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Governing Solar Geoengineering and Carbon Removal

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Briefing to United Nations Environment Committee of Permanent Representatives

United Nations, Nairobi

22 May 2018

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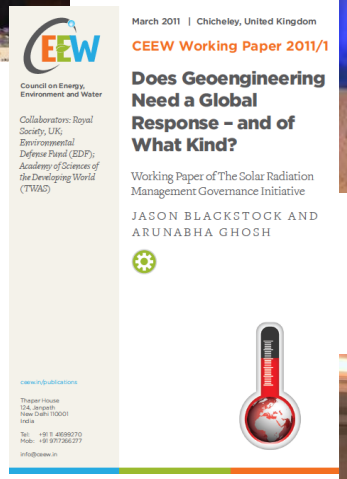
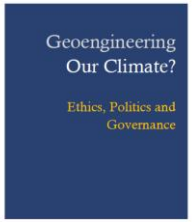
CEEW research & engagement on climate engineering governance





Working Paper
25 February, 2014
www.geoengineeringourclimate.com

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

Arunabha Ghosh

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

ESSAY

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

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Four major governance concerns

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

Why govern?

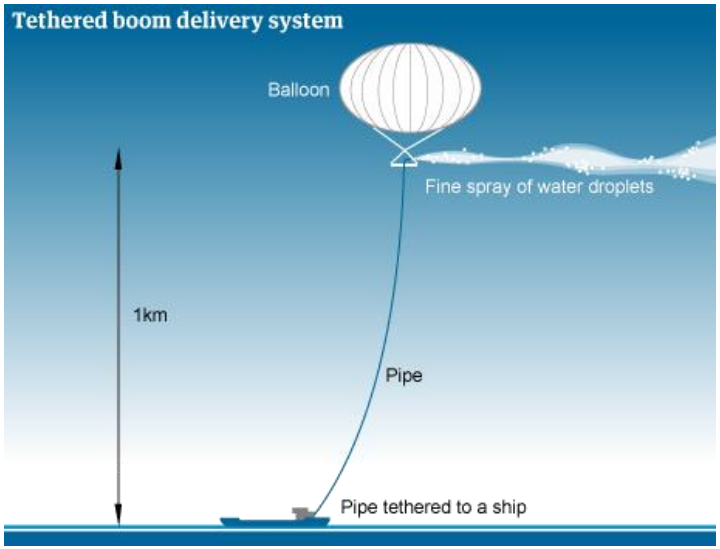
- Material concerns centre on **risks**
  - Loss of biodiversity
  - Rainfall and hydrological cycle (Bala et al., 2008; Brovkin, 2009)
  - Tropical forests (Eliseev, 2010)
  - Ozone (Royal Society, 2009; Heckendorn et al., 2009)
  - Oceans' ecological balance (Scott, 2005; Lampitt, 2008; Trick et al., 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))

SOURCE: Ghosh (2011); Ghosh (2014)

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



SOURCE: Morgan and Ricke (2010); Burger and Gundlach (2016)

IMAGE: Guardian (2011)

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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?

SOURCE: Ghosh (2011); Nature (2012); Ghosh (2014)

PHOTO: HSRC

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

National

- Sovereignty, speed, enforcement

VS

- No international monitoring or dispute resolution, legal uncertainties

Adapting existing treaties

- Speed, flexibility, legitimacy

VS

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

Creating new treaties and/or organisations

- Fill regulatory gaps, functional division, soft law

VS

- Time lag, regime complex and incoherence across institutions

SOURCE: Ghosh and Blackstock (2011)

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?

SOURCE: Blackstock and Ghosh (2011)

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

SOURCE: CEEW (2014); Chowdhury and Ghosh (2013); Sugiyama, Asayama, Ishii, Ghosh et al (2017)

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?

SOURCE: CEEW (2014); Chowdhury and Ghosh (2013); Wong (2015); Sugiyama, Asayama, Ishii, Ghosh et al (2017); Parson (2017) ; Stilgoe, Owen, Macnaghten (2014)

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?

SOURCE: Ghosh (2014)

Thank you

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