

REINFORCING PRECAUTION AGAINST GEOENGINEERING TO PROTECT BIODIVERSITY AND COMMUNITIES

Briefing for Delegates at COP 16

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Agenda item 20: Marine, Coastal and Island biodiversity

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Agenda item 25: Biodiversity and Climate Change

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This compilation of draft decisions can be found at:

<https://www.cbd.int/conferences/2024/cop-16/documents>

Geoengineering, the large-scale manipulation of the atmosphere and marine and terrestrial ecosystems intended to address various symptoms of climate change, implies similarly large-scale risks to biodiversity and associated livelihoods. Geoengineering describes a range of technologies that aim to reflect some of the incoming sunlight away from Earth (to lower global temperatures) or to remove carbon dioxide from the atmosphere. The Convention on Biological Diversity (CBD) pioneered intergovernmental discussion on climate geoengineering by taking several precautionary decisions beginning in 2008, with the CBD ultimately establishing a *de facto* moratorium on deployment.

The CBD's decisions are especially relevant in light of the rapidly increasing number of marine and solar geoengineering projects and open field experiments being planned or carried out – in direct contravention of the *de facto* moratorium. At COP 16, therefore, the CBD needs to recall, affirm and ensure the implementation of its decisions, while strengthening the provisions intended to protect ecosystems and communities from the impacts of geoengineering.

The following discussion pertains to agenda item 20 (b) Conservation and Sustainable Use of Marine and Coastal Biodiversity and of Island Biodiversity and agenda item 25 on Biodiversity and Climate Change.

Background

In a notable example of foresight and precaution, the CBD took a series of groundbreaking decisions addressing geoengineering and its potential impacts on biodiversity and people, beginning in 2008.¹ To underpin its decisions, the CBD produced peer-reviewed, technical reports on ocean fertilization² and on geoengineering's potential impacts on biodiversity³ as well as on related regulatory matters.⁴

By consensus of all Parties and based on the precautionary approach, COP 10, decision X/33 paragraph 8 (w) called

- 1 See detailed information of all decisions and publications on climate-related geoengineering and biodiversity at the CBD's website: <https://www.cbd.int/climate/geoengineering/>
- 2 Scientific Synthesis of the Impacts of Ocean Fertilization on Marine Biodiversity, CBD Technical Series No.45. <https://www.cbd.int/doc/publications/cbd-ts-45-en.pdf>
- 3 CBD (2012), Technical Series 66, Geoengineering in Relation to the Convention on Biological Diversity - Part I. Impacts of Climate-Related Geoengineering on Biological Diversity <https://bit.ly/3Ws7LT4>
- 4 CBD (2012), Technical Series 66, Geoengineering in Relation to the Convention on Biological Diversity – Part II: The Regulatory Framework for Climate-Related Geoengineering Relevant to the Convention on Biological Diversity <https://www.cbd.int/doc/publications/cbd-ts-66-en.pdf>

on Parties to “Ensure (...) that no climate-related geo-engineering activities that may affect biodiversity take place” until a set of conditions is met, including: having in place a transparent multilateral global governance mechanism; establishing that no transboundary harm would occur; and having an adequate scientific basis to justify the geoengineering actions, taking into account the risks posed to biodiversity and considering related social and cultural impacts. The decision made an exception for small-scale scientific research studies in controlled settings for the purposes of gathering scientific data and *only after* a thorough assessment of potential impacts on the environment.⁵

None of the conditions detailed in the CBD decisions on climate-related geoengineering have been met. Given the growing number of risky marine and solar geoengineering proposals and attempted/ongoing field experiments – many incentivized by geoengineering’s perceived potential role in carbon trading – the CBD’s call for precaution is particularly timely and crucial. Geoengineering threatens land, marine and coastal biodiversity, the environment, and the rights, territories and livelihoods of Indigenous Peoples and local communities.

