future), I submit that

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<sup>48</sup> A classic on this topic that emphasizes the role of Christianity in this short-term instrumental approach to nature is White, “The Historical Roots of Our Ecological Crisis.” On green political thought, see Goodin, *Green Political Theory*; Eckersley, *Environmentalism and Political Theory*. It is also good to remember that many indigenous cultures collapsed due to environmental disconnect, see Diamond, *Collapse*.

actively engaging with the whole range of human stances on nature (given how much adversity there is inside of that range) is the best available solution to this problem of moral corruption. To be clear, the point is not that indigenous perspectives are a kind of *proxy for future people*, or otherwise can “speak for” them better than anyone else. Rather, it is *in light of the necessary unavailability of genuine future representation* that we should bring the whole range of human understanding to bear on climate issues. Indigenous perspectives not only add to that just because they are adding perspectives – they are adding to that in an especially valuable manner because they stand in contrast to dominant views that have caused the crisis.

One may wonder why it behooves us to take it seriously *because* the view is articulated by indigenous peoples. Is it not rather that it behooves us because this view helps us address moral corruption, not because a specific group articulated it? But what matters about this view is that it captures much human wisdom that got sidelined in recent centuries but is still preserved by certain groups. These groups matter (*obviously* not solely for that reason, but for the purposes of this argument) on the strength of their connection to the period of the human story on this planet when that wisdom was acquired. And short of having people from the future around to articulate views, the best we can do to solve this problem of moral corruption is to bring the full range of available human wisdom to bear on the matter. That, in turn, we do by paying attention to indigenous people.

## **7. Where Does All This Leave Us?**

Let me make two points by way of concluding. The first is that geoengineering might unfortunately become a rather important and perhaps at some point even practically

indispensable part of a portfolio in combatting climate change. My sense of the debate about SAI is that we should pursue research. We should understand if SAI is safe. But anybody who takes that stance – whose performative dimension I emphasized earlier – must get involved more broadly and help make sure, to the best of their abilities, that SAI is deployed only as part of a portfolio approach to climate change and that it is indeed deployed as part of a globally balanced approach (one that in particular avoids the creation of “Sacrifice Zones” where people suffer disproportionate consequences from geoengineering).<sup>49</sup> Anybody who supports a moratorium ought to help make sure that the optimism about our ability to deal with the climate crisis differently carries the day.

Critics are correct that geoengineering is a technological fix to a problem that only arises because we live in a global culture driven by such fixes in pursuit of short-term consumption. But that a mindset got us into this predicament and geoengineering makes sense in terms of this mindset does not mean that, given that we are now in this crisis, geoengineering could not also make sense from different perspectives. At the same time, the only appropriate way of deploying geoengineering is as one component of a broader set of social practices much *beyond* technological fixes. We ought to cultivate such practices to get through the energy transition (and start it in earnest to begin with) and reach a stage where we can inhabit this planet in new ways. What I articulate here might make sense even from an ecocentric perspective on nature. At this stage, taking care of nature, to preserve our ecosystems *roughly* as they are, might require uncanny measures.

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<sup>49</sup> I owe the term “Sacrifice Zone” to Jennie Stephens.



My second point is about giving a broader hearing to indigenous views. On this subject, let me offer two quotes from Kyle Whyte that capture what I mean to say. Whyte argues that “indigenous voices should be involved in scientific and policy discussions of different types of geoengineering,” and continues:

Geoengineering discourses cannot just be associated with geoengineering to the exclusion of topics and solutions that Indigenous peoples value. A conversation about geoengineering that, say, disallows or is silent on, treaty rights or colonialism, is not a space for Indigenous voices to matter, in my opinion. Or a discussion where Indigenous peoples are asked to trust non-Native people again, this time, is problematic if there are not direct reasons given for why trust is an appropriate attitude. For the conversation must address why distrust occurred in the first place, which has to do with legal and policy frameworks, social and culture norms and economic systems that are anti-Indigenous.<sup>50</sup>

