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Climate Geoengineering and Dispute Settlement under UNCLOS and the UNFCCC: Stormy Seas Ahead?

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Introduction

Over the course of the past two decades, our collective understanding of the interactions between climate change and oceans has evolved significantly. There has been a growing understanding that unmitigated climate change results in significant changes to ocean ecosystems. Among the most direct impacts are changes in ocean temperature, ocean currents, and ocean acidification. These changes, in turn, are having a range of secondary impacts on marine ecosystems, including sea level rise, changes in species populations, ecosystem health and overall resilience.[1] Our understanding of these impacts has and will continue to evolve as science matures and as our understanding of the scale of these changes improves.

Impacts of climate change on oceans are not limited to the impacts of unmitigated climate change. Efforts to mitigate and adapt to climate change also affect ocean ecosystems. Efforts to produce renewable energy in the marine environment, for example, through offshore wind, wave, and tidal energy projects all will have some impact on marine ecosystems. More recently,

[1] Thomas F Stocker et al, eds, *Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change: Summary for Policymakers (Switzerland: IPCC, 2013)*, at 6, 9, 22

Electronic copy available at: http://ssrn.com/abstract=2373751

geoengineering has emerged as a possible tool to respond to climate change, but with potentially significant implications for ocean systems.

As concern over our ability to avoid the worst impacts of climate change through traditional mitigation efforts has risen in the past decade, geoengineering has moved rapidly from the periphery into the mainstream. With the ongoing impasse in efforts under the United Nations Framework Convention on Climate Change (UNFCCC)[2] to ensure an adequate global mitigation effort to avoid a runaway climate scenario, some scientists and policy makers are turning to geoengineering as an alternative tool.[3]

For purposes of this chapter, geoengineering is defined as the "intentional large-scale manipulation of the environment"[4] The key aspects of the definition are the intent and the effect of the action: environmental change must be the primary intent of the action, and its effects must be at a continental or global scale.[5] Geoengineering can affect a range of environmental systems for various purposes. The focus in this chapter is on marine-based efforts to alter the climate system to mitigate climate change impacts.

A number of the options currently considered either propose making direct use of oceans to engineer the climate, or are expected to have significant impacts on oceans. Given the current absence of a global consensus on how to best tackle climate change— and the uneven distribution of emissions, mitigation efforts, adaptation capacity, and vulnerability— it is not difficult to anticipate a future where countries faced with the impacts of unmitigated climate change will have divergent views on whether and how to use geoengineering technologies to avoid the worst impacts.

Geoengineering options, however, come with their own impacts, risks, and uncertainties. These impacts, risks, and uncertainties will likely be viewed differently in different parts of the world. Countries at risk from the impacts of sea level rise or extreme weather events, for example, after decades of failed attempts to push for adequate mitigation, may at some point feel justified to implement geoengineering options unilaterally, especially if they offer cost effective ways to prevent impacts that can no longer be avoided through global emission reduction efforts. More generally, some regions will be more vulnerable to climate change, some regions will be more dependent on ocean resources, and some regions will have higher capacity to adapt to climate change. Consequently, the uneven distribution of potential benefits, impacts, risks and uncertainties can reasonably be expected to lead to disputes over the deployment of geoengineering.

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[2] United Nations Framework Convention on Climate Change, May 9, 1992, 1771 UNTS 107, 31 ILM 849 (entered into force Mar. 21, 1994).

[3] See, for example, reference to geoengineering in Thomas F Stocker et al, eds, *Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change: Summary for Policymakers (Switzerland: IPCC, 2013)*, at 27

[4] David W Keith, "Geoengineering the Climate: History and Prospect," 25 Annu Rev Energy Environ 245, 247 (2000). This is also the definition adopted by the IPCC Expert Meeting on Geo-engineering. See Ottmar Edenhofer et al, eds, *IPCC Expert Meeting on Geoengineering: Meeting Report* (Potsdam, Germany: IPCC, 2011), online: IPCC < http://www.ipcc-wg3.de/publications/supporting-material-1/EM-GeoE-Meeting-Report-final.pdf>.

[5] *Id*.

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This chapter explores how the dispute settlement procedures under the 1982 Convention on the Law of the Sea (UNCLOS)[6] and the UNFCCC are likely to respond to disputes over ocean based geoengineering initiatives designed to counter the effects of climate change. This focus is chosen to illustrate the challenge of solving such disputes, recognizing that there are many other forums that may be utilized to resolve geoengineering disputes. Among these are other multilateral environmental agreements (MEAs), such as the Convention on Biological Diversity,[7] human rights tribunals, and domestic courts.[8]

This chapter addresses the issues surrounding dispute resolution over geoengineering in five steps. First, the promise, impacts, risks, and uncertainties surrounding geoengineering in the oceans are briefly explored. Second, possible violations of substantive provisions of UNCLOS or UNFCCC as a result of unilateral ocean iron fertilization (OIF) effort by member states are identified. Third, an overview of the various dispute settlement procedures under UNCLOS and the UNFCCC is provided. An assessment of key issues, such as choice of procedure, triggering, and mechanism for resolving disputes over geoengineering is offered. The chapter concludes with some final thoughts on dispute settlement at the intersection of ocean governance and climate change.

I. Ocean-based Geoengineering Methods

In a post-Kyoto world of stalled climate negotiations and continuously rising greenhouse gas emissions, geoengineering has attracted the interest of those looking beyond conventional mitigation solutions. Geoengineering can be classified into two basic methods: direct carbon dioxide removal (CDR), and solar radiation management (SRM).[9] CDR refers to mechanisms that remove atmospheric CO_2, and thus address one of the causes of anthropogenic climate change by reducing the greenhouse effect.[10] CDR methods include large-scale enhancements of land-based sinks, weather modification, and biochemical and mechanical schemes intended to increase the oceanic uptake of CO_2.[11] SRM methods aim to mitigate climate change by reducing the amount of solar radiation that the Earth absorbs, by changing the planetary albedo, or reflectivity.[12] One notable advantage of SRM over CDR is that the climate change mitigation

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[6] *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 3; 21 ILM 1261.
[7] Convention on Biological Diversity, June 5, 1992, 1760 U.N.T.S. 79; 31 ILM 818.
[8] *See* Lord et al., CLIMATE CHANGE LIABILITY: TRANSNATIONAL LAW AND PRACTICE (Richard Lord et al., eds., Cambridge University Press, 2012). (providing an overview of a range of possible climate related disputes). Unless otherwise specified, it is assumed for purposes of this chapter that the proponents and opponents of geoengineering projects are states rather than private actors, as the dispute resolution mechanisms considered in this chapter are designed for state actors.
[9] Catherine Redgwell, *Geoengineering the Climate: Technological Solutions to Mitigation - Failure or Continuing Carbon Addiction*, 2 CARBON & CLIMATE L. REV. 178, 179 (2011).
[10] The Royal Society, *Geoengineering the climate; science, governance and uncertainty*, THE ROYAL SOCIETY 1, 1 (2009).
[11] The IPCC Expert Meeting on Geoengineering notes that not all CDR activities fall within the definition of geo-engineering, but they take the view that any could given a large enough scale and intent. *See* Ottmar Edenhofer et al. eds., *IPCC Expert Meeting on Geoengineering: Meeting Report* (Potsdam, Germany: IPCC, 2011) at 6.
[12] The Royal Society, *Geoengineering the climate; science, governance and uncertainty*, THE ROYAL SOCIETY 1, 1 (2009).

effects can be observed much faster for SRM methods.[13] Geoengineering activities can take place on land, in the ocean, in the atmosphere, or in space, though land and ocean-based methods have been the subject of the most experiments to date. In the following section, SRM and CDR methods of geoengineering that utilize the oceans are briefly described.

