

Climate Change Mitigation Techniques and International Law: Assessing the Externalities of Reforestation and Geoengineering

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Abstract. As a subspecies of the climate justice debate, a compelling moral case can be made that actors should receive their fair share of benefits and burdens, and more specifically, that those who benefit from the provision of public goods ought, under some circumstances, to share in the costs of their provision. The climate justice debate has paid relatively scant attention, however, to the possible adverse side-effects of climate mitigation mechanisms. The article reviews such global public goods-protecting techniques as compensation payments for keeping rainforests intact, and climate engineering, for their adverse impact on human rights and biodiversity. Espousing a consequentialist ethical perspective, it calls for increased vigilance in institutionally designing and implementing climate change mitigation mechanisms, however well-intentioned these may be.

1. Introduction

For many years now, global justice theorists have posited moral obligations requiring that states, or the international community, act towards those in need, wherever they may find themselves, especially those mired in dire poverty (Beitz 1979; Caney 2005b; Pogge 2002). For at least a decade, these theories have also been applied to the issue of climate justice, with scholars arguing in favour of the obligation of rich nations to do more than others to reduce greenhouse gas emissions or even host environmental migrants, on the grounds that rich nations bear a disproportionate historic responsibility and also have a greater capacity to act (Bell 2004; Posner and Sunstein 2007). Most recently, as a subspecies of the climate justice debate, a compelling moral case has been made that rich outsiders also have duties of justice to share in the costs of rainforest protection, and thus that inhabitants of

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the low-income states on whose territory these rainforests are found should not bear the burden of protection alone (Angeli 2016; Armstrong 2015). The idea is that the international community, and developed states in particular, should compensate rainforest states for preserving their rainforests, as rainforests have the capacity to sequester carbon in ways that other resources or mechanisms do not. This capacity for carbon sequestration thus makes an important contribution to reducing greenhouse gas emissions and combating climate change.

From a policy perspective, this is surely an attractive argument. However, it should be noted that in order for a solution with the appearance of justice to rise to the level of an international law rule, states should also act upon it and/or believe that the law requires them to behave in the prescribed way—at least for those who embrace a formal sources theory of international law that is grounded in expressions of actual state consent (d'Aspremont 2011). Thus, considering that this writer is an international lawyer, the *legal question* is whether international law obliges developed states to transfer financial resources to developing states with a view to compensating them for not cutting down their rainforests. In methodological terms, this question can be answered by examining international conventions and relevant state practice, with a view to identifying customary international law, as the main formal sources of international law identified in Article 38(1) of the Statute of the International Court of Justice. In this connection Article 38(1) can be considered as a secondary rule of recognition in the Hartian sense, in that it recognizes the limited number of processes that can produce valid law (Hart 1961; Payandeh 2010, 994). It will surprise few readers that, applying this classic legal methodology, at the time of writing, states do *not* have a specific legal obligation to compensate rainforest states.

Naturally, currently *valid* law is not necessarily *just* law, as there is no automatic parallelism between legal and moral obligations. It may be argued that moral obligations do not come into existence through lawmaking processes recognized by the international community of states, but on the basis of rational arguments advanced by thinkers espousing a particular justice theory. At the same time, Steven Ratner, the leading theorist of the justice of positive international law, claims that international law is not insulated from international morality or global justice as international law transforms moral prescriptions into legally binding rules and as it is “real world” or practical global justice (Ratner 2015, 1–2). Moreover, the compatibility of international law with theories of global justice gives international actors good reason to respect international law (*ibid.*, 3) and thus serves to promote compliance.

Unfortunately, Ratner's “thin” theory of the justice of international law has relatively little relevance for *environmental law*, as his standard of justice revolves around the advancement of peace and respect for basic human rights (*ibid.*, 64). Pursuant to this approach, the absence of obligatory compensation mechanisms under international law does not seem to be unjust, as it does not impinge on international peace and security or the enjoyment of human rights, at least not directly. However, on account of other theories of justice, the current system, which is largely discretionary and lacks legal obligations, could well be considered as *unjust*. Thus, Chris Armstrong has argued that a wide variety of positions on global justice and fairness support normative obligations for outsiders to compensate rainforest states for protecting their forests (Armstrong 2015), obligations that may well have

to be translated into binding law. It is not my aim here to repeat or critique this well-laid out argument, though I wish to emphasize that I am broadly in agreement with it. International law should take into account, much more than is now the case, positive obligations of international solidarity, including the protection of the global commons (cf. human rights: Langford et al. 2014). A paradigmatic shift in the conceptualization of the nature and goals of international law is called for, which deemphasizes the protection of state sovereignty through primarily negative obligations (a remnant of the 1648 Peace of Westphalia), in favour of a more communitarian focus on the protection of the global commons and the global redistribution of resources (e.g., on the decline of state consent in the provision of global public goods: Krisch 2014, 1).

On this point, international law surely has a lot to learn from international ethics. At the same time, international ethics, for its part, may sometimes have a blind spot for the practical institutionalization of proposed normative principles, however convincing these may be (Pierik and Werner 2010, 4). Ethics may overlook the fact that, ultimately, the successful implementation of international moral obligations is in need of legal grounding, or to put it more bluntly, international ethics needs international law. As a result, I will start my analysis in Section 2 by examining the entry points within the current legal system for compensation obligations resting on rich nations.

