

# The Geoengineering Quarterly

20 March 2010

Welcome to the first edition of *The Geoengineering Quarterly*. The purpose of this newsletter is to present to policymakers and the general public a broad range of opinions relating to geoengineering. Please feel free to pass it on to anyone who you think may find it of interest.

The focus of this first edition is on the governance of geoengineering. Earlier this week the UK's House of Commons Science and Technology Select Committee published their report on the Regulation of Geoengineering setting out key principles by which they believe the field should be regulated. Next week in Asilomar, California a gathering of people with an interest in the field will also discuss how they believe geoengineering should be regulated. This newsletter presents five different perspectives from leading experts in the field:

- Pablo Suarez and Maarten van Aalst both from the Red Cross/Red Crescent Climate Centre, and Jason Blackstock from the Centre for International Governance Innovation argue for a framework of ethics, responsibilities and standards that places the protection of human subjects at its core
- David Santillo and Paul Johnson, from Greenpeace, call for a governance system that is “mandatory, international and ultimately global in scope”
- Steve Rayner, Professor of Science and Civilisation at the University of Oxford and one of the authors of the Royal Society's report on geoengineering, outlines the Geoengineering Paradox – that the readiness of a technology to deploy seems to be inversely related to its social acceptability
- Diana Bronson, from ETC Group, questions whether geoengineering research is desirable in the first place and draws attention to the lack of diversity in involvement in the debate about geoengineering regulation
- Chris Vivian, Chairman of the Scientific Groups of the London Convention and Protocol, describes the involvement of that organisation in starting to regulate ocean fertilisation

It is hoped that this newsletter will add to the richness of the debate about how geoengineering should be regulated.

I would like to thank all the contributors who have so kindly written articles for this newsletter and would encourage others to submit articles for subsequent editions, which will focus on other aspects of this field. As the name suggests, this newsletter will be published four times per year and on an ongoing basis - whatever your views about geoengineering, interest in and debate about this subject will continue for as long as we are unable to reduce greenhouse gas emissions to a level that is compatible with a stable climate.

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# Towards a people-centered framework for geoengineering governance: a humanitarian perspective

*Pablo Suarez<sup>1</sup>, Jason Blackstock<sup>2</sup> and Maarten van Aalst<sup>3</sup>*

Altering the Earth's climate, whether inadvertent or deliberate, is an experiment in which every person on our planet, present and future, is a test subject. Methods for intentionally modifying our climate system to moderate greenhouse gas climate change — geoengineering methods — are now gaining traction among an expanding crowd who fear the impacts of our continuing global carbon emissions experiment could soon be disastrous for many of these subjects. Even now, humanitarian organizations are struggling to meet the increasing needs of subsistence farmers, fishing communities, shantytowns and other highly vulnerable populations who are beginning to feel the impacts of climate change. Yet to date, there are no mechanisms in place to support the necessary growth of investments in community-based adaptation, i.e. climate risk management to address adverse impacts at the local level.

Given our dangerously slow global progress on mitigation, an inclination to consider geoengineering as a potential recourse for limiting future human suffering is understandable — perhaps even necessary in order to be prepared for a 'runaway', catastrophic scenario of rapid climate change if mitigation efforts continue to prove insufficient. But before theoretic consideration gives way to deliberate geoengineering experimentation with our global climate, and by extension with every person on Earth, it is imperative that a framework of ethics, responsibilities and standards be developed to govern such experiments. We argue that such a framework must place the protection of human subjects — particularly those populations most vulnerable to climate alterations of any kind — at its core. In other words: a people-centered approach for geoengineering governance.