This captures the spirit in which I propose a broader engagement with indigenous views. This cannot be a matter of sporadic encounters but must involve systematic engagement (in curricula, exchanges, decision making bodies, etc.) and thus also a more systematic interrogation of our global culture (in the spirit of my point about how such engagement helps with moral corruption). In particular at universities, faculty and students should be much more familiar than they typically are today with the history of indigenous peoples in their areas and with indigenous perspectives on basic philosophical issues, and get some exposure to indigenous knowledge. Elsewhere Whyte says this:

The fact that Indigenous peoples have suffered from science and technology that have aspired to high ideals, should not be lost within the governance models. There has to be a strong understanding that the high ideals and the reality of the crisis faced by all humanity cannot be used as excuses to cheapen the sovereignty of Indigenous peoples and to avoid having to provide a burden of proof that early SRM research should not be associated with Indigenous people’s past experiences with scientists and engineers. These obligations should not be seen as roadblocks or hang ups to making progress on learning more about SRM. They are simply part of what has to be done in an international landscape that has been shaped profoundly by the

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<sup>50</sup> Whyte, “Indigeneity in Geoengineering Discourses: Some Considerations,” 304.

suppression and displacement of Indigenous peoples and the destruction of the quality of their lands.<sup>51</sup>

Again the point is that engagement with (and genuine appreciation of) indigenous viewpoints must occur in broader contexts. At the same time, once there is such engagement, specific issues must be sorted out on their own terms. In this spirit I suggest that the Saami Council's take on SAI should not be followed even while I argue for broadened engagement. Needless to say, I salute and support the Council's caretaker attitude towards nature. SAI can be part of such an attitude, but its advocates must help make sure that this is indeed so.

I propose broader engagement with some diffidence. About half a billion people identify as indigenous, spreading across about 100 countries. There are vast literatures about (and by) them. Still, many people inhabiting the other three worlds have little to nothing to do with this Fourth World and know little about indigenous people in their own country. Much historical amnesia has set in following the magnitude of harm done to indigenous people over centuries. Even people who care to know about them often feel a sense of helplessness when it comes to engaging indigenous traditions – partly because these traditions are so different from the mainstream, partly because all engagement occurs under the long shadow of past and present cruelty and disregard.

Doing things differently is fraught with profound challenges. To the extent that there have been efforts at engaging, they have often been in the manner of what Edward Said elsewhere called *orientalism*.<sup>52</sup> That is, it has been engagement highly mediated through

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<sup>51</sup> Whyte, "Now This!," 184. See also Whyte, "The Recognition Dimensions of Environmental Justice in Indian Country."

<sup>52</sup> Said, *Orientalism*.

cliches that have grown in a cultural space shaped by enormous power imbalances and historical injustices (“discoveries”) – and inevitably my own discussion here is also ultimately grounded in that space. The danger is that we once again enlist indigenous cultures for our own purposes, this time literally to save life on this planet as we know it.<sup>53</sup> All this shows how long a road to travel this is.<sup>54</sup> But I submit that what Harvard should write back to the Saami Council ought to include versions of these two concluding points.