5 The text of Decision X/33 text states: 8 (w) “Ensure, in line and consistent with decision IX/16 C, on ocean fertilization and biodiversity and climate change, in the absence of science based, global, transparent and effective control and regulatory mechanisms for geo-engineering, and in accordance with the precautionary approach and Article 14 of the Convention, that no climate-related geo-engineering activities that may affect biodiversity take place, until there is an adequate scientific basis on which to justify such activities and appropriate consideration of the associated risks for the environment and biodiversity and associated social, economic and cultural impacts, with the exception of small scale scientific research studies that would be conducted in a controlled setting in accordance with Article 3 of the Convention, and only if they are justified by the need to gather specific scientific data and are subject to a thorough prior assessment of the potential impacts on the environment.” <https://www.cbd.int/climate/geoengineering/>

How is geoengineering dangerous?

All geoengineering technologies – including solar geoengineering (interventions to reflect away some sunlight back to space) and carbon removal technologies on land and/or in coastal and marine environments – imply significant impacts for ecosystems and communities.^{6,7}

For example, large-scale carbon dioxide removal (CDR) technologies will require vast amounts of land, energy, biomass, water, fertilizer, minerals and/or other resources. CDR technologies are highly speculative – most are at the ‘pilot’ stage or exist only as models. There is no proof that they can effectively and permanently remove CO₂ from the atmosphere at the scale required to meet the thousands of so-called ‘net-zero pledges’ made by companies and countries. At the same time, the development of large-scale CDR technologies will require new or modified infrastructure and extractive industries (e.g. pipelines, storage facilities), the creation of which will produce *additional* greenhouse gas emissions, increasing the risks of so-called climate overshoot (exceeding 1.5°C temperature rise in the 21st century) and other negative socio-environmental impacts.⁸

Deploying bioenergy with carbon capture and storage (BECCS) at large scale could spur grabs for land, water and nutrients, resulting in “massive displacements of land and people, with global implications for food supply, land rights, and environmental justice.”⁹ Unequal impacts at regional levels are expected with large-scale solar

6 Trisos CH, Amatulli G, Gurevitch J, Robock A, Xia L, Zambri B. 2018. Potentially dangerous consequences for biodiversity of solar geoengineering implementation and termination. *Nature Ecology and Evolution* 2:475–82.

7 The CBD’s Technical Series report no. 66 highlights potential impacts on biodiversity: CBD (2012), Technical Series 66, *Geoengineering in Relation to the Convention on Biological Diversity - Part I. Impacts of Climate-Related Geoengineering on Biological Diversity* <https://bit.ly/3Ws7LT4>

8 Intergovernmental Panel on Climate Change, “Chapter 3: Impacts of 1.5°C Global Warming on Natural and Human Systems,” In: *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, (Intergovernmental Panel on Climate Change, 2018), 175-312, doi: [org/10.1017/9781009157940.005](https://doi.org/10.1017/9781009157940.005)

9 Silke Beck and Martin Mahony, “The IPCC and the politics of anticipation,” *Nature Climate Change*, vol. 7 no. 5, April 2017.

geoengineering deployment also resulting in climate ‘winners and losers’. While some could theoretically benefit if lower temperatures are achieved, others may suffer from increased floods and droughts.¹⁰ Various marine-based techniques such as ‘Ocean Fertilization’ and ‘Ocean Alkalinity Enhancement’ propose to use around 10% of the ocean’s surface (to have a meaningful climate impact),¹¹ with potentially devastating consequences for coastal communities and fragile marine ecosystems.¹²

The UN’s Human Rights Council’s Advisory Committee has warned that deployment of geoengineering technologies could impact the human rights of “millions or perhaps billions of people” and that the lives and livelihoods of Indigenous Peoples, traditional communities, peasants and fisherfolk are at particular risk.¹³

Critically, none of these geoengineering techniques are designed to address the root causes of climate change, but, instead, would create indefinite dependency on the technologies and place an even greater burden on future generations. Additional consequences could include increased corporate capture of public policy-making spaces and exacerbated geopolitical tensions generally. Finally, if certain geoengineering techniques¹⁴ are deployed and then stopped – whether intentionally or by accident or due to geopolitical conflict – the interruption could trigger a so-called ‘termination shock’ effect – i.e. a dramatic increase in temperatures and an accelerated rate of climate change that would make it difficult for many

species and ecosystems to adapt. In short, geoengineering proposals take attention, energy and resources away from reducing greenhouse gas emissions – the only true path to stopping and preventing further climate change – while posing grave environmental and social risks.

