



Governing Solar Geoengineering and Carbon Removal

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Permanent Representatives

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21 June 2011 | Lima, Peru

CEEW Lecture

International Cooperation and the Governance of Geoengineering

Keynote Lecture to the Expert Meeting on Geoengineering, Intergovernmental Panel on Climate Change

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Business Standard

Time for geoengineering governance?

By Arunabha Ghosh

INFLEXION POINTS
ARUNABHA GHOSH

The possibility of a geoengineering intervention to avert the worst effects of climate change is being discussed in earnest. The idea is to inject sulphate aerosols into the stratosphere to reflect some of the sun's radiation away from the Earth. This would be a 'stopgap' measure to buy time for more permanent solutions to be developed.


March 2011 | Chicheley, United Kingdom

CEEW Working Paper 2011/1


Does Geoengineering Need a Global Response - and of What Kind?

Working Paper of The Solar Radiation Management Governance Initiative

JASON BLACKSTOCK AND ARUNABHA GHOSH



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COMMENT



Developing countries must lead on solar geoengineering research

The nations that are most vulnerable to climate change must drive discussions of modelling, ethics and governance, argue A. Atiq Rahman and colleagues.

Working Paper
25 February, 2014
www.geoengineeringourclimate.com

Geoengineering
Our Climate?

Ethics, Politics and
Governance

Climatic Change
DOI 10.1007/s10584-017-1994-0

ESSAY

Environmental Institutions, International Research Programmes, and Lessons for Geoengineering Research

The Asia-Pacific's role in the emerging solar geoengineering debate

Arunabha Ghosh, Masahiro Sugiyama¹, Shinichiro Asayama², Atsushi Ishii³, Takanobu Kosugi⁴, John C. Moore^{5,6}, Jolene Lin⁷, Penehuro F. Lefate⁸, Wil Burns⁹, Masatomu Fujiwara¹⁰, Arunabha Ghosh¹¹, Joshua Horton¹², Atsushi Kurosawa¹³, Andy Parker¹⁴, Michael Thompson¹⁵, Pak-Hang Wong¹⁶, Lili Xia¹⁷



Four major governance concerns

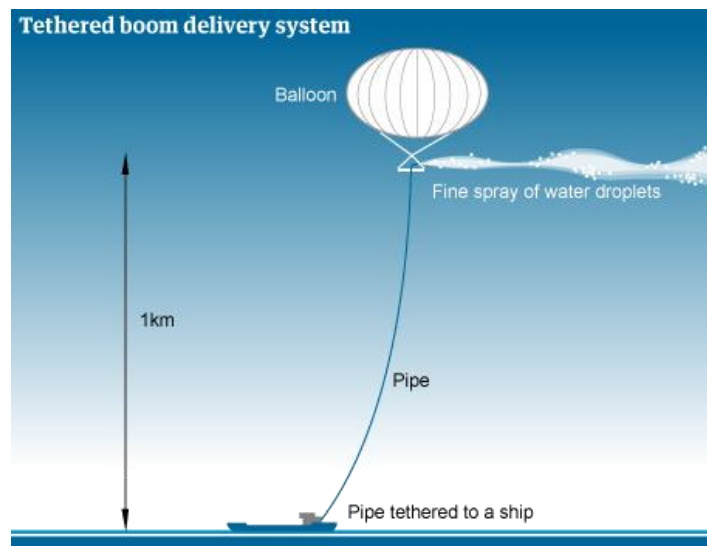
- Why govern?
- What should be governed?
- Who should govern?
- How should we govern?

Why govern?

- **Material concerns centre on risks**
 - Loss of biodiversity
 - Rainfall and hydrological cycle (Bala et al., 2008; Brovkin, 2009)
 - Tropical forests (Eliseev, 2010)
 - Ozone (Royal Society, 2009; Heckendorn et al., 2009)
 - Oceans' ecological balance (Scott, 2005; Lampitt, 2008; Trick et al., 2010)
 - Termination effect (Robock, 2008; Leinen, 2011)
 - Risk of unilateral action (Victor 2008; ETC, 2010; Keohane and Victor 2011; Lloyd and Oppenheimer, 2011)
 - Socio-political concerns (Morgan, Nordhaus, Gottlieb 2013)
 - Technological race
- **Ethical concerns centre on intentions**
 - Opposition to interference with nature
 - No or little action on climate mitigation (Caldeira and Wood, 2008; Keith et al., 2010)
 - Ascertain the intent behind research into geoengineering technologies (Fleming, 2007; Barrett, 2008)
 - Demand a say over actions that have transborder impacts (ETC, 2009; Banerjee, 2011; NGOs letter, 2011)
 - Intergenerational equity (Burns, 2011; Weiss, 1992; UNFCCC Art. 3(1))

What should be governed? Thresholds of research...

- Laboratory studies/computer modelling
 - Climate observations and inter-comparison modelling
- Small-scale field experiments
 - Experiments with aerosols
 - Cloud brightening
- Medium- to large-scale field experiments
 - Designing delivery mechanisms
 - How much sea-water spraying? How much SO₂ injection?
- Deployment
- Which governance functions?
 - Coordination
 - Monitoring
 - Dispute resolution



Who should govern?

- Scenario 1: Privately funded research
- Scenario 2: Small number of countries collaborate on field experiments
- Scenario 3: Research groups in several countries collaborate
- Scenario 4: Large economy unilaterally acts
- Scenario 5: Small island state/ coalition of vulnerable countries permit the use of territory

Is national governance enough?



