Part Three:
Operator Liability

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Chapter 6: The Nagoya – Kuala Lumpur Supplementary Protocol on Redress and Liability

The *Nagoya – Kuala Lumpur Supplementary Protocol on Redress and Liability* of 2010[1] is an international treaty that provides rules on liability[2] for damage resulting from living modified organisms (LMOs) obtained through modern biotechnology. It complements the *Cartagena Protocol on Biosafety*,[3] which addresses the safe handling and transboundary movement of LMOs but does not contain substantive provisions on liability for damage resulting from these organisms.[4] Before the Supplementary Protocol was adopted, a number of authors discussed the need for, and potential contents of, an additional instrument on liability for damage resulting from LMOs.[5] However, after the Supplementary Protocol was adopted in 2010, comparatively few publications have assessed its final provisions in depth.[6]

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1 Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety (15 October 2010; effective 05 March 2018), UN Doc. UNEP/CBD/BS/COP-MOP/5/17, p. 64 (hereinafter 'Supplementary Protocol' or 'SP').

2 On the meaning of this term, see chapter 2, section C.

3 Cartagena Protocol on Biosafety to the Convention on Biological Diversity (29 January 2000; effective 11 September 2003), 2226 UNTS 208 (hereinafter 'Cartagena Protocol' or 'CP').

4 See chapter 3, section A.II.6.

5 See *Alfonso Ascencio*, The Transboundary Movement of Living Modified Organisms: Issues Relating to Liability and Compensation, 6 (1997) RECIEL 293; *Philippe Cullet*, Liability and Redress for Modern Biotechnology, 15 (2006) YB Int'l Env. L. 165; *Susanne Förster*, Internationale Haftungsregeln für schädliche Folgewirkungen gentechnisch veränderter Organismen (2007); *Elizabeth Duall*, Liability and Redress Regime for Genetically Modified Organisms Under the Cartegena Protocol, 36 (2007) Geo. Wash. Int'l L. Rev. 173; *Katherine E. Kohm*, Shortcomings of the Cartagena Protocol: Resolving the Liability Loophole at an International Level, 27 (2009) UCLA Journal of Environmental Law and Policy 145; *Dire Tladi*, Civil Liability in the Context of the Cartagena Protocol: To Be or Not to Be (Binding)?, 10 (2010) Int. Environ. Agreements 15.

6 See the contributions in *Akiho Shibata* (ed.), International Liability Regime for Biodiversity Damage (2014); also see *Stefan Jungcurt/Nicole Schabus*, Liability and Redress in the Context of the Cartagena Protocol on Biosafety, 19 (2010) RECIEL 197; *Sufian Jusoh*, Harmonisation of Liability Rules in Transboundary Move-

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The following section briefly reviews the Supplementary Protocol's negotiating history (A.), followed by a thorough analysis of the obligations and responsibilities it creates. The scope of the Supplementary Protocol covers damage to biodiversity resulting from LMOs which have been subject to a transboundary movement (B.). Liability for such damage is addressed by the Supplementary Protocol in two ways. The first approach and main focus of the Supplementary Protocol is *administrative liability*, which seeks to require the responsible operator to take practical measures in response to damage to biological diversity caused by an LMO (C.).[7] The second approach is a provision on *civil liability*, which addresses material and personal damage that is 'associated with' damage to biodiversity (D.). Several provisions concern general and cross-cutting issues, such as exemptions from liability, financial security and the Supplementary Protocol's relationship to the law of state responsibility (E.). However, a number of crucial issues are not addressed by the Supplementary Protocol (F.). Nor can these gaps be filled by an *Implementation Guide* published by an association of biotechnology companies (G.).

A. Negotiating History

During the negotiations of the Cartagena Protocol, it was highly controversial whether the Protocol should contain substantive provisions on liability for damage resulting from LMOs and whether such rules should be legally binding.[8] Because no agreement could be reached, the negotiating parties decided to postpone the matter and only adopted an 'enabling provision' in Article 27 of the Cartagena Protocol, whereby they undertook

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ment of Biotechnology Crops (2012), 189–203; *Odile J. Lim Tung*, Genetically Modified Organisms and Transboundary Damage, 38 (2013) SAYIL 67; *Gurdial S. Nijar*, The Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety: An Analysis and Implementation Challenges, 13 (2013) Int. Environ. Agreements 271; *Aarti Gupta/Amandine Orsini*, Liability, Redress and the Cartagena Protocol, in: Elisa Morgera/Jona Razzaque/Michael G. Faure (eds.), Biodiversity and Nature Protection Law, Elgar Encyclopedia of Environmental Law, Volume III (2017) 445.

7 For terminological clarifications, see chapter 2, section G.

8 *Kate Cook*, Liability: 'No Liability, No Protocol', in: Christoph Bail/Robert Falkner/Helen Marquard (eds.), The Cartagena Protocol on Biosafety (2002) 371; *Akiho Shibata*, A New Dimension in International Environmental Liability Regimes: A Prelude to the Supplementary Protocol, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 17, 19–24.