Subsequently, in Section 3, I put on my glasses as a *critical* international lawyer, understood as a lawyer who deconstructs a prevalent normative/legal discourse and pinpoints possibly unforeseen side effects. David Kennedy (2004) has done so magisterially with respect to international humanitarianism, demonstrating how even the most well-intentioned projects can give rise to as many problems as they solve. A thorough deconstruction of climate-justice-based practices of global redistribution is obviously too great a challenge to tackle in these few pages. This will not stop me, however, from drawing attention to the risk of unforeseen side effects from a tunnel vision on financial transfers as a leading climate mitigation strategy, e.g., in terms of their implementation impact on internationally protected rights of indigenous peoples. However, this critical assessment need not detract from the persuasiveness of the moral imperative of obligatory compensatory financial transfers. It only calls for vigilance when institutionally implementing this imperative.

Similar vigilance is called for when envisaging and implementing alternative (complementary or rival) climate-change mitigation strategies, which may well grow in strength in the coming years in the face of the relative inefficiency of existing strategies in tackling global warming. The international community has been putting a high premium on financial transfers, as evidenced by the 2015 Paris Agreement.¹ However, when financial pledges by rich nations to low-income nations fail to materialize, the international community may well contemplate more radical strategies aside from, or even instead of, financial transfers and capacity-building, to avert catastrophic climate change.

¹ Paris Agreement, 12 December 2015, Article 9. The Paris Agreement was adopted at the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change.

One such strategy, and probably the most radical one, consists in using geoengineering techniques (Section 4). According to the Royal Society (2009, 11), these techniques aim “to intervene in the climate system by deliberately modifying the Earth’s energy balance to reduce increases of temperature and eventually stabilise temperature at a lower level than would otherwise be attained.” Geoengineering techniques raise ethical questions of resource distribution: They typically qualify as single-best-effort global public goods, i.e., global public goods (a stable climate, in our case) that can be produced by unilateral or “minilateral” intervention (Barrett 2007, chap. 1), and thus raise concerns over states free-riding on other states’ efforts. I will not pursue this concern in detail here, however legitimate it is. Rather, I consider, just as I do with respect to transfer payments to save rainforests, whether geoengineering comes with its own risks, notably for global and local ecological stability as protected by international norms. There are many techniques of climate geoengineering, but I will place the emphasis on ocean iron fertilization,² as this has already been experimented with and has been subjected to limited international regulation.

As the perspective of this contribution is primarily normative and legal, I will not examine whether one strategy is more effective than another in tackling climate change. The strategies have been selected as they begin to be implemented on the basis of regulatory fiat (financial transfers) or through technological experimentation (geoengineering). They will be viewed as realities, and as defensible, under certain theories of justice. However, it is the aim of this contribution to review their design, implementation, and possible side effects in light of international legal norms that protect individuals and the environment from the negative externalities of state and institutional action. Both the protection of rainforests and geoengineering, in spite of their intuitive appeal, come with risks, which may produce violations of international human rights law and international environmental law. Accordingly, the perspective is largely one of conflict between envisaged norms of climate-change mitigation (whether of the obligatory or permissive variant) and existing norms of international law that protect common values and goods, such as individual and collective human rights and ecological stability. The further, and related, aim of the analysis is to design on a preliminary basis a regulatory framework setting out (a) the obligations of states in the context of the selected methods of climate-change mitigation; (b) the methods, or modes of implementation, that are prohibited; and (c) the methods, or modes of implementation, that are authorized when specific conditions are satisfied.

2. Compensating Developing States for Not Logging Their Forests: Finding Entry Points in International Law

This first part addresses the question of whether the proclaimed moral duty for developed states to compensate developing states for not logging their forests rises to the level of an international legal obligation. There is an assumption in the

² Ocean iron fertilization is a technique that, by introducing iron into the surface waters of the oceans, boosts the growth of phytoplankton, which may in turn remove carbon from the atmosphere. Barrett 2007, 16.

aforementioned question which requires some justification up front, namely, that developing states are in principle free to log their forests on the basis of their permanent sovereignty over their natural resources.

Developing states can decide to log their forests, or they can decide not to. If they choose not to, the argument goes that global justice may require compensation for developing states for the opportunity costs associated with preserving the forests. If developing states are not allowed to log their forests in the first place, one could perhaps still argue on moral grounds that third states are required to compensate them, since refraining from logging has the same opportunity costs in this situation. In his parallel contribution to this issue, Angeli (2016) develops a cautious argument in this respect. In his view, rainforest states have the moral right to exploit their natural resources given the current structure of the international system, although countervailing considerations, such as being sensitive to the consequences of exercising these rights both for outsiders and future generations, may have to be taken into account. Whether this means that non-rainforest states have a corresponding moral duty to compensate rainforest states for not exercising their moral right, or at least for forgoing the exploitation of rainforests, remains implicit in his analysis. I am inclined to believe that Angeli takes the view that they have no such duty, where he points out that income rights—rights to earn income or benefits from the use or transfer of natural resources—are not as closely related to the ideal of collective self-determination in democratic states as control rights. Arguably this means that rainforest states do not have a moral right to claim compensation from non-rainforest states, as a right to compensation is an income right and not a control right.

From a *legal* perspective, the argument that third states are required to compensate rainforest states for not committing an internationally wrongful act is equally difficult to maintain. Once it is established that an internationally wrongful act has been or is about to be committed, there is no “financial cost”-based escape rule that states can rely on to justify their behaviour, or to make financial assistance conditional on compliance by other states, unless states have mutually agreed to such a rule in relation to a specific matter. Accordingly, the further development of the legal argument as to whether developed states are required to compensate developing states hinges on the existence of a principle allowing these states to cut down their forests.

Such a principle does indeed exist, and is known as states’ “permanent sovereignty over natural resources” located on their territory. This principle came into being in a decolonization context, where, in essence, it meant that newly independent states were free to dispose of the natural resources located on their territory, without any interference from, or rights for, former colonial powers or their economic operators. This idea was famously laid down in the UN natural resources declaration of 1962,³ and the 1974 Declaration on the Establishment of a New International Legal Order.⁴ Clearly, since the 1970s, international instruments have nuanced the permanent sovereignty of states over their natural resources by

³ UN General Assembly, Resolution 1803 (XVII) of 14 December 1962, Permanent Sovereignty over Natural Resources.