A. SRM Methods

1. Aerosol Marine Cloud Brightening

Injection of aerosols into clouds is an SRM strategy that can be deployed from the oceans. It would involve a fleet of remote controlled vessels that would spray water droplets into marine clouds with the aim of increasing cloud condensation, and thus raising cloud albedo.[14] Models show that impacts are unlikely to be homogeneous,[15] so it is difficult to predict its efficacy. Cost estimates of marine cloud modification by aerosol injection from ships are generally significantly lower than conventional mitigation measures, though estimates are subject to considerable uncertainties.[16] Aerosol marine cloud brightening can cause changes in precipitation and weather patterns, and have potentially adverse effects on the ozone layer and high-altitude clouds.[17]

2. Ocean Surface Albedo Modification

This SRM method involves altering the reflectivity of the surface of the ocean. Seitz, for example, describes a technology where instead of injecting aerosols into clouds, tiny bubbles of air, or hydrosols, are injected into the surface of the water.[18] The brightened surface has higher albedo, which results in lower heat absorption. Hydrosols may be preferable to aerosols, because they have a shorter life cycle, and their effect can be more tailored if negative ecological impacts are observed.[19] Ships equipped with the technology to disperse hydrosols already exist, and the application of hydrosols can be more localized compared to cloud-brightening aerosols.[20] While this method does not pose as much risk to the global weather patterns, it could alter ocean

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[13] Ken Caldeira et. al., *The Science of Geoengineering*, 41 ANNUAL REV. OF EARTH AND PLANETARY SCIENCES 231, 250 (2013).
[14] H. Korhonen et. al., *Enhancement of marine cloud albedo via controlled sea spray injections: a global model study of the influence of emission rates, microphysics and transport*, 10 ATMOSPHERIC CHEMISTRY AND PHYSICS 4133, 4134 (2010); albedo refers to the reflectivity of a surface, measured as a function of the amount of solar irradiation to the amount that is reflected. See Gernot Klepper & Wilfried Rickels, "The Real Economics of Climate Engineering" (2012) 2012 Economics Research International, Article ID 316564 at 3.
[15] H. Korhonen et. al., *Enhancement of marine cloud albedo via controlled sea spray injections: a global model study of the influence of emission rates, microphysics and transport*, 10 ATMOSPHERIC CHEMISTRY AND PHYSICS 4133, 4141 (2010).
[16] Gernot Klepper & Wilfried Rickels, "The Real Economics of Climate Engineering" (2012) 2012 Economics Research International, Article ID 316564 at 7.
[17] The Royal Society, *Geoengineering the climate; science, governance and uncertainty*, THE ROYAL SOCIETY 1, 31 (2009).
[18] Russel Seitz, *Bright water: hydrosols, water conservation and climate change*, 105 CLIMATIC CHANGE 365, 366 (2011).
[19] *Id*. at 376.
[20] *Id*. at 375-76.

convection patterns, increase ocean acidification, and affect marine life through pollution and changing light conditions.[21]

B. CDR Methods

1. Ocean-based Weathering

This CDR method works by increasing the ocean's alkalinity, either by adding strong bases into the water, or through an electrochemical reaction.[22] Since higher uptake of atmospheric CO_2 by the oceans can lead to ocean acidification, this method would counter that process, and encourage further absorption of CO_2. Some of the drawbacks include the safety concerns with transporting the chemicals necessary for dissolution, or the energy necessary to complete the electrochemical reaction.[23] In addition, large areas of ocean would be involved in deploying this technology, and substantial land areas affected by the mining of the resources needed.[24] As an alternative, the chemical reaction can take place at a power plant where CO_2 is being released, and the solution that would be created by that process would then be released to the oceans.[25]

2. Physical Pump

Another CDR technology that can use the oceans is a physical pump, consisting of large vertical pipes that will enhance the downwelling and upwelling effects within the ocean. The idea is that increasing the circulation of the water will increase CO_2 sequestration rates.[26] Despite the natural solubility pump contributing more to the deep ocean CO_2 deposits than the biological pump, current estimates of the efficacy of this CDR method show that a displacement of 1 million m^3/s would only result in a sequestration of 0.01 to 0.02 GtC/year.[27] Solubility pump projects carry the risk of transporting dissolved CO_2 from the deep ocean to the surface, and releasing it into the atmosphere.[28]

3. Biological Pump: Ocean Iron Fertilization (OIF)

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[21] Alan Roboc, *Bubble, bubble, toil and trouble: An editorial comment*, 105 CLIMATIC CHANGE 383, 383-84 (2011).
[22] KZ House et al, *Electrochemical acceleration of chemical weathering for carbon capture and sequestration*, 1 ENERGY PROCEDIA 4953, 4954 and 4958 (2009)
[23] KZ House et al, *Electrochemical acceleration of chemical weathering for carbon capture and sequestration*, 1 ENERGY PROCEDIA 4953,4958-59 (2009).
[24] Ken Caldeira et al., *The Science of Geoengineering*, 41 ANN. REV. OF EARTH & PLANETARY SCI., 231, 249 (2013).
[25] Ken Caldeira et al., *The Science of Geoengineering*, 41 ANNUAL REV. OF EARTH AND PLANETARY SCIENCES, 231, 247 (2013).
[26] UK, Royal Society, *Geoengineering the climate; science, governance and uncertainty* (RS Policy document 10/09) Chair: Professor John Shepherd (London, UK: The Royal Society, 2009) at 19.
[27] Ibid.
[28] Rosemary Rayfuse & Robin Warner, "*Climate change mitigation activities in the ocean: turning up the regulatory heat*, *in* CLIMATE CHANGE AND THE OCEANS: GAUGING THE LEGAL AND POLICY CURRENTS IN THE ASIA PACIFIC AND BEYOND 234, 239 (Warner & Clive Shofield et al. eds., Edward Elgar 2012) .

Phytoplankton close to the ocean surface draws CO_2 from the atmosphere by performing photosynthesis and turning CO_2 into organic carbon.[29] OIF works as a CDR mechanism by increasing the productivity of the plankton, and thus drawing down CO_2 from the atmosphere.[30] The most efficient location for OIF is in the Southern Ocean, an area with high-nutrient low-chlorophyll (HNLC) waters, where the main factor limiting CO_2 absorption is iron.[31] Once iron is added, plankton growth is encouraged, and more photosynthesis occurs. The definition of OIF under the London Convention and the London Protocol is "any activity undertaken by humans with the intention of stimulating primary productivity in the oceans"[32] The economic appeal of OIF is potentially strong: the estimated cost, again subject to high uncertainties, is significantly lower than conventional mitigation options.[33]

OIF is perhaps the most piloted and researched ocean-based method. Between 1993 and 2009, 13 *in situ* ocean fertilization experiments were conducted. A number of factors that may limit its efficacy were discovered.[34] Despite the extensive research that has been conducted, the potential environmental effects of OIF are not well known. Some of the possible negative effects include increased ocean acidification and algal blooms, leading to eutrophication and anoxia.[35] Algal blooms can travel, and thus cause an impact on a much larger area of the ocean than what was originally fertilized. The increase in phytoplankton resulting from OIF comes at the base of the food chain.[36] There is a potential positive aspect associated with the growth of algae: an OIF technique was actually patented as a way of increasing fish stocks.[37] It is unclear, however, how the increase in productivity will affect individual species and ecosystems.

