

# The World Needs a Ministry of Climate Modification

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At the start of Kim Stanley Robinson's recent novel, *The Ministry for the Future*, a huge heat wave kills millions of people in India. In response, the Indian Air Force launches a massive operation to spray reflective particles in the upper atmosphere and thereby cool the planet.

What is being described is a kind of technology called geoengineering, a term that refers to technological approaches to managing the climate. The two main types of geoengineering currently being studied are carbon geoengineering, which speeds up CO<sub>2</sub> removal from the atmosphere, and solar geoengineering, which seeks to increase the amount of sunlight reflected back into space. The scenario Robinson describes is a commonly studied type of solar geoengineering. (Another possibility is launching a sunshade into space to block out a small fraction of the sunlight hitting the Earth.)

Both the technology and the trigger for its use are realistic. What is unrealistic in Robinson's scenario is the response of other nations, which all seem to shrug and accept India's actions. Solar geoengineering is almost guaranteed to have both benefits and costs, winners and losers. Reduced sunlight may diminish agricultural productivity. Regional climates could also change. A worst-case scenario would be a geoengineering tug of war, with different nations acting to change the climate in different ways to benefit themselves.

The other eye-opening feature of Robinson's scenario is that India carries out the operation independently. It's intuitive to think of geoengineering as something that could only be done by global agreement. However, this technology allows a single nation, a consortium, or even a wealthy non-state actor to directly affect the whole planet. A future Elon Musk – or, for that matter, the current one – could do it.

How do we govern this kind of technology? In 2009, academics at the Oxford Geoengineering Programme outlined five criteria, known as the Oxford Principles, for geoengineering governance. Among other things, geoengineering should be regulated as a public good, with public participation in decision-making, and "robust governance structures" that should exist before anything is deployed. The Principles say that geoengineering should be done with the informed consent of those affected, but there is no real way for the people of the world to give such consent.

Although some international law experts have explored ways to cobble together a geoengineering governance system out of existing treaties, the fundamental problem is that international law is neither democratic nor enforceable. While we vote for people to represent us at the local, state and national levels, there is no comparable representation at the global level. Instead, the executive branches of national governments appoint ambassadors to represent them at the larger global level. The connection of ordinary citizens to such ambassadors could hardly be more tenuous.

What's worse is that international law is fundamentally different from what we normally call law in that it lacks enforcement. As the withdrawal of the United States from the Paris Accords demonstrates, treaties are voluntary agreements. The UN General Assembly passes resolutions that may express world opinion (although only national governments, not people, are represented there) but are totally unenforceable. The International Court of Justice, commonly known as the World Court, only has jurisdiction if both parties agree to it, and even then, judgments are not binding. The UN Security Council is able to enforce its decisions, but only with the blunt tools of trade sanctions and military force – and even these must ultimately be provided by member states. (It also suffers from a serious democratic deficit, with the five permanent and veto-holding members being the winners of a war that ended 75 years ago.) Furthermore, none of these bodies have power over anything other than governments. If a seasteading billionaire, a well-meaning environmental organization, or a transnational corporation threatened by a warming climate decides to take unilateral action, existing global institutions are powerless.

Of course, geoengineering is not just a concern but a potentially lifesaving technology that could buy the world time to change its economy first to carbon-neutral and then to carbon-negative, actively removing excess CO<sub>2</sub> from the atmosphere. If solar geoengineering is deployed this way, it must be managed for the greatest overall benefit and maintained for extended periods; otherwise, a sudden stop would result in much more rapid warming than would occur otherwise.

It is clear that to deliberate upon and, if necessary, deploy geoengineering technology, we need a global democratic body capable of creating and enforcing laws that are binding on individuals and corporations, not just nations. It should consist of both scientific experts and elected representatives – environmental decisions depend on science but are ultimately determined by human values. Following Robinson's lead, we might call it the Ministry of Climate Modification.

Many questions would have to be answered before the Ministry could start operations. How would decisions be made? How would representatives be chosen? If enforcement is necessary, how would it be carried out? Where would money come from? (A carbon tax is one possibility; a small tax on currency speculation is another.) It would be a big and complex decision – but so is anything related to geoengineering and climate more generally.

Once the Ministry exists, we could decide to give it the power to do more than govern geoengineering. It could address the causes of climate change itself and assist adaptation. For example, it could oversee a global carbon market and supply funds to move vulnerable coastal residents and infrastructure to higher elevations.

The Ministry of Climate Modification proposed here does not have the breadth of the fictional Ministry for the Future, although it may have a bit more power. But it could play a similar role in promoting the common interests of humanity and the biosphere. It would provide a new tool to enable the whole of humanity to make decisions about the fate of humanity – in a legitimate, enforceable, and democratic manner.

