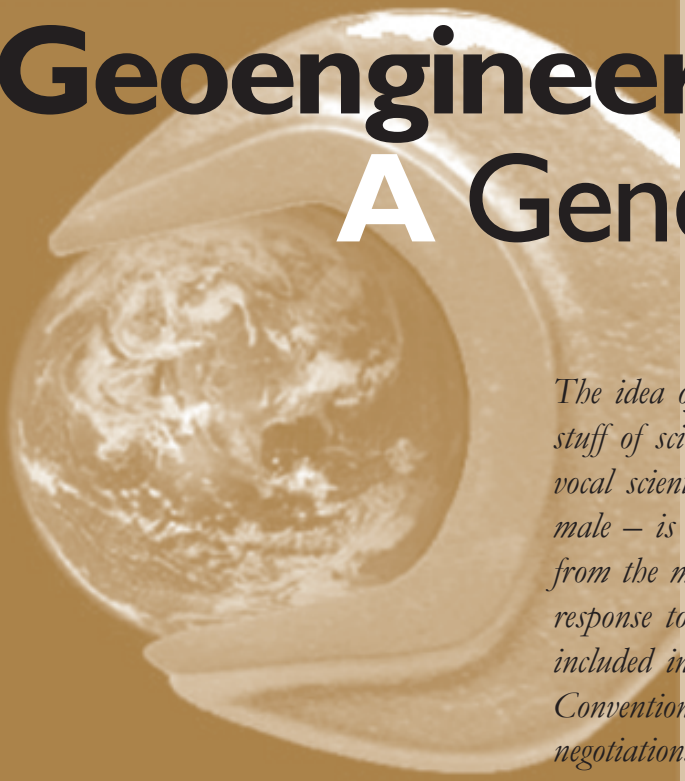
Geoengineering: A Gender Issue?



By Diana Bronson

The idea of re-engineering the planet used to be the stuff of science fiction, but a band of increasingly vocal scientists and other advocates – almost all male – is rapidly moving these controversial ideas from the margins to the mainstream of policy response to climate change. Some want geoengineering included in the United Nations Framework Convention on Climate Change (UNFCCC) negotiations. Others are waiting for Copenhagen negotiations to fail in order to create a political opening for a high-risk Plan B: a climate techno-fix.

Planetary Techno-Fix. *Geoengineering is seriously being considered as a solution to climate change, sending alarm bells to communities especially from the South that demand significant emissions reduction from industrialised countries.*

Photo from Matter Network.

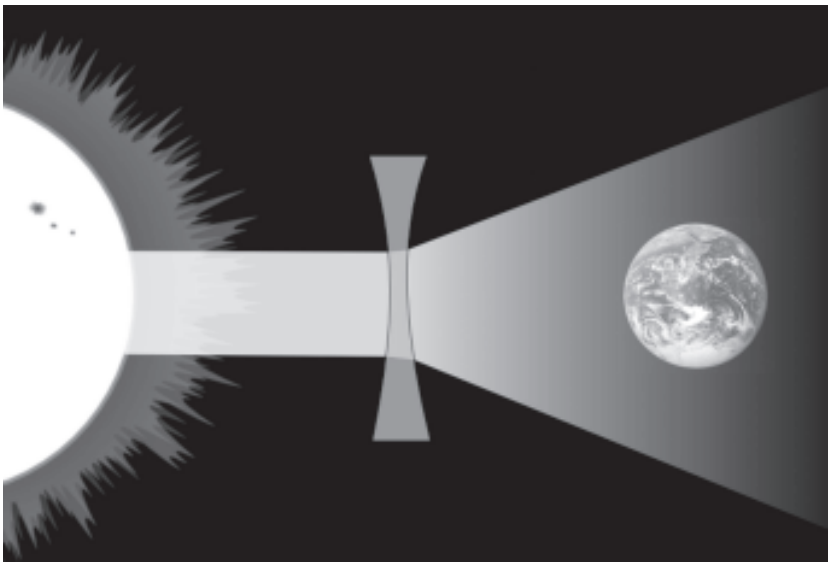
Geoengineering is the intentional, large-scale manipulation of the earth's climate systems by artificially changing oceans, soils and the atmosphere most often as a response to climate change. It is a technological fix on a planetary scale – one that may have devastating environmental, economic and social impacts, particularly in the global South that is already suffering most from the impacts of rapid environmental change and will have least say in how such technologies are deployed.

Engineering is defined in Webster's English Dictionary as "the application of science to the optimum conversion of the resources of nature to the uses of mankind." Since "geo" means the earth, this "optimum conversion" carries great planetary risks. And since all people on the planet do not have a common view of how the resources of nature should be used, "mankind" is a loose and intellectually lazy notion, laden with the false universalism of the patriarchal mind. Geoengineering does not benefit "mankind." At best, it offers an appearance of a short-term remedy for those who caused the climate crisis and who do not want to pay for it. The majority of humankind have nothing to gain at all and potentially, a great deal to lose.