C. Concerns Regarding Geoengineering Methods

In addition to specific concerns associated with each of the individual SRM and CDR methods described above, there are general concerns with the use of geoengineering to mitigate climate change. First, given the current state of knowledge, which is largely theoretical, it is

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[29] Ken Caldeira et al., *The Science of Geoengineering*, 41 ANNUAL REV. OF EARTH & PLANETARY SCI., 231, 247 (2013).
[30] UK, Royal Society, *Geoengineering the climate; science, governance and uncertainty* (RS Policy document 10/09) Chair: Professor John Shepherd (London, UK: The Royal Society, 2009) at 17.
[31] Randall S. Abate & Andrew B. Greenlee, *Sowing Seeds Uncertain: Ocean Iron Fertilization, Climate Change, and the International Environmental Law Framework*, 27 PACE ENVTL. L. REV. 555, 564. (2010).
[32] *Resolution on the Regulation of Ocean Fertilization*, LC-LP.1(2008) LC 30/16 Annex 6 (Adopted on Oct. 31, 2008) at para 1.
[33] Gernot Klepper & Wilfried Rickels, "The Real Economics of Climate Engineering" (2012) 2012 Economics Research International, Article ID 316564 at 6. Need a better citation for this source
[34] Till Markus & Harald Ginzky, *Regulating Climate Engineering: Paradigmatic Aspects of the Regulation of Ocean fertilization,* CARBON & CLIMATE L. REV. 477, 478 (2011).
[35] Karen N Scott, *International Law in the Anthropocene: Responding to the Geoengineering Challenge*, 34 MICH. J. INT'L L. 309, 324 (2013).
[36] Terry Barker, et al., *Mitigation from a cross-sectoral perspective*, *in* CLIMATE CHANGE 2007: MITIGATION. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTER-GOVERNMENTAL PANEL ON CLIMATE CHANGE 619, 625 (B. Metz et al., eds., Cambridge UP 2007).
[37] "Method of Increasing Seafood Production in the Barren Ocean with Fertilizer Comprising Chelated Iron, U.S. Patent No. 6,408,792 (filed Oct. 19, 2001). In 2012, a Canadian First Nation carried out an OIF experiment in the Pacific Ocean for the expressed purpose of capturing carbon and restoring salmon populations. See Jim Lee, "The Haida Salmon Restoration Project: Dumping iron in the ocean to save fish, capture carbon" *CV News* (10 October 2013), online: <http://climateviewer.com>.

difficult to determine whether the negative impacts of some geoengineering projects would outweigh the promised results, and whether it would lead to yet unknown environmental and social damage.[38]

Second, successfully deploying geoengineering strategies risks reducing the incentive to lower greenhouse gas emissions, and thus cause a moral hazard by becoming a substitute to more direct action on climate change. [39] Even the serious consideration of geoengineering may result in a reduction of effort to pursue more traditional climate mitigation solutions by governments and private investors alike. This moral hazard is exacerbated by the fact that some geoengineering proposals do not mitigate all negative impacts of climate change; for example, albedo modification still leaves the oceans open to acidification from atmospheric CO_2. Geoengineering could leave important effects of the increase in GHG concentrations unmitigated, but could nevertheless gain traction with those reluctant to change because it does not challenge the status quo of high carbon consumption.[40]

Finally, and perhaps most pertinent to this chapter, the explicit purpose of geoengineering is to cause global effects on the climate system, while most ocean-based SRM and CDR methods can be carried out unilaterally. This means proponents may be faced with international conflict and questions about the legitimacy of their efforts.[41] In the final analysis, it is the cost and the ability to act unilaterally that has the greatest potential to make geoengineering attractive to states most vulnerable to unmitigated climate change who may grow increasingly frustrated by the global stalemate on conventional mitigation, adaptation, and loss and damage, and the increasing evidence of dramatic impacts.

II.. Possible Geoengineering Disputes under the UNFCCC

Identifying specific substantive disputes related to geoengineering under the UNFCCC regime is a particular challenge given the state of the UNFCC regime. Some of the key elements of the current regime, particularly those contained in the Kyoto Protocol,[42] are not likely to survive past 2020. Many new elements are currently under active negotiation. Elements of the framework convention itself could be amended as a result of the negotiations currently under way. It is far from clear whether the issue of geo-engineering will be specifically addressed as part of the 2015 agreement, or whether agreement will be reached at all.[43] As a result of these uncertainties, possible disputes under the UNFCCC related to geo-engineering are considered at a fairly high level.

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[38] Karen N Scott, *International Law in the Anthropocene: Responding to the Geoengineering Challenge*, 34 MICH. J. INT'L L. 309, 321 (2013).
[39] Jesse Reynolds, *The Regulation of Climate Engineering*, 3(1) LAW, INNOVATION AND TECH. 113, 123 (2011).
[40] John Virgoe, *International governance of a possible geoengineering intervention to combat climate change*, 95 CLIMATIC CHANGE 103, 105 (2009).
[41] Till Markus & Harald Ginzky, *Regulating Climate Engineering: Paradigmatic Aspects of the Regulation of Ocean fertilization,* CARBON & CLIMATE L. REV. 477, 483 (2011).
[42] *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 11 December 1997, 2303 UNTS 148, 37 ILM 22 (entered into force 16 February 2005).
[43] For an overview of the state of the negotiations, see "Warsaw Highlights: Monday 11 November 2013" *Earth Negotiation Bulletin* (12 November 2013) 12(584) International Institute for Sustainable Development online: IISD <http://www.iisd.ca/climate/cop19/enb/>

Disputes under the UNFCCC with respect to geoengineering would likely fall into two broad categories. One would explore whether geoengineering generally or a specific method is prohibited under the UNFCCC. There is little basis for such positions under the UNFCCC as it stands as of this writing, but it is conceivable that the 2015 agreement could address the appropriateness of geoengineering as a way to achieve the objectives of the UNFCCC.

The second category would consider whether geoengineering generally or specific methods are recognized, endorsed, or otherwise sanctioned under the UNFCCC in some form. Framed most broadly, disputes could focus on whether geoengineering efforts are considered to be efforts consistent with the ultimate objective of the UNFCCC in Article 2. More specifically, they could entail question about whether efforts to pursue geoengineering would count toward a Party's mitigation or adaptation efforts, finance obligations, or commitments regarding the development and dissemination of climate technologies. An emerging issue might include whether impacts from geoengineering could be the basis for assistance under the emerging loss and damage mechanism.[44]

In the absence of more specific agreement on the role of geo-engineering, there are some general provisions in the UNFCCC that may offer some basis for resolving these disputes. The UNFCCC preamble, for example, draws on a number of principles from the 1972 Stockholm Declaration.[45] Some of the provisions that may be relevant to a dispute include Principles 2, 3, 6, 7, and 21. Of these, Principle 21, a codification of the customary international law principle against transboundary harm, is the one specifically referenced in the preamble, so is most likely to be given weight in case of a dispute under the UNFCCC.

