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Book Reviews

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Christopher J. Preston, ed.

Climate Justice and Geoengineering: Ethics and Policy in the Atmospheric Anthropocene. Lanham, MD: Rowman and Littlefield, 2016; ISBN 978-1-78348-637-3; $30.00; 234 pp.

The collective-action problem presented by climate change is the primary reason that greenhouse gas emission reductions remain far below optimal. This will continue to be the case, despite recent steps such as the Paris Agreement. Adapting to a changed climate will also be suboptimal because those countries that will need to adapt the most have the least resources to do so. In response, and because the planet is already locked into a certain amount of future warming from past emissions, geoengineering has been proposed as an additional mitigation tool by some. Geoengineering comes in two types. Carbon dioxide removal (CDR) would sequester CO_2. It would be relatively low-risk and high-cost; its cooling impact would not be felt for a long time. Solar radiation management (SRM) would reflect back into space a portion of incoming sunlight, cooling the planet. It would be relatively high-risk, low-cost, and fast-acting. Current modelling and experimental evidence indicates that some geoengineering techniques are technically feasible, economically viable, and could substantially—or even dramatically—reduce climate risks. However, uncertainties remain.

There is now an extensive literature on the ethics of geoengineering. Christopher Preston, who has previously edited a path-breaking volume on the topic,[1] has now produced another, specifically on justice and geoengineering. His introduction to *Climate Justice and Geoengineering: Ethics and Policy in the Atmospheric Anthropocene* offers several important observations. First, 'the thought of intentionally manipulating the whole planet challenges the whole segment of environmental thinking that suggests humans need to be stepping back from their interference with nature' (viii). Fortunately, advocates

1 Christopher J. Preston (ed.), *Engineering the Climate: The Ethics of Solar Radiation Management* (Lanham, MD: Rowman and Littlefield, 2012).

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of geoengineering research recognize its disadvantages. He cites one such researcher, Harvard's David Keith, who is also a contributor to the collection: 'You are repulsed? Good. No one should like it. It is a terrible option' (viii). Geoengineering is evidently not just another emerging technology whose boosters promise that it can easily solve every problem under the sun. Preston further notes that, whereas early scholarship on geoengineering ethics considered geoengineering proposals in isolation, contributors to this 'second generation analysis' (x) attempt to do so in the context of climate change risks and in comparison with emission reductions and adaptation. This shift in emphasis is necessary and overdue.

Yet the majority of the volume's chapters discuss geoengineering ethics without referencing recent evidence regarding its expected climatic impacts. Instead, they assume that geoengineering would harm some people and help others. The authors often also assume that the harms would fall largely on those who are already most vulnerable to climate change and that they might exceed the forecast harms of climate change. These assumptions are not justified by the results of climate models. An optimized amount of SRM currently seems capable of vastly reducing precipitation and temperature anomalies for all regions.[2] Higher magnitudes of SRM cooling might cause net harm to some people and ecosystems, but even this appears to be substantially less than the expected damage from climate change. Based on this, and on the fact that those who contributed the least to climate change are the most at risk from it, there is a prima facie case that geoengineering could bring about 'justice' benefits—contrary to many arguments made in this book. Ethics writings must remain connected to actual evidence in order to be relevant for real-world decision-making.

Despite Preston's call for a comparative approach to geoengineering and other responses to climate change, most of the chapters do this inconsistently. This inconsistency occurs in three dimensions: benefits and costs, probabilities, and assessment standards. First, throughout the book, geoengineering's risks are assumed and foregrounded, overshadowing its apparent ability to reduce climate change. By contrast, most authors portray conventional emission-reduction methods as a universal good. In reality, the scale of cuts necessary to prevent dangerous climate change—that is, achieving net-zero emissions within fifty years—would harm some people and ecosystems. Such emission reductions would be so expensive that they would restrict economic development through, for example, higher energy prices. For the majority of the

2 Ben Kravitz et al., 'A Multi-Model Assessment of Regional Climate Disparities Caused by Solar Geoengineering', 9(7) *Environmental Research Letters* 074013 (2014).

world's population, hindering economic development would perpetuate low levels of food security, housing, healthcare, and general well-being in a way that would be considered unacceptable in rich countries. Furthermore, a dramatic growth in wind, hydropower, solar, nuclear, and other zero- or low-carbon sources would have large environmental impacts.

Second, the volume's contributors often state that the necessary emission reductions are not occurring because of the moral shortcomings of political leaders, as well as a lack of political will more generally. In reality, adequate mitigation is unlikely to occur, precisely because of the collective-action problem affecting it. In contrast, SRM appears to be potentially so effective and to have such low direct deployment costs that its implementation could be in a single country's interests in terms of its incurred costs and its avoided climate change damage.[3] SRM thus turns the free-rider problem of the conventional emission reduction approach 'upside down'.[4] Other countries may—without contributing to the costs—simply enjoy the benefit of the global effects of the implementing country's decision, others may protest, and still others may fall somewhere in-between. Although this may be ethically troubling, it is a politically feasible outcome that would, according to current modelling, result in much lower climate change impacts.