Current developments at the UN

UNFCCC, the Supervisory Body of the Article 6.4 mechanism tasked with developing rules to govern a new carbon market regime under the Paris Agreement, has received proposals to include large-scale land and marine-based geoengineering technologies – such as large-scale BECCS, direct air capture (DAC), ocean fertilization and ocean alkalization – among the sources of carbon credits or offsets. Voluntary carbon markets are already driving geoengineering experiments, and approval of these techniques under the Paris Agreement mechanism would further legitimize them and open the floodgates to commercial exploitation.¹⁵

The London Convention/London Protocol (LC/LP), which aims to prevent pollution at sea, established a precautionary governance framework for marine geoengineering in 2013, explicitly stating that ocean fertilization *should not* be deployed.¹⁶

In March 2023, the Scientific Groups that report to the LC/LP announced their intention to monitor four additional geoengineering technologies for possible regulation, due to the technologies’ potential “adverse impacts on the marine environment”. The four technologies include (1) enhancing ocean alkalinity, (2) the use of biomass for carbon sequestration such as via macroalgae cultivation and artificial upwelling, and solar geoengineering techniques like (3) marine cloud brightening and (4) deploying microbubbles/reflective particles/materials.¹⁷

10 Climate Action Network, Solar Radiation Manipulation / Modification: Debunking dangerous distractions: <https://climatenetwork.org/wp-content/uploads/2024/02/Info-sheet-SRM-ARTWORK.pdf>

11 GESAMP 2019 High Level Review of a Wide Range of Proposed Marine Geoengineering Techniques <http://www.gesamp.org/publications/high-level-review-of-a-wide-range-of-proposed-marine-geoengineering-techniques>

12 National Academies of Sciences, Engineering, and Medicine, A Research Strategy for Ocean-based Carbon Dioxide Removal and Sequestration, The National Academies Press, 2022, <https://doi.org/10.17226/26278>

13 See UN Human Rights Council meeting document (54th Session, 11 September – 06 October 2023): <https://documents.un.org/doc/undoc/gen/g23/141/86/pdf/g2314186.pdf> See also, CIEL media brief, 11 September 2023: <https://www.ciel.org/news/media-brief-geoengineering-human-rights/>

14 Such as Stratospheric Aerosol Injection, Marine Cloud Brightening, Artificial Upwelling

15 Geoengineering Monitor, 2022, UNFCCC Article 6.4: No to legitimizing geoengineering and land-based offsets <https://tinyurl.com/293b2cff> and ETC Group, 2022, False Solutions Alert: Geoengineering in climate negotiations, <https://tinyurl.com/yf7ca6yz>

16 See Annex 4, here: [https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/LCLPDocuments/LP.4\(8\).pdf](https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/LCLPDocuments/LP.4(8).pdf)

17 International Maritime Organization (2023), Marine geoengineering - assessing the impacts on the marine environment, 24 March 2023: <https://www.imo.org/en/MediaCentre/Pages/WhatsNew-1854.aspx>

At the 45th meeting of the LC/18th meeting of the LP, the Parties issued a cautionary statement about these marine-related geoengineering technologies, stating that each has the **“potential for deleterious effects that are widespread, long-lasting or severe”** and that **“there is considerable uncertainty regarding their effects on the marine environment, human health and other uses of the ocean.”**¹⁸

