

Riding the GeoStorm



Illustration from *The adventures of Uncle Lubin* by Heath Robinson

Is it possible to govern Geoengineering?

When speaking about geoengineering governance, a sensible first question is whether geoengineering, with its inherently high risks, unequal impacts, long term effects and broad geopolitical, military, environmental and global justice implications, is even possible to “govern.”¹

Particularly, the deployment of Solar Radiation Management poses potentially unresolvable governance issues, including potential irreversibility and that its deployment could endanger the food and water sources of billions of people in Asia and Africa in a transboundary manner. But all proposed geoengineering schemes, if deployed at the spatial scale and time scale necessary to influence the climate, will involve grave and unfairly distributed negative impacts.

Geoengineering

...sometimes called climate engineering, refers to a set of proposed techniques and technologies to deliberately intervene in and alter Earth systems on a large scale – particularly to climate system manipulations as a “technofix” for climate change.

Geoengineering may involve interventions on land, oceans, or in the atmosphere. It may include so-called solar radiation management (SRM), as well as other Earth system interventions under the umbrella of greenhouse gas removal (GGR) including carbon dioxide removal (CDR). Most of these are theoretical proposals, and although a few CDR techniques may be closer to the market according to their promoters, the claim that these technologies would be effective at scale for addressing climate change is speculation, based at best on limited computer modeling.

None of the geoengineering techniques on the table aim to address the root causes of climate change. Instead, they are intended to partially counteract some of its symptoms. Underlying drivers of climate change will continue and may be exacerbated by some geoengineering schemes (e.g. land use change). Geoengineering is transboundary in nature, as it aims to intentionally alter Earth systems such as the carbon cycle and the hydrological cycle.

The question of whether it is even possible to govern geoengineering is valid and urgent. However, governance is not only about establishing regulations to legalize and permit the development of a certain technology. Banning the use of a too-risky technology is also an approach to governance, as is the case with the Nuclear Test Ban Treaty² and the UN's adoption of a Treaty to Prohibit Nuclear Weapons, Leading Towards their Total Elimination, in July 2017.³

Nuclear testing had devastating impacts on some regions and indigenous peoples. In the case of geoengineering, we can avoid the same mistake by developing strong, precautionary multi-lateral governance of geoengineering in advance, commensurate with its risks.

“Governing geoengineering” is not just a future governance outcome, but pivots on the process leading up to it. The current debates on geoengineering (and its governance structure) often privilege technocratic worldviews and engineering perspectives, as well as vested interests, both from pro-geoengineering academic researchers (who may in some instances also have economic stakes in the issue), the fossil fuel industry and others with clear economic or geopolitical interest in the proposals. Together, these voices dominate the conversation. Such an unbalanced process leads towards biased, undemocratic governance outcomes.

It also pre-emptively addresses the fundamental question of whether we need geoengineering to confront climate change or whether there are other, much safer alternatives we should affirm, promote, develop and apply political will towards first.

Holy Grail of “negative emissions”

In 2015, the Paris Agreement on climate change agreed to limit the increase of the global temperature to “well below 2 degrees,” including to “pursue efforts to limit the increase to 1.5°C above pre-industrial levels” before the end of this century. But the sum of the nationally determined contributions (NDC) delivered by each country to UNFCCC one year later translated into a global average increase of 2.9-3.4 degrees.⁴ This gap is a grave concern that must be addressed by immediate and real emission cuts, along with a fundamental change of the energy matrix and industrial production and consumption patterns, starting with the few countries that are responsible for more than two thirds of the global GHG emissions.

But instead of advancing these necessary measures, the concept of “negative emissions” – the idea that it is possible to avoid cutting GHG emissions drastically if emissions are offset by different technological (or other) means – has gained traction.

This notion of a technofix for getting to 1.5 degrees paved the way for geoengineering boosters to scale up their discourse and present geoengineering proposals not as a reserve or an emergency plan, but as an “unavoidable” measure to be taken sooner rather than later. They have also used this argument to demand more public and private support for their research and experiments.⁵

The moral dilemma of the technofix route is that since none of the geoengineering techniques aim to address the root causes of climate change, they can be used to divert political will from real solutions. These interventions are only intended to partially counteract some of its symptoms. Underlying drivers of climate change (e.g. growing energy consumption, uncontrolled urbanization and industrialization, deforestation, unsustainable agriculture and land use changes) would continue causing climate chaos, which means deploying geoengineering would create a “captive” market.

