



GESAMP

Joint Group of Experts on the
Scientific Aspects of Marine
Environmental Protection

GESAMP 46/4/9
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Agenda item 4

**PLANNING OF GESAMP ACTIVITIES:
MARINE GEOENGINEERING**

**Report of GESAMP Working Group 41 workshop on societal issues of marine
geoengineering techniques**

Date: 26 to 27 March 2019

Venue: IMO, London

Participants:

Chris Vivian	Co-Chair of GESAMP Working Group 41 (WG 41)
Emily Cox	Cardiff University
Robert Bellamy	University of Manchester
Catherine Redgwell	University of Oxford
Timo Goelsch	Kiel University
Miranda Boettcher	IASS Potsdam
Andrew Birchenough	IMO Technical Secretary of GESAMP WG 41
Chrysanthe Kolia	GESAMP Administrative Coordinator

Participation by Skype:

Philip Boyd	Co-Chair of GESAMP WG 41 - University of Tasmania
Jeffrey McGee	University of Tasmania
Mike Elliott	University of Hull
Peter Kershaw	Chair of GESAMP

1 Overall objectives for the workshop:

1. to develop an appreciation where the social sciences stand in terms of being able to contribute substantively to the work of the GESAMP WG and where the knowledge gaps are.
2. to think about a modus that allows the WG to benefit from the social science work.

The agenda for the meeting is provided in the annexed.

2 Brief introduction to GESAMP

2.1 Peter Kershaw gave a presentation on GESAMP, its purpose, how it functions and current work. In the context of the Group's work he said that the report on geoengineering can feed into the United Nations Environment Assembly (UNEA) process. In addition, geoengineering is an issue in the broader Climate Change context and thus of high relevance to several UN agencies, not the least the two WG41 sponsoring agencies IMO and IOC, It is also relevant in the context of the UN Decade for Ocean Science for Sustainable Development to deliver on the societal outcomes.

3 Brief introduction to GESAMP WG 41 report

3.1 Chris Vivian (Co-Chair of WG41) presented the main findings of the report on Marine Geoengineering which identified 27 geoengineering approaches with varied information available for each. Information and evidence are essential in order to assess potential long-term benefits and risk. These are currently inadequate to permit robust scientific assessment as well as evidence-based decision-making. The report presents recommendations for the future work of the group to a) provide a streamlined, robust framework for scientific assessment for effective and transparent review; and b) to provide a holistic assessment that includes social, political, economic, ecological, ethical and other societal dimensions.

3.2 A general discussion followed about the report and the way forward for GESAMP WG 41. It was suggested to approach funders e.g. Research Councils or Universities, who may have already had to consider the wider implications of geoengineering proposals (e.g. RCUK and the German Research Foundation), to ask how they considered the wider societal issues. It was also suggested looking at the experience of the Solar Radiation Management Governance Initiative (SRMGI) whose mission is to build the capacity of developing countries and emerging economies to evaluate SRM and to bring new voices to the discussion of research governance. In a discussion about governance, it was suggested that governance consisted of politics, administration and legislation. The PESTLE analysis framework was mentioned which is used as a tool to analyze Political, Economic, Sociological, Technological, Legal and Environmental issues.

3.3 The importance of domestic governance in implementing international regulation e.g. the example of Canada and the experiment off the west coast in 2012 was mentioned. It was suggested that it would be useful to find out why the OFAF (Ocean Fertilization Assessment Framework – London Convention/London Protocol) had not been used in the West coast of Canada experiment in 2012, the South Korean proposal or the proposed experiments off Chile and Peru.

3.4 WOA II (2nd World Ocean Assessment - currently underway with a proposed early 2020 release date) was mentioned as a good reference for examples of approaches to marine management in order to follow the sequence of a success story. A step by step approach can also allow information gathering.

3.5 It was agreed that a pre-assessment framework as suggested in the GESAMP WG 41 report would be useful but that a clearinghouse mechanism to record marine geoengineering proposals and on-going research would also potentially be useful.

3.6 Attention was drawn to how different organizations use alternative entry points to marine geoengineering to try to get around legislation e.g. the proposals for ocean nourishment to increase fish stocks off Chile and Peru. This indicated the need for dialogue with proponents of such activities.