## Literature

- Anaya, S. James. *Indigenous Peoples in International Law*. Oxford: Oxford University Press, 2004.
- Baer, Lars-Anders. “The Rights of Indigenous Peoples – A Brief Introduction in the Context of the Sámi.” *International Journal on Minority and Group Rights* 12 (2005): 245–67.
- Bodley, John H. *Victims of Progress*. Lanham: Rowman & Littlefield Publishers, 2014.
- Buck, Holly Jean. *After Geoengineering: Climate Tragedy, Repair, and Restoration*. London: Verso, 2019.
- . “Perspectives on Solar Geoengineering from Finnish Lapland: Local Insights on the Global Imaginary of Arctic Geoengineering.” *Geoforum* 91 (2018): 78–86.
- . “Prospects of Climate-Engineering in a Post-Truth Era.” In *Has It Come to This? The Promises and Perils of Geoengineering on the Brink*, edited by J. P. Sapinski, Holly Jean Buck, and Andreas Malm, 231–40. New Brunswick: Rutgers University Press, 2020.
- Burkhart, Brian Yazzie. *Indigenizing Philosophy through the Land: A Trickster Methodology for Decolonizing Environmental Ethics and Indigenous Futures*. East Lansing: Michigan State University Press, 2019.
- Cajete, Gregory. “Look to the Mountain: Reflections on Indigenous Ecology.” In *A People’s Ecology: Explorations in Sustainable Living*, edited by Gregory Cajete, 3–20. Santa Fe: Clear Light Publishers, 1994.
- Callicott, J. Baird. *Thinking Like a Planet: The Land Ethic and the Earth Ethic*. New York: Oxford University Press, 2014.
- Callicott, J. Baird, and Michael P. Nelson. *American Indian Environmental Ethics: An Ojibwa Case Study*. Upper Saddle River: Pearson, 2003.
- Chakrabarty, Dipesh. *The Climate of History in a Planetary Age*. Chicago: University of Chicago Press, 2021.

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<sup>53</sup> On these themes, see Chandler and Reid, *Becoming Indigenous*.

<sup>54</sup> For examples of where this kind of thing seems to have been done well, see Nakashima et al., *Weathering Uncertainty*; Deloria et al., *Unfolding Future*; Kimmerer, *Braiding Sweetgrass*. See also Nelson, *Original Instructions*; Topa and Narvaez, *Restoring the Kinship Worldview*.

- Champagne, Duane. "UNDRIP (United Nations Declaration on the Rights of Indigenous Peoples) Human, Civil, and Indigenous Rights." *Wicazo Sa Review* 28, no. 1 (2013): 9–20.
- Chandler, David, and Julian Reid. *Becoming Indigenous: Governing Imaginaries in the Anthropocene*. London: Rowman & Littlefield, 2019.
- Charters, Claire, and Rodolfo Stavenhagen, eds. *Making the Declaration Work. The United Nations Declaration on the Rights of Indigenous Peoples*. Copenhagen: IWGIA, 2009.
- Clark, Britta. "How to Argue about Solar Geoengineering." *Journal of Applied Philosophy* forthcoming (n.d.).
- Crossen, Jonathan. "Another Wave of Anti-Colonialism: The Origins of Indigenous Internationalism." *Canadian Journal of History* 52, no. 3 (2017): 533–59.
- Crutzen, Paul J. "Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?" *Climatic Change* 77 (2006): 211–20.
- Daes, Erica-Irene. "An Overview of the History of Indigenous Peoples: Self-Determination and the United Nations." *Cambridge Review of International Affairs* 21, no. 1 (2008): 7–26.
- Dahl, Jens. *The Indigenous Space and Marginalized Peoples in the United Nations*. New York: Palgrave Macmillan, 2012.
- Davies, Jeremy. *The Birth of the Anthropocene*. Oakland: University of California Press, 2016.
- Deloria, Philip J., K. Tsianina Lomawaima, Bryan McKinley Jones Brayboy, Mark N. Trahan, Loren Ghiglione, Douglas Medin, and Ned Blackhawk, eds. *Unfolding Futures: Indigenous Ways of Knowing for the Twenty-First Century*. Vol. 147/2. Daedalus: Journal of the American Academy of Arts & Sciences. Cambridge: American Academy of Arts & Sciences, 2018.
- Deloria, Vine Jr. *God Is Red: A Native View of Religion*. Golden: Fulcrum Publishing, 2003.
- Diamond, Jared M. *Collapase: How Societies Choose to Fail or Succeed*. New York: Penguin, 2004.
- Dunbar-Ortiz, Roxanne. "The First Decade of Indigenous Peoples at the United Nations." *Peace&Change* 31, no. 1 (2006): 58–74.
- Dunleavy, Haley. "An Indigenous Group's Objection to Geoengineering Spurs a Debate About Social Justice in Climate Science." *Inside Climate Justice*, July 7, 2021. <https://insideclimatenews.org/news/07072021/sami-sweden-objection-geoengineering-justice-climate-science/>.
- Dykema, John A., David W. Keith, James G. Anderson, and Debra Weisenstein. "Stratospheric Controlled Perturbation Experiment: A Small-Scale Experiment to Improve Understanding of the Risks of Solar Geoengineering." *Philosophical Transactions of the Royal Society A* 372 (2014). <http://dx.doi.org/10.1098/rsta.2014.0059>.
- Eckersley, Robyn. *Environmentalism and Political Theory: Toward an Ecocentric Approach*. London: Routledge, 1992.
- Ellis, Erle C. "Earth Science in the Anthropocene: New Epoch, New Paradigm, New Responsibilities." *EOS Forum* 90, no. 49 (2009): 473.
- Engel, Karen. "The UN Declaration on the Rights of Indigenous Peoples in the Context of Human Rights." *The European Journal of International Law* 22, no. 1 (2011): 141–63.
- Gall, Alexander. "Atlantropa: A Technological Vision of a United Europe." In *Networking Europe. Transnational Infrastructures and the Shaping of Europe, 1850–2000*, edited by Erik Van der Vleuten and Anja Kaijser, 99–128. Sagamore Beach: Science History Publications, 2006.