From the humanitarian perspective, the prospect of a collective failure to mitigate greenhouse gas emissions followed by the need to design and implement a 'techno-fix' (such as solar radiation management through stratospheric aerosol injection or cloud brightening) is deeply disturbing. Such geoengineering methods raise at least two questions:

- 1. Who will pay for assistance to vulnerable, climate-affected populations in a geoengineered future?**
- 2. How will the most vulnerable populations — often already marginalized within international climate dialogues — be given voice in deciding if, when and how geoengineering experiments will be conducted?**

Unlike most of the discussion to date, which has focused on watts per square meter, parts per

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This article expresses the personal thoughts and opinions of the authors, and not necessarily those of the institutions with which they are affiliated. Some of the ideas presented in this paper benefited from conversations with Arame Tall, Janot Mendler de Suarez and participants in the geoengineering side events held at COP15 in Copenhagen.

million, energy intensity per dollar of GDP, etc... these two questions clearly bring into focus the human dimensions — the human lives— that will be most impacted by geoengineering experiments.

To address the first question, an analogy worth considering is that of the recently developed principle of a *Responsibility to Protect* (R2P).<sup>4</sup> The underlying premise of R2P is that if any country is unable (or unwilling) to protect its citizens from severe threats to their physical wellbeing, then the international community has a responsibility to intervene and provide, as best as possible, that protection for the population. This humanitarian concept has emerged and is now slowly being codified as an international norm with a specific focus on the prevention of genocide.

Of course, codifying and operationalizing a principle similar to R2P in the context of environmental and climatic threats would present enormous challenges. Even in the context of genocide, where the failure of a country to protect its own citizens from harm is immediately self-evident, there has yet been little progress from statements of normative principles to practicable standards and policies to guide interventions that provide true protection for vulnerable populations. And in the case of climate change, all but the most severe climatic threats to human wellbeing are far less immediate and defined than for genocide; vulnerability to nearly all climatic threats are deeply entangled with the level of economic wealth and infrastructural development supporting the population. Nonetheless, extending some of the guiding principles of R2P to the governance of geoengineering experimentation might help address at least some of the above issues.

The most important of these principles is the focus on the international community having a responsibility to protect vulnerable populations, and in particular those populations whose ability to protect themselves is constrained. This can be interpreted in two distinct ways.

On the one hand, it can focus attention on the reality that many of the most vulnerable populations are those with the least physical or political leverage to mitigate the carbon emissions driving climate change, and who equally have the lowest adaptive capacity to deal with the impacts of climate change. In this context, if geoengineering techniques *might* provide a means for avoiding some of the worst climate-induced suffering of these populations — which would otherwise have no protection — does the international community have a ‘responsibility’ to explore and develop them?

On the other hand, it can also highlight the fact that these same vulnerable populations — those close to the margin of tolerance for climate variability and change, with the least capacity to adapt — are also likely to be those most detrimentally impacted by any negative side effects of geoengineering experiments. This raises questions about the responsibility—even liability—of those involved in formulating and carrying out geoengineering experiments, and emphasizes the problematic ethical implications of any geoengineering intervention that would widen the existing “climate divide” between rich and poor countries and peoples. Who will pay for the consequences of an experiment gone wrong? This question is severely complicated by the fact that natural climate variability will make any definitive attribution of cause-and-effect between the climate intervention testing and a particular impact next to impossible.

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<sup>4</sup> See *United Nations Security Council Resolution 1674*.

Both these interpretations lead into the second question identified above: when it comes to decision-making regarding geoengineering experimentation, what should/will be the role of poorer countries, and in particular of the most vulnerable people? In medical field, before trying an experimental intervention, doctors need to secure informed consent from the patient. In the climate field, can a few resourceful and presumably informed individuals intervene in our planet's atmosphere without first securing the consent from those most likely to suffer if things don't go as expected? What would it take to secure informed consent from the roughly seven billion subjects before they participate in clinical trials of a geoengineering intervention? The difficulties are clear, particularly when those most threatened by the experimental intervention are likely to be illiterate and not always adequately represented in governance structures from local to global scales. The very analogy to R2P highlights the problematic reality that the populations most at risk have next to no leverage within the current international climate debate.<sup>5</sup>

These two questions, while extremely difficult to practically answer, have the singular critical advantage of focusing the discussion of emerging geoengineering options squarely where it belongs: on the human consequences of both climate change and potential climate intervention technologies. With the impacts of climate change already beginning to deteriorate the wellbeing of vulnerable populations around the world, keeping this focus squarely on the humanitarian questions is critically important — and, of course, emphasizes that our first and foremost objective of climate policy must be the global reduction of man-made contributions<sup>6</sup> to greenhouse gases in our planet's atmosphere.