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to elaborate 'international rules and procedures' on liability and redress after the Cartagena Protocol had entered into force.[9] After the Protocol had entered into force in 2003, the negotiation process was launched by the first meeting of the parties to the Protocol (COP-MOP) in 2004.[10] A *Technical Group of Experts* compiled views and laid out the potential aspects that would need to be considered when developing a comprehensive set of rules.[11] On this basis, a *Working Group* established by the COP-MOP commenced negotiations.[12] However, while parties pushing for binding rules began to provide concrete text proposals on the various elements, some developed countries still challenged the overall need to adopt a legally binding instrument.[13]

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9 Cf. *Nijar* (n. 6), 279; *Alejandro Lago Candeira*, Administrative Approach to Liability: Its Origin, Negotiation and Outcome, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 92, 96; *Worku D. Yifru/Kathryn Garforth*, The Supplementary Protocol: A Treaty Subject to Domestic Law?, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 150, 154.

10 Cf. CP COP-MOP, Terms of Reference for the Open-Ended Ad Hoc Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety: Synthesis Report of Submissions Received from Parties, Other Governments and Organizations, UN Doc. UNEP/CBD/BS/COP-MOP/1/9 (2003); CP COP-MOP, Decision BS-I/8. Establishment of an Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Protocol, UN Doc. UNEP/CBD/BS/COP-MOP/1/15, p. 102 (2004).

11 Technical Group of Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, Report of the Technical Group of Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, UN Doc. UNEP/CBD/BS/TEG-L&R/1/3 (2004).

12 For detailed accounts of the negotiating process, see *Gurdial S. Nijar* et al., Liability & Redress Under the Cartagena Protocol on Biosafety (2008); *Tladi* (n. 5); *Jungcurt/Schabus* (n. 6); Third World Network, Liability and Redress for Damage Resulting from GMOs: The Negotiations Under the Cartagena Protocol on Biosafety (2012); *Wen Xiang*, International Liability and Redress for Genetically Modified Organisms and Challenge for China's Biosafety Regulation, in: Vasilka Sancin/Maša Kovič Dine (eds.), International Environmental Law (2012), 581; *Nijar* (n. 6), 280–282; *René Lefeber/Jimena Nieto Carrasco*, Negotiating the Supplementary Protocol: The Co-Chairs' Perspective, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 52. Detailed reports of the negotiating meetings were published in IISD, Earth Negotiations Bulletin, Volume 09: Biological Diversity and Plant Genetic Resources (19 December 2017), available at: http://enb.iisd.org/vol09/ (last accessed 28 May 2022).

13 *Nijar* (n. 6), 281; also see Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Proto-

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At the third session of the Working Group in 2007, the group's co-chairs presented a streamlined document which contained two parallel approaches to operator liability.[14] Besides the conventional civil liability approach, which refers to the harmonization of domestic laws on civil liability, the co-chairs' proposal also featured a so-called *administrative approach*, which provides for the implementation of response measures to remedy environmental damage (rather than the mere payment of financial compensation).[15] The administrative approach is premised on the existence of *competent national authorities* which evaluate the damage and determine the response measures that have to be taken by the responsible operator.[16] The approach originates from environmental legislation in the United States, particularly the *Comprehensive Environmental Responsibility, Compensation and Liability Act* of 1980 (CERCLA),[17] and was adopted in 2004 by the European Union in its *Environmental Liability Directive*.[18] In 2005, the administrative approach was employed in an international treaty for the first time in the *Liability Annex* to the Environmental Protocol to the Antarctic Treaty.[19] After an initial period of scepticism, parties soon

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col on Biosafety, Liability and Redress (Article 27): Compilation of Submissions on Experiences and Views on Criteria for the Assessment of the Effectiveness of Any Rules and Procedures Referred to in Article 27 of the Protocol, UN Doc. UNEP/CBD/BS/WG-L&R/2/INF/2 (2006).

14 See Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, Report of the […] Third Meeting, UN Doc. UNEP/CBD/BS/WG-LR/3/3 (2007), Annexes I and II.

15 *Gurdial S. Nijar*, Civil Liability in the Supplementary Protocol, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 111, 121.

16 See *Jungcurt/Schabus* (n. 6), 202; for a detailed account, see *infra* section C.

17 Cf. United States, Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund), as Amended Through P.L. 109–591, Enacted August 10, 2005, 42 U.S.C. §§ 9601–9675 (hereinafter 'CERCLA').

18 Directive 2004/35/CE on Environmental Liability with Regard to the Prevention and Remedying of Environmental Damage (21 April 2004), OJ L 143, p. 56 (hereinafter 'EU Environmental Liability Directive'); see *G. Winter* et al., Weighing up the EC Environmental Liability Directive, 20 (2008) J. Envt'l L. 163, 164–165.

19 Annex VI to the Protocol on Environmental Protection to the Antarctic Treaty: Liability Arising from Environmental Emergencies (14 June 2005; not yet in force), ATCM Measure 1 (2005) (hereinafter 'Antarctic Liability Annex'); see *Michael Johnson*, Liability for Environmental Damage in Antarctica, 19 (2006) Geo. Int'l Envtl. L. Rev. 33; *René Lefeber*, The Legal Significance of the Supplementary Protocol: The Result of a Paradigm Evolution, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 73, 85–86.