4 Ethics

4.1 We had been unable to find an expert on ethics available to attend the workshop therefore it was agreed to approach some experts after the meeting to request input. The participants did, however, have a short discussion on the issue.

4.2 Issues that were raised included:

- .1 discounting i.e. spending the money of our children and grandchildren. Is this ethically defensible?
- .2 Moral corruption i.e. future generations assuming the burden of climate action, including the responsibility of maintaining/ceasing any geoengineering systems

- .2 regarding people as part of their natural environment or as alien species?
- .3 are changes happening outside one's control? Where does one lay the blame?
- .4 mitigation deterrence by considering geoengineering;
- .5 the link between ethics and International Law;
- .6 the link between ethics and International Law;
- .7 the risks and benefits of geoengineering activities across generations but also between north and south;
- .8 Areas beyond national jurisdiction;
- .9 the knowledge of indigenous populations should be considered (reference: Kate Gannon on ocean fertilization and indigenous communities); and
10. should we be looking at informed or tacit consent? Early participation can assist in making decision-making processes more democratic and more ethical.

4.3 The question of what ethical issues GESAMP WG 41 should take into account and to what extent was raised. It was agreed that it was not an abstract issue and that the ethical assumptions related to marine geoengineering proposals needed to be teased out probably using a framework that would map out the issues. Reference was also made to the Oxford Principles and that it was important to include the preamble to the principles as it set out the societal context.

5 International marine law

5.1 Catherine Redgwell presented 'Some reflections on international governance of marine geoengineering'. Points made included:

- .1 regarding UNCLOS;
 - .1 there is no discussion of geoengineering or climate change,
 - .2 climate change and UNCLOS are in silos from policy makers perspectives;
 - .3 there is a lack of a definition of marine scientific research in UNCLOS, therefore it could be defined in relevant marine conventions e.g. London Protocol, OSPAR, Baltic, Mediterranean and Caribbean and also taken up by the UN agencies participating in the UNCLOS forums;
 - .4 there is no robust regulatory assessment framework in the provisions in UNCLOS; and
 - .5 wider obligations under UNCLOS are also of importance.
- .2 the decision on the storage of CO₂ in geological formations beneath the seabed and that on marine geoengineering have enlarged the LC/LP remit;
- .3 within and beyond LC/LP a wider question is raised regarding compatibility of regulation of marine research with its freedom under UNCLOS;
- .4 a voluntary research governance framework as an effective mechanism towards deployment has been recommended which raises issues of trust, control and transparency.
- .5 The preamble to the Oxford Principles carefully set up underlying assumptions and are important to underline in the report; and

5.2 In the subsequent discussion, additional points made were on the definition of Governance, should there be adherence to legally mandatory requirements or consider softer law approaches? The potential of collaborating with another existing international body on marine geoengineering was also raised. In the case of ocean iron fertilization, it was highlighted that it had progressed from laboratory work to field studies work over the last twenty years. By breaking down different components (i.e. testing, modelling) these can then be mapped on the Law of the Sea. Governance for research can be linked with Governance for deployment. This can take the form of a discreet deployment study which can help decide where we go next (see: Ocean Fertilization trajectory).

6 Public policy and science and technology studies/technology assessment

6.1 Robert Bellamy presented 'Marine Geoengineering: 'Slippery slope' or 'uphill struggle'. Points made included:

- .1 framing of marine geoengineering proposals is important as context and methods condition outcomes. This can lead to closing down decisions and options and premature lock in;
- .2 how governance needs to be based on understanding on possible trajectories;
- .3 the need to incentivize marine geoengineering responsibly through policy instruments; and
- .4 'opening up' marine geoengineering assessment by using multi-criteria mapping.

7 Environmental economics

7.1 Timo Goelsch made a presentation on the contribution of environmental economics to assessing marine geoengineering and the knowledge gaps. He said that environmental economics had 3 things to offer:

- .1 an assessment framework - cost benefit analysis;
- .2 an explanatory framework – incentives and strategies determination; and
- .3 design principles for institutions that can change incentives and structures.

7.2 Other participants voiced their concern that by focusing on cost benefit analysis then it is assumed that everything can be monetized, therefore other aspects can be ignored. Also, a cost-benefit analysis should take place within a broader framework of valuing things.