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## **Governance of geoengineering research cannot be left to voluntary codes of conduct**

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To most people, geoengineering remains an unknown or, at most, an obscure and abstract concept. Even among those who have some understanding of what is being proposed, it is often considered alongside science fiction, an engineer's dream of fine tuning planetary systems to work to our advantage and heal the damage of our worst excesses. And yet, the technical and policy discussions around geoengineering are growing in number and visibility. Concomitantly, however theoretical the benefits that they appear to offer, such schemata are attracting more interest and achieving greater superficial legitimacy, especially among those desperately seeking

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<sup>5</sup> *There are some inter-governmental entities as well as many non-governmental organizations and processes addressing climate issues from perspectives such as poverty reduction, humanitarian assistance, environmental and social justice, working directly with and advocating on behalf of some of the world's most vulnerable. The technical complexities and very rapid growth of geoengineering may in part explain their inability so far to engage strongly in key events like the Asilomar International Conference on Climate Intervention Technologies (March 22-26, 2010). Future instances of discussion about geoengineering and its governance should make a top priority of involving these kinds of stakeholders.*

<sup>6</sup> *In the medical analogy, it could be argued that climate change mitigation is comparable to ensuring the patient engages in a balanced diet that reduces health risks - instead of having abusive consumption followed by an experimental and very risky intervention like geoengineering. The Hippocratic oath comes to mind: "First, do no harm".*

a relatively simple technical fix for the climate - a fix which would cut through the politically challenging task of bringing about rapid, deep and lasting cuts in greenhouse gas emissions.

As a result, we are faced with the very real prospect that, despite the considerable environmental and social risks, a growing number of ever bigger field trials of geoengineering techniques will be proposed. Research institutes, corporations, entrepreneurs and even nation states appear keen to press ahead in the absence of global consensus. A lack of strong political agreement emerging from Copenhagen can be viewed against a daily backdrop of emerging science on current and projected impacts of climate change and acidification of the oceans. This has only reinforced the impression held by some that it is already too late to envisage a future without the application of geoengineering. Add to this the assertions that, in direct terms at least, manipulation of the atmosphere or oceans could deliver global cooling at a fraction of the cost of emissions reductions and the stage seems set for arguments that field testing of geoengineering is a logical next step.

What is in grave danger of being lost in the rush to apply engineering theory to complex natural systems is a sense of perspective of the gravity and magnitude of what is being proposed. The atmospheric and oceanic processes which geoengineers, even in the experimental phase, would aim to manipulate are the very systems on which life on earth depends. These are not a scientific preserve, any more than the world is an open access laboratory. Deliberate attempts to perturb fluxes and cycles of energy and matter to the extent that the changes induced would be measurable and attributable at the scales envisaged, without containment or prospect of applying the norms of experimental control, would be an unprecedented and deeply worrying development predicated in the name of scientific research.

Qualifications such as those proposed by Keith *et al.*<sup>7</sup> that “*experiments should expand gradually to scales big enough to produce barely detectable climate effects and reveal unexpected problems, yet small enough to limit risks*” may seem at first to offer safeguards, but represent an balance of ideals which is unlikely to be definable or achievable in practice. They invite the immediate question of how effects that are barely detectable could ever be distinguished reliably from background variability in complex systems, or therefore attributed as effects at all. As Robock *et al.*<sup>8</sup> stress, “*weather and climate variability preclude observation of the climate response without a large, decade-long forcing*”; it is hard to see how such forcing could be defended as an experimental intervention “*small enough to limit the risks*”. Moreover, the boundary between experiment and deployment of geoengineering would therefore seem unavoidably blurred, to the extent that these may also be indistinguishable.

The fact that such propositions are being considered at all should serve primarily to alert us to just what is at stake should we continue to fail to bring emissions under control. Nonetheless, given that there is already substantial interest (academically, politically and financially) in pressing ahead with an expanding programme of atmospheric and oceanic field trials, far better such research falls under rigorous and precautionary evaluation, authorisation and control than it proceeds in a manner unregulated beyond the self-imposed controls of its proponents.