Article 2 also has potential to be relevant in disputes over geoengineering: The ultimate objective of the convention is to "achieve, in accordance with the relevant provisions of the Convention, the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[46] With regard to SRM methods, this provision makes it clear that the UNFCCC priorities lie in addressing the root causes of climate change, namely concentrations of atmospheric CO_2, so it seems unlikely that proponents of SRM geoengineering will be able to argue that their purpose is to fulfil the ultimate objective of the Convention.

Article 3.3 potentially raises complex questions about the application of precaution to geoengineering.[47] Assuming that uncertainty over the impacts of geoengineering continues, it seems clear that as long as conventional mitigation measures still have a reasonable chance to succeed, precaution would weigh against implementing geoengineering methods. However, if

[44] The current state of the mechanism is reflected in decisions made in Warsaw in November, 2013. See Decision 2/CP.19, Warsaw International Mechanism for Loss and Damage Associated with Climate Change Impacts included in Report of the Conference of the Parties on its Nineteenth Session, held in Warsaw from 11 to 23 November 2013, U.N. Doc. FCCC/CP/2013/10/Add.1, 31 January 2014.
[45] United Nations Conference on the Human Environment, Stockholm, Swed., June 16, 1972, *Declaration of the United Nations Conference on the Human Environment*, U.N. Doc. A/CONF.48/14/Rev.1 (1973).
[46] United Nations Framework Convention on Climate Change, May 9, 1992, 1771 UNTS 107, art. 2, 31 ILM 849 (entered into force Mar. 21, 1994)
[47] *Ibid* at art. 3.

geoengineering methods are pursued at a time when conventional mitigation is unlikely to prevent run-away climate change, it will be much more debatable whether a precautionary approach would advocate for or against the use of geoengineering. Furthermore, differences between SRM and CDR methods would suggest some significant differences in the application of precaution, most notably the fact that CDR methods may address ocean acidification and other effects of GHG emissions while SRM methods do not.

Finally, Article 4.1(b) and (d) are likely to be relevant to disputes over the use of geoengineering as mitigation measures. Subsection (b) provides a general mandate that "Parties shall formulate and implement programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases."[48] Subsection (d) more specifically commits Parties to "promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs … including … oceans as well as other terrestrial, coastal and marine ecosystems."[49]

Oceans are specifically identified as a significant sink for greenhouse gases. These provisions could therefore be used by a party to seek to justify geoengineering projects as fulfilling these commitments under the Convention. For developed country parties, this commitment is further reiterated in Article 4.2(a), which states that they shall develop national measures to mitigate climate change by protecting and enhancing greenhouse gas sinks and reservoirs. Similarly to Article 4.1(b), the provision does not mandate a specific activity.

On balance, it would seem difficult to use UNFCCC articles 3.3, 4.1(b) and 4.1(d) as persuasive justifications for deploying geoengineering projects because the UNFCCC does not mandate the impugned action specifically. According to article 33.3(b) of the Vienna Convention on the Law of Treaties, in interpreting a treaty, "any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation" shall be taken into account.[50] This would imply that if parties have not generally accepted the meaning of the UNFCCC to be that of *compelling* specific action, they cannot use it as a defense. To date, the more reasonable interpretation of UNFCCC would seem to be that it is not compelling specific actions. Furthermore, paragraph (c) states that one must also consider "any relevant rules of international law applicable in the relations between the parties," meaning the position could not be supported without discharging the state's responsibility pursuant to general principles of international environmental law, notably the prevention of transboundary harm.[51]

The role of geoengineering as an appropriate mitigation strategy under the UNFCCC will be brought to the attention of UNFCCC negotiators as a result of the release of the IPCC Fifth Assessment report.[52] To date, however, there has been no official endorsement by the IPCC,

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[48] United Nations Framework Convention on Climate Change, May 9, 1992, 1771 UNTS 107, art. 4.1(b), 31 ILM 849 (entered into force Mar. 21, 1994).
[49] *Ibid* at art. 4.1(d).
[50] Vienna Convention on the Law of Treaties, art. 31.3(b), May 23 1969, 1155 UNTS 331.
[51] Vienna Convention on the Law of Treaties, art. 31.3(c), May 23 1969, 1155 UNTS 331.
[52] Thomas F Stocker et al, eds, *Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change: Summary for Policymakers (Switzerland: IPCC, 2013)*. See also

which defines mitigation as "actions that reduce net carbon emission and limit long-term climate change."[53] In its Fourth Assessment Report in 2007, geoengineering is referred to as "speculative."[54] It is not examined as thoroughly, due to a lack of studies showing reliable results.[55]

In 2011, the Intergovernmental Panel on Climate Change (IPCC) Expert Meeting on geoengineering concluded that there could be some overlap between geoengineering and mitigation, but did not discuss the possibility of updating the definition of mitigation to include geoengineering.[56] The report does, however, refer to CDR geoengineering methods as addressing the same point of the carbon cycle as some accepted mitigation techniques.[57]

The Summary for Policy Makers released as part of the Fifth Assessment Report of the IPCC only briefly mentions geo-engineering. It points out, for example, that many impacts of climate change are already irreversible unless GHGs are actively removed from the atmosphere. The IPCC refrains from making a comprehensive quantitative assessment of geoengineering, pointing again to the lack of sufficient evidence. It does, however, highlight some of the limitations of CDR methods, and states that SRM methods "have the potential to substantially offset a global temperature rise," but could give rise to further environmental concerns.[58]

III. Dispute Settlement under the UNFCCC

MEAs have generally distinguished between non-compliance procedures (NCP) and dispute settlement procedures (DSP). NCPs focus on questions of a Party's compliance with its treaty commitments and obligations, whereas DSPs are designed more broadly to deal with disputes related to or arising out of a treaty. The UNFCCC makes provision for both, though the NCP has to date not been set up, and neither process has been used.

The NCP in the form of a multilateral consultative process, contemplated under Article 13 of the Convention, is not required. The COP is simply mandated to consider the establishment of such a process to be available for Parties to resolve questions regarding the implementation of

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Catherine Redgwell, *Geoengineering the Climate: Technological Solutions to Mitigation - Failure or Continuing Carbon Addiction*, 2 CARBON & CLIMATE L. REV. 178, 180 (2011).

[53] Brian Fisher, et al., *Issues related to mitigation in the long-term context*, *in* CLIMATE CHANGE 2007: MITIGATION. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTER-GOVERNMENTAL PANEL ON CLIMATE CHANGE 169, 225 (B. Metz et al, eds., Cambridge UP 2007).

[54] Terry Barker, et al., *Mitigation from a cross-sectoral perspective*, *in* CLIMATE CHANGE 2007: MITIGATION. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTER-GOVERNMENTAL PANEL ON CLIMATE CHANGE 619, 624 (B. Metz et al, eds., Cambridge UP 2007).

[55] Terry Barker, et al., *Mitigation from a cross-sectoral perspective*, *in* CLIMATE CHANGE 2007: MITIGATION. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTER-GOVERNMENTAL PANEL ON CLIMATE CHANGE 619. (This is, of course, consistent with the IPCC's overall mandate, which is to assess the existing research literature, not to carry out its own research).