At least four governance routes

Ad hoc principles and codes of conduct

- Flexibility, speed, stakeholder-led

VS

- Who decides, conflict of interest, lack of public control, future options constrained

Adapting existing treaties

- Speed, flexibility, legitimacy

VS

- Overburdened agendas, lack of expertise, complicated process, enforcement

National

- Sovereignty, speed, enforcement

VS

- No international monitoring or dispute resolution, legal uncertainties

Creating new treaties and/or organisations

- Fill regulatory gaps, functional division, soft law

VS

- Time lag, regime complex and incoherence across institutions

International governance via which forums?

- Potentially applicable to **all geoengineering methods**
 - ENMOD; UNFCCC
 - CBD: no climate-related geo-engineering activities that may affect biodiversity take place, until there is an adequate scientific basis (COP10); no single geoengineering approach that currently meets basic criteria for effectiveness, safety and affordability... (COP11)
- Potentially applicable to **specific methods**
 - London Convention/ London Protocol (ocean fertilisation); Montreal Protocol (aerosols); MARPOL (marine cloud brightening); Outer Space Treaty (solar arrays)
- Potentially applicable to **activities** within or impacting upon specific method
 - UNCLOS
- Potentially applicable to **specific substances**
 - Sulphates: IMO, CLRTAP, Montreal Protocol; Space Mirrors: Outer Space Treaty
- Potentially applicable over **geographical or spatial** limitations
 - CLRTAP limited to Europe/N. America; IMO (LC/LP); Outer Space Treaty
- Which functions to assign to these institutions?

Transparency concerns at each stage of research development

- Transparency is a common principle
 - Royal Society, 2009; Oxford Principles, 2010; National Academy of Sciences, 2015
- Transparency about research idea and methodology
 - Blackstock et al 2016
- Transparency about research outputs and impact assessment
 - Morgan et al 2013
- Transparency about outdoor experimentation
 - Parker 2015; Bodle et al 2014
- Transparency about funding of research
 - Gans and Murray 2012

Who do we consult, how do we consult, and for how long?

- **Public information:** one-way flow of information from proponent to participants
- **Public consultation:** one-way flow of information from participants to proponent
- **Public participation:** bi-directional flow of information for maximum information exchange
 - Secondary impacts as well (human health, biosphere processes, etc.)
- Who gets a voice: all citizens or “virtuous and capable leaders”?

What if they said no?

Who are the stakeholders? And whose feedback counts?

	Scientists	Investors	Social Scientists	Negotiators/Advisers	Governments/Legislatures	International organisations	People/ Civil society
Scientists	Peer review	Return on investment	Governance for research necessary	Governance for research necessary	Publicly funded research needs oversight	Unilateral CE research vs. international partnerships	With prior informed consent
Investors	Avoid private CE experiments	For-profit vs. philanthropy	External oversight necessary	Who owns the IP?	Who owns the IP?	Who owns the IP?	No
Social scientists	Too much governance studies	Too much governance studies	Peer review	You might be legitimising CGE research	Have you consulted everyone	Have you consulted everyone	You might be legitimising CGE research
Negotiators/Advisers	Consider all tech options	Consider all tech options	Do no harm	Preserve maximum flexibility	Preserve maximum flexibility	Do no harm	Keep some options off the table
Governments/Legislatures	Respect scientific freedom	Don't over regulate	External oversight necessary	Need to constrain others	Unilateral action unwarranted	Unilateral action unwarranted	Regulate
International organisations	Don't impose moratorium	Don't impose moratorium	Appropriate levels of regulation	Need to constrain others	Appropriate levels of regulation	No clear regulatory regime	Impose moratorium
People/ Civil society	Respect scientific freedom	Investment does not need consent	Different positions on CGE research	Views are respected but not final	Democratic process to be respected	Democratic process to be respected	Different positions on CGE research

How do we design international research programmes?

- **Research capacity**

- Localised research
- ITER/CERN: Sourcing inputs from developing countries for larger research infrastructure
- Mapping out institutions in poorer countries to include them in research collaborations
- Research on ethical, legal, social and political issues

- **Flexible funding**

- In-kind support: staff, material inputs, institutional resources
- CGIAR Fund, 2009: to balance donors and researchers

- **Responsibility & liability**

- Explicit clauses when research creates international institutions e.g. CERN
- Flexible options : European initiative for Implementing Geological Disposal of Radioactive Waste Technology Platform

- **Intellectual property & access to data**

- HGP; Bermuda Principles: data released within 24 hours
- CERN: tighter rules but “open science” model; dissemination takes precedence over revenues
- ITER: royalty-free access to other members

- **Cooperation & institutional design**

- Voluntary or formal agreement
- Scope, thresholds and rules
- Transparency: codes of conduct; self-report; independent review

Progressively inclusive approach to CGE governance?

- Research and governance must go hand in hand
 - Demand for more participative public-private research will increase
 - Designing an international research programme will also need governance: capacity; funding; responsibility & liability; IP & access to data; institutional design
- Stakeholders are not just interested academic researchers
 - Stakeholder engagement is long, hard and inconclusive
 - Need to find the right forums
- Progressive governance anticipates *and* responds
 - National-level scientific assessments
 - National stakeholder consultations to understand perceptions
 - National policymaking and legislation
 - Voluntary reporting to international forums or networks
 - Role of UN Environment?
 - Public-private governance and independent peer review and oversight
 - Role of UN Environment?
 - Multilateral intergovernmental registry, reporting and accountability
 - Role of UN Environment?

Thank you

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