A starting point

Although many geoengineering advocates recognize that drastic emissions reductions are needed to confront climate change, and thus rhetorically insist geoengineering should only be a complement to that, their research feeds the illusion to policymakers that high emissions can continue. In that way, political attention on speculative geoengineering options is already deviating resources from the development of the alternatives that could be a real, permanent solution to the climate crisis.

A starting point for a discussion on confronting climate change should be to acknowledge that traditional emission reduction strategies such as energy efficiency, replacing fossil fuels with renewable energies, and retrofitting buildings will not suffice to reach the objectives of the Paris Agreement. Industrial production and consumption patterns have far exceeded safe planetary boundaries. What we need is an honest conversation about radical emission reduction pathways that transcend mainstream economic thinking. We also need sound, socially just and culturally appropriate strategies to repay our land-carbon debt by vastly, yet carefully, restoring natural ecosystems. Developing geoengineering technologies, or rejecting such a trajectory, is a matter of political and social deliberation and choice. It is saying that we would sooner alter our planet than alter our economic system. It is no technical or scientific necessity – it is a defence of a failed status quo.

What we need is an honest conversation about radical emission reduction pathways that transcend mainstream economic thinking.

Geoengineering discussions at the UN

The United Nations has been home to a decade-long discussion on geoengineering based on the precautionary approach and environmental and social concerns, with its center of gravity at the UN Convention on Biological Diversity (CBD). At the CBD, a *de facto* moratorium on ocean fertilization was established in 2008,⁶ and on geoengineering in general in 2010.⁷

More thematically focused, the London Convention/London Protocol to prevent marine pollution adopted a decision in 2013 to prohibit marine geoengineering (except for legitimate scientific research).⁸

The CBD has published two reports on geoengineering that were extensively reviewed by its member governments, including an analysis of the regulatory and legal framework related to the Convention and the possible role of other UN bodies.⁹

Climate manipulation has been a subject of military interests for many decades as a means to control the weather for hostile purposes. The impacts of the hostile use of weather modification by the USA against Vietnam led to the adoption of the UN Environmental Modification Treaty (ENMOD) in 1977 to prevent the manipulation of the environment as a means of warfare.¹⁰

Some geoengineering proponents have intentionally denied the reality of these discussions that have already taken place inside the UN system. They argued instead that geoengineering research and experiments can be self-regulated and voluntarily managed through ethical guidelines, codes of conduct and similar measures.¹¹ Some pragmatically believe that such 'soft governance' approaches are more in line with the way international governance moves forward in the current geopolitical climate, while others are hoping that some kind of self-regulation or soft regulation of the first links of the geoengineering chain would prevent broader international measures, such as a ban.

The political writer Naomi Klein has observed that the tragedy of recent international climate change governance is that the climate change problem emerged to prominence at the height of the so-called Washington Consensus when neoliberal governments did not consider it realistic to make strong decisions, and instead opted for ineffective voluntary and market responses to a problem that required strong multilateral action.¹² It would be a grave mistake to repeat that ideologically-driven error when approaching geoengineering governance.

Self-regulation or partial regulation (thematic, national, regional) of geoengineering experiments and deployment is clearly inappropriate, particularly in the light of the transboundary nature, significant dangers and inherent inequity of impacts that geoengineering proposals imply.

Transboundary nature

Because geoengineering by definition aims to intentionally alter Earth systems such as the atmosphere, the carbon cycle and implicitly the hydrological cycle, it is transboundary in nature. And because we know very little about the functioning of the planetary ecosystem as a whole and its subsystems, including climate, there is a significant likelihood that instead of improving the climate, geoengineering could make things worse in unexpected ways.¹³

Some researchers argue that the governance of CDR proposals should be separate from the governance of SRM because they are technically and spatially different and pose different risks at the place of deployment. But several of the proposed technologies, whether they are considered under the umbrella of CDR/GGR or SRM, share important characteristics that must be considered for their governance. For instance, ocean fertilization, stratospheric aerosol injection and marine cloud brightening all aim to add huge amounts of additional compounds into dynamic and fragile ecosystems.