[56] Ottmar Edenhofer et al, eds, *IPCC Expert Meeting on Geoengineering: Meeting Report* (Potsdam, Germany: IPCC, 2011) at 2.

[57] *Id.* at 3.

[58] Thomas F Stocker et al, eds, *Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change: Summary for Policymakers (Switzerland: IPCC, 2013)*, at 27.

the Convention.[59] After some effort to develop this multilateral consultative process during the early COPs, this effort has been abandoned for the time being.

Article 14 of the UNFCCC establishes the more traditional DSP.[60] While it has not been used to date, its essential elements are set out in Article 14 of the Convention with the following three defining features. First, the process only contemplates disputes among Parties.[61] Second, Parties have some choice over the process, with compulsory conciliation serving as the default if parties have not either selected the same compulsory process or otherwise agree on a process for resolving their dispute.[62] Third, the outcome of the compulsory conciliation process is non-binding.[63]

Process options other than the default conciliation process include the International Court of Justice (ICJ) and arbitration.[64] Declarations regarding choice of forum can be made under Article 14.[65] The Netherlands have accepted both the ICJ and arbitration as compulsory with regards to countries that have accepted one or both of these forms, and the Solomon Islands have accepted arbitration as compulsory.[66] As a result, a dispute under the UNFCCC DSP is most likely to proceed through conciliation, assuming disputing Parties do not otherwise agree after the dispute has been formally registered.

The dispute settlement mechanism under Article 14 of the UNFCCC is open to Parties to the Convention, which include states and regional economic integration organizations (the European Union). Private actors are not parties to the Conventions, and would therefore not be able to initiate a DSP. If a state party wanted to pursue the settlement of a dispute relating to a geoengineering project, the dispute would have to be brought against a state party with some responsibility for the project, even if a privately owned corporation executed it.

UNFCCC does not exclude other avenues for settling disputes; it actually provides for this possibility under Art 14.1.[67] If, however, the dispute is not settled twelve months after the notification of the existence of a dispute, it shall be submitted to conciliation.[68] An exception arises where both parties have made [the same] default selection under 14.2.[69] It is unlikely that this would arise under current conditions, given the small number of parties who have made a selection, so an unresolved dispute is most likely to go to conciliation after twelve months.

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[59] United Nations Framework Convention on Climate Change*,* May 9, 1992, 1771 UNTS 107, art. 13, 31 ILM 849 (entered into force Mar. 21, 1994).
[60] *Ibid* at art. 14.
[61] *Ibid* at art. 14.1.
[62] *Ibid* at art. 14.5.
[63] *Ibid* at art. 14.6.
[64] *Ibid* at art. 14.2.
[65] *Ibid*.
[66] United Nations Framework Convention on Climate Change, *Declarations by Parties*, Online: UNFCCC <https://unfccc.int>.
[67] United Nations Framework Convention on Climate Change*,* May 9, 1992, 1771 UNTS 107, art. 14.1, 31 ILM 849 (entered into force Mar. 21, 1994).
[68] *Ibid* at art. 14.5.
[69] *Ibid*.

Article 14 does contemplate guidance from the COP on the design of arbitration and conciliation procedures,[70] though no such procedures have been finalized to date. The focus of the COP instead has shifted to the Kyoto Protocol. The Protocol adopted the DSP of the UNFCCC, but also developed a detailed NCP in the form of a compliance system to deal with the full range of commitments and obligations Parties accepted under the Protocol, ranging from accounting and reporting on emissions and credits to meeting specific emission reduction targets.

The Kyoto compliance system consists of a facilitative branch responsible for a broad range of Party commitments, and an enforcement branch with a mandate to impose prescribed consequences for breaches of obligations dealing with emission reduction targets and accounting of emissions and credits. While the DSP and the facilitative branch of the Kyoto compliance system have been essentially inactive, the enforcement branch of the Kyoto compliance system has rendered a number of decisions, and is likely to continue to be active for a few more years. The rulings of the enforcement branch could potentially serve as a resource to other dispute settlement processes.[71] While an assessment of the Kyoto compliance mechanism is beyond the scope of this chapter, its future is currently very much in doubt as the current negotiations are based on an expectation that the Kyoto Protocol itself will not continue past its second commitment period.[72]

Beyond these non-compliance and dispute settlement procedures under the UNFCCC and the Kyoto Protocol, the COP itself has played a significant role in dealing with disputes that have arisen under the UNFCCC. Among such disputes that have come before the COP have been appeals of decisions of the Kyoto compliance committee[73] and complaints about decisions of other institutions created within the UNFCCC, such as the Clean Development Mechanism.[74] As the number of institutions under the UNFCCC grows, so will the pressure to develop formal dispute resolution mechanisms to respond to complaints from Parties and private actors about the manner in which these institutions are carrying out their mandates.

There is only limited guidance on how disputes over the appropriate forum for resolving disputes might be resolved. The Kyoto compliance system is clear on the limits of its mandate, as is the appeal procedure from the Kyoto compliance system to the COP. This still leaves ample room for disagreements among Parties as to which forum would be most appropriate to resolve a given dispute. Furthermore, none of the current mechanisms is accessible to non-parties, though negotiations are under way on a possible appeal mechanism for decisions of the CDM executive board by non-parties affected by a decision.[75]

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[70] *Ibid* at art 14.6.
[71] *See* Ruth MacKenzie, *The role of dispute settlement in the climate regime*, *in* PROMOTING COMPLIANCE IN AN EVOLVING CLIMATE CHANGE REGIME 403 (Brunnee et al., Cambridge University Press 2012).
[72] *See* M. Doelle, *Experience with the Kyoto Compliance System*, *in* PROMOTING COMPLIANCE IN AN EVOLVING CLIMATE CHANGE REGIME (Brunnee et. al., Cambridge University Press 2012) (providing an overview of the Kyoto compliance system).
[73] *Id*, see discussion of the case against Croatia at 115.
[74] "Warsaw Highlights: Monday 11 November 2013" *Earth Negotiation Bulletin* (12 November 2013) 12(584) International Institute for Sustainable Development online: IISD <http://www.iisd.ca/climate/cop19/enb/> at 3.
[75] "Summary of the Warsaw Climate Change Conference: 11-23 November 2013" *Earth Negotiation Bulletin* (26 November 2013) 12(594) International Institute for Sustainable Development online: IISD <http://www.iisd.ca/climate/cop19/enb/> at 17.

It is conceivable that a dispute over geoengineering under the UNFCCC would turn into a debate over the seriousness of environmental impacts, risks, and uncertainties of the geo-engineering technology compared to the impacts, risks and uncertainties of unmitigated climate change, with the precautionary principle at the center of the debate. At the heart of such a dispute would be the magnitude of the harm. Which set of negative effects will be more serious: the loss of fish stocks and damage to the marine ecosystem due to anoxia, for example, or the increase in the effects of climate change as a result of a decision not to deploy geoengineering?

In addition to comparing the magnitude of harm, the resolution of a dispute over geoengineering under the UNFCCC would likely also turn on the nature of the harm. For example, article 3.3 of the UNFCCC seems to place climate change "above" other environmental impacts in terms of the application of the precautionary principle.[76] The argument could be centered on the effectiveness of the geoengineering technology, the question of how much CO_2 it could sequester, and what climate impacts these efforts could avoid. Underlying all these issues would be the risk and uncertainties, which are considerable both with respect to the impacts of geoengineering, and the impacts of unmitigated climate change. As discussed in the following sections, a dispute under UNCLOS may have a different focus, as it may be more squarely focused on the impacts on marine ecosystems.