Several CBD decisions related to geoengineering have cited the relevance of the London Convention/London Protocol’s work on governance of geoengineering activities.¹⁹

Scientists, governments in Africa and the EU Parliament call for a stop to solar geoengineering

More than 500 scientists from 61 countries have supported a call demanding an “International Non-Use Solar Geoengineering Agreement”, stating:

“Solar geoengineering deployment at planetary scale cannot be fairly and effectively governed in the current system of international institutions. It also poses an unacceptable risk if ever implemented as part of future climate policy. A strong political message from governments, the United Nations and civil society is urgently needed.”²⁰

Many governments already agree: The 19th meeting of the African Ministerial Conference on the Environment (AMCEN) also called for a solar geoengineering non-use governance mechanism,²¹ while the EU Parliament passed a resolution in December 2023 calling for such a

18 International Maritime Organization (2023) 45th Consultative Meeting of Contracting Parties to the London Convention and the 18th Meeting of Contracting Parties to the London Protocol (LC 45/LP 18) <https://bit.ly/4diiTrS>

19 For example, here: Convention on Biological Diversity, 2017, Climate-related Geoengineering and Biodiversity, <https://www.cbd.int/climate/geoengineering/>

20 Solar Geoengineering Non-Use Agreement <https://www.solar-geoeng.org/>

21 The African Ministerial Conference on the Environment (AMCEN) AMCEN/19/6, August 17, 2023. <https://bit.ly/3Qqt0Rs>

mechanism.²² Negotiations at UNEA 6 in February this year on a resolution on SRM also risked undermining decisions of the CBD on geoengineering, however this was met with strong resistance particularly from Global South countries who called for the resolution to uphold precaution and acknowledge calls for a Solar Geoengineering Non-Use Agreement.²³

Why COP 16 needs to reinforce precaution and geoengineering monitoring

Below are some examples of geoengineering activities being conducted that are likely in contravention of CBD decisions on geoengineering:

Rogue solar geoengineering experiments

Although solar geoengineering is inherently uncertain and risky, commercial interests are already experimenting in the open air.

At the end of 2022, the US start-up company Make Sunsets released sulfur dioxide-filled balloons in the Mexican state of Baja California. The company did not ask the government for permission, nor did it conduct consultations with Indigenous Peoples or local communities. Make Sunsets are already selling what they call “Cooling Credits” on their website.²⁴

22 European Parliament resolution of 21 November 2023 on the UN Climate Change Conference 2023 in Dubai, United Arab Emirates (COP28), para 92: “...notes the lack of scientific certainty on the effects and expresses concern about the global risks and adverse impacts of SRM on the environment and climactic and geopolitical stability; underlines, therefore, that a global approach is essential and that no countries should unilaterally experiment with this technology; takes note that a UN resolution on global governance has been blocked; calls on the Commission and the Member States to initiate a non-use agreement at international level, in accordance with the precautionary principle and in the absence of evidence of its safety and a full global consensus on its acceptability;” https://www.europarl.europa.eu/doceo/document/TA-9-2023-0407_EN.html