It is true that some other CDR proposals, if applied, would take place at the national level, and thus could be governed by national laws. But the aim of climate geoengineering, by definition, is to be deployed at a scale that will affect the global climate, whether SRM or CDR. So, it would be extremely dangerous to leave the decision of deployment only to the national level without considering the impacts of additionality and accumulated effects.

The transboundary nature of geoengineering and the unequal distribution of impacts strongly requires that any decision about experimentation and deployment be taken at a multilateral level, with the full participation of those that could be negatively affected and considering many different kinds of impacts simultaneously.

Self-regulation or partial regulation (thematic, national, regional) of geoengineering experiments and deployment is clearly inappropriate, particularly in the light of the transboundary nature, significant dangers and inherent inequity of impacts that geoengineering proposals imply.

Research and governance – the chicken and the egg?

Geoengineering researchers and promoters have often advocated that their research and experiments would be best governed by voluntary guidelines and codes of conduct. Some are more cautious about deployment, while others think that even deployment could be subject just to national norms.

None of those ideas are commensurate with the dangers of geoengineering, its game-changing role in international politics and its inherent transboundary nature. The majority of research on geoengineering is not aimed to be merely theoretical, but instead is designed to develop a technique, or at least create the conditions to develop geoengineering proposals.

Outdoor experiments, including small scale, could create “technological lock-ins,” and “entrenchments,” “whereby social and technological choices are constrained by pre-existing technological commitments, norms or standards,”¹⁴ as happened with other technological developments. This leads to a slippery slope of larger field experiments and ultimately deployment.



A machine to collect lost golf balls by Heath Robinson

The trial of the techniques will lead to their “proof of principle,” useful to fundraise for more experiments, and will end up with geoengineering being available to powerful actors who could use it unilaterally to advance their interests. Even the threat of geoengineering capabilities will have geopolitical ramifications. As Oxford University Physics Professor Raymond Pierrehumbert expresses, “...it’s bad enough that Trump has his hands on the nuclear weapons launch codes. Do we really want to give someone like him the tools to monkey with the world’s climate as well?”¹⁵

“...it’s bad enough that Trump has his hands on the nuclear weapons launch codes. Do we really want to give someone like him the tools to monkey with the world’s climate as well?”¹⁵

~ Professor Raymond Pierrehumbert

Furthermore, geoengineering research is a deviation of resources from the much-needed research on better and just ways to confront climate change. If geoengineering research is carried out at all, it should be limited to open discussions and indoor studies, like comparing computer models to learn more about climatic conditions and the potential impacts of geoengineering. This research would have to be transparent, particularly around funding and commercial conflict of interests. And any closed research must be performed with careful attention to avoid technological lock-in dynamics and not be used politically to shift climate politics.

Is a global consensus possible?

The events of the US election of Donald Trump and his immediate promise to leave the Paris Agreement (which he made true within his first six months in office) is not just a cautionary anecdote about changing conditions. It is pivotal to understanding the conditions for geoengineering governance.

The kind of governance required for geoengineering demands a global consensus to agree on its development and use, in a democratic framework that requires full democratic participation and commitment of all countries and must last for decades and maybe centuries. If that governance were to emerge, the countries of the world would be negotiating over not just the amount of carbon and greenhouse gases in the atmosphere and the reliability of measures to reduce that but also a second variable – the amount of heat in the atmosphere and techniques to lessen that heat.

We have seen the international community repeatedly fail to collaborate to address climate change when there was only one variable to argue over (levels of emissions), so why would we believe that they will now be able to establish the strong and durable consensus required to govern the complexities of geoengineering (which in the case of SRM geoengineering, requires technologically varying incoming sunlight and atmospheric heat in a verifiable manner in addition to managing greenhouse gas levels)?¹⁶

The Paris Agreement, with all its shortcomings, seemed to be a global consensus in the direction that climate change global action should go. But it took only a few months after it came into force for President Trump, as leader of the biggest historical contributor to climate change, to announce this country would withdraw from the agreement.