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accepted that the administrative approach could be a viable option for liability in the context of biodiversity damage resulting from LMOs.[20]

While the administrative approach increasingly found support, it was still highly controversial whether the instrument should also include legally binding provisions on civil liability.[21] Developing countries insisted on including such provisions, arguing that their civil liability regimes were not yet equipped to deal with damage resulting from LMOs.[22] In addition, developing countries saw strict liability[23] rules as a possible remedy for their hitherto underdeveloped biosafety regimes.[24] On the other hand, many developed countries opposed the inclusion of civil liability provisions, arguing that they would open the gates for claims for traditional damage, which in their view was not covered by the mandate provided by the Cartagena Protocol.[25] Moreover, a number of developed country parties, including the European Union,[26] expressly wanted to avoid having to amend their existing domestic regimes on biosafety and liability for LMO-related damage.[27] This seems to reflect a general reluctance of states to commit to international civil liability regimes, as the implementation of such regimes often requires substantive changes to domestic rules and procedures.[28] Some parties were also concerned that the adoption of civil

20 *Nijar* (n. 6), 281–282.
21 See *Tladi* (n. 5), 17–18.
22 *Jungcurt/Schabus* (n. 6), 203; see *Elmo Thomas/Mahlet Teshome Kebede*, One Legally Binding Provision on Civil Liability: Why It Was so Important from the African Negotiator's Perspective, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 125.
23 See chapter 2, section E.
24 Cf. *Nijar* (n. 15), 118.
25 *Jungcurt/Schabus* (n. 6), 201; cf. IISD, Summary of the Second Meeting of the Group of Friends of the Co-Chairs on Liability and Redress in the Context of the Cartagena Protocol on Biosafety: 8–12 February 2010, ENB Vol. 9 No. 495 (2010), 7.
26 On the EU's position, see *Edward H. P. Brans/Dorith H. Dongelmans*, The Supplementary Protocol and the EU Environmental Liability Directive, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 180, 197–198.
27 *Nijar* (n. 6), 282.
28 See CBD Secretariat, Status of Third-Party Liability Treaties and Analysis of Difficulties Facing Their Entry into Force: Note by the Executive Secretary, UN Doc. UNEP/CBD/BS/WG-L&R/1/INF/3 (2005); *Jungcurt/Schabus* (n. 6), 201–202; more generally, see *Anne Daniel*, Civil Liability Regimes as a Complement to Multilateral Environmental Agreements, 12 (2003) RECIEL 225.

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liability rules would imply an acknowledgement of the inherent danger of biotechnology products.[29]

At COP-MOP 4 in 2008, the negotiating parties agreed in principle to develop a legally binding instrument that followed the administrative approach but also included one article on civil liability.[30] This compromise resulted in the provisions now contained in paragraphs 2 and 3 of Article 12.[31] Originally, this article was meant to be complemented by a non-binding set of guidelines on civil liability and redress.[32] However, although parties had begun to negotiate on a draft for these guidelines,[33] their completion was no longer pursued when the adoption of the Supplementary Protocol came into reach.[34]

The Supplementary Protocol was adopted on 15 October 2010 during COP-MOP 5 in Nagoya, Japan.[35] After being ratified by 40 states,[36] the Supplementary Protocol entered into force on 5 March 2018, as provided

29 *Nijar* (n. 6), 282.

30 Cf. CP COP-MOP, Decision BS-IV/12. Liability and Redress Under the Cartagena Protocol on Biosafety, UN Doc. UNEP/CBD/BS/COP-MOP/4/18, p. 84 (2008); see IISD, Summary of the Fourth Meeting of the Parties to the Cartagena Protocol on Biosafety: 12–16 May 2008, ENB Vol. 9 No. 441 (2008), 7; *Tladi* (n. 5), 18–22.

31 While the first paragraph of Article 12 also refers to civil liability, it rather seems to relate to the implementation of the administrative approach, cf. *infra* section C.V.1. For a detailed discussion of paras. 2 and 3, which relate to civil liability in a stricter sense, see *infra* section D.II.

32 Cf. CP COP-MOP Decision BS-IV/12 (2008) (n. 30), Annex, section 2.

33 Cf. Group of Friends on L&R, Draft Guidelines on Civil Liability and Redress in the Field of Damage Resulting from Transboundary Movements of Living Modified Organisms: Proposal by the Co-Chairs, UN Doc. UNEP/CBD/BS/GF-L&R/3/3 (2010).

34 Cf. CP COP-MOP, Report of the Fifth Meeting of the Conference of the Parties to the Convention on Biological Diversity Serving as the Meeting of the Parties to the Cartagena Protocol on Biosafety, UN Doc. UNEP/CBD/BS/COP-MOP/5/17 (2010), para. 129; *Jungcurt/Schabus* (n. 6), 203.

35 Cf. CP COP-MOP, Decision BS-V/11. International Rules and Procedures in the Field of Liability and Redress for Damage Resulting from Transboundary Movements of Living Modified Organisms, UN Doc. UNEP/CBD/BS/COP-MOP/5/17, p. 62 (2010).

36 Pursuant to Article 18(3) SP, the ratification by a regional economic integration organization (such as the European Union) shall not be counted towards the number of 40 ratifications in addition to the ratifications of the Member States of such an organization.