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<sup>7</sup> Keith, D.W., Parson, E. & Morgan, M.G. (2010) Research on global sun block needed now. *Nature* 463: 426-427

<sup>8</sup> Robock, A., Bunzi, M., Kravitz, B. & Stenchikov, G.L (2010) A test for geoengineering? *Science* 327: 530-531

In this context, the Royal Society's report on governance of geoengineering<sup>9</sup> is a timely and valuable contribution. Its proposals for effective public engagement and for governance mechanisms to be emplaced before large-scale field trials are considered are particularly welcome. However, given the likely transboundary extent of both intended and unintended impacts, the potential for inequitable distributions of benefits and risks and the unpredictability inherent in environmental manipulation, the proposition that such mechanisms could be voluntary in nature is highly questionable. For the same reasons, we are deeply sceptical of Keith *et al.*'s suggestion "*to build international co-operation and norms from the bottom up*", through a combination of loosely co-ordinated international programmes and informal consultations on aspects of assessment and acceptability. It is hard to see how any voluntary code of conduct, such as that expected to emerge from the upcoming conference in Asilomar, California, in March 2010 (initiated by the Climate Response Fund) could provide for the robust, transparent and accountable assessment and control systems that research entailing such scales of intervention and potential impact demands.

To be truly effective in serving the needs of governments and civil society, such a governance system must be mandatory, international and ultimately global in scope. While this may sound like an unachievable ideal, the basis for just such a mechanism already exists in the approach taken by parties to the London Convention and London Protocol in regulating ocean fertilisation (OF). This approach explicitly allows for 'legitimate scientific research' involving OF while prohibiting other OF activities<sup>10</sup>, supported by an assessment framework under which the legitimacy and scientific value of proposed research can be tested. Although currently specific to OF, the approach could provide a model for broader governance of geoengineering research. The desire to avoid burdensome vetting of research must not take precedence over ensuring environmental protection. As a contribution to the development of the assessment framework, Greenpeace has proposed a set of seven criteria for 'legitimate scientific research', including the need for justification, prior international consultation, transparency and exclusion of projects of a commercial nature<sup>11</sup>; these could also have more general application.

It is said by some that geoengineering is merely a prudent plan B, by others that it is an undesirable but perhaps essential contingency and by others still as a somewhat terrifying prospect which should shock us into making the deep and urgent emissions cuts which are long overdue. Wherever one sits on that spectrum, it is clear that discussion of geoengineering has so far been largely inaccessible to the public in whose name and assumed interest it would presumably be invoked. The wider environmental, political and social implications of schemes under which geoengineers would attempt to control the climate on our assumed behalf have not been addressed with any seriousness to date. As Blackstock & Long<sup>12</sup> note, questions of risk

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<sup>9</sup> The Royal Society (2009) *Geoengineering the climate: Science, governance and uncertainty*. Royal Society Policy document 10/09, September 2009, RS1636, ISBN 978-0-85403-773-5: 82pp.

<sup>10</sup> Resolution LC-LP.1(2008) on the regulation of ocean fertilization, adopted by the Thirtieth Meeting of the Contracting Parties to the London Convention and the Third Meeting of the Contracting Parties to the London Protocol, 31<sup>st</sup> October 2008

<sup>11</sup> Greenpeace International (2009) *Seven principles for 'legitimate scientific research' involving ocean fertilization*, submission to Thirty Second Meeting of the Scientific Group to the London Convention, Third Meeting of the Scientific Group to the London Protocol, Roma, 25-29 May 2009, LC/SG 32/Inf.16: 2pp.

<sup>12</sup> Blackstock, J.J. & Long, J.C.S. (2010) *The politics of geoengineering*. *Science* 327: 527

acceptability, liability and of if, when and where testing should begin are not merely scientific in nature, but represent substantial political challenges. Such issues have all too often been identified as unavoidable but then conspicuously avoided in the rush to facilitate research with as few impediments as possible. We owe it to future generations to do better than that.