- Gardiner, Stephen M. *A Perfect Moral Storm: The Ethical Tragedy of Climate Change*. Oxford: Oxford University Press, 2013.
- . “Is ‘Arming the Future’ with Geoengineering Really the Lesser Evil?” In *Climate Ethics: Essential Readings*, edited by Stephen M. Gardiner, 284–312. Oxford: Oxford University Press, 2010.
- Geoengineering Briefing. “SCoPEX: Stratospheric Controlled Perturbation Experiment.” *Geoengineering Monitor*, February 7, 2021. [https://www.geoengineeringmonitor.org/wp-content/uploads/2021/02/scopex\\_kiruna\\_sweden\\_briefing\\_Feb\\_2021.pdf](https://www.geoengineeringmonitor.org/wp-content/uploads/2021/02/scopex_kiruna_sweden_briefing_Feb_2021.pdf).
- Golja, C. M., L. W. Chew, J. A. Dykema, and D. W. Keith. “Aerosol Dynamics in the Near Field of the SCoPEX Stratospheric Balloon Experiment.” *Journal of Geophysical Research* 126, no. 4 (2021).
- Goodin, Robert E. *Green Political Theory*. Cambridge: Polity, 1992.
- Hamilton, Clive. *Earthmasters: The Dawn of the Age of Climate Engineering*. New Haven: Yale University Press, 2013.
- Hamilton, Clive, François Gemenne, and Christophe Bonneuil, eds. *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*. London: Routledge, 2015.
- Hansen, Lars Ivar. *Hunters in Transition: An Outline of Early Sami History*. Leiden: Brill, 2014.
- Hiar, Corbin. “White House Cautiously Opens the Door to Study Blocking Sun’s Rays to Slow Global Warming.” *Politico*, July 1, 2023. <https://www.politico.com/news/2023/07/01/white-house-cautiously-opens-door-to-study-blocking-suns-rays-to-slow-global-warming-ee-00104513>.
- Horton, Joshua, and David W. Keith. “Solar Geoengineering and Obligations to the Global Poor.” In *Climate Justice and Geoengineering: Ethics and Policy in the Atmospheric Anthropocene*, edited by Christopher Preston, 79–92. Lanham: Rowman and Littlefield, 2016.
- Hourdequin, Marion. “Climate Change, Climate Engineering, and the ‘Global Poor’: What Does Justice Require?” *Ethics, Policy & Environment* 21, no. 3 (2018): 270–88.
- Jentoft, Svein, Henry Minde, and Ragnar Nilsen, eds. *Indigenous Peoples: Resource Management and Global Rights*. Delft: Eburon, 2004.
- Katz, Eric. “Geoengineering, Restoration, and the Construction of Nature.” *Environmental Ethics* 37, no. 4 (2015): 485–98.
- Kaufman, Alexander C. “A Longshot 2020 Candidate Wants to Push Geoengineering into the Climate Debate.” *Huffpost* (blog), June 25, 2019. [https://www.huffpost.com/entry/andrew-yang-climate-plan\\_n\\_5d1116fce4b0aa375f513e46](https://www.huffpost.com/entry/andrew-yang-climate-plan_n_5d1116fce4b0aa375f513e46).
- Keith, David. *A Case for Climate Engineering*. Cambridge: The MIT Press, 2013.
- . “The Peril and Promise of Solar Geoengineering.” *Public Lecture at Harvard University*, December 12, 2019. <https://www.nytimes.com/2021/10/01/opinion/climate-change-geoengineering.html>.
- . “What’s the Least Bad Way to Cool the Planet?” *New York Times*, October 1, 2021, sec. op-ed. <https://www.nytimes.com/2021/10/01/opinion/climate-change-geoengineering.html>.
- Kent, Neil. *The Sámi Peoples of the North: A Social and Cultural History*. London: Hurst, 2019.
- Kimmerer, Robin Wall. *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*. Minneapolis: Milkweed Editions, 2015.