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by Article 18(1).[37] As of May 2022, it has 49 parties, including the European Union and all of its Member States except Greece and Malta.[38]

B. Scope

According to Article 3(1), the Supplementary Protocol applies to 'damage resulting from living modified organisms which find their origin in a transboundary movement'. This provision consists of three elements. Firstly, the Supplementary Protocol applies to living modified organisms (I.). Secondly, the notion of damage is defined as an 'adverse effect on the conservation and sustainable use of biological diversity' (II.). The third criterion is that damage must result from LMOs 'which find their origin in a transboundary movement' (III.). In addition, the Protocol contains provisions governing its temporal and geographical scope (IV.).

I. Subject Matter: Living Modified Organisms

Like the Cartagena Protocol, the Supplementary Protocol applies to *Living Modified Organisms* (LMOs). The definition of this term,[39] as well as all other definitions contained in the Cartagena Protocol, are expressly incorporated into the Supplementary Protocol.[40]

Besides LMOs intended for intentional introduction into the environment, the scope of the Supplementary Protocol expressly extends to LMOs destined for contained use and to LMOs intended for direct use for food,

37 Cf. UN OLA, Status of the Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety, United Nations Treaty Collection, available at: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-8-c&chapter=27&clang=_en (last accessed 28 May 2022).

38 Cf. *ibid.*, see Council of the European Union, Council Decision on the Conclusion on Behalf of the European Union of the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety (12 February 2013), OJ L 46, p. 1.

39 A living modified organism is defined in Article 3(g) CP as 'any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology'. On the meaning and scope of this phrase, see chapter 3, section A.I.1.

40 Article 2(1) SP.

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feed or processing.[41] Unlike the Cartagena Protocol,[42] the Supplementary Protocol does not provide for a differentiated treatment of these types of uses of LMOs.[43]

1. LMOs That Are Pharmaceuticals for Humans

However, it could be questioned whether the Supplementary Protocol applies to LMOs used for pharmaceutical purposes. The Supplementary Protocol does not contain any reference to pharmaceuticals, and their coverage was apparently not discussed during its negotiations.[44] As shown above, the Cartagena Protocol contains an express provision ruling out from its scope the transboundary movement of LMOs 'which are pharmaceuticals for humans', provided they are addressed by 'other relevant international agreements or organisations'.[45] Pursuant to Article 16(3) SP, the provisions of the Cartagena Protocol shall apply, *mutatis mutandis*,[46]

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41 Article 3(1) SP.

42 The Cartagena Protocol's Advance Informed Agreement (AIA) mechanism does not apply to LMOs destined for contained use, see Article 6(2) CP, and provides for a simplified AIA mechanism for LMO-FFPs, see Articles 7(3) and 11 CP. For details, see chapter 3, sections A.II.1.a) and A.II.1.f).

43 *Nijar* (n. 6), 273. Whether LMO-FFPs should be covered by the Supplementary Protocol was highly controversial during the negotiations, see *Lim Tung* (n. 6), 70–71.

44 This finding is derived from a full-text search of the Supplementary Protocol's *travaux préparatoires*, including publicly available draft texts and reports from the negotiations between 2002 and 2010, the topically structured documentation of proposed rules and government positions in *Nijar* et al. (n. 12), and the *Earth Negotiations Bulletin* reports of those meetings that were covered, see IISD (n. 12). In their responses to a questionnaire submitted before the actual negotiations commenced, *Uganda* and *Cameroon* identified the import and consumption of LMO pharmaceuticals as belonging to the 'types of activities or situations perceived most likely to cause damage', and one NGO suggested the inclusion of pharmaceuticals into the scope of the instrument to be developed; see Technical Group of Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, Compilation of Views Submitted in Response to Questionnaire on Liability and Redress for Damage Resulting from Transboundary Movement of LMOs, UN Doc. UNEP/CBD/BS/TEG-L&R/1/INF/1 (2004), on pages 7, 60 and 77. However, the issue of pharmaceuticals was apparently never raised in the actual negotiations.

45 Article 5 CP; see chapter 3, section A.I.4.

46 With the necessary changes, see 'mutatis mutandis', in: *Aaron X. Fellmeth/Maurice Horwitz*, Guide to Latin in International Law (2011), 189.

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to the Supplementary Protocol. This means that the general exemption for LMO pharmaceuticals in the Cartagena Protocol also applies to the Supplementary Protocol.[47] Consequently, LMOs that are pharmaceuticals for humans would not be covered by the Supplementary Protocol's scope if they were addressed by other relevant international agreements or organisations,[48] which, as noted earlier, seems not (yet) to be the case.[49]

This result is of particular importance for LMOs employed for disease control purposes (such as genetically modified insects or organisms equipped with engineered gene drives[50]). If these types of LMOs were regarded as pharmaceuticals (as suggested by one author[51]), damage caused by these organisms would fall outside the scope of the Supplementary Protocol.[52] This would be a significant limitation, especially since it is widely acknowledged that engineered gene drives involve a substantial risk of causing (potentially transboundary) damage to biodiversity.[53] However, as argued above, classifying LMOs used for disease control as 'pharmaceuticals for humans' would overstretch the ordinary meaning of this term in its context. Consequently, the exemption only applies to LMOs directly used as medicinal drugs but not to LMOs used for other public health purposes, such as disease vector control.