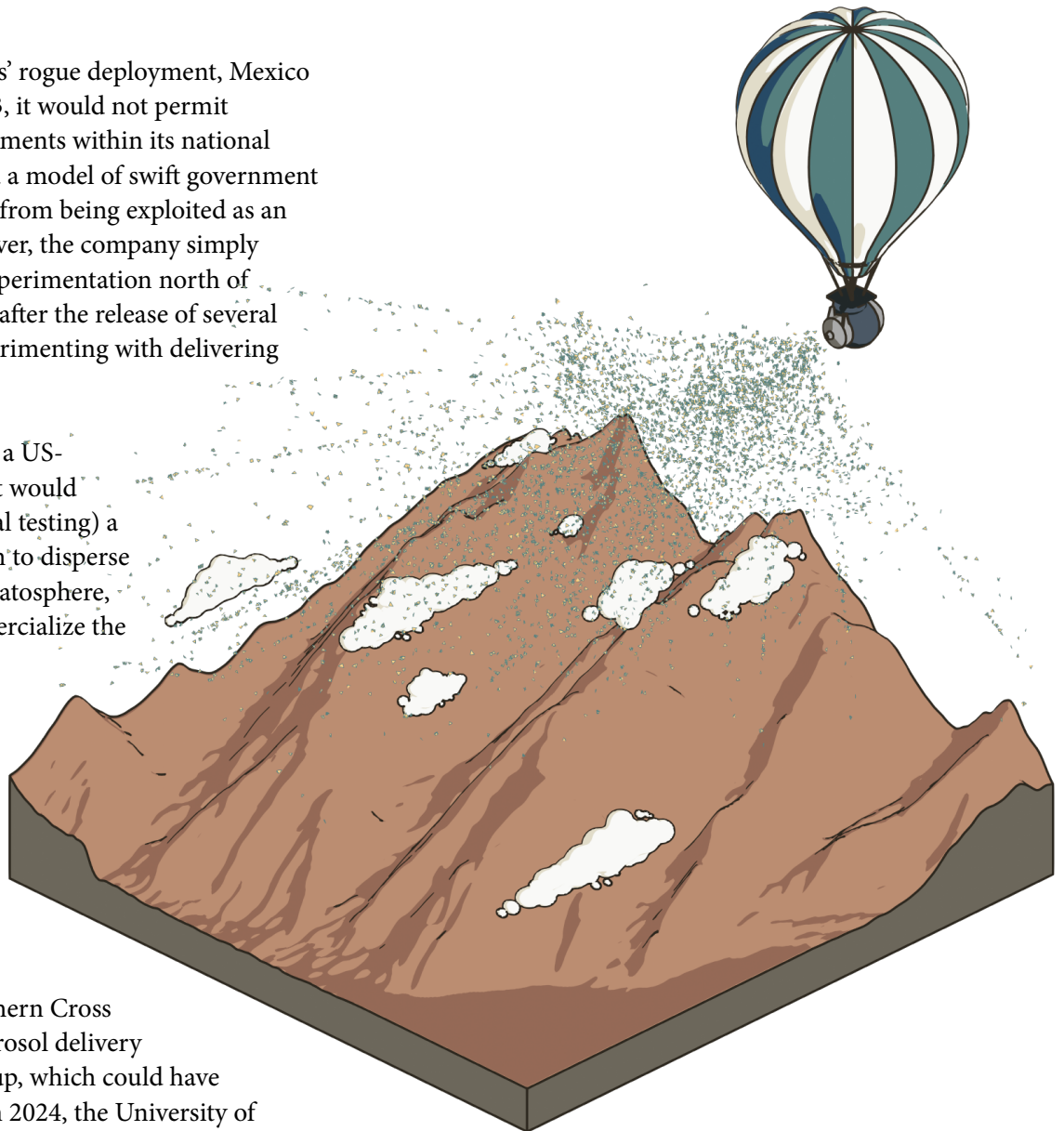
23 ETC Group, March 2, 2024, A solar geoengineering Trojan horse at UNEA-6, <https://bit.ly/3JFNrq0>

24 “By purchasing a Cooling Credit, your funds will be used to release at least 1 gram of our ‘clouds’ into the stratosphere on your behalf...We will share the fulfillment of your Cooling Credit order after deployment via email with the location, time, date, serial number[s] of your Cooling Credits, and the release altitude of your order. Accessed 26 September 2024: <https://tinyurl.com/bdhz4skr>

In response to Make Sunsets' rogue deployment, Mexico announced, in January 2023, it would not permit solar geoengineering experiments within its national territory.²⁵ Mexico provided a model of swift government action to prevent a country from being exploited as an unwitting laboratory; however, the company simply moved their commercial experimentation north of the border to the USA and, after the release of several balloons, they are now experimenting with delivering from planes.²⁶