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## **The Geoengineering Paradox**

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Climate change geoengineering, defined by Britain's Royal Society as "the deliberate large-scale manipulation of the planet's environment to counteract climate change" (Shepherd et al 2009:1) encompasses a wide variety of technologies exhibiting diverse technical characteristics with very different implications for their governance.

Some of these technologies aim to reflect some of the sun's energy back into space to reduce the warming effect of increasing levels of greenhouse gases in the atmosphere (Solar Radiation Management or SRM). The other is to find ways to remove some of the carbon dioxide from the atmosphere and sequester it in the ground or in the oceans (Carbon Dioxide Removal or CDR). Both goals can be achieved by one of two different means. One is to put something into the air or water or on the land's surface to stimulate or enhance natural processes. Injecting sulphate aerosols into the upper atmosphere imitates the action of volcanoes, which we know to be quite effective at reducing the sun's energy reaching the earth's surface; hence this is one candidate SRM technique. Similarly, we know that lack of iron constrains plankton growth in some parts of the ocean. So adding iron to these waters would enhance plankton growth, taking up atmospheric CO<sub>2</sub> in the process. This would be a potential CDR technique also achieved by imitating nature.

The other approach to both SRM and CDR is through more traditional "black-box" engineering. Mirrors (either large or more likely myriad small ones) in space would be a way of reflecting sunlight (SRM), while a potential CDR technique would be to build machines to remove CO<sub>2</sub> from ambient air and inject it into old oil and gas wells and saline aquifers.

At first sight, it might seem that the different goals and means represented in geoengineering are alternatives. Some commentators have suggested that geoengineering is itself an alternative to mitigation (e.g., Barrett 2008) although the Royal Society report emphatically rejected this idea. However, closer scrutiny suggests that different techniques may be suited to very different tasks and time perspectives. There is much interest in SRM using sulphate aerosols. This is because we know from volcanic eruptions that such tiny particles in the atmosphere can effectively cool the earth, the technique is relatively straightforward, the programme costs involved appear to be relatively modest and they could be implemented quickly. Hence many commentators see aerosols as a Band Aid to stop the earth from getting too hot and triggering a runaway greenhouse effect or other possible climatic emergency.

Aerosols have at least two well-recognized drawbacks. One is that the effects on the earth's climate may be uneven, possibly causing disruption of the Asian Monsoon upon which billions

rely for agriculture. Another is that stopping a sulphate aerosol programme in the event of unforeseen negative outcomes would result in a sudden temperature spike, unless drastic compensating emission reductions have been simultaneously achieved. That is to say, the full environmental and social costs of aerosols may be very much higher than the programme implementation costs and there is likely to be a high level of technological lock-in. These drawbacks strongly suggest that SRM using aerosols would be controversial. Also, public opinion is likely to be wary of “tinkering with earth systems”, especially through what could be described as deliberate air pollution. And, furthermore, the transborder implications suggest that aerosols would require a high level of international agreement for their deployment and, as we know, international agreement on climate actions is elusive.

At the other extreme, air capture of carbon “using artificial trees” and sequestration in spent oil and gas wells or saline aquifers seems a relatively distant and costly prospect compared to aerosols. In any case, as with conventional emissions mitigation, the climate benefits of removing carbon from the air will take longer to realize (although, in principle, all of the carbon that came out of the ground could be put back there). On the other hand, except where the geological formations used for storage cross national boundaries, regulation of the technology would seem to be almost entirely a matter for the governments of the countries in which it is located. Furthermore, in the event that the technology did have unforeseen negative consequences, there would be no technical barrier to switching the black-box machines off, although it is arguable that the sunk costs in the technology would create vested commercial interests in keeping it running.

This is the geoengineering paradox. The technology that seems to be nearest to maturity and could technically be used to shave a few degrees off a future peak in anthropogenic temperature rise is likely to be the most difficult to implement from a social and political standpoint, while the technology that might be easiest to implement from a social perspective and has the potential to deliver a durable solution to the problem of atmospheric carbon concentrations is the most distant from being technically realized.