What would happen if this was the agreement supposed to govern geoengineering and activities were already underway?

Broad societal deliberations must come first

The prospect of controlling global temperatures raises serious questions of power and justice: Who gets to control the Earth's thermostat and adjust the climate for their own interests? Who will make the decision to deploy if such drastic measures are considered technically feasible, and whose interests will be left out?

Because of its inherent conditions and factors, a broad societal deliberation on geoengineering and its governance, including the possibility of going further than a moratorium to establish a ban, is relevant for all of society, and principally for those people and regions that would be adversely affected by geoengineering.

A legitimate discussion on geoengineering governance must be:

- **Based on the precautionary principle**, taking into account and respecting the existing UN decisions related to geoengineering, such as the decisions that call for *de facto* moratoria and ban of marine geoengineering.
- **Not confined to climate-related issues**, as the consequences are more far-reaching than the climate, including weaponization, international equity, intergenerational justice, impacts on other ecosystems, such as biodiversity and oceans, impact on local and national economies dependent on those, indigenous and peasant rights, among others.
- **Informed by a rigorous discussion on ecologically sustainable and socially just alternatives to confront climate change and its causes:** we must build radical emission pathways that transcend mainstream economic thinking, such as the managed premature phase-out of fossil fuels, sustainable agricultural models, and absolute reductions in global resource and energy consumption through circular economy approaches. We must also make space for sound and careful restoration of the world's ecosystems, first and foremost: our rainforests, moors, and oceans. Until this is done, there is no reason to believe that geoengineering is needed and not merely a dangerous deviation of resources from safe, fair, and ecologically sustainable approaches.

- **Participatory, transparent deliberations on the potential impacts of geoengineering and the need for precaution** should be carried at national and regional levels with the full participation of civil society, social movements and Indigenous Peoples. These could feed into international discussions.
- **Multilateral, transparent and accountable deliberations, where all governments can freely participate in a democratic manner**, open to public scrutiny and with the full participation of civil society organizations, Indigenous Peoples and social movements (especially those most directly affected by climate change), and accountable to the UN in its outcomes.
- **All discussions must be free from corporate influence**, including through philanthro-capitalists, so that private interests cannot use their power to determine favourable outcomes or to promote schemes that serve their interests.
- **Have obligatory, public and non-ambiguous conflict of interest policies** that prevent researchers with commercial interests in geoengineering to act as “independent” expertise.
- **Respectful of existing international laws**, including those protecting peace and security, human rights, indigenous rights, biodiversity and national sovereignty, particularly to ensure that any activity undertaken in a country does not cause damage to the environment of other nations, and those prohibiting hostile acts of environmental modification.
 - **Mindful of concomitant crises**, especially hunger, poverty, inequality, loss of biological diversity, ecosystem destruction, atmospheric pollution and ocean acidification.
 - **Cognizant that neither the seriousness of the climate crisis nor a lack of scientific knowledge can be used to justify experimentation**, especially in the view of possible unintended consequences of geoengineering.
- **An agreed global multilateral governance mechanism must strictly precede any kind of outdoor experimentation or deployment.**
- **An agreed global multilateral governance mechanism must strictly precede any kind of outdoor experimentation or deployment.**
- **A ban on geoengineering deployment is a governance option that must be kept open and upheld.**

An agreed global multilateral governance mechanism must strictly precede any kind of outdoor experimentation or deployment.