- Kuhn, Gabriel. *Liberating Sápmi: Indigenous Resistance in Europe's Far North*. Oakland: PM Press, 2020.
- LaDuke, Winona. *All Our Relations: Native Struggles for Land and Life*. Chicago, Illinois: Haymarket Books, 2016.
- Lâm, Maivân Clech. *At the Edge of the State: Indigenous Peoples and Self-Determination*. Ardsley: Transnational Publishers, 2000.
- Latour, Bruno. *Facing Gaia: Eight Lectures on the New Climatic Regime*. Translated by Catherine Porter. Medford: Polity, 2017.
- Lehtola, Veli-Pekka. *The Sámi People: Traditions in Transitions*. Fairbanks: University of Alaska Press, 2005.
- Leopold, Aldo. *A Sand County Almanac: And Sketched Here and There*. Oxford: Oxford University Press, 2020.
- Lightfoot, Sheryl. *Global Indigenous Politics: A Subtle Revolution*. London: Routledge, 2018.
- Lukács, Georg. *History and Class Consciousness: Studies in Marxist Dialectics*. Translated by Rodney Livingstone. Cambridge: MIT Press, 1971.
- Malm, Andreas, and Alf Hornborg. "The Geology of Mankind? A Critique of the Anthropocene Narrative." *The Anthropocene Review* 1, no. 1 (2016): 62–69.
- Manuel, George, and Michael Posluns. *The Fourth World: An Indian Reality*. Minneapolis: University of Minnesota Press, 2019.
- McGregor, Deborah. "Honouring Our Relations: An Anishnaabe Perspective on Environmental Justice." In *Speaking for Ourselves: Environmental Justice in Canada*, edited by Julian Agyeman, Peter Cole, and Randolph Haluza-Delay, 27–41. Vancouver: University of British Columbia Press, 2009.
- McKinnon, Catriona. "Sleepwalking into Lock-in? Avoiding Wrongs to Future People in the Governance of Solar Radiation Management Research." *Environmental Politics* 28, no. 3 (2019): 441–59.
- . "The Panglossian Politics of the Geoclique." *Critical Review of International Social and Political Philosophy* 23, no. 5 (2020): 584–99.
- McLaren, Duncan. "Recognizing the Injustice in Geoengineering: Negotiating a Path to Restorative Climate Justice through a Political Account of Justice as Recognition." In *Has It Come to This? The Promises and Perils of Geoengineering on the Brink*, edited by J. P. Sapinski, Holly Jean Buck, and Andreas Malm, 82–98. New Brunswick: Rutgers University Press, 2020.
- Minde, Henry, ed. *Indigenous Peoples: Self-Determination, Knowledge and Indigeneity*. Delft: Eburon Academic Publishers, 2008.
- . "The Making of an International Movement of Indigenous Peoples." *Scandinavian Journal of History* 21 (1996): 221–46.
- Möller, Ina. "Winning Hearts and Minds? Explaining the Rise of the Geoengineering Idea." In *Has It Come to This? The Promises and Perils of Geoengineering on the Brink*, edited by J. P. Sapinski, Holly Jean Buck, and Andreas Malm, 21–33. New Brunswick: Rutgers University Press, 2020.
- Momaday, N. Scott. *The Man Made of Words*. New York: St. Martin's Griffin, 1997.
- Morgan, Rhiannon. *Transforming Law and Institution. Indigenous Peoples, the United Nations and Human Rights*. London: Routledge, 2016.
- Morton, Oliver. *The Planet Remade: How Geoengineering Could Change the World*. Princeton Oxford: Princeton University Press, 2017.