⁴ UN General Assembly, Resolution 3201(S-VI) of 1 May 1974, Declaration on the Establishment of the New International Economic Order, par. 4.

drawing attention to the interests of the environment.⁵ Yet these instruments have no formal legal status, and, moreover, recent provisions have highlighted the *balance* to be struck between environmental and developmental instruments.⁶ The principle of sustainable development enshrined in these instruments means that states could legitimately forgo environmental protection options if such would further their socioeconomic development. On the basis of this principle, the decision of a rainforest state to cut down its trees could be justified should this serve its development purposes, at least insofar as specific tree species are not internationally protected by such international law instruments as the 1992 Convention on Biological Diversity to which the state concerned is also a party.⁷

The principle of permanent sovereignty over natural resources has also been restricted by states becoming parties to the relevant agreements of the World Trade Organization, the General Agreement on Tariffs and Trade (GATT) in particular. By agreeing to GATT, states commit to the principles of free trade laid down in this treaty and are precluded from justifying export restrictions with respect to their (supposedly valuable) natural resources, on the basis of the principle of permanent sovereignty. This was confirmed by a WTO panel in the case of *China-Raw Materials* (2011).⁸ We need not pause too long here, however, as the question is not whether a rainforest state has to share its natural resources with other states, and allow them to be exported. Rather, the question is whether non-rainforest states have an international obligation to financially assist rainforest states in preserving rainforests with a view to carbon sequestration.

In accordance with our positivist approach to the sources of international law set out above, this legal question can best be answered by ascertaining whether, going by their actual practice, as reflected in treaties and customs, states are of the view that this moral obligation rises to a legal one. At the same time, I am also interested in whether systemic legal tendencies and principles of international law, while perhaps not specifically providing for a legal obligation to pay compensation, nevertheless provide entry points for just such an obligation.

It is not disputed that there is no international agreement currently in force that puts in place a financial transfer system specifically aimed at protecting rainforests. However, a considerable number of multilateral environmental agreements (MEAs) require specific states—*developed states* and states in economic transition—to take the lead in contributing to the realization of global public goods, via the transfer of funds and technical assistance received from richer states.⁹ The Paris Agreement contains such clauses of solidarity as well.¹⁰

⁵ See notably Principle 21 of the 1972 Stockholm Declaration of the United Nations Conference on the Human Environment, and Principle 3(1) of the UN Environment Programme Draft Principles of Conduct in the Field of the Environment for the Guidance of States in the Conservation and Harmonious Utilization of Natural Resources Shared by Two or More States.

⁶ Principle 2 of the UN's Rio Declaration on Environment and Development 1992.

⁷ UN Convention on Biological Diversity, adopted in Rio de Janeiro, 1760 UNTS 79; 31 ILM 818 (1992).

⁸ World Trade Organization, *China—Measures Related to the Exportation of Various Raw Materials* (5 July 2011), WT/DS394/R, panel report, pars. 7.157, 7.381–3, 7.407.

⁹ As regards climate change: Article 3(1) of the UN Framework Convention on Climate Change.

¹⁰ Paris Agreement (note 1 above), 9–11.

However that may be, such solidarity clauses are among the cornerstones of the international legal framework to tackle climate change in that states have *common but differentiated responsibilities* (CBDR) to protect the climate as a global public good. This concept of CBDR is central in the climate-justice debate in international ethics, where it is advanced to allocate burdens to states on the basis of having contributed or caused climate change, or having the capability to address it (Caney 2005a; Posner and Sunstein 2007, 1607). As the concept of CBDR has been laid down in international legal instruments, it is also a *legally binding principle* (Cullet 2010, 161–81; Hey 2011, 18; Stone 2004, 276). This highlights the co-extensiveness of law and ethics as far as global environmental action is concerned.

Clearly, it is one thing to claim that developed states have to take the lead in combating climate change, or that developing countries are under no obligation to reduce their emissions, but it is quite another to claim that developed states have a specific obligation to reward (some) developing countries for not cutting down their rainforests with a view to reducing overall emissions. Such an obligation may have its normative roots in the CBDR principle, but it does not ensue automatically from it—or as Hey (2011, 18) has argued—CBDR “cannot apply in an all or nothing fashion.” The concept of CBDR only prescribes that economic disparities between states be taken into account when fashioning obligations under international environmental law, and it thus steers solutions to environmental problems of global relevance, such as climate change, in a certain direction, while leaving open the question of *how* obligations should be fashioned exactly. Still, the concept provides a measure of legal-obligatory backing for transfer payments with respect to rainforest protection.

To the extent that actual practice of such transfer payments becomes more widespread and is accompanied by a conviction that such a practice is legally required, a more specific CBDR-based pay-to-protect obligation as regards rainforests may obviously emerge. In fact, there is no shortage of relevant practice. An impressive legal-institutional and financial machinery is currently being put in place to compensate developing states for sequestering carbon in their forests, while allowing developed states—and their corporations—to meet their emission-reduction targets. This compensation may be either public or market-based: Either a developed state or a climate fund simply grants money to a developing state in return for a commitment not to log forests, or a state/corporation transfers funds in return for an emissions allowance (under a market-based emissions trading scheme).¹¹ The REDD+ initiative is probably the most important one in this respect. REDD+, which stands for “reducing emissions from deforestation and forest degradation,” is specifically established as a mechanism through which the North channels money to the South in return for the South preserving its forests.