2. Products Derived From LMOs

During the negotiations of the Supplementary Protocol, it was highly contentious whether it should apply to products which have been derived

47 This does not affect the above-mentioned equal treatment by the Supplementary Protocol of different categories of LMOs (contained use/LMO-FFPs/intended for introduction into the environment) that are subject to differential treatment in the Cartagena Protocol, since Article 16(3) incorporates the provisions of the Cartagena Protocol only 'except as otherwise provided'. The list of LMOs covered by Supplementary Protocol contained in Article 3 can be regarded as such a derogating provision.

48 This conclusion is shared, even though without reasoning, by *Lim Tung* (n. 6), 71; and *Nijar* (n. 6), 273.

49 See chapter 3, section A.I.4.

50 See chapter 1, sections C.III.1 and E.III.

51 *Lim Tung* (n. 6), 71; *Odile J. Lim Tung*, Transboundary Movements of Genetically Modified Organisms and the Cartagena Protocol: Key Issues and Concerns, 17 (2014) Potchefstroom Electronic Law Journal 1739, 1744–1745.

52 Cf. *Lim Tung* (n. 6), 71.

53 See chapter 1, section C.IV.4, and chapter 5, section D.

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from LMOs (so-called 'products thereof').[54] In the final text, all references to *products thereof* were removed. In the report of COP-MOP 5, at which the Supplementary Protocol was adopted, it was noted that there were different understandings of whether 'processed materials that are of living modified organism-origin' were covered by Article 27 of the Cartagena Protocol, which mandated the development of the Supplementary Protocol.[55] The report noted that one such understanding was that parties '*may apply* the Supplementary Protocol to damage caused by such processed materials, provided that a causal link is established between the damage and the living modified organism in question'.[56] But this has no bearing on the interpretation of the Supplementary Protocol, as it merely restates a general principle of international law. By virtue of their sovereignty, states are free to unilaterally apply norms of international law even outside of their defined scope of application, provided that this does not collide with other obligations of that state.[57] Such conflicting obligations may, in particular, arise from international trade law, where the extension of liability rules to products of LMOs might be considered as an unjustified trade restriction.[58] In any event, there was consensus among negotiators that the Supplementary Protocol should only apply when the original LMO, and not just the processed material, had been subject to a transboundary movement.[59]

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54 Cf. *Reynaldo A. Alvarez-Morales*, A Scientific Perspective on the Supplementary Protocol, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 105, 107–109; *Shibata* (n. 8), 22–24; *Lefeber/Nieto Carrasco* (n. 12), 66–67.

55 Report of COP-MOP 5 (n. 34), para. 133.

56 *Ibid.* (emphasis added).

57 This follows from the sovereign independence of states, cf. *Malcolm N. Shaw*, International Law (8th ed. 2017), 167, noting that '[t]he starting points for the consideration of the rights and obligations of states within the international legal system remains that international law permits freedom of action for states, unless there is a rule constraining this'. Also see PCIJ, Case of the S.S. "Lotus" (France v. Turkey), Judgment of 07 September 1927, PCIJ Rep. Ser. A, No. 10, 18; *James Crawford*, Brownlie's Principles of Public International Law (9th ed. 2019), 431–432.

58 Cf. *Rodigro C. A. Lima*, Trade and the Supplementary Protocol: How to Achieve Mutual Supportiveness, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 131, 135; *Jusoh* (n. 6), 217–232; see chapter 3, section C.

59 *Shibata* (n. 8), 24; *Lefeber/Nieto Carrasco* (n. 12), 67; *Lima* (n. 58), note 5 at p. 135.

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II. Damage to Biological Diversity

Pursuant to Article 3(1), the Supplementary Protocol applies to 'damage' resulting from LMOs. The term 'damage' is defined by Article 2(2)(b) as

> '*an adverse effect on the conservation and sustainable use of biological diversity, taking also into account risks to human health*'.

Unlike virtually all other international instruments on environmental liability,[60] the Supplementary Protocol's scope does not cover all forms of

60 See, e.g., the Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment (21 June 1993; not yet in force), 32 ILM 1228, Article II(10); Vienna Convention on Civil Liability for Nuclear Damage (25 May 1963; effective 12 September 1997), 1063 UNTS 358, as amended by the Protocol of 12 September 1997 (effective 4 October 2003), IAEA Doc. INFCIRC/566 (hereinafter '1997 Vienna Convention on Civil Liability for Nuclear Damage'), Article 1(1)(k); International Convention on Civil Liability for Oil Pollution Damage (29 November 1969; effective 19 June 1975), 973 UNTS 3, as amended by the Protocol of 27 November 1992 (effective 30 May 1996), 1956 UNTS 255 (hereinafter '1992 Oil Pollution Convention'), Article 1(6); International Convention on Civil Liability for Bunker Oil Pollution Damage (23 March 2001; effective 21 November 2008), IMO Doc. LEG/CONF.12/19 (hereinafter 'Bunker Oil Convention'), Article 1(9); Convention on Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Seabed Mineral Resources (01 May 1977; not yet in force), 16 ILM 1451, Article 1(6); International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (03 May 1996; not yet in force), 25 ILM 1406, as amended by the Protocol of 30 April 2010, IMO Doc. LEG/CONF.17/DC/1 (hereinafter 'HNS Convention'), Article 1(6)(c); Convention on Civil Liability for Damage Caused During Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels (10 October 1989; not yet in force), UN Doc. ECE/TRANS/79, Article 1(10); Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and Their Disposal (10 December 1999; not yet in force), UNEP/CHW.5/29, p. 88 (hereinafter 'Basel Protocol on Liability for Hazardous Wastes'), Article II(2)(c)(iv); Kiev Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters (21 May 2003; not yet in force), UN Doc. ECE/MP.WAT/11-ECE/CP.TEIA/9 (hereinafter 'Kiev Liability Protocol'), Article II(2)(d)(iv); Antarctic Liability Annex (n. 19), Article 2(b). However, note that while all of these instruments provide for reimbursement of expenses made for reasonable measures of prevention or reinstatement actually undertaken, many expressly exclude monetary compensation for damage to the environment *per se*, see chapter 11, section B.I.1. Also see Convention on International Liability for Damage Caused by Space Objects (29 March 1972; effective 01 September 1972), 961 UNTS 187, Article 1(a); Convention on Third Party Liability in the Field of Nuclear Energy (29 July