8 Public perception of technologies

8.1 Emily Cox presentation focused on 'Public perceptions of marine geoengineering' and highlighted points from the research conducted at Cardiff University and elsewhere including:

- .1 people really do not like the idea of putting anything in the ocean. This is part of the dislike of the idea 'messing with nature'. It also relates to distrust over ability of scientists to predict and control and their motives. Thus, geoengineering currently has negative connotations to the public;
- .2 people have an emotional connection to the ocean which is seen as restorative, fragile and pristine;
- .3 people are in favour of research in general but are skeptical about research being possible in an open environment like the Ocean;

- .4 people are skeptical about interventions in nature viewing them as 'a sticking plaster on a broken leg' and prefer protection of areas;
- .5 novel geoengineering methods are seen as too long-term while negative emissions technologies don't deal with the root cause;
- .6 climate change impacts on peoples' lives right now and therefore seen as an urgent/immediate problem;
- .7 CO₂ is seen as toxic and dirty, probably by analogy with air pollution by carbon monoxide and particulates;
- .8 possible exceptions from the general view of the techniques in the GESAMP report may be microalgae, fisheries enhancement and subsea mineralization; and
- .9 no differences were found between populations living at the coast and those inland.

8.2 Emily pointed out some cautionary issues, stating that there is currently little existing research on marine geoengineering and that has mainly been done in Europe and North America focusing on ocean protection/impacts, expert stakeholders and economic analysis. The previous work carried on OIF has also been undertaken alongside SRM methods. The conclusion was that care needs to be taken with any survey responses!

8.3 Framing, a way of structuring or presenting a problem or an issue, was highlighted as a key issue that the WG needs to pay attention to. What is framed as the key benefit? Geoengineering techniques might be perceived differently if people perceive them as a climate change action.

8.4 There was discussion on upstream engagement i.e. engagement with the public at the earliest opportunity. The public is often good at identifying broader risks and it was pointed out that members of the public often filter and understand ideas through their own beliefs and values. Early public engagement was seen as highly desirable but is time consuming and resource intensive, therefore it may be more practical to focus on the most promising techniques. However, it was highlighted that if a project or issue fails to understand or address the public concerns then it can often be doomed to failure, fracking and genetically modified (GM) food were given as examples.

8.5 It was also highlighted that the term "geoengineering" was often viewed by the public with negative connotations. Also, the term "marine geoengineering" homogenises and diverse range of technologies therefore the GSAMP WG may want to consider referring to specific techniques in future rather than the general term.

9 Security and international relations

9.1 No experts were in attendance to comment on these issues at the workshop but we intended to approach some experts after the meeting to request some input. However, it was agreed the WG will approach some experts to get some brief ideas on these issues (e.g. Paul Nightingale and Olaf Corry). Also, may be worth approaching Chatham House and looking into Climate Change Security in the US that toyed with marine geoengineering.

10 A marine systems analysis approach

10.1 Mike Elliott gave a presentation on an "integrated marine management systems analysis approach" and why we need it for the marine environment. All tools, mechanisms, decisions can be brought together by creating a system analysis framework. This framework can then be used on marine geoengineering. This exercise will help us get out of our silos.

10.2 Mike outlined possible mapping approaches of the system to represent system elements and connections. The systems analysis approach was developed integrating social sciences with ecological risk assessment and management methods. It was underpinned by the DAPSI(W)R(M) (pronounced dap-see-worm) framework sub-system. The DAPSI(W)R(M) framework was developed in order to understand the complexity of the marine environment system, with the understanding that if managed sustainably, the marine environment will deliver a range of ecosystem services.

10.3 Mike also highlighted the 10 tenets for societal marine management responses, stating that to be successful, management measures or responses to changes resulting from human activities should be:

- .1 Ecologically sustainable
- .2 Technologically feasible
- .3 Economically viable
- .4 Socially desirable/tolerable
- .5 Legally permissible
- .6 Administratively achievable
- .7 Politically expedient
- .8 Ethically defensible (morally correct)
- .9 Culturally inclusive
- .10 Effectively communicable

10.4 The presented framework was seen as a complex systems analysis and there was a general consensus that systems approach framework would be useful to guide further work of the GESAMP WG. It allows for diverse opinions to be weighed in different ways and to be transparent and reflective of reality. What do we see in this system – constraints or objectives/goals? It was suggested that the WG 41 could use scenario development and real case studies e.g. ocean iron fertilization, to test such the framework.