However, participation in such schemes remains *voluntary*: What matters is *that emissions are reduced, not how*. Thus, current practice cannot be taken as evidence of an obligation for developed nations to transfer funds to developing states for the purpose of carbon sequestration in forests. Clearly, nothing prevents the law from evolving, and from “upgrading” voluntary schemes to binding obligations, in line

¹¹ E.g., the North-South transfers under the clean development mechanism of Article 12 of the Kyoto Protocol.

with some global justice theories. A binding agreement could well stipulate that developed states are legally required to financially assist developing states with carbon sequestration in forests. This could technically be done by making “clean development mechanism forests” a compulsory component of states’ mitigation mechanisms, and by strengthening the Green Climate Fund as the main gateway to transfer funds from developed to developing states as regards forestry carbon sequestration.¹²

I consider it unlikely, however, that the Paris Treaty follow-up agreements will change their general goal-based approach to combating climate change to a specific measure-based one. After all, transfer payments to rainforest states are just one option—even if potentially an important one—to reduce emissions. At a more theoretical level, this speaks to a global governance approach that uses *instrument pluralism* to realize a global public good. Note how this differs from *value pluralism*, an ethical theory which denies a meaningful role to global distributive justice on the grounds that the values held by various communities are just too different to find common ground (Shapcott 2014). *Instrument pluralism* assumes that such common ground can be and in fact has been found, but that a variety of equally valid measures can contribute to a predetermined community goal. Naturally, such measures can be considered as a downstream instantiation of value pluralism in that actors may reasonably differ with respect to the proper measures to be taken, but the main takeaway is that all these measures are at the service of a commonly defined goal or global value, in this case the reduction of greenhouse gas emissions. In Section 4, I will discuss one other promising measure to reach the same goal: geoengineering. First, however, I turn to the side effects of compensation measures.

3. Side Effects of Implementing Financial Transfers to Protect Rainforests

So far, I have supported the ethical proposition that developed countries should compensate developing countries for not cutting down their forests. I have noted that this proposition has not yet been laid down in positive law, but also that the principle of CBDR offers legal backing for emerging legal obligations to compensate. Nevertheless, as global climate-change action is *goal-* rather *measure-*oriented, I have considered it unlikely that the specific measure of rainforest compensation will crystallize as an international legal obligation.

That such a compensation measure does not, and may not, rise to the level of an international legal obligation, does not detract from its apparent sensibility within a permissive scheme of global action. A critical scholar is aware, however, that a sensible approach to a problem may at times yield unwelcome side effects, a realization of which may call for a reconsideration of the original approach. In this section, I will assume that rainforest compensation is *prima facie* sensible from the perspective of theories of justice, but espousing a rigorous consequentialist approach I will inquire into possibly adverse *implications* of its implementation in practice. The institutional relevance of this approach is that, if adverse effects are

¹² E.g., United Nations Framework Convention on Climate Change (UNFCCC), COP 19, Warsaw, Nov. 2013, Decisions 1–28/CP.19.

found, remedial measures or safeguards that limit the fallout of the principle's implementation may have to be taken.

Existing practice with respect to REDD projects may be particularly instructive in identifying shortcomings or harmful consequences of North-South financial transfers to sequester carbon in forests. It must be admitted that REDD has had its fair share of criticism. At the most fundamental level, it has been submitted that REDD may give rise to a moral hazard in that it could serve as an excuse for developing countries not to cut their emissions at home.¹³ But even if one agrees with the necessity of putting in place REDD-style projects to save the climate, one cannot dispense with giving some thought to major implementation problems which such projects run into and could run into. For one thing, REDD risks abuse by unscrupulous investors reconverting rainforests into profitable plantations in the absence of an unambiguous legal definition of the notion "forest."¹⁴ For another, it may become prone to corruption as local firms may bribe local officials so as to start logging protected forests in spite of a legal prohibition. Strong monitoring, verification, and reporting will be required to tackle these concerns. Furthermore, REDD may fail to tackle the real drivers of deforestation and forest degradation.¹⁵ After all, REDD is limited to the transfer of money from developed states to developing states in return for efforts to protect forests. In the absence of direct and adequate compensation of local economic operators' losses, such operators will continue to log tropical hardwood, all the more so as long as there is an (international) market for it. Accordingly, the international community may, as a complementary measure, also want to address the demand side by regulating international commerce.

Finally, REDD projects may take insufficient account of the interests and rights of the local population who may agree to "forest protection" without having given their free and informed consent (Brown 2013). A fine example is offered by the fierce opposition to the REDD agreement between Norway and Indonesia in respect of forests in Kalimantan inhabited by indigenous people, whose representatives called for an immediate moratorium on the REDD agreement in Central Kalimantan in 2011 (Lang 2011). REDD projects are nevertheless supposed to take into account indigenous rights on the basis of UNFCCC REDD safeguards.¹⁶ However, these safeguards are not binding, and moreover, they may not exactly be in accordance with international human rights law (Conway 2014). Ideally, given their expertise, international human rights bodies should be involved in further refining the UNFCCC safeguards. At the same time, one should ensure that the safeguards are not designed so strictly as to become an obstacle to capital transfers to developing countries. In fact, the UNFCCC requirements of results-based finance may

¹³ See the leading critic of REDD, the website www.redd-monitor.org, run by Chris Lang.

¹⁴ For civil society action against including forestry in emissions trading, see e.g., FERN, *Keep Forests out of the ETS, EU Forest Watch: Informing NGOs, MEPs, Member States, the European Commission and the Media* 133 (December 2008).

¹⁵ But see the United Nations Framework Convention on Climate Change (UNFCCC), COP 19, Warsaw, Nov. 2013, Decisions 1–28/CP.19.