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environmental damage but is strictly limited to adverse effects on the conservation and sustainable use of biodiversity. Material and personal damage are only addressed insofar as it is 'associated with' biodiversity damage,[61] while economic loss is not mentioned in the Supplementary Protocol at all. Hence, any injury suffered from an incident not resulting in biodiversity damage is excluded from the Protocol's scope. The reason for this lies in the object and purpose of the biosafety regime, which is the 'conservation and sustainable use of biological diversity, taking also into account risks to human health'.[62]

The Supplementary Protocol's definition of 'damage' involves a number of terms that require closer inspection. First, the meaning of 'biological diversity' must be clarified (1.). Second, damage is defined by the Protocol as an 'adverse effect on the conservation and sustainable use' of biodiversity (2.). Such effects need to be 'measurable or otherwise observable' and 'significant' (3.). In addition, 'risks to human health' shall also be taken into account (4.).

1. Biological Diversity

The term 'biological diversity' is defined by Article 2 of the CBD as

> *'the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems'.*

The term 'variability' implies that the concept of biological diversity does not address individual species, habitats and ecosystems or the environment as such. For this reason, it has been suggested that injury to 'variability among living organisms' may be difficult to quantify in order to establish

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1960; effective 01 April 1968), 956 UNTS 251, as amended by the Additional Protocol of 28 January 1964 and the Protocol of 16 November 1982 (effective 7 October 1988), 1519 UNTS 329, Article III(a), which does not include damage to the environment. A further Protocol to the Paris Convention adopted in 2004 includes damage to the environment into the scope of compensable damage, but this Protocol has not yet entered into force. For a useful collection of documents, see *Hannes Descamps/Robin Slabbinck* et al. (eds.), International Documents on Environmental Liability (2008).

61 Article 12(2) SP; see *infra* section D.I.

62 Article 1 CP.

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the occurrence of damage.[63] However, such an understanding is based on an excessively narrow interpretation of the term 'variability'. The term refers to the variability of life in all forms, levels and combinations, including the variety and frequency of different ecosystems, species and genetic information.[64] At the same time, efforts to preserve this variability will inevitably be focused on 'tangible manifestations of biological diversity' such as particular ecosystems or populations of species.[65] Consequently, injury to the variability among living organisms can arise from damage to individual components of biological diversity, such as individual species or ecosystems,[66] but whether such injury amounts to 'damage' in terms of the Supplementary Protocol has to be assessed in light of the other given criteria.

2. Adverse Effects on the Conservation and Sustainable Use of Biological Diversity

The term 'damage' is defined in Article 2(2)(b) as an 'adverse effect on the conservation and sustainable use' of biological diversity. The reference to *conservation* and *sustainable use* originates from the Cartagena Protocol,

63 *Duall* (n. 5), 195, citing ICCP, Liability and Redress for Damage Resulting from the Transboundary Movements of Living Modified Organisms: Review of Existing Relevant Instruments and Identification of Elements: Note by the Executive Secretary, UN Doc. UNEP/CBD/ICCP/2/3 (2001), para. 77.

64 *Lyle Glowka* et al., A Guide to the Convention on Biological Diversity (1994), 16.

65 CBD COP, Synthesis Report on Technical Information Relating to Damage to Biological Diversity and Approaches to Valuation and Restoration of Damage to Biological Diversity, as Well as Information on National/Domestic Measures and Experiences: Note by the Executive Secretary, UN Doc. UNEP/CBD/COP/9/20/Add.1 (2008), para. 9; also see *Glowka* et al., IUCN Guide to the CBD (n. 64), 16.

66 Synthesis Report on Article 14(2) CBD (n. 65), para. 19; This understanding is confirmed by the *Biodiversity Compact* (see chapter 7), which refers to adverse changes to species or ecosystems and 'natural resource services essential to sustain any Species', see The Compact: A Contractual Mechanism for Response in the Event of Damage to Biological Diversity Caused by the Release of a Living Modified Organism, Second Amended Text (18 September 2012), available at: http://www.biodiversitycompact.org/wp-content/uploads/Compact-Second-Amended-Text-with-translation-reference-January-2014-2.pdf (last accessed 28 May 2022), Article 6.2.