This is not an argument for dismissing geoengineering. On the contrary, the potential dangers of global warming suggest that it is prudent to investigate all possible avenues to combat it. It is, however, a warning against an overly narrow or technocratic view of range of issues that must be assessed in developing and characterizing the various geoengineering options from the very beginning of any research programme. In the end, social constraints can be as binding on the application of technology as techno scientific ones. We ignore the lessons of nuclear energy and GM agriculture at our peril.

#### References:

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Shepherd, J, P. Cox, J. Haigh, D. Keith, B. Launder, G. Mace, G. MacKerron, J. Pyle, S. Rayner, C. Redgewell, A. Watson 2009. **Geoengineering the Climate: Science, Governance and Uncertainty**. The Royal Society, London

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## **Governing geoengineering or geoengineering governance?**

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Discussions about geoengineering governance are all the rage, with many scientists, politicians and academics weighing in on what needs to be done with varying degrees of precision. Indeed, this lack of precision would not be tolerated in a high-school science class. The confusion surrounding these discussions is partly due to the vagueness of these terms: both “governance” and “geoengineering” encompass a wide range of definitions, approaches and technologies.

This serves the geoengineering lobby well. In a vague governance framework, options such as “self regulation,” “voluntary standards” or “codes of practice” can take on a veneer of respectability. In the case of the Asilomar conference on climate engineering, the debate is intentionally restricted to the most narrow interpretation possible. Indeed, the only topic up for discussion is the issue of voluntary guidelines to govern research and experimentation – not the a priori and more fundamental question of whether or not any research and experimentation is desirable.

A murky term like governance can also be a convenient placeholder for strong binding rules from an international body. Attempts are being made to bend prohibitive resolutions in a more permissive direction. This is precisely what proponents of ocean fertilization have attempted to do at the London Convention and Protocol on Marine Dumping, and what will be tried again at the upcoming meetings of the Convention on Biological Diversity. Both of these international bodies have adopted strong resolutions against ocean fertilization and both are now in the midst of defining new international rules.

Science historian James Fleming has argued that debates on geoengineering should be “international, inter-generational and inter-disciplinary”. That is a good start. But it is hardly how one could characterize the debate so far. In an open letter opposing the Asilomar Conference on Climate Intervention <http://www.etcgroup.org/en/node/5080>, an international group of non-governmental organizations underlined this lack of diversity (including its gender and geopolitical dimensions) much to the derision of mainstream science commentators and geoengineering enthusiasts. ETC Group stands behind that letter and remains convinced that how one understands the debate on geoengineering depends at least partially on where one is located in the international system.

As we have pointed out elsewhere <http://etcgroup.org/en/node/4761>, if you are situated in a poor country, your people already suffering the effects of climate change (to which you made little or no contribution), you would be justifiably skeptical of this latest plan to get wealthy countries off the mitigation hook. One would have to be astonishingly naïve to think that the very countries that failed to adopt ambitious carbon emission targets (or meet the modest ones they did adopt, or pony up the necessary resources to get on with the urgent business of adaptation) would come up with an equitable-for-all climate techno-fix.

Why on earth would the majority of the world’s governments and peoples trust OECD countries to do the right thing on climate engineering while those same governments spent trillions to rescue their banks in conditions where more than a billion people went hungry? Why would countries in the global South have any confidence that the OECD states that have ignored

scientific advice on global warming for decades and don't have the political courage to persuade their populations to take public transport will suddenly have the political audacity and scientific acumen to manage the most dangerous global scientific exercise imaginable?

A real discussion on geoengineering would have to be:

- International, transparent and accountable, where all the governments of the world can freely participate, that is open to the scrutiny and participation of civil society organizations, Indigenous peoples and social movements (especially those most directly affected by climate change), and that is accountable to UN member states in its outcomes.
- Free from corporate influence where private interests can use their wealth and power to determine favourable outcomes or to promote schemes which serve their interests.
- Respectful of existing international laws including those protecting peace and security, human rights, biodiversity, national sovereignty, and those prohibiting hostile acts of weather modification.
- Mindful of concomitant crises, especially hunger, poverty, loss of biological diversity, ecosystem destruction and ocean acidification.
- Guided by precautionary principles and cognizant that neither the seriousness of the climate crisis nor a lack of scientific knowledge can be used to justify reckless and dangerous experiments.

