Geo-Engineering

Why in news?

For the third year in a row, 2016 set a record for the highest global average surface temperatures. The global mean surface temperature is now 1.1 degrees celsius above pre-industrial levels.

What are the impacts of CO2?

- Carbon dioxide in the atmosphere — above 400 parts per million and it will stay there for a long time.
- The impacts are likely to be severe. Like rising sea levels; heat and water stress affecting health, mortality, agricultural yields and industrial output; and billions of dollars of damage to infrastructure.

Can geo-engineering be the solution?

- Geo-Engineering is defined as the deliberate large-scale intervention in earth’s climate system, to limit adverse global warming.
- Solar geo-engineering was mentioned in the first report on climate change to President Lyndon Johnson in 1965, and was discussed in reports of the US National Research Council (NRC) in 1977, 1983 and 1992.
- The case rests on two arguments: To limit climate risks, net emissions must fall to zero; and cutting emissions does not eliminate risks because of gases already in the atmosphere.
One category of technologies, i.e., carbon dioxide removal to reduce atmospheric concentrations includes bio-energy with carbon capture and storage, direct air capture, and ocean fertilisation (adding nutrients to stimulate marine food production to absorb CO2).

The other category is solar radiation management, or solar geoengineering, to reflect sunlight and reduce the amount of infrared radiation getting trapped by greenhouse gases.

Proposed technologies include brightening marine clouds, and deploying space mirrors. But the most discussed is injecting the stratosphere with reflective sulphate aerosols.

What are the forums for international governance?

In 2010, the Convention on Biological Diversity imposed an unenforceable moratorium on geo-engineering experiments. No other international rules exist. But several forums could be relevant.

Applicable to all geo-engineering methods: UNFCCC; the dormant UN Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques.

To specific methods: Montreal Protocol; MARPOL 73/78; UN Outer Space Treaties.

To specific substances: Convention on Long Range Transboundary Air Pollution; International Maritime Organization.


In 2017, the Carnegie Climate Geo-engineering Governance Initiative was launched, to initiate dialogue and develop governance frameworks.

What should India do?
First, the Department of Science and Technology should assess ongoing research in India and elsewhere, and identify uncertainties relevant for India (impact on monsoons, for instance).

Second, Indian universities and think-tanks should collaborate to develop governance templates (for laboratory research, field experiments, and large-scale deployment) and test their applicability and legitimacy.

Third, India should call for all national geo-engineering research programmes to voluntarily report to an international forum.

Fourth, it could consider joining an international research programme, taking account of research capacities, funding mechanisms, liability rules, and intellectual property.

What is the way ahead?

Scientific research, transparency, public engagement, and the application of the precautionary principle must go hand-in-hand.

An inclusive approach to understanding ethical, legal, moral, political, and technological concerns is needed. India must add its voice to the conversation.

Source: Business Standard