A Dangerous Distraction

Geoengineering is a dangerous and expensive distraction from the urgent work that needs to be done on mitigation and adaptation. These technologies, by virtue of being large-scale, highly centralised with significant commercial and military connections and applications, are bound to deliver inequitable outcomes. The illusion of a climate techno-fix just around the corner serves as an all too convenient excuse for industrialised countries to drag their heels and continue avoiding the urgent changes required to reverse the climate's trajectory.

It is hard not to notice that an overwhelming majority of people discussing geoengineering are men. Whether it is the meetings that are



Sun Shade. *One technological proposal of cooling the earth is to set up a giant sun shade, possibly through free flying spacecrafts with mirrors that can filter sun's rays that are directed to the earth.*

Illustration from Wikimedia Commons

organised, the reports that are written, the traffic on the listserves, the academic papers that are published or the media coverage, women are practically absent from the discussion. If engineering is a male-dominated field – and it is – then engineering on a planetary scale is even more so.

While statistics have not yet been compiled on gender and geoengineering, it is enlightening to look at the two most recent influential reports this year by the United Kingdom's Royal Society and Bjorn Lomborg's Copenhagen Consensus Center.[1] Women only account for 16 per cent in these reports' panels.

Other influential reports offer no means to break down the gender of the authors as they are published on an institutional basis. And some score far worse than the two studies above: One that merits specific mention is published by Novim, a new California-based think tank that claims to do science "without advocacy or agenda." It looked at all the "technical" issues involved in the research, development and deployment of shooting sulphate aerosols into the stratosphere.[2] It had a working group and a board composed uniquely of men. The study failed to acknowledge that the social position of the ten men who authored the report in some way, coloured their perceptions, methodologies or recommendations – despite the fact that the working group convenor, Steven Koonin, is current United States Under-Secretary of State for Energy.

There are three broad categories of geoengineering technologies currently in research and development in Northern academic, public and private settings. They are solar radiation management or reflecting sunlight back to space, carbon dioxide removal and sequestration, and intentional weather modification.

Managing the Sun

Solar Radiation Management (SRM) covers a series of technologies that aim to increase the albedo or reflectivity of the earth by reflecting more sunlight back to outer space and thereby cooling the planet without changing in any way the composition of greenhouse gases in the atmosphere. In other words, SRM technologies address the symptom of global warming without addressing the cause, which is the increased concentration of greenhouse gases.

SRM comes in the forms of spraying aerosol sulphates in the atmosphere, cloud whitening, space sun shades and albedo enhancement.

- **Aerosol sulphates in the stratosphere** Pumping aerosol sulphates into the stratosphere to block sunlight, thereby lowering the earth's thermostat.
- **Cloud whitening** Spraying seawater through unmanned ships to make clouds "whiter" by increasing the condensation nuclei in clouds, thereby reflecting more of the sun's rays back to space.
- **Space sunshades** Trillions of small free-flying spacecrafts launched a million miles above the earth or space mirrors, made from a reflective mesh of aluminum threads and placed between the earth and sun.
- **Albedo enhancement** Increasing the reflectiveness of the Earth's surface by planting whiter or shinier crops, painting roofs and roads, or covering desert regions with white material.

SRM has the potential to cause significant environmental damage, including releasing additional greenhouse gases into the atmosphere, changing weather patterns and reducing rainfall,

damaging the ozone layer, altering the colour of our skies, diminishing biodiversity, making solar power less effective, allowing ocean acidification to proceed unhindered, and provoking sudden climatic jumps if stopped. Among the most critical questions in deploying SRM: Who will control the earth's thermostat? Who will make the decision to deploy when such drastic measures are considered technically feasible?

Burying the Carbon

Carbon Dioxide Removal and Sequestration technologies remove carbon dioxide from the atmosphere and attempt to store it somewhere other than the atmosphere where it provokes warming. While the removal part of the equation is no longer so scientifically challenging, the question of the safe storage of carbon dioxide remains high risk, hugely expensive and uncertain in terms of duration. Carbon dioxide removal can be done through ocean fertilisation, ocean upwelling or downwelling enhancement, genetic engineering of algae, carbon-sucking machines or synthetic trees and biochar.