The Open letter from NGOs on the Asilomar Conference states the problem clearly:

The issue of large-scale geoengineering experimentation and its impact is not about technical peer-review. It is about no less than rights, responsibilities and the future of the planet. This public debate must include the peoples and countries that are most vulnerable and likely to be affected by geoengineering, not only those who stand to gain from its exploitation.

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## **Towards regulation of ocean fertilisation by the London Convention and London Protocol - the story so far**

***Chris Vivian, Chairman of the Scientific Groups of the London Convention and Protocol***

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The "Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972", the "London Convention" for short, was one of the first global conventions to protect the marine environment from human activities and has been in force since 1975. Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter. In 1996, the "London Protocol" was agreed to further modernize the Convention and, eventually, replace it. It came into force in March 2006. Currently 86 States are Parties to the Convention and 37 States are Parties to this Protocol.

## **The Story Begins**

In early 2007, Planktos Corporation announced that it was planning to carry out iron fertilisation experiments in June 2007 offshore from the Galapagos Islands

The US, IUCN and Greenpeace submitted papers about this proposal and the issue in general to the meeting of the Scientific Groups (SGs) of the London Convention (LC) and Protocol (LP) in June 2007. The SGs meeting agreed a Statement of Concern that was made public after the meeting and can be found on the LC/LP website at:

[http://www.imo.org/includes/blastData.asp/doc\\_id=8272/14.pdf](http://www.imo.org/includes/blastData.asp/doc_id=8272/14.pdf)

## **The Statement of Concern**

The Statement of Concern included the following:

- “The SGs of the London Convention and the London Protocol took the view that knowledge about the effectiveness and potential environmental impacts of ocean iron fertilization currently was insufficient to justify large-scale operations.”
- “The SGs noted with concern the potential for large-scale ocean iron fertilization to have negative impacts on the marine environment and human health. They therefore recommended that any such operations be evaluated carefully to ensure, among other things, that such operations were not contrary to the aims of the London Convention and London Protocol.”

The SGs meeting also agreed an initial set of issues that any evaluation should consider and requested that the following points be addressed by the Governing Bodies:

- The purposes and circumstances of proposed large-scale ocean iron fertilization operations and whether these are compatible with the aims of the Convention and the Protocol
- The need, and potential mechanisms, for regulation of such operations; and
- The desirability of bringing to the attention of other international instruments and institutions, proposals for such operations.

## **Governing Bodies Meeting in October 2007**

The meeting of the Governing Bodies of the LC and LP in October 2007:

- Endorsed the SGs “Statement of Concern”
- Agreed that the scope of work of the LC and LP included ocean fertilization, as well as iron fertilization
- Agreed that the LC and LP were competent to address this issue due to their general objective to protect and preserve the marine environment from all sources
- Agreed that they would further study the issue from the scientific and legal perspectives with a view to its regulation

- Agreed terms of reference for the SGs to address ocean fertilization
- Set up a Legal Inter-sessional Correspondence Group to consider legal issues that need to be addressed

The LC/LP Governing Bodies also stated:

“Recognizing that it was within the purview of each State to consider proposals on a case-by-case basis in accordance with the London Convention and Protocol, urged States to use the utmost caution when considering proposals for large-scale ocean fertilization operations. The governing bodies took the view that, given the present state of knowledge regarding ocean fertilization, such large-scale operations were currently not justified.”

The report of the meeting contains further details on this issue in paragraphs 4.14 to 4.29 and Annexes 5 and 6 and can be found at:

[http://www.imo.org/includes/blastData.asp/doc\\_id=7832/15.pdf](http://www.imo.org/includes/blastData.asp/doc_id=7832/15.pdf)

### **Scientific Groups Meeting May 2008**

The SGs meeting in May 2008:

- Stated that given the spatial and temporal variability of the marine environment, the potential for deleterious impacts depends not only on the spatial scale or amounts of nutrients, but also on a range of other parameters
- Updated the set of issues that any evaluation should consider taking into account the comments made at the ‘Ocean Iron Fertilization’ symposium held at Woods Hole Oceanographic Institution in September 2007.