In 2024, Stardust Solutions, a US-Israeli startup, announced it would start testing (including aerial testing) a solar geoengineering system to disperse reflective particles in the stratosphere, aiming to eventually commercialize the techniques.²⁷

Marine Cloud Brightening experiments – injecting salt spray into low marine clouds to increase their capacity to reflect sunlight – have been conducted in Australia since 2020. The Guardian reported on Southern Cross University's testing of an aerosol delivery system and plans for scale-up, which could have transboundary impacts.²⁸ In 2024, the University of Washington, linked to the privately-funded initiative



25 Government of Mexico, 2023, <https://www.gob.mx/semarnat/prensa/la-experimentacion-con-geoingenieria-solar-no-sera-permitida-en-mexico> and Biermann, F., 2023, <https://www.solargeoeng.org/mexico-bans-solar-geoengineering-experiments/>

26 Make Sunset's Monthly: Donations. August 5, 2024 <https://makesunsets.com/blogs/news/make-sunsets-monthly-donations>

27 Eric Niiler, "Scientists Resort to Once-Unthinkable Solutions to Cool the Planet," Wall Street Journal 14 February 2024: <https://www.wsj.com/science/environment/geoengineering-projects-cool-planet-weather-f0619bf7>

28 Graham Readfearn, "Scientists trial cloud brightening equipment to shade and cool Great Barrier Reef," The Guardian, 16 April 2020: <https://www.theguardian.com/environment/2020/apr/17/scientists-trial-cloud-brightening-equipment-to-shade-and-cool-great-barrier-reef>; see also ETC Group news release, "Geoengineers test risky planetary engineering scheme in Australia," 11 May 2020: <https://etcgroup.org/content/geoengineers-test-risky-planetary-engineering-scheme-australia>

SilverLining, launched a cloud brightening experiment off the coast of Alameda, California. The testing was halted by Alameda's City Council following the revelation that there had been no public notice nor any review by the Council. The experiment was opposed by 70 Indigenous Peoples and civil society organizations.²⁹ In 2021, Harvard University announced a solar geoengineering field experiment above Kiruna in Sweden's Lapland, but the action was suspended following Indigenous and civil society protests led by the Sámi Council.³⁰ The project, called SCoPEX, proposed a solar geoengineering experiment in Arizona as well, but

29 See <https://www.geoengineeringmonitor.org/2024/06/city-of-alameda-mcbp/>

30 Geoengineering Monitor, 2021, Widespread opposition to solar geoengineering halts test flight, <https://tinyurl.com/yzzk25s8>

that was rejected by Indigenous Peoples there.³¹ SCoPEX suspended its work in 2023 and officially closed in 2024,³² but one of its two initiators, David Keith, has left Harvard and moved on to the University of Chicago to lead a broader “Climate Systems Engineering Initiative.”³³

The US-based Ice911 Project (now called Arctic Ice Project) conducted solar geoengineering experiments – distributing reflective particles across sea ice – within Indigenous territories of northern Alaska in 2017.³⁴ In 2024, the spin-off company Bright Ice Initiative has announced it will expand experimentation to Iceland and the Indian Himalayas. According to its website, the company is currently launching experiments in the Himalayas.³⁵ Indigenous Peoples have roundly rejected these projects – due to uncertain impacts and the company’s failure to conduct meaningful consultation – and argue that they “have the inherent right to choose what goes in our bodies, on our lands, in our waters and air.”³⁶

Geoengineering experiments at sea: lack of consultation, but many risks

There are more than 40 companies undertaking or planning to undertake dozens of open-sea marine geoengineering experiments and projects, some of them

at large-scale.³⁷ At least half of the companies are already selling carbon credits in voluntary carbon markets, even in the absence of proof that carbon removal is actually taking place and/or that any removal will be permanent.³⁸ Lack of efficacy, however, does not mean there won’t be impacts on marine and coastal environments and biodiversity and on the livelihoods of Indigenous Peoples and marine, Arctic and coastal communities.