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which applies to LMOs that 'may have' said adverse effects.[67] Against this background, it has been questioned whether the phrase 'conservation and sustainable use of biological diversity' signifies a concept distinct from that of 'damage to biological diversity', which is used (but not defined) in the CBD.[68]

a) Adverse Effects on Conservation

While the CBD does not define the term 'conservation of' biological diversity, the term's ordinary meaning[69] implies that it primarily refers to preventing the loss of biological diversity. This is confirmed by the CBD's preamble, which recognizes that 'biological diversity is being significantly reduced by certain human activities'.[70] Moreover, the term 'biodiversity loss' was defined in a decision adopted by the Conference of Parties (COP) to the CBD in 2004 as

> *'the long-term or permanent qualitative or quantitative reduction in components of biodiversity and their potential to provide goods and services, to be measured at global, regional and national levels'.*[71]

As shown above, decisions adopted by the CBD COP are usually carried by a consensus of all states parties, which arguably awards them a quasi-normative 'soft law' status that also takes influence on the interpretation

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67 Cf. Article 4 CP. This wording, in turn, originates from Article 8(g) CBD. On the question of whether the Cartagena Protocol is limited to hazardous LMOs, see chapter 3, section A.I.2.

68 See Articles 14(1)(d), 14(2), 22(1) CBD; cf. ICCP (n. 63), para. 77; *Duall* (n. 5); *Juan-Francisco E. Espinosa*, The Definition of Damage Resulting from Transboundary Movements of Living Modified Organisms in Light of the Cartagena Protocol, 47 (2009) Canadian YBIL 319, 326–327; *Worku D. Yifru* et al., Review of Issues, Instruments and Practices Relevant to Liability and Redress for Damage Resulting from Transboundary Movements of Living Modified Organisms (2012), 22; *Armelle Gouritin*, EU Environmental Law, International Environmental Law, and Human Rights Law (2016), 161–162.

69 Cf. 'conservation, n.', in: *James Murray* et al., Oxford English Dictionary, Online Edition, available at: http://www.oed.com/ (last accessed 28 May 2022).

70 See Preamble to the CBD, Recital 6.

71 CBD COP, Decision VII/30. Strategic Plan: Future Evaluation of Progress, UN Doc. UNEP/CBD/COP/DEC/VII/30 (2004), para. 2. In this context, also see Synthesis Report on Article 14(2) CBD (n. 65), paras. 8–15.

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of the terms of the CBD.[72] Hence, it can be assumed that any 'loss' of biodiversity, i.e. a reduction or loss of a certain species either in a certain habitat or globally, will also be an adverse effect on the 'conservation of' biological diversity.[73] Even beyond the threshold of actual loss, conservation of biodiversity could be adversely affected, for instance, when human efforts to prevent biodiversity loss are undermined.[74] Moreover, it can be drawn from the definition that damage not only encompasses the physical loss of components of biodiversity *per se*, but also the loss of their ability to provide goods and services.[75]

However, not every change to biological diversity necessarily constitutes an 'adverse effect' on its conservation. For instance, it could be questioned whether the mere undesired presence of an LMO in an ecosystem or changes to the genome of natural species due to cross-over (or hybridization) events necessarily constitute 'adverse effects'. For instance, the *Biodiversity Compact*, a private civil liability instrument developed by multinational biotechnology corporations,[76] expressly provides that these types of changes do not per se constitute 'significant and adverse changes' that give rise to liability under the Compact.[77] However, such a restrictive interpretation appears not to be warranted for the Supplementary Protocol, since there is no indication that an 'adverse effect on the conservation' is only given when there is a 'loss' of biodiversity in the sense of the aforementioned definition.

b) Adverse Effects on Sustainable Use

'Sustainable use' is defined in Article 2 CBD as the 'use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity'. Sustainable use could be adversely affected when such use is no longer possible or must be restricted in order to prevent the loss of biodiversity, for instance when the continuation of previously sustainable use practices would risk the extinction of certain species or the destruction of components of biological diversity (e.g.

72 See chapter 5, section B.
73 Cf. *Espinosa* (n. 68), 336–337.
74 In the context of engineered gene drives, see *Axel Hochkirch* et al., License to Kill?, 11 (2018) Conservation Letters e12370.
75 Synthesis Report on Article 14(2) CBD (n. 65), para. 14.
76 See chapter 7.
77 Cf. Biodiversity Compact (n. 66), Article 8.3.

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habitats or ecosystems). In this understanding, the concept of 'sustainable use' has a clear anthropocentric focus[78] while, in contrast, 'conservation' aims at preserving biodiversity as such and follows a more ecocentric approach.[79]

c) Conclusions

The foregoing analysis has shown that there are no apparent differences between the concepts of 'adverse effects on the conservation and sustainable use of biological diversity' used in the Supplementary Protocol and 'damage to biological diversity' used in the CBD.[80] Any event that endangers or reduces the 'variability of living organisms' will affect either the conservation of biological diversity, its sustainable use, or both. This is clearly the case when a species is endangered or extinct. On the other hand, not every change to the composition of biological diversity necessarily constitutes an 'adverse effect', and not every adverse effect is caused by a 'loss' of biodiversity.[81] Whether particular changes result in adverse effects on its *conservation* or *sustainable use* will have to be assessed on a case-by-case basis, having regard to the threshold that adverse effects must be both 'measurable or otherwise detectable' and 'significant'.[82]

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78 *Espinosa* (n. 68), 337 even assumes that 'it is necessary to verify that there has been a loss of income or that there has been a consequential loss to a state, including loss of income'.