The report of the meeting contains further details on this issue in section 2 and Annex 2 and can be found at: [http://www.imo.org/includes/blastData.asp/doc\\_id=9938/16.pdf](http://www.imo.org/includes/blastData.asp/doc_id=9938/16.pdf)

### **Governing Bodies Meeting in November 2008**

At the meeting of the LC/LP Governing Bodies in November 2008, they:

- Adopted a non-binding resolution on the regulation of ocean fertilisation
- Agreed to further consider a potential legally binding resolution or an amendment to the LP at its next meeting in 2009
- Agreed to hold technical and legal inter-sessional meetings to prepare for the next meeting

Key Points of Resolution LC-LP 1. (2008):

- Agreed that, given the present state of knowledge, ocean fertilization activities other than legitimate scientific research should not be allowed.

- Agreed that in order to provide for legitimate scientific research, such research should be regarded as placement of matter for a purpose other than the mere disposal thereof.
- Such other activities should be considered as contrary to the aims of the Convention and Protocol and not currently qualify for any exemption from the definition of dumping.
- Agreed that scientific research proposals should be assessed on a case-by-case basis using an assessment framework to be developed by the SGs
- Agreed that until that guidance is available, Contracting Parties should be urged to use utmost caution and the best available guidance to evaluate the scientific research proposals to ensure protection of the marine environment consistent with the Convention and Protocol
- Agreed that for the purposes of this resolution, legitimate scientific research should be defined as those proposals that have been assessed and found acceptable under the assessment framework

The report of the meeting contains further details on this issue in section 4 and Annex 5 and can be found at: [http://www.imo.org/includes/blastDataOnly.asp/data\\_id%3D24255/16.pdf](http://www.imo.org/includes/blastDataOnly.asp/data_id%3D24255/16.pdf)

### **Meetings of the Legal and Technical Inter-Sessional Groups February 2009**

At the meetings:

The technical group developed a draft risk assessment framework for evaluating ocean fertilisation scientific experiments that will be reviewed by the SGs in May 2009.

The legal group developed 8 options to clarify/interpret/amend the Convention/Protocol and agreed to forward them to the Governing Bodies meeting in October 2009 for their consideration. See the reports at:

[http://www.imo.org/includes/blastData.asp/doc\\_id=11170/5.pdf](http://www.imo.org/includes/blastData.asp/doc_id=11170/5.pdf)

[http://www.imo.org/includes/blastData.asp/doc\\_id=11172/5.pdf](http://www.imo.org/includes/blastData.asp/doc_id=11172/5.pdf)

### **Scientific Groups Meeting May 2009**

The meeting reviewed the draft risk assessment framework for evaluating ocean fertilisation scientific experiments and considered the Action Levels proposed by Australia and New Zealand. The report of the meeting contains further details on this issue in section 2 and Annex 2 and can be found at: [http://www.imo.org/includes/blastData.asp/doc\\_id=11805/15.pdf](http://www.imo.org/includes/blastData.asp/doc_id=11805/15.pdf)

### **Governing Bodies Meeting October 2009**

They considered the outcome of the discussions of both the Legal Group and the SGs on ocean fertilisation and debated ways forward. The meeting agreed to hold a legal inter-sessional meeting to deepen the understanding of the legal options. The report of the meeting contains further details on this issue in section 4 and Annex 4 and can be found at:

[http://www.imo.org/includes/blastData.asp/doc\\_id=12615/15.pdf](http://www.imo.org/includes/blastData.asp/doc_id=12615/15.pdf)

## **Legal Working Group Meeting March 2010**

This meeting reviewed in detail the 5 legally-binding options plus a proposal from Australia and New Zealand.

## **Future Activity**

The SGs Meeting in April 2010 will finalise the draft assessment framework for consideration by the Governing Bodies meeting in October 2010. At that meeting, the legal working group report will be considered and there will be a discussion about the next steps. The SGs meeting will also for the first time discuss Marine Geoengineering.

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