Endnotes

- 1 For a description of techniques and the potential impact of geoengineering see the website www.geoengineeringmonitor.org/ and ETC Group and Heinrich Böll Foundation, “Smoke and Mirrors: a civil society briefing on geoengineering,” May 2017. Available online at: www.etcgroup.org/content/civil-society-briefing-geoengineering.
- 2 Treaty Banning Nuclear Tests in The Atmosphere, in Outer Space and Under Water (Partial Test Ban Treaty) (PTBT), 1963, Available online at www.nti.org/learn/treaties-and-regimes/treaty-banning-nuclear-test-atmosphere-outer-space-and-under-water-partial-test-ban-treaty-ptbt/ Comprehensive Nuclear Test Ban Treaty, A/50/1027, 1993. Available online at www.un.org/disarmament/wmd/nuclear/ctbt/
- 3 Treaty to prohibit Nuclear Weapons, A/CONF.229/2017/8, 2017. www.un.org/disarmament/ptnw/index.html
- 4 United Nations Environment Program, *The Emissions Gap Report 2016*, A UNEP Synthesis Report, November 2016. Available online at: www.unep.org/emissionsgap/
- 5 See: Joshua B. Horton, David W. Keith, and Matthias Honegger, “Implications of the Paris Agreement for Carbon Dioxide Removal and Solar Geoengineering,” Viewpoints, *Harvard Project on Climate Agreements*, July 2016. Available online at: www.belfercenter.org/sites/default/files/legacy/files/160700_horton-keith-honegger_vp2.pdf
John Shepherd, “What does the Paris Agreement mean for geoengineering?” The Royal Society, *In Verba*, Blogpost, 17 February 2017. Available online at: <http://blogs.royalsociety.org/in-verba/2016/02/17/what-does-the-paris-agreement-mean-for-geoengineering/>
- 6 CBD, COP 9 Decision IX/16 section C, paragraph 4, 2008. Available online at: www.cbd.int/decision/cop/?id=11659
- 7 CBD decision X/33 (w), 2010. Available online at: www.cbd.int/decision/cop/?id=12299
- 8 London Protocol, Resolution LP.4(8), LC 35/15, Annex 4, 2013; pending ratifications to enter into force. Available online at: www.gc.noaa.gov/documents/resolution_lp_48.pdf
- 9 Secretariat of the CBD, “Geoengineering in Relation to The Convention on Biological Diversity: Technical and Regulatory Matters,” CBD Technical Series No. 66, Convention on Biological Diversity, Montreal, September 2012. Available online at: www.cbd.int/doc/publications/cbd-ts-66-en.pdf
See also P. Williamson and R. Bodle, “Update on Climate Geoengineering in Relation to the Convention on Biological Diversity: Potential Impacts and Regulatory Framework.” Technical Series No.84, Secretariat of the Convention on Biological Diversity, Montreal, October 2016. www.cbd.int/doc/publications/cbd-ts-84-en.pdf
- 10 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, 1977. Available online at: www.un-documents.net/enmod.htm
- 11 See for example, Jeff Tollefson, “Asilomar geoengineering conference report released,” *Nature News Blog*, 8 November 2010. Available online at: http://blogs.nature.com/news/2010/11/asilomar_geoengineering_confer.html
- 12 Naomi Klein, *This Changes Everything: Capitalism vs. the Climate*, Simon & Schuster: New York, 2014.
- 13 Raymond T Pierrehumbert, “The trouble with geoengineers hacking the planet,” *Bulletin of the Atomic Scientists*, Analysis, 23 June 2017. Available online at: <http://thebulletin.org/trouble-geoengineers-%E2%80%9CChacking-planet%E2%80%9D10858>
- 14 Paul Oldham *et al*, “Mapping the landscape of climate engineering,” *Philosophical Transactions of the Royal Society*, Vol. 372, 2014, p. 2. Available online at: <http://rsta.royalsocietypublishing.org/content/372/2031/20140065>
- 15 Raymond T Pierrehumbert, “The trouble with geoengineers hacking the planet,” *Bulletin of the Atomic Scientists*, Analysis, 23 June 2017. Available online at: <http://thebulletin.org/trouble-geoengineers-%E2%80%9CChacking-planet%E2%80%9D10858>
- 16 See Steve Gardiner, “Is ‘Arming the Future’ with Geoengineering Really the Lesser Evil? Some Doubts About the Ethics of Intentionally Manipulating the Climate System,” *Climate Ethics: Essential Readings*, Oxford, 2010. Available online at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1357162

More information:

www.boell.de/en

www.etcgroup.org

www.geoengineeringmonitor.org



HEINRICH BÖLL STIFTUNG

www.boell.de/en

etc  monitoring power
tracking technology
strengthening diversity
GROUP www.etcgroup.org