Proposed marine geoengineering techniques pose potentially serious impacts on the marine environment. In addition to discussions within the CBD’s Technical Series report noted above, the International Maritime Organization’s Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) investigated proposed marine geoengineering technologies; the Group’s published review included a call for a precautionary approach.³⁹

Ocean fertilization, for example, leads to the disruption of the marine food web, potentially producing anoxia at some levels of the ocean, and enhancing the growth of toxic algae.⁴⁰ The use of enhanced weathering or Ocean Alkalinity Enhancement (OAE) requires vast quantities of rock, multiplying the impacts of mining and requiring a high energy demand.⁴¹ The impacts of OAE on the carbon cycle and biodiversity are also highly unpredictable due to the complexity of the marine environment and carbon exchange processes and may

31 Indigenous Environmental Network, “Indigenous Peoples Celebrate the Ending of Harvard’s Geoengineering Experiment SCoPEX,” 25 March 2024: <https://www.ienearth.org/indigenous-peoples-celebrate-end-of-harvards-geoengineering-experiment-scopex/>

32 <https://salatainstitute.harvard.edu/an-update-on-scopex/>

33 See University of Chicago news release, “David Keith joins University of Chicago to lead Climate Systems Engineering initiative,” 11 April 2023: <https://news.uchicago.edu/story/david-keith-joins-university-chicago-lead-climate-systems-engineering-initiative>

34 Field, L., Ivanova, D., Bhattacharyya, S., Mlaker, V., Sholtz, A., Decca, R., *et al.* (2018). Increasing Arctic sea ice albedo using localized reversible geoengineering. *Earth’s Future*, 6, 882–901. <https://doi.org/10.1029/2018EF000820>

35 See Bright Ice Initiative web site: <https://brighticeinitiative.org/melting-glaciers-in-the-himalayas-threatens-water-supply-and-agriculture-for-more-than-a-billion/>

36 See, for example, the letter, “Alaska Native Organizations demand the end to Synthetic glass microbeads research project,” available here: <https://docs.google.com/document/d/1G5b-MSKyV5cl96ly-BV140jhyfE-SaPTEt85aVZC5TjM/edit>

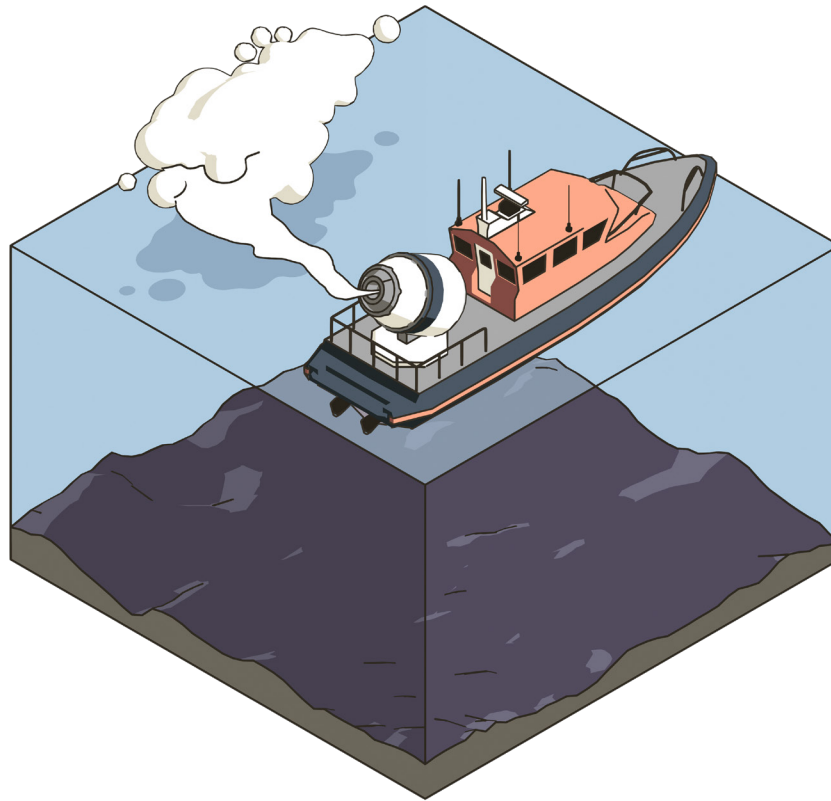
37 Chalmin, Anja, April 12, 2024, Arctic ice management and other marine geoengineering projects should remain science fiction, *Geoengineering Monitor*, <https://bit.ly/3JEGwlt> (See also *Geoengineering Map Updates* from April 3 and 10, 2024)