IV. Possible Geoengineering Disputes under UNCLOS

Compared to the UNFCCC, relevant provisions under UNCLOS are easily identified, have been in place for decades, and are not subject to active negotiations. This allows for a more concrete assessment of how the provisions of UNCLOS may respond to geoengineering disputes. The most relevant group of obligations under UNCLOS that are likely to be relevant are provisions in Part XII dealing with the protection of the marine environment, particularly Articles 192, 194, 195, and 210.[77]

UNCLOS, Part XII deals generally with State obligations with respect to the marine environment. As early as 1991, academics characterized Part XII as constitutional in character, reflecting in part existing custom, but at the same time providing the first comprehensive statement on the protection of the marine environment in international law.[78]

The starting point for Part XII is a general obligation under Article 192 to "protect and preserve the marine environment,"[79] balanced with a reaffirmation of the right of States to exploit their natural resources "in accordance with their duty to protect and preserve the marine

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[76] United Nations Framework Convention on Climate Change, May 9, 1992, 1771 UNTS 107, art. 3.3, 31 ILM 849 (entered into force Mar. 21, 1994).
[77] UNCLOS, art.192, 194, 195, 210.
[78] *See* M.L. McConnell, et al., *The Modern Law of the Sea: Framework for the Protection and Preservation of the Marine Environment?*, 23 CASE W. RES. J. INT'L L. 83, 84 (1991). *See also* J.L. Hafetz, *Fostering Protection of the Marine Environment and Economic Development: Article 121(3) of the Third Law of the Sea Convention*, 15 AM. U. INT'L L. REV. 583, 597 (2000).
[79] *See* United Nations Convention on the Law of the Sea, art. 192, Dec. 10, 1982, 1833 U.N.T.S. 396. (hereinafter referred to as UNCLOS). This article is considered to reflect customary international law, and as such is binding on all States, not only Member States. *See* J.L. Hafetz, *supra* 17, at 598.

environment."[80] Under this part of the Convention, States are obligated to take all measures consistent with the Convention necessary "to prevent, reduce and control pollution of the marine environment *from any source*, using the best practical means."[81] Article 194 is central to any analysis of State obligations regarding geoengineering. It provides the foundation for the following specific obligations that provide further guidance on what a State may be expected to do to protect and preserve the marine environment:

- an obligation for States to act individually or jointly as appropriate[82];
- an obligation to take all measures necessary to prevent, reduce and control pollution of the marine environment[83];
- an obligation for States to use best practical means at their disposal[84];
- an obligation for States to act in accordance with their capabilities[85];
- an obligation to endeavour to harmonize policies with other States[86];
- an obligation for States to control activities under their control or jurisdiction so as to not cause damage by pollution to other States and their environment[87];
- an obligation to prevent pollution from spreading to areas outside of a State's jurisdiction of control[88]; and
- a specific obligation for the preservation and projection or rare or fragile ecosystems, and the habitat of species at risk.[89]

Article 195 directs States on measures to prevent, reduce, and control pollution of the marine environment.[90] It does so by obliging States to prevent the transfer of harm from one type or area to another. While the exact scope of this provision is not clear, it does, at a minimum, introduce the concept that measures must be designed so as to not result in other environmental damage, an issue that has been the subject of considerable controversy in the context of geoengineering. In so doing, UNCLOS may have been ahead of its time, providing a simple, yet potentially very effective tool to require States to take a holistic and integrated approach to addressing environmental issues.[91]

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[80] UNCLOS, art.193. This article is also considered to reflect customary international law. *See* J.L. Hafetz, *Fostering Protection of the Marine Environment and Economic Development: Article 121(3) of the Third Law of the Sea Convention*, 15 AM. U. INT'L L. REV. 583, 598 (2000).
[81] UNCLOS art. 194, Dec. 10, 1982, 1833 U.N.T.S. 396.
[82] UNCLOS, arts. 197, 207(4), and 212(3).
[83] The definition of "pollution" includes the addition of energy to the marine environment, see UNCLOS, art. 1
[84] United Nations Convention on the Law of the Sea, art. 194(1), Dec. 10, 1982, 1833 UNTS 396.
[85] *Id*.
[86] *Id*.
[87] *Id*. art. 194(2)
[88] *Id*.
[89] *Id*. art. 194(1), (2) and (5).
[90] *Id. Art 195*.
91 *See* J.I. Charney, *Implementing the United Nations Convention on the Law of the Sea: Impact of the Law of the Sea Convention on the Marine Environment*, 7 GEO. INT'L ENVTL. L. REV. 731, 732 (1995). *See also* Jonathan I. Charney, *The Marine Environment and the 1982 United Nations Convention on the Law of the Sea*, 28 INT'L LAW. 879.

Article 210 calls on states to adopt regulations "to prevent, reduce and control pollution of the marine environment by dumping."[92] This provision is generally interpreted as giving power to the 1972 London Convention, which provides for detailed international rules regulating dumping.[93] Breaching the general prohibition on OIF under the London Convention could be argued as a breach of UNCLOS pursuant to Article 210.[94] This could apply to other geoengineering methods that include actions that constitute "dumping." The importance of this link is accentuated by the recent negotiation of an amendment to the 1996 Protocol to the London Convention.[95] The exact relationship between the London ocean dumping regime and UNCLOS is far from clear. Uncertainties include whether the placement of iron constitutes dumping for purposes of Article 210, and whether the reference to the London Convention includes the 1996 Protocol and its 2013 amendments, which provide for a permitting process for the placement of iron for scientific purposes.[96]

Under certain circumstances, UNCLOS could be used as a possible justification for geo-engineering. A Party might make the case that the threat of climate change to ocean pH in the form of ocean acidification is more severe than the environmental harm of the geoengineering project. Since there is a strong link between atmospheric CO_2 and ocean acidification, sequestering CO_2 might be argued to fulfill a state's responsibility under UNCLOS Article 192 or 194(1).[97] This justification would, however, not be available for SRM methods. It is also less likely to be successful for OIF given the breadth of evidence regarding its potential negative environmental impacts.