Third, scholars regularly subject geoengineering to a much more stringent assessment than emission reductions. For example, Teea Kortetmäki and Markku Oksanen claim in their chapter that the argument that SRM implementation would be the best option for food security is problematic and ultimately is to be rejected because it 'cannot tackle other environmental problems of food production (such as habitat loss, soil degradation, and water eutrophication), and the need to restrict or change environmentally harmful food activities is likely to remain' (130). Of course, no method of reducing climate risk can address all these problems, yet aggressive emission cuts are never condemned on these grounds. Rejecting an option because it fails to solve all of the mentioned issues amounts to defaulting to a pathway that may well result in greater harm.

This inconsistent treatment of geoengineering compared with emission cuts fails to take seriously the threats to those who are most vulnerable to climate change. Climate ethics cannot offer useful insights when it fails to fully and

3 Ryo Moriyama, Masahiro Sugiyama, Atsushi Kurosawa, Kooiti Masuda, Kazuhiro Tsuzuki, and Yuki Ishimoto, 'The Cost of Stratospheric Climate Engineering Revisited', *Mitigation and Adaptation Strategies for Global Change* (2016), <http://link.springer.com/article/10.1007/s11027-016-9723-y>.

4 David Victor, 'On the Regulation of Geoengineering', 24(2) *Oxford Review of Economic Policy* 322, at 323 (2008).

consistently consider the expected costs, benefits, and probabilities of climate change scenarios and all the responses to it, from the poor as well as the rich.

As I have noted, the collection focuses on justice. This is a rich concept that can mean different things to different people. Yet most contributors do not define what they mean by it. In addition to the common notions of distributive, restorative, and corrective justice, the book's chapters also speak of climate, procedural, intergenerational, social, participatory, recognition, epistemic, social harmony, solidarity, and food justice. A concept that is poorly defined and allowed to envelop so many things loses both meaning and utility.

The book's frequent undue favouring of emission reductions over geoengineering, coupled with an emphasis on the historical responsibility for climate change, implies that even risk-free geoengineering would be ethically problematic because it would allow wrongdoers to go unpunished by not requiring historically high emitters to undertake costly emission cuts and to provide financial resources to historically low emitters. This presumes the validity and applicability of some notion of retributive justice. However, a discussion of retributive justice is notably absent from the collection. Climate ethicists should be openly discussing it, if they wish to rely on it.

The chapters contain a surprising number of straw-man arguments, vague assertions of what something 'implies' or 'obscures', and insinuations and assumptions regarding others' motives. For example, Augustin Fragnière and Stephen Gardiner consider how popular and academic publications often frame SRM as 'Plan B', in the sense that it could be relied on in the event that emission cuts turn out to be insufficient. They posit that SRM ethically fails as Plan B based on their own definition of what a Plan B is—one that is not actually used in the popular and academic publications that they attempt to critique. Furthermore, they repeatedly assert without evidence what the Plan B framing implies, suggests, obscures, or draws attention away from—or how it otherwise misleads. Another example is Duncan McLaren's claim that SRM fits within a 'Promethean discourse', a vague construct that encompasses positions as diverse as the climate denialism of the Heartland Institute and the support for nuclear power by the radical Green commentator George Monbiot.[5] McLaren states that 'the Promethean discourse [is] rooted in part in climate skepticism' (148), and that the statements of SRM research advocates 'are intermingled with those from libertarian, anti-regulation, climate sceptic lobby groups' (151). Such poor argumentation undermines several chapters.

5 A concept developed in John S. Dryzek, *The Politics of the Earth: Environmental Discourses*, 3rd ed. (Oxford: Oxford University Press, 2013), at 52–72.

A strength of the collection is that among its contributors are some scholars from outside the discipline of ethics. Keith's colleague and co-author Joshua Horton is a political scientist; together they make the case for a moral obligation to research SRM. Veteran energy expert Jane Long explores how geoengineering could fit into a portfolio of responses to climate change. Economists Johannes Emmerling, Massimo Tavoni, and Richard Tol discuss how integrated climate-society models help us understand the expected distribution of impacts of climate change and related responses. Because climate change implicates numerous natural and social systems in complex ways, and because policy responses necessitate difficult trade-offs, these diverse informed perspectives strengthen the book.

Until recently, nearly all writing on geoengineering assumed that its development would undermine emission-reductions efforts, with harmful consequences. There are now reasons to think that this might not be the case.[6] It is encouraging to see that none of the book's chapters makes this assumption. Instead, the occasional references to a potential undermining of emission reductions resulting from the pursuit of geoengineering options are accompanied by appropriate qualifying language.

Most of the book's chapters are explicitly or implicitly concerned with SRM, with little or no attention to CDR. This is understandable, as the former raises novel issues whereas the latter in some ways is just a (net) emission-reduction method. This differing emphasis reinforces the growing sense that the two categories of geoengineering have little in common and should be considered separately. Furthermore, the chapters generally consider only large-scale geoengineering implementation, whereas most present decisions concern research. More attention to the ethics of geoengineering research would be beneficial.

Ultimately, *Climate Justice and Geoengineering* represents a solid step forward in both climate ethics and geoengineering discourse, for which Preston deserves credit. Although I have dwelled on some of the chapters' flaws, progress is never linear. Shortcomings often provide the basis for subsequent improvement.

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6 Jesse Reynolds, 'A Critical Examination of the Climate Engineering Moral Hazard and Risk Compensation Concern', 2(2) *The Anthropocene Review* 174 (2014/2015).