38 Anja Chalmin, April 10, 2024, Dumping biomass in the open ocean is an unproven carbon removal strategy, but that hasn’t stopped companies from selling carbon credits, *Geoengineering Monitor*. <https://bit.ly/3JFDMzB>

39 GESAMP (2019), High level review of a wide range of proposed marine geoengineering techniques, GESAMP Working Group 41, <https://bit.ly/3UEOMDC>; see also, GESAMP (2019), Marine and social scientists are urging a precautionary approach towards marine geoengineering techniques which involve deliberate large-scale manipulation of the environment, 12 March 2019 <https://bit.ly/4aTHaD6>

40 *Geoengineering Monitor* (2021), Ocean Fertilization, Technology Briefing <https://bit.ly/3UCwC5v>

41 Stefano Caserini, Niccolò Storni, and Mario Grosso, “The Availability of Limestone and Other Raw Materials for Ocean Alkalinity Enhancement,” *Global Biogeochemical Cycles* 36, no. 5 (May 2022), <https://doi.org/10.1029/2021gb007246>



also threaten marine food chains.⁴² Several marine-based geoengineering techniques, including large-scale macroalgae cultivation, disrupt light and temperature levels; increase turbidity; and add organic material and CO₂, increasing acidification and reducing oxygen.⁴³ All these alterations and disruptions will impact marine life and food chains.

Dumping seaweed and terrestrial biomass (such as wood) into the ocean to capture carbon and sink it to the ocean floor negatively impacts deep ocean ecosystems, ocean bio-geochemistry and marine food webs.⁴⁴ There is growing concern among marine scientists that the

impacts of these techniques on the deep sea, which could be irreversible, are not being adequately considered.⁴⁵

These are some examples of why governments and the CBD need to strengthen existing decisions to ensure that geoengineering open-field experiments are not permitted, and to prevent geoengineering companies from taking advantage of insufficient national regulations or simply relocating from areas of strong regulation (and/or strong opposition) to areas of weak regulation.

It is time to take action before ecosystems are irreversibly harmed.

See details of ongoing and planned geoengineering experiments and projects, including actors, techniques and the current status of projects at the interactive Geoengineering Map: <https://map.geoengineeringmonitor.org/>

42 Chalmin, Anja (2024), Carbon market-driven experiments in the open ocean endanger the marine environment, *Geoengineering Monitor*, April 03 2024 <https://bit.ly/3JGUhTA>

43 Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), High-level Review of a Wide Range of Proposed Marine Geoengineering Techniques (GESAMP, 2019), 66 <http://www.gesamp.org/publications/high-level-review-of-a-wide-range-of-proposed-marine-geoengineering-techniques> 42-77

44 Wu, J., Keller, D. P., and Oschlies, A.: Carbon dioxide removal via macroalgae open-ocean mariculture and sinking: an Earth system modelling study, *Earth Syst. Dynam.*, 14, 185–221, <https://doi.org/10.5194/esd-14-185-2023>, 2023.

45 Levin, L. A., et al. (2023) Deep-sea impacts of climate interventions. *Science*. doi.org/10.1126/science.ade7521

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