- Naess, Arne. *The Ecology of Wisdom: Writings by Arne Naess*. Edited by Alan Drengson and Bill Devall. Berkeley: Counterpoint, 2010.
- Nakashima, D. J., K. Galloway McLean, H. D. Thulstrup, A Ramos Castillo, and J. T. Rubis. *Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation*. Paris: UNESCO and UNU, 2012.
- Nelson, Melissa K., ed. *Original Instructions: Indigenous Teachings for a Sustainable Future*. Rochester: Bear & Company, 2008.
- Neumann, John von. “Can We Survive Technology?” In *John von Neumann: Collected Works*, edited by A.H. Taub, VI:504–19. Oxford: Pergamon Press, 1961.
- Niezen, Ronald. *The Origins of Indigenism: Human Rights and the Politics of Identity*. Berkeley: University of California Press, 2003.
- Office of the United Nations High Commissioner for Human Rights. *Making the Declaration Work. The United Nations Declaration on the Rights of Indigenous Peoples*, 2013.
- Piacentini, Pablo, ed. *Story Earth: Native Voices on the Environment*. San Francisco: Mercury House, 2008.
- Preston, Christopher J., ed. *Climate Justice and Geoengineering: Ethics and Policy in the Atmospheric Anthropocene*. London: Rowman & Littlefield, 2016.
- , ed. *Engineering the Climate: The Ethics of Solar Radiation Management*. Lanham: Lexington Books, 2012.
- Price, T. Douglas. *Ancient Scandinavia: An Archaeological History from the First Humans to the Vikings*. Oxford: Oxford University Press, 2015.
- Pulitano, Elvira, ed. *Indigenous Rights in the Age of the UN Declaration*. Cambridge: Cambridge University Press, 2012.
- Reynolds, Jesse. *The Governance of Solar Geoengineering: Managing Climate Change in the Anthropocene*. Cambridge: Cambridge University Press, 2019.
- Reynolds, Jesse, Peter Irvine, and Andy Parker. “Five Solar Geoengineering Gropes That Have Outstayed Their Welcome.” *Earth’s Future* 4, no. 12 (2016): 562–68.
- Risse, Mathias. *On Global Justice*. Princeton: Princeton University Press, 2012.
- Ross, Anne, Kathleen Pickering Sherman, Jeffrey G. Snodgrass, Henry D. Delcore, and Richard Sherman. *Indigenous Peoples and the Collaborative Stewardship of Nature: Knowledge Binds and Institutional Conflicts*. Walnut Creek: Routledge, 2011.
- Ruddiman, William F. “The Anthropogenic Greenhouse Era Began Thousands of Years Ago.” *Climatic Change*. 61, no. 3 (2003): 261–93.
- Said, Edward W. *Orientalism*. New York: Penguin Books, 2003.
- Sapinski, J. P., Holly Jean Buck, and Andreas Malm, eds. *Has It Come to This? The Promises and Perils of Geoengineering on the Brink*. New Brunswick: Rutgers University Press, 2020.
- Schneider, Linda, and Lili Fuhr. “Defending a Failed Status Quo: The Case Against Geoengineering from a Civil Society Perspective.” In *Has It Come to This? The Promises and Perils of Geoengineering on the Brink*, edited by J. P. Sapinski, Holly Jean Buck, and Andreas Malm, 50–69. New Brunswick: Rutgers University Press, 2020.
- Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press, 1998.
- Smith, Wake. *Pandora’s Toolbox: The Hopes and Hazards of Climate Intervention*. Cambridge: Cambridge University Press, 2022.