¹⁶ United Nations Framework Convention on Climate Change (UNFCCC), COP 16, Cancun, Nov. 2010, Decision 1/CP.16, appendix I, par. 2(c) and (d).

have already become so strict,¹⁷ that the least developed countries face difficulties in satisfying them (Voigt and Ferreira 2016, 58).

In sum, an analysis of the effects of REDD projects demonstrates that the actual implementation of the principle of rainforest transfer payments may yield unwelcome, albeit unintentional, side effects. One could make sense of these side effects in three ways. First, applying the doctrine of double effect, which has its roots in Catholic thought, one could argue that these side effects have to be taken for granted, insofar as transfer payments promote desirable ends (climate change mitigation and intragenerational solidarity) that outweigh the “evil” consequences (Mangan 1949, 43). Second, one could consider these consequences to be so grave that they irreparably damage the principle, so that the only just action is to outlaw its implementation.¹⁸ Or third, one may seek to prevent or mitigate these consequences so as to safeguard public support for the principle. As adverse side effects are not inherent in the principle of rainforest transfer payments (unlike, for instance, the side effects of certain drugs), the third option is surely the most attractive one: It maximizes the principle’s intentional effects while minimizing its unintentional side effects. Thus, in order to safeguard the principle’s legitimacy, designers of REDD should continue to ensure that the “commodification” of forests does not create perverse incentives for nontransparent state-to-state deals, and for Western investors to have their cake and eat it: Receiving valuable carbon-emissions certifications while simultaneously exploiting southern states’ natural resources in violation of indigenous peoples’ rights and these states’ sovereignty over their own natural resources.

4. Geoengineering

As stated in Section 2, there is a moral case for an international obligation to support such “natural intervention” as reforestation and afforestation as a climate-change mitigation strategy, even if it is unlikely that this obligation will rise to the level of an obligation under international law. Admittedly, such intervention may produce some undesirable side effects, in the sense that forestry commodification may at times prevail over local forest dwellers’ rights and interests. Increased stakeholder participation and rigorous monitoring could ensure, however, that such side effects will be reduced. Accordingly, enhanced REDD-style programmes, combined with trade bans for illegally logged wood, are the road to take.

Still, even if such measures turn out to be successful, afforestation, reforestation, and deforestation avoidance may only contribute to at most 25 percent of atmospheric CO₂ reduction by 2050 (Niles et al. 2002, 1621–39; Reyer, Guericke, and Ibsch 2009, 15–34). This may not suffice to bring a halt to global warming. To more drastically reduce CO₂ emissions in the atmosphere, more radical, technological solutions may have to be contemplated. Such technological solutions are denoted as “geoengineering.”¹⁹ They are mainly comprised of carbon dioxide removal

¹⁷ UNFCCC, COP 19, Warsaw, Nov. 2013, Decision 13/CP.19 and Decision 14/CP.19.

¹⁸ E.g., the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (Geneva, 10 October 1980).

¹⁹ See for a discussion: Royal Society 2009.

(CDR, e.g., carbon capture and storage in deep geological formations²⁰ or ocean fertilization)²¹ and—possibly more futuristic—solar radiation management (SRM, e.g., through space mirrors or stratospheric aerosol injection: Lane and Bickel 2013).

One may argue that global justice principles in respect of forestry, with developed nations compensating developing nations for preserving their forests, may provide guidance for geoengineering projects, where some actors incur costs developing technologies from which others as a matter of course benefit. Fairness demands that actors receive their “fair” share of benefits and burdens,²² and, in our case more specifically, that those who benefit from the provision of public goods ought, under some circumstances, to share in the costs of their provision (Armstrong 2015, 7). It is morally objectionable—unfair—for actors to free-ride, i.e., to profit from the products of other actors’ efforts. Hence, the argument goes that it is unfair for states to just benefit, without compensation, from other states’ efforts to protect rainforests, or to develop geoengineering techniques. This argument, as discussed above, has had major traction, also in practical terms, as regards rainforest protection.

However, as far as geoengineering is concerned, the risk of some agents free-riding on the efforts of others has not yet been at the centre of the regulatory debate. Rather, this debate is focused on whether such projects are morally justifiable and lawful in the first place, rather than on spreading the costs of investments in geoengineering projects. Unlike afforestation and reforestation, geoengineering risks causing serious environmental harm, although ironically it is aimed at mitigating climate change by reducing harmful CO₂ emissions.

Given the risks associated with (certain) geoengineering techniques, the question arises as to whether such techniques should not be banned, or at least be subjected to stringent regulation. One is faced with a moral dilemma here, as by taking such measures, one would forfeit or seriously circumscribe the climate mitigation opportunities offered by geoengineering. At the same time, strong support for geoengineering may give rise to a moral hazard in that it risks diverting resources and interest away from other climate mitigation strategies, which are proven to be effective but require a radical lifestyle transformation (e.g., reduction of meat consumption and international travel).

Given this dilemma, it is not surprising that the international community is rather ambivalent about geoengineering. The Fifth Assessment Report (2013) of the Intergovernmental Panel on Climate Change (IPCC) is illustrative in this regard. While stating that “[m]odelling indicates that SRM methods, if realizable, have the potential to substantially offset a global temperature rise,” it highlights that “[t]here is insufficient knowledge to quantify how much CO₂ emissions could be partially offset” by geoengineering, which, moreover, “carry side effects and long-term consequences on a global scale.”²³ International regulators for their part have remained largely silent on geoengineering, apparently awaiting the emergence of

²⁰ See for an overview of relevant technologies: <http://www.ccsassociation.org/>.

²¹ This technique is further discussed below.

²² What is considered “fair” depends on the theory of justice adopted, and some theories even equate justice with fairness (Rawls 2001).

