EDITORIAL

How to govern geoengineering?

The Paris Agreement aims to limit the global temperature rise to 1.5° to 2°C above preindustrial temperature, but achieving this goal requires much higher levels of mitigation than currently planned. This challenge has focused greater attention on climate geoengineering approaches, which intentionally alter Earth's climate system, as part of an overall response starting with radical mitigation. Yet it remains unclear how to govern research on, and potential deployment of, geoengineering technologies.

There are two main types of geoengineering: carbon dioxide removal (CDR) from the atmosphere and solar radiation management (SRM) to cool the planet. Geoengineering does not obviate the need for radical reductions in greenhouse gas (GHG) emissions to zero, combined with adaptation to inevitable climate impacts. However, some scientists say that geoengineering could delay or reduce the overshoot. In so doing, we may expose the world to other serious risks, known and unknown.

"Geoengineering has planet-wide consequences..."

Since 2009, the U.K. Royal Society, the European Union, and the U.S. National Academy of Sciences have recognized the need for governance and for a strategic approach to climate geoengineering policies. However, national governments and intergovernmental actors have thus far largely ignored their recommendations.

There are exceptions. Decisions of the Convention on Biological Diversity have created normative frameworks for considering the use of geoengineering. Amendments to the London Convention/London Protocol have addressed marine geoengineering in a risk management framework. These approaches can be built on and linked to other relevant intergovernmental processes. However, there is no comprehensive international framework for governing these emerging technologies.

CDR would need to be implemented at very large scales to have the desired effect. Land requirements could be immense, affecting global food prices and food security. Environmental impacts would include loss of biodiversity, pesticide pollution, and disturbing the oceans' ecological balance. The greatest near-term risk, however, may be the unilateral deployment of SRM by one country, a small group of countries, or a wealthy individual. The real or perceived impacts of deployment could further destabilize a world already going through rapid change. Effective global governance frameworks could reduce this risk.

SRM research is in its infancy, but the real challenges pertain to ethics and governance. For example, should there be a strategic research program, coupled with global agreement to prohibit deployment unless and until certain risks and governance questions are adequately addressed? Applying SRM without reducing GHG emissions and concentrations would condemn future generations to continuing SRM for centuries. Impacts would include a slower hydrological cycle, effects on the ozone layer, and changing monsoon patterns. Regional impacts are likely to be stronger the more radiation is being reflected. The world's most vulnerable people would likely be most affected. Ocean acidification would continue.

How would the world's governments determine if the potential global benefit of geoengineering is worth the risks to certain regions? How should transborder and transgenerational issues be addressed? How would governance frameworks withstand geopolitical changes over decades or more of deployment? How might such technologies be developed and deployed without undermining political will to cut emissions?

The world is heading to an increasingly risky future and is unprepared to address the institutional and governance challenges posed by these technologies. Geoengineering has planet-wide consequences and must therefore be discussed by national governments within intergovernmental institutions, including the United Nations. The research community has been addressing many of these issues, but the global policy community and the public largely have not. It is time to do so.

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