11 Actions

11.1 Following discussion, the following actions were agreed:

- .1 Email specialists on ethics, security and international relations for comments on marine geoengineering (CV). Potential contacts include:
 - .1 marine ethics - Caroline Kennedy at Warwick University – Piracy in the High Seas. Nathalie Klein, Australia;
 - .2 climate security – Elizabeth Chilecki, Olaf Corry, Paul Nightingale;
 - .3 international relations – Judith Kreuter, Darmstadt; and
 - .4 John Moore, Beijing University.

- .2 Chilean forum formed in response to proposed fisheries enhancement projects may have some useful expertise to tap into, particularly public perceptions issues, Andy to provide relevant contacts;
- .3 Collate and distribute all the presentations and papers identified (Chrysanthe Kolia); and
- .4 Draft workshop notes to be compiled and circulated for comment (all).

12 GESAMP WG 41 Co-Chairs Thoughts Following the Workshop

12.1 Throughout the presentations there were calls by speakers, representing a wide range of disciplines, to move away from use of the term 'geoengineering' towards that of 'climate intervention'. This is consistent with other groups such as C2G2 which have dropped this term. We advocate considering transitioning the name of the working group towards that of "climate intervention – potential marine options" while recognising that the term "marine geoengineering" is used by the London Protocol in a legal agreement. However, it would be wise to consult with the UN agencies involved in GESAMP about this proposal to ensure the implications of such a change are fully assessed before any implementation.

12.2 Based on the in-depth discussions, it appeared that all the disciplines that we had planned to cover in the workshop were relevant to the consideration of marine geoengineering. It will be challenging to be so inclusive in a revamped working group, as we will have to maintain a core of natural scientists, but there are some experts who can cover more than one discipline. Another option is to consider having corresponding members who do not attend meetings. A further issue that was raised was the likelihood of having difficulties in getting the geographical coverage we desire across the working group, given the highly specialised nature of some of these disciplines. This was an issue for us in setting up the initial WG membership in 2016 and is likely to be further exacerbated in our transition to a mix of the natural sciences, technology and the humanities. Hence it is likely that we will again be faced with a narrow geographical range from which to select new members. As in 2016, this was raised as a significant problem.

12.3 The importance of framing the topics is very important as context and methods can affect outcomes. This issue was raised by almost every speaker regardless of their discipline."

12.4 There was a general consensus that the GESAMP WG should integrate natural sciences and societal disciplines into a holistic assessment of marine geoengineering techniques and that a systems approach framework as presented by Mike Elliott would be useful means to do this.

ANNEX

**Workshop of the GESAMP Working Group on Marine Geoengineering (WG 41)
26-27 March 2019
at the International Maritime Organization,
4 Albert Embankment, London SE1 7SR**

Overall objectives for the meeting:

1. To develop an appreciation where the social sciences stand in terms of being able to contribute substantively to the work of the GESAMP WG and where the knowledge gaps are.
2. To think about a modus that allows the WG to benefit from the social science work.

AGENDA

1. Welcome from IMO including administrative issues, safety issues etc. – *Andy Birchenough, IMO*
2. Introductions - *all*
3. Brief introduction to GESAMP – *Peter Kershaw, Chairman of GESAMP*
4. Brief introduction to GESAMP WG 41 report – *Chris Vivian, Co-chair of WG 41*
5. Initial thoughts from attendees on the current thinking on relevant insights from their fields of expertise for the marine context (If attendees could prepare 2 or 3 slides to each for these sub-items that would be helpful):
 - a. Ethics - TBC
 - b. International marine law - *Catherine Redgwell, University of Oxford*
 - c. Public policy - *Rob Bellamy, University of Manchester*
 - d. Science & Technology Studies/Technology Assessment - *Rob Bellamy, University of Manchester*
 - e. Environmental economics - *Timo Goeschl, Heidelberg University*
 - f. Public perception of technologies - *Emily Cox, Cardiff University*
 - g. Security - TBC
 - h. International relations - TBC
6. Experience with integrating social sciences in EU scientific projects – *Mike Elliott, University of Hull*
7. General Discussion - *all*
8. Identification of key issues for WG 41 to address in future work – *all*