²³ IPCC, Fifth Assessment Report, Climate Change 2013: The Physical Science Basis, Summary for Policymakers, 27, last paragraph.

more scientific evidence as to its effective contribution to climate change mitigation, as well as its harmful effects.

Many geoengineering techniques are still in their infancy, but one specific technique of geoengineering is rapidly developing and actually being experimented with: *marine* geoengineering, and ocean fertilization in particular. Ocean fertilization is defined as “any activity undertaken by humans with the principal intention of stimulating primary productivity in the oceans.”²⁴ It typically involves the introduction of iron into the ocean with a view to stimulating phytoplankton bloom, which in turn, through a biochemical process, removes carbon dioxide from the atmosphere. If implemented on a large scale it could prove to be a significant climate change mitigation technique. At the same time, however, its potentially harmful effects remain largely unknown.²⁵ This explains why, as a precautionary measure, ocean fertilization has recently been subjected to some form of binding international regulation via a 2013 amendment to the London Dumping Protocol,²⁶ after recommendations in the literature to this effect (see notably Scott 2013, 333–5; Rayfuse 2008, 324–5; Verlaan 2011, 186; Ginzky 2010, 57).

In essence, the London Protocol *outlaws* ocean fertilization,²⁷ and only allows it if a permit is issued in accordance with a specific assessment framework.²⁸ In embracing this solution, States tried to combine the precautionary approach—pursuant to which scientific uncertainty should not be used as an excuse not to regulate, especially if the environmental risks are high—with the freedom of marine scientific research, and the potential of such research to contribute to climate change mitigation.²⁹ They contemplated the possibility of subjecting other marine geoengineering techniques to the ocean fertilization regime,³⁰ while allowing such techniques, including ocean fertilization, to progress if they meet specific conditions relating to consultation, risk-management, monitoring, and effects-assessment.³¹

The extensive technical regulation of the permit conditions cannot, however, conceal the fact that hard moral choices will have to be made, notably by balancing the adverse environmental effects of ocean fertilization with the climate change mitigation benefits accruing to it, or prioritizing one over the other. Indeed, how could

²⁴ IMO 2013, par. 1 of Annex 4, “Resolution LP.4(8) on the Amendment to the London Protocol to Regulate the Placement of Matter for Ocean Fertilization and Other Marine Geoengineering Activities (adopted on 18 October 2013).”

²⁵ See on the potential impact on biodiversity: Secretariat of the Convention on Biological Diversity, Scientific Synthesis of the Impacts of Ocean Fertilization on Marine Biodiversity, CBD Technical Series No. 45 (2009).

²⁶ International Maritime Organization (IMO), “1996 Protocol to the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972” (hereinafter London Protocol).

²⁷ Article 6*bis*(1) of the London Protocol

²⁸ Article 6*bis*(2) of the London Protocol. The assessment framework is elaborated on in Annex 5 of the London Protocol.

²⁹ IMO 2013, preambular pars. 5, 7, 9, and 10 of Resolution LP.4(8) of 2013 (note 24 above).

³⁰ IMO 2013, Annex 5, “Draft guidance on a procedure for considering the inclusion of new activities in Annex 4 to the London Protocol” (consideration of potential marine geoengineering activities and procedure for considering their inclusion in Annex 4 to the London Protocol).

³¹ Annex 5 of the London Protocol.

one otherwise interpret vague guidelines such as that “[a] decision to issue a permit shall only be made if [. . .] conditions are in place to ensure that, as far as practicable, environmental disturbance and detriment would be minimized and the benefits maximized”?³² It is of note that, under the London Convention and Protocol, permits are not issued *centrally* but by the states parties themselves. These States may well decide to put a higher premium on the potential for climate-change mitigation, and issue a permit even in the face of serious environmental risks. Such a decision may well be in compliance with the international assessment framework. Even if it were not, the issuing state might not risk sanctions, since—as is the case with many multilateral environmental agreements—the relevant international compliance-monitoring body can only give advice and recommendations, or issue a formal statement of concern.³³ Nevertheless, since the adoption of the amendment to the London Convention and Protocol, states—at least those who accept the amendment—will have to justify their permit decisions before a world court of public opinion, even if they do not face harsh legal sanctions in case of noncompliance.

In the absence of a more rigorous assessment framework that gives more detailed instructions as to how to balance climate-change mitigation benefits with the risk of environmental harm, at the end of the day it remains difficult to judge states’ conduct. While the assessment framework contains a large number of procedural obligations, there is no clear standard of substantive wrongfulness, and responsibility and liability issues have not been addressed.

When amending the London Protocol for the purposes of regulating ocean fertilization, one can ultimately not avoid the conclusion that the contracting parties have eschewed making hard moral choices regarding the use of geoengineering as a means to solve the global climate crisis. This reluctance is understandable, as ocean fertilization and other marine geoengineering techniques are just a subset of a larger category of geoengineering techniques that raise similar moral and regulatory issues. In fact, for the negotiators of the amendments to the London Protocol, it had already proved a challenge to subsume *fertilization* under *dumping*, which the London Convention and Protocol were originally designed to regulate (in the end, “placement of matter” was placed alongside “dumping of waste and other matter” to extend the scope of the Convention and the Protocol to include fertilization).³⁴ This need for legal creativity more generally epitomizes the shortcomings of the current international legal framework when it comes to regulating geoengineering. As a result, the international community may want to develop a technology-neutral framework convention on the permissibility, or not, of geoengineering, in which stark moral choices are made (cf. Scott 2013, 353). Such a convention should address (a) whether or not we are ready to countenance serious environmental harm in order to avert possibly more serious harm resulting from climate change; (b) moral hazard concerns, and, in the event that geoengineering is

³² Annex 5, par. 26.5, of the London Protocol.