V. Dispute Settlement under UNCLOS

The UNCLOS dispute settlement procedures set out in Part XV of UNCLOS have been described as rivalling the process set up under the World Trade Organization in terms of potential for resolving Party-to-Party disputes and the power conferred on dispute resolution tribunals,[98] although they are limited in scope to defined subject matters set out in UNCLOS.[99] The process is set out in three sections of Part XV. The first section establishes the rules under

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[92] UNCLOS, art.210.
[93] Karen N Scott, *International Law in the Anthropocene: Responding to the Geoengineering Challenge*, 34 MICH. J. INT'L L. 309, 339 (2013).
[94] *See* Randall S. Abate & Andrew B. Greenlee, *Sowing Seeds Uncertain: Ocean Iron Fertilization, Climate Change, and the International Environmental Law Framework*, 27 PACE ENVT'L L. REV. 555 (2010). (Providing an overview of ocean iron fertilization under UNCLOS).
[95] At of this writing, the text of the amendments to the 1996 Protocol was not available. For the announcement of the amendment, see http://www.imo.org/MediaCentre/PressBriefings/Pages/45-marine-geoengieneering.aspx
[96] *Id*.
[97] UNCLOS, art. 192, 192(1).
[98] *See* J.L. Hafetz, *Fostering Protection of the Marine Environment and Economic Development: Article 121(3) of the Third Law of the Sea Convention*, 15 AM. U. INT'L L. REV. 583, 597 and 632 (2000). *See also* D. Brack, *International Environmental Disputes*, (Royal Institute of International Affairs, 2001), at 11, and Brian K Myers, *Trade Measures and the Environment: Can the WTO and UNCLOS Be Reconciled*, 23 UCLA J. ENVT'L. L. & POL'Y 37. (2005)
[99] *See* Y. Shany, The Competing Jurisdiction of International Courts and Tribunals, 5 (Oxford University Press 2003). *See also* N. Klein, The Role of Dispute Settlement in the UN Convention on the Law of the Sea 129 – 24, (Cambridge University Press, 2005).

which the Parties to a dispute are to agree on a dispute settlement tool.[100] The second section sets rules for initiating a dispute settlement process in the absence of agreement.[101] The third section provides some limited exceptions to the binding dispute settlement process.[102] Two features of the UNCLOS process that have been particularly noted by commentators are the ability to initiate the process without having to agree on a procedure, on a case-by-case basis, and the binding nature of the outcomes.[103]

This part of the chapter considers how the dispute settlement process under UNCLOS would respond to a claim related to a State's use of marine-based geoengineering to reduce the impacts of climate change. It focuses on aspects of the UNCLOS dispute settlement process that are likely to be relevant to geoengineering.

As with many international dispute settlement procedures, the overriding obligation on Parties is to resolve disputes through peaceful means.[104] Parties are encouraged to seek agreement on how to resolve disputes. The binding settlement process set out in Part XV of UNCLOS is intended as a safeguard for cases where disputes cannot be resolved by Parties on their own, and where they are unable to agree on a process for resolving the dispute peacefully.[105] Consensus on how to resolve a dispute will often take the form of a specific agreement reached at some point after the dispute arises. Agreement can also arise from State obligations enshrined in another treaty to which the disputing countries are Parties, if that treaty sets out a process for resolving disputes under UNCLOS.[106] Whether the UNCLOS dispute settlement process can be initiated, therefore, depends in general terms on whether a settlement is reached through an alternate process agreed to by the Parties, and whether the alternate process excludes the application of the UNCLOS dispute settlement process.[107]

Subject to these conditions, any Party to UNCLOS can initiate a binding dispute settlement process against another Party to the Convention.[108] The choice of procedure is determined based on a number of factors, including any declarations filed by the Parties under Article 287(1) on which of the following procedures are acceptable to it:

- the International Tribunal for the Law of the Sea (ITLOS) process under Annex VI[109];

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[100] *See* United Nations Convention on the Law of the Sea, art. 279 -85, Dec. 10, 1982, 1833 UNTS 3; 21 ILM 1261.
[101] *Id*. art. 286 - 96.
[102] *Id*. art. 297 - 99.
[103] *See, e.g.*,, B. Kwiatkowska, *The Australia and New Zealand v. Japan Southern Bluefin Tuna (Jurisdiction and Admissibility) Award of the First Law of the Sea Convention Annex VII Arbitral Tribunal*, 16 INT'L J. MAR. & COAST. L. 239 (2001).
[104] See UNCLOS art. 280
[105] United Nations Convention on the Law of the Sea, art. 279 -81, Dec. 10, 1982, 1833 UNTS 3; 21 ILM 1261.
[106] *Id*. art. 288(2). For a treaty that specifically relies on the UNCLOS binding dispute resolution process, see the 1995 UN Fish Stock Agreement, art. 30, Aug. 4, 1995, 34 ILM 1542.
[107] *Id*. UNCLOS, art. 281(1). This provision was at the heart of the recent Bluefin Tuna Arbitral Tribunal ruling discussed below.
[108] *Id*. art. 286.
[109] For an overview of the ITLOS process and its rulings to date, see A. Rest, *Enhanced Implementation of International Environmental Treaties by Judiciary – Access to Justice in International Environmental Law For Individuals and NGOs: Efficacious Enforcement by the Permanent Court of Arbitration*, 1 MACQUARIE J. OF INT'L

- the International Court of Justice (ICJ)[110];
- an arbitral tribunal established under UNCLOS, Annex VII[111]; or
- a special arbitral tribunal established under UNCLOS Annex VIII.[112]

In the absence of a declaration, a Party is deemed to have selected the arbitral tribunal procedure under Annex VII.[113] In cases where two Parties to a dispute have not selected a common procedure in their respective declarations, the arbitral tribunal procedure under Annex VII will likewise be the applicable procedure. Regardless of the choice of procedure, the tribunal chosen has general jurisdiction concerning the interpretation and application of UNCLOS, and has the authority to determine its own jurisdiction to hear a particular dispute.[114] In addition to UNCLOS, a tribunal selected to resolve a dispute under these provisions is authorized to consider other rules of international law to the extent that they are not incompatible with the rules set out in UNCLOS.[115] A tribunal's findings are final and binding on the Parties to the dispute, but not binding on other Parties to UNCLOS, and, therefore, at least in theory, are not precedent setting for purposes of interpreting the provisions of UNCLOS.[116]

While there are a number of differences between the four procedures set out in Article 287, the most important factor for Parties is likely to be the level of control over the selection of members of a tribunal on the one hand, and the level of expertise of those members on the other hand. ITLOS and the ICJ have the advantage of being permanent tribunals and as such are more likely to make predictable rulings, and rulings that take into account the implications of specific rulings for the future of dispute settlement under UNCLOS. The arbitration process under Annex VII has the advantage of providing a Party with more control over the membership of the specific tribunal hearing a particular dispute. In addition, the Annex VIII special arbitration tribunal process has the advantage of the flexibility to be able to ensure special expertise in the subject matter under dispute.[117]

Given the consistency in terms of jurisdiction, scope, and outcome of these four processes, a detailed comparison of the four options is not necessary for purposes of determining whether a dispute over the deployment of geoengineering could be brought under UNCLOS. More important for purposes of this analysis of whether a Party can bring a successful claim under UNCLOS is the question of jurisdiction with respect to a claim, as well as substantive issues related to such a claim. On the issue of jurisdiction to force a tribunal ruling under

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AND COMPARATIVE ENVT'L L. 1, 13 (2004). For a survey of recent rulings, see also Robin Churchill, *The International Tribunal for the Law of the Sea: Survey for 2002*, 18 INT'L J. MAR. & COAST. L. 447(2003).

[110] For a discussion of the potential for conflict between the UNCLOS dispute settlement process and the ICJ, *see* Y. Shany, supra note 62, at 32-33.

[111] *See United Nations Convention on the Law of the Sea*, art. 287(1)(c), Dec. 10, 1982, 1833 UNTS 3, 21 ILM 1261.

[112] *Id*. art. 287(1)(d)

[113] *Id*. Articles 297 to 299 provide opportunities to further limit the options Parties have with respect to binding dispute settlement procedures. These provisions include a number of limitations that are fairly specific and restricted in scope. They do not appear to apply to obligations and responsibilities in UNCLOS that could be relevant to a dispute over climate change mitigation, and are therefore not considered further here.