- **Ocean fertilisation** Stimulating the growth of phytoplankton with iron or nitrogen in order to promote carbon sequestration deep at sea. There have already been more than a dozen experiments and 191 states at the Convention on Biological Diversity adopted a *de facto* moratorium on the practice in May 2008. The London Convention is about to adopt rules on what constitutes "legitimate" scientific research.
- **Ocean upwelling or downwelling enhancement** Using giant pipes to bring up nitrogen or phosphorous enriched waters (relative to carbon) to the surface to cool surface waters and enhance ocean sequestration of carbon dioxide, promoted notably by the company Atmocean.
- **Genetic engineering of algae** Genetically engineered algae, covering urban buildings, open ponds, or the surface of the ocean would be used to capture carbon dioxide. This solution is advanced by UK engineers.[3]
- **Carbon-sucking machines or synthetic trees** Extracting carbon dioxide from the air by using liquid sodium hydroxide (or another "proprietary sorbent material"[4]), which is converted to sodium carbonate, then extracting the solid carbon dioxide to be buried.
- **Biochar** Burning huge quantities of biomass through pyrolysis (low oxygen) and burying the concentrated carbon in soil, a proposal backed by the corporate-driven International Biochar Initiative.

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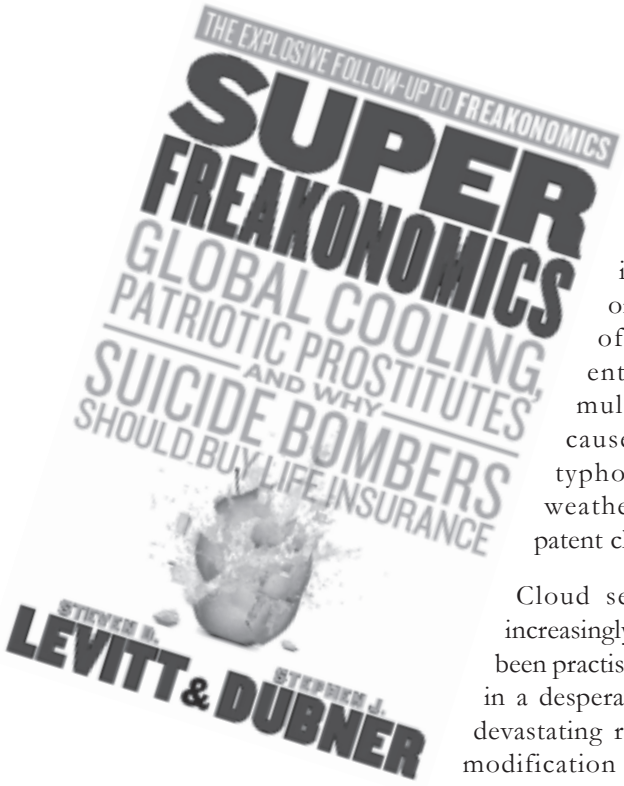
When used at a large scale, these technologies can cause destruction or intentional modification of complex ecosystems and are therefore likely to cause unpredictable side effects. The duration and the safety of sequestration in land or sea, whether through biological or mechanical means, are mostly unknown. Many of these techniques require unsustainable inputs and land and ocean use.

Controlling the weather

Technologies that alter weather patterns have been used by the military for some time. The most common of these is cloud seeding in order to induce rain and disable enemy troop movement. Cloud seeding has also been used for agriculture. However, this technology has delivered unpredictable results and has never been systematically successful.



On a Freaky Future. *Recently released,* Superfreakonomics *by authors Steven Levitt and Stephen J. Dubner, promotes geoengineering, claiming that such large-scale human-made solutions must respond to climate change, that is caused by humans on an industrial scale. The book has been heavily criticised because of being "error-riddled." As Paul Krugman wrote, "The first five pages, by themselves, are enough to discredit the whole thing. Why? Because they grossly misrepresent other peoples' research, in both climate science and economics."*

Sources: Paul Krugman (17 October 2009), "Super freakonomics on Climate, Part 1," URL: http://krugman.blogs.nytimes.com/2009/10/17/superfreakonomics-on-climate-part-1/ . See also the blogs on Climateprogress.org on this subject.

Another technology is used in suppressing or redirecting the path of a hurricane. It entails control over multiple factors that cause hurricanes, typhoons and extreme weather events. Several patent claims are pending.

Cloud seeding for rain is increasingly widespread and has been practised in many countries in a desperate attempt to avoid devastating results. But weather modification technologies have unpredictable and potentially devastating global and regional impacts, particularly on soil alkalinity and ocean ecosystems. Weather modification has also been advanced as an adaptation technology for climate change particularly in protecting waterflow for hydropower schemes.[5]

The Language of Geoengineering

Perhaps the best illustration of the gender bias of geoengineering is the language that is used to talk about it. There are "hard" and "soft" technologies. The notion of controlling or dominating the earth's climate systems is prominent, whereas notions like integrity and respect for existing ecosystems receive scant mention. Sometimes the vocabulary used is more explicitly gendered and filled with sexual imagery.