³³ Compliance Procedures and Mechanisms pursuant to Article 11 of the 1996 Protocol to the London Convention 1972 (Adopted in 2007: LC 29/17, Annex 7), par. 5.1.

³⁴ Note that as early as Resolution LC-LP.1(2008) on the Regulation of Ocean Fertilization, the states parties had already stated that ocean-fertilization activities fall within the scope of the London Convention and the London Protocol.

given a cautious go-ahead; (c) whether investing in geoengineering could give rise to tradable carbon credit permits;³⁵ and, last but not least; (d) global justice-based financial transfers to those investing in geoengineering solutions.

5. Concluding Observations

This contribution started out with engaging, from an international law perspective, with the global justice-based premise that developed states have obligations to transfer financial resources to developing states so as to compensate them for preserving their rainforests. Such obligations have not yet risen to the level of legal obligations. However, states are increasingly aware of the fact that the protection, enhancement, or extension of rainforests is one of the most serious options available for curtailing increases in greenhouse gas levels in the earth's atmosphere, and that the legal principle of common but differentiated responsibilities requires developed states to help developing states tackle the tragedy of the commons. Dynamics at recent UNFCCC conferences of the parties have further added to this momentum. It cannot be ruled out that in the near future obligations to transfer financial resources for the purpose of rainforest preservation will be inserted into a binding international legal document pertaining to climate change mitigation. Practical challenges remain, however. How exactly should the amount of carbon stored in forests be assessed? Are investors' tradeable certified emissions reductions in respect of forests durable? Can implementation be adequately monitored? How should the opportunity cost of avoided deforestation be calculated precisely?³⁶ Will the international community be willing to disburse the 30 billion USD estimated to be needed annually to compensate rainforest countries for not cutting down their forests? From the norm-conflict perspective espoused in this contribution, the main challenge concerns the reconciliation of the REDD system with international human rights law in a way that does justice to the rights of forest-dwelling (indigenous) communities, while not making REDD implementation so cumbersome that its supporters would consider abandoning it.

REDD programmes, however, may not sufficiently address the drivers of deforestation, nor may they suffice to mitigate overall climate change, especially if the world's consumption and production patterns do not change. A more radical solution may have to be contemplated: geoengineering aimed at removing carbon from the atmosphere or reflecting solar radiation. Climate-change mitigation techniques raise legal concerns, however, and much more so than the others. Given their as-yet-unknown but potentially extensive environmentally harmful effects, application of the precautionary principle may call for rigorous regulation, which should nonetheless leave room for legitimate scientific research and experimentation that could cast further light on the benefits of geoengineering. Regulators may find themselves between a rock and hard place here, though, as overly strict regulation

³⁵ Planktos, one of the corporations involved in ocean iron fertilization hopes one day to issue carbon credit certificates to recoup its investment in climate-change mitigation. See <http://nancho.net/planktos/model.htm>. Such credits have not yet been officially approved.

³⁶ See, e.g., statements by Brice Lalonde of the French delegation, EU press conference, UNFCCC Poznan, 5 December 2008.

of geoengineering may come down to forfeiting a golden opportunity to drastically reduce carbon in a cost-effective manner.

Ultimately, states have no specific international obligations (as yet) to implement, or to assist others in implementing a specific climate-change mitigation technique. They only have general obligations to reduce their carbon emissions on the basis of the UNFCCC. This instrument does not determine how exactly such reductions should be brought about. Thus, the various climate-change mitigation techniques, including those discussed in this contribution, are essentially voluntary in nature. The fact that they are voluntary does not mean that they are no longer relevant to international law, however: The very design and implementation of such techniques may produce undesirable side effects that run afoul of specific international legal norms that protect a variety of (global) interests, such as human rights, national sovereignty, free trade, and biodiversity. When such side effects are substantial, or unknown but potentially substantial, climate-change mitigation techniques may have to be strictly regulated or even banned altogether.

Nonetheless, the question remains whether the classic rules of international law should not be interpreted somewhat more loosely, or even take a back seat, in the face of the global climate catastrophe which awaits us if we fail to sufficiently curb emissions. It is noted that, in extreme situations, international law allows states to invoke the—in essence moral/political—defence of necessity as a ground for precluding the wrongfulness of an act, when this is the only way for the state to safeguard an essential interest of the state or the international community against a grave and imminent peril.³⁷ On this basis, it is possible to legally justify a decision that by failing to adequately address climate change is a greater evil than noncompliance with international norms. As the extra-legal defence of necessity undermines the existing international legal framework, creating legal uncertainty, while risking becoming a slippery slope towards more generalized noncompliance with the law, it has so far, and indeed for good reason, hardly been accepted.³⁸ Also as far as climate change is concerned, even in spite of its urgency, it remains advisable, on legitimacy and transparency grounds, that if the international community is indeed of the view that necessity trumps compliance with the law when it comes to combating climate change, it takes such a decision *explicitly* and lays it down in an international instrument. Notably, in respect of geoengineering techniques, such an instrument could be called for.

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³⁷ International Law Commission (ILC), Article 25(1) of Responsibility of States for Internationally Wrongful Acts (2001). Note that this provision also requires that this act “not seriously impair an essential interest of the State or States towards which the obligation exists, or of the international community as a whole.”

³⁸ Typically, the case of the Torrey Canyon is cited, a Liberian ship bombed by the RAF to protect the British coast from an oil spill. See Commentary to the Articles cited in the previous footnote, *Yearbook of the ILC* 2001, vol. 2, p. 82.