[114] *Id*. art. 288.

[115] *Id*. art. 293(1)

[116] *Id*. art. 296.

[117] One example is expertise on climate change impacts and mitigation, which is expertise a standing tribunal such as the ITLOS or the ICJ may not always possess to the same extent.

UNCLOS, the most important rulings to date under UNCLOS have been two rulings related to a dispute over Southern Bluefin Tuna.[118] In addition, the ruling of the ITLOS in the dispute between Ireland and the United Kingdom (The MOX Plant Case)[119] offers some indication that the ITLOS will be reluctant to accept claims for which the UNCLOS process is unavailable where the issue under dispute is also relevant under another international agreement with a dispute settlement process.[120]

There is a reasonable basis for concluding that the environmental degradation caused by a geoengineering project could be covered by the UNCLOS articles pertaining to protection of the marine environment, namely Articles 192, 194 and 195. Furthermore, the London Convention and its 1996 Protocol can be viewed as implementing UNCLOS Article 210, and could constitute an appropriate international standard for purposes of Article 297(1) to extend the application of the compulsory dispute settlement process to geoengineering projects in coastal waters. Even disputes pertaining to OIF undertaken within a coastal country's territory could, therefore, potentially be subject to compulsory dispute settlement under UNCLOS.

Another important feature of the UNCLOS DSP is the availability of provisional measures for the purpose of prevention serious environmental harm, pursuant to Article 290.[121] This may be helpful when dealing with environmental problems associated with geoengineering. Provisional measures are only available when specified conditions are met. For example, in the *MOX Plant* case, the applicant did not meet the bar of sufficient urgency to warrant the enactment of provisional measures.[122] In the *Southern Bluefin Tuna* dispute, the declining of fish stocks fulfilled the urgency requirement, and ITLOS set fish catch totals as a provisional measure.

Conclusion

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[118] See Southern Bluefin Tuna cases (New Zealand v. Japan; Australia v. Japan), Request for the Prescription of Provisional Measures under Article 290, Paragraph 5, of the UN Convention on the Law of the Sea (1999) 38 ILM 1624 (International Tribunal for the law of the Sea (ITLOS),). For the final ruling, see: *Southern Bluefin Tuna Case*(2000), 39 ILM 1359 (UNCLOS Arbitral Tribunal). The case arose out of a long-standing dispute among the parties over the conservation of southern bluefin tuna. An initial ruling determined that the dispute was properly brought under UNCLOS. The ITLOS then proceeded to award provisions measures for the protection of bluefin tuna pending the resolution of the dispute. The final ruling concluded that provisions of the Convention for the Conservation of Southern Bluefin Tuna (CCSBT) amounted to an agreement by the parties not to be bound by the UNCLOS dispute settlement procedure for purposes of disputes related to the conservation of bluefin tuna. For a more detailed assessment of these rulings, see M. Doelle, From Hot Air to Action? Climate Change, Compliance and the Future of International Environmental Law (Carswell, 2005) at 205.

[119]The MOX Plant Case (Ir. v. U.K.), Case No. 10, (3 December 2001), 5 ITLOS Rep. 95. The case arose out of a dispute between Ireland the United Kingdom over radioactive waste pollution in the Irish Sea originating from a UK nuclear facility. For more details, see M. Bruce Volbeda, *The MOX Plant Case: the Question of "Supplemental Jurisdiction" for International Environemntal Claims under UNCLOS* 42 TEX INT'L LJ 211(2006-2007).

[120] *Id*. *See also* V. Hallum, *International Tribunal for the Law of the Sea: The Mox Nuclear Plant Case*, 11 R.E.C.I.E.L. 372, 373 (2002)

[121] UNCLOS, art. 290.

[122] Natalie Klein, The Role of Dispute Settlement in the UN Convention on the Law of the Sea 75 (Cambridge University Press 2005).

The relationship between the UNCLOS DSP and those of other international regimes has attracted the attention of academics in a variety of contexts, from trade to whaling.[123] There is potential for either or both DSPs as well as the NCPs under the UNFCCC to be invoked in case of a dispute over geoengineering affecting the marine environment. As a general rule, parties concerned about the environmental impact of geoengineering projects are more likely to pursue resolution under the DSP under UNCLOS. One caution with regard to UNCLOS in this regard is that it does not explicitly endorse the precautionary principle, largely a product of the time it was negotiated.

Questions about the contribution of geoengineering toward the commitments regarding mitigation, finance, technology and loss and damage under the UNFCCC regime are most likely to come before either the NCPs or DSPs under the UNFCCC regime. The regime is in such a state of flux, however, that it is difficult to make any firm predictions about the substance of such a dispute. Much will depend on whether and how the new regime under negotiation will formally address the role of geoengineering in managing climate change.

It is uncertain at this early stage whether a dispute under either regime would be resolved through a careful balancing of benefits, impacts, risks and uncertainties of a given geoengineering proposal, or whether each regime will focus on its perceived areas of priority. Would a DSP under UNCLOS give adequate weight to the potential role of geoengineering in mitigating climate change? Would a DSP under the UNFCCC give adequate weight to the risks to marine ecosystems?

From a process perspective, the UNCLOS DSP is currently more robust, tried, and tested than the DSP under the UNFCCC. Most importantly, perhaps, the UNCLOS DSP is compulsory, whereas the UNFCC's DSP is not. The NCP under the Kyoto Protocol is also quite robust, compulsory, and has been used regularly since its inception in 2006. Its role in resolving disputes over geoengineering is very much up in the air, as its future is very much uncertain, and its mandate is currently quite limited.

It is unlikely that the DSP under the UNFCCC would eliminate the UNCLOS DSP as an available process for a Party concerned about the impact of geoengineering projects on marine ecosystems. Alternative procedures under any other relevant agreements to which the parties may belong will supersede the UNCLOS mechanisms, but only if they provide for a binding decision. The parties to the dispute can also agree to address the dispute under UNCLOS, which means they may have a choice between multiple regimes with binding dispute settlement procedures.[124] UNFCCC conciliation would not satisfy this requirement because it does not result in a binding decision, but a recommendatory award, which the parties are required to consider in good faith.[125] In the final analysis, a dispute over geoengineering could be brought

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[123] *See*, for example, Jared Zemantauski, *Has the Law of the Sea Convention Strengthened the Conservation Ability of the International Whaling Commission*, 43 U. MIAMI INTER-AM. L. REV. 325 (2011); Brian K Myers, *Trade Measures and the Environment: Can the WTO and UNCLOS Be Reconciled*, 23 UCLA J. ENVTL. L. & POL'Y 1, 37(2005); and Patrizia Vigini, *The Overlapping of Dispute Settlement Regimes; An Emerging Issue in International Law*, 11 ITALIAN Y.B. INT'L L. 139. (2001).

[124] *United Nations Convention on the Law of the Sea*, art. 282, Dec. 10, 1982, 1833 UNTS 3, 21 ILM 1261.

[125] United Nations Framework Convention on Climate Change, art 1, 31, May 9, 1992, 1771 UNTS 107, ILM 849.

before multiple dispute settlement and non-compliance bodies because the claims could be structured so differently that each would amount to a different dispute.[126]

[126] Natalie Klein, The Role of Dispute Settlement in the UN Convention on the Law of the Sea 366 (Cambridge University Press 2005).