Take for example the much-discussed chapter on geoengineering in the recently published *Superfreakonomics*: "What distinguishes a big ass volcano is not just how much ejaculate it has, but where the ejaculate goes" explain the authors as they articulate not only how shooting sulphates in the stratosphere resembles volcanoes but also how volcanoes are seen to resemble a certain male sexual experience.

This notion of controlling the earth, that is traditionally perceived as female, is deeply rooted in the Western philosophical tradition as many feminist authors have pointed out over the past thirty years. It is filled with the arrogance and hubris. Sometimes, listening to geoengineers get excited about the potential climate leveraging geoengineering offers, one is reminded of small boys playing with new toys. Yet this does not change the fact that the potential consequences of these much bigger toys are much more devastating.

Fatal Flaws and Frameworks

Despite its already questionable proposals, geoengineering is seriously being considered in the current climate talks, giving communities especially in the South much more reasons to be alarmed. Today there is no multilateral body specifically mandated to take on the governance and regulation of emerging technologies like geoengineering. Thus it is not clear who will determine the kind and conditions of technique that will be deployed.

Should geoengineering become a part of climate change adaption and mitigation programmes, geoengineers who have the technical and economic means to fiddle with the global thermostat take the lead. In the absence of a multilateral debate, these people will even define what constitutes a "climate emergency."[6]

Recent governance proposals, including a "voluntary code of practice,"[7] rather than a binding and globally agreed upon set of rules, make a mockery of any notion of accountability. In the absence of a global consensus, support for geoengineering technologies would be irresponsible, reinforcing the lack of accountability of industrialised countries for climate change and worsening negative consequences on the global South.

Geoengineering thus constitutes a perfect excuse

Taming even the Ocean. *The seas are also eyed by geoengineering proponents. The latter say that by stimulating the growth of phytoplankton with iron or nitrogen, the seas can eventually sequester carbon.*

Photo by Eurimco Zimbres from Wikimedia Commons.

for industrialised countries. It offers governments an option to evade historical responsibility rather than reducing emissions. Geoengineering research is often seen as a way to "buy time."[8] The Organisation for Economic Cooperation and Development (OECD) governments and powerful corporations who have denied or ignored climate change for decades and are responsible for 90 per cent of historic emissions– are the ones with the budgets and the technology to execute this gamble with the earth. There is no reason to trust they will have the interests of more vulnerable states or peoples in mind.

Moreover, geoengineering puts the earth at great peril, with impacts that are unknown and even irreversible. Even without the climate talks, its deployment is likely to violate national sovereignties, regional security and international treaties.

Since a geoengineering project is done at a massive scale, it obliterates any possibility of effective local, national or regional climate policies. It is likely to provoke unpredictable disruptions to the climate system such as precipitation disturbances and even drought in Asia and Africa that could be caused by some SRM techniques.

Many geoengineering techniques also have latent military purposes and their deployment would violate the UN Environmental Modification Treaty, that prohibits the hostile use of environmental modification.

Similarly, it commercialises climate. As competition is already stiff in the patent offices between those who think they have a planetary fix for the climate crisis. But should "Plan B" ever actually be designed, the prospect of it being privately held is terrifying.

The Way Forward

Given the very flawed framework of geoengineering particularly in the context of climate change, demanding equal access to this male-dominated field will hardly deliver the kind of results feminists would like to see in th future of our only planet. However, it is essential to expose how the patriarchal nature of geoengineering and its inclusion in the mainstream policy discussions.

As geoengineering enters the discussions in national legislative processes and the UNFCCC and as more public and private money flows into this field, it is vital that women's voices be heard and that women work to elaborate a feminist critique and response to this development. ■

Diana Bronson *is a programme manager of ETC Group and lives in Montreal, Canada. She has a background in journalism and human rights.*

Endnotes

1 *Found respectively at URL: http://royalsociety.org/news.asp?id=8734 and URL: http://fixtheclimate.com/*

2 *See Novim (2007), "Climate Engineering Responses to Climate Emergencies" at URL: http://novim.org/attachments/037_Novim%20Report%20Final%2007.28.09.pdf*

3 *See Institute of Mechanical Engineers (UK) (August 2009), "Geo-Engineering: Giving us the Time to Act" at URL: http://www.imeche.org/*

4 *Ibid.*

5 *See for example plans by Pacific Gas and Electric Company (California) to use cloud seeding in the Pit and McCloud Watersheds to offset snow pack loss from climate change – Christina Aanestad (nd), "Seeding Clouds for Hydropower" Climate Watch" over KQED Radio, URL: http://blogs.kqed.org/climatewatch/2009/09/05/seeding-clouds-for-hydropower/*

6 *Opcit. See Novim.*

7 *UK Royal Society (2009), "Geoengineering the Climate: Science, Governance and Uncertainty." URL: http://royalsociety.org/geoengineeringclimate/*

8 *Opcit. See Institute of Mechanical Engineers (UK)*