References

- Angeli, O. 2016. *Self-Determination and Sovereignty over Natural Resources*. Ratio Juris: forthcoming.
- Armstrong, C. 2015. Fairness, Free-Riding and Rainforest Protection. *Political Theory* 43: 1–33.
- Barrett, S. 2007. *Why Cooperate? The Incentive to Supply Global Public Goods*. Oxford: Oxford University Press.
- Beitz, C. R. 1979. *Political Theory and International Relations*. Princeton, NJ: Princeton University Press.
- Bell, D. R. 2004. Environmental Refugees: What Rights? Which Duties? *Res Publica* 10(2): 135–52.
- Brown, M. I. 2013. *Redeeming REDD: Policies, Incentives and Social Feasibility*. London: Routledge.
- Caney, S. 2005a. Cosmopolitan Justice, Responsibility, and Global Climate Change, *Leiden Journal of International Law* 18(4): 747–75.
- Caney, S. 2005b. *Justice Beyond Borders: A Global Political Theory*. Oxford: Oxford University Press.
- Stone, C. 2004. Common but Differentiated Responsibilities in International Law. *American Journal of International Law* 98: 276–301.
- Conway, D. 2014. Collectively Cooking One Broth: Seeking Greater Integration between the Climate Change and Human Rights Regimes on REDD+. *Human Rights and International Legal Discourse* 8(1): 52–68.
- Cullet, P. 2010. Common but Differentiated Responsibilities. In *Research Handbook on International Environmental Law*. Ed. M. Fitzmaurice, D. Ong, and P. Merkouris, 161–81. Cheltenham: Edward Elgar.
- d'Aspremont, J. 2011. *Formalism and the Sources of International Law*. Oxford: Oxford University Press.
- Ginzky, H. 2010. Ocean Fertilization as Climate Change Mitigation Measure—Consideration Under International Law. *Journal of European Environmental and Planning Law* 7(1): 57–78.
- Hart, H. L. A. 1961. *The Concept of Law*. Oxford: Oxford University Press.
- Hey, E. 2011. Common but Differentiated Responsibilities. In *Max Planck Encyclopedia of Public International Law*. Oxford: Oxford University Press.
- IMO (International Maritime Organization). 2013. Report of the Thirty-Fifth Consultative Meeting and the Eighth Meeting of Contracting Parties (LC 35/15). Thirty-fifth consultative meeting of contracting parties to the London Convention & Eighth meeting of contracting parties to the London Protocol, October, 14–18.
- Kennedy, D. 2004. *The Dark Side of Virtue*. Princeton, NJ: Princeton University Press.
- Krisch, N. 2014. The Decay of Consent. International Law in an Age of Global Public Goods. *American Journal of International Law* 108: 1–40.
- Lane, L., and E. Bickel. 2013. *Solar Radiation Management: An Evolving Climate Policy Option*. Washington, D.C.: American Enterprise Institute.
- Lang, C. 2011. Kalimantan Forests and Climate Partnership Faces Yet More Criticism. *REDD Monitor*, June 23.
- Langford, M., W. Vandenhole, M. Scheinin, and W. van Genugten, eds. 2014. *Global Justice, State Duties: The Extraterritorial Scope of Economic, Social, and Cultural Rights in International Law*. Cambridge: Cambridge University Press.
- Mangan, J. 1949. An Historical Analysis of the Principle of Double Effect. *Theological Studies* 10: 41–61.

- Niles, J., S. Brown, J. Pretty, A. Ball, and J. Fay. 2002. Potential Carbon Mitigation and Income in Developing Countries from Changes in Use and Management of Agricultural and Forest Lands. *Philosophical Transactions of the Royal Society of London* 360: 1621–39.
- Payandeh, M. 2010. The Concept of International Law in the Jurisprudence of H. L. A. Hart. *European Journal of International Law* 21: 967–95.
- Pierik, R., and W. Werner. 2010. Cosmopolitanism in Context: An Introduction. In *Cosmopolitanism in Context: Perspectives from International Law and Political Theory*. Ed. R. Pierik and W. Werner, chap. 1, 1–10. Cambridge: Cambridge University Press.
- Pogge, T. 2002. *World Poverty and Human Rights*. Cambridge: Polity.
- Posner, E. A., and C. R. Sunstein. 2007. Climate Change Justice. *Georgetown Law Journal* 96: 1565–612.
- Ratner, S. 2015. *The Thin Justice of International Law: A Moral Reckoning of the Law of Nations*. Oxford: Oxford University Press.
- Rawls, J. 2001. *Justice as Fairness: A Restatement*. Ed. E. Kelly. Cambridge: Harvard University Press.
- Reyer, C., M. Guericke, and P. Ibsch. Climate Change Mitigation via Afforestation, Reforestation and Deforestation Avoidance—and What about Adaptation to Environmental Change? *New Forests* 38: 15–34.
- Royal Society. 2009. *Geoengineering the Climate: Science, Governance and Uncertainty*. RS Policy document 10/09. London: The Royal Society.
- Scott, K. 2013. International Law in the Anthropocene: Responding to the Geoengineering Challenge. *Michigan Journal of International Law* 35: 333–5.
- Shapcott, R. 2014. International Ethics. In *The Globalization of World Politics: An Introduction to International Relations*. Ed. J. Baylis, S. Smith, and P. Owens, 198–210. Oxford: Oxford University Press.
- Verlaan, P. 2011. Current Legal Developments: London Convention and London Protocol. *The International Journal of Marine and Coastal Law* 26: 186–94.
- Voigt, C., and F. Ferreira. 2016. The Warsaw Framework for REDD+: Implications for National Implementation and Results-based Finance. In *Research Handbook on REDD+ and International Law*. Ed. C. Voigt, 30–62. Cheltenham: Edward Elgar.