- . “The Cost of Stratospheric Aerosol Injection through 2100.” *Environmental Research Letters* 15, no. 11 (2020): 1–15.
- Stephens, J. C., P. Kashwan, D. McLaren, and K. Surprise. “The Risks of Solar Geoengineering Research.” *Science* 372, no. 6547 (2021): 1161.
- Stephens, J. C., and K. Surprise. “The Hidden Injustices of Advancing Solar Geoengineering Research.” *Global Sustainability* 3, no. e2 (2020).  
<https://www.cambridge.org/core/journals/global-sustainability/article/hidden-injustices-of-advancing-solar-geoengineering-research/F61C5DCBCA02E18F66CAC7E45CC76C57>.
- Surprise, Kevin. “Stratospheric Imperialism: Liberalism, (Eco)Modernization, and Ideologies of Solar Geoengineering Research.” *Environment and Planning: Nature and Space* 3, no. 1 (2020): 141–63.
- Thompson, R. *The Rights of Indigenous Peoples in International Law: Selected Essays on Self-Determination*. Saskatoon: University of Saskatchewan, Native Law Center, 1987.
- Topa, Wahinkpe, and Darcia Narvaez. *Restoring the Kinship Worldview: Indigenous Voices Introduce 28 Precepts for Rebalancing Life on Planet Earth*. Berkeley: North Atlantic Books, 2022.
- Versluis, Arthur. *Sacred Earth: The Spiritual Landscape of Native America*. Rochester: Inner Traditions, 1992.
- Viveiros de Castro, Eduardo, and Déborah Danowski. “Humans and Terrans in the Gaia War.” In *A World of Many Worlds*, edited by Marisol de la Cadena and Mario Blaser, 172–203. Durham: Duke University Press, 2018.
- Watt-Cloutier, Sheila. *The Right to Be Cold: One Woman’s Fight to Protect the Arctic and Save the Planet from Climate Change*. Minneapolis: University of Minnesota Press, 2018.
- White, Lynn. “The Historical Roots of Our Ecological Crisis.” *Science* 155 (1967): 1203–7.
- Whyte, Kyle Powys. “How Similar Are Indigenous North American and Leopoldian Environmental Ethics?” In *Revisiting Aldo Leopold’s Land Ethic: Emerging Cultures of Sustainability*, edited by William Forbes, 1–18. Stephen F. Austin University Press, 2018.
- . “Indigeneity in Geoengineering Discourses: Some Considerations.” *Ethics, Policy & Environment* 21, no. 3 (2018): 289–307.
- . “Indigenous Climate Change Studies: Indigenizing Futures, Decolonizing the Anthropocene.” *English Language Notes* 55, no. 1–2 (2017): 153–62.
- . “Indigenous Science (Fiction) for the Anthropocene: Ancestral Dystopias and Fantasies of Climate Change Crises.” *Environment and Planning E: Nature and Space* 1, no. 1–2 (2018): 224–42.
- . “Now This! Indigenous Sovereignty, Political Obliviousness and Governance Models for Solar Radiation Management Research.” *Ethics, Policy & Environment* 15, no. 2 (2012): 172–87.
- . “The Recognition Dimensions of Environmental Justice in Indian Country.” *Environmental Justice* 4, no. 4 (2011): 199–205.
- Wildcat, Daniel. *Red Alert! Saving the Planet with Indigenous Knowledge*. Golden: Fulcrum Publishing, 2009.
- Winner, Langdon. “Rebranding the Anthropocene: A Rectification of Names.” *Techne* 21, no. 2 & 3 (2017): 282–94.



York, Richard. "Geoengineering and Imperialism." In *Has It Come to This? The Promises and Perils of Geoengineering on the Brink*, edited by J. P. Sapinski, Holly Jean Buck, and Andreas Malm, 179–88. New Brunswick: Rutgers University Press, 2020.