79 On the difference and interplay between anthropocentric and ecocentric approaches, see *Alan E. Boyle*, The Role of International Human Rights Law in the Protection of the Environment, in: Alan E. Boyle/Michael Anderson (eds.), Human Rights Approaches to Environmental Protection (1996) 43, 51–53; *Silja Vöneky/Felix Beck*, Umweltschutz und Menschenrechte, in: Alexander Proelß (ed.), Internationales Umweltrecht (2nd ed. 20202) 191, MN. 150–152.

80 Cf. *Espinosa* (n. 68), 335; *Shibata* (n. 8), 23; but see *Daniela M. Schmitt*, Staatenverantwortlichkeit für Schäden an der biologischen Vielfalt (2018), 81 who assumes that there is a difference between damage to biological diversity *per se* and damage to its conservation and sustainable use.

81 Cf. Synthesis Report on Article 14(2) CBD (n. 65), para. 16.

82 Cf. Article 2(2)(b)(i) and (ii) SP; see next section.

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3. Threshold of Damage: 'Measurable' and 'Significant'

To qualify as recoverable damage under the Supplementary Protocol, adverse effects on biological diversity need to fulfil two requirements stipulated in Article 2(2)(b): First, the damage must be *measurable or otherwise observable*. Wherever available, this shall be determined according to scientifically established baselines that have been recognized by a competent authority and that take into account any other human-induced or natural variation.[83] The notion 'baseline' refers to information about the state of the affected environment before the incident occurred.[84]

Generally, determining a baseline condition requires data on the condition of the affected ecosystem just before the incident occurred.[85] In principle, this would require periodic, nationwide biodiversity surveys.[86] As the Supplementary Protocol remains silent on the matter of baseline data collection prior to the occurrence of damage,[87] the availability of such data will largely depend on the existence of biodiversity inventories and studies performed by individual states parties.[88] However, baselines can also be estimated *ex post*, for instance by using *temporal trend analysis*, which builds upon historical data from impacted areas (where available), *reference area comparison*, which evaluates trends in similar areas that remained unaffected, or mathematical modelling techniques.[89]

The second threshold for damage to be recoverable is that it must be *significant*, which shall be established on the basis of a non-exhaustive list of factors provided in Article 3(3) of the Supplementary Protocol. These factors include the long-term or permanent change (i.e. change that will not be redressed through natural recovery within a reasonable time), the

83 Article 2(2)(b)(i) SP.

84 Cf. EU Environmental Liability Directive (n. 18), Article 2(14).

85 *Brans/Dongelmans* (n. 26), 187.

86 On this problem in the context of globally spreading gene drives, see *Marion Dolezel* et al., Beyond Limits – The Pitfalls of Global Gene Drives for Environmental Risk Assessment in the European Union, 15 (2020) BioRisk 1, 12–13.

87 *Brans/Dongelmans* (n. 26), 187–188.

88 In this context, see *Ted Gullison* et al., Good Practices for the Collection of Biodiversity Baseline Data (2015); for the EU, see EEA, EU 2010 Biodiversity Baseline – Adapted to the MAES Typology, EEA Technical report No 9/2015.

89 Cf. Synthesis Report on Article 14(2) CBD (n. 65), para. 40. See *Joshua Lipton/Kate LeJeune*, Determining and Quantifying Environmental Damage, in: Joshua Lipton/Ece Özdemiroğlu et al. (eds.), Equivalency Methods for Environmental Liability (2018) 57, 74–79.

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extent of the qualitative or quantitative changes, the reduction of ecosystem services, and the extent of any adverse effects on human health.[90]

It is questionable whether these criteria are sufficiently precise. While some authors assume that the definition of damage contained in the Supplementary Protocol established 'hard criteria' for determining damage to the environment,[91] others argue that it may be difficult in practice for experts to agree on the 'significance' of adverse effects, especially when there is scientific uncertainty on the (potentially long-term) negative impacts.[92] Some even challenge the 'remarkably vague' wording used in this part of the Supplementary Protocol and doubt whether there is any harmonized understanding of when unwanted side-effects of releasing an LMO amount to 'damage to biological diversity'.[93] In any event, a critical limitation for measuring adverse effects on biodiversity damage could be that there is a lack of knowledge about the situation of biodiversity before the rise of harmful anthropogenic activities.[94] Hence, there might be situations in which establishing a baseline will not be possible due to a lack of pre-incident information on the state of biodiversity. It is unclear whether other methods are available in these situations to measure change where baselines do not exist.[95] At the same time, this shows that establishing damage to biodiversity is more a scientific issue than a legal one.[96]

4. Risks to Human Health

As an additional element in its definition of *damage*, the Supplementary Protocol refers to 'taking also into account risks to human health'.[97] This wording originates from Article 8(g) of the CBD and Article 1 of the Cartagena Protocol, where it is used in addition to the risks that LMOs might pose to biodiversity. However, the meaning of the phrase 'taking

90 Article 2(3) SP.
91 Cf. *Jungcurt/Schabus* (n. 6), 200.
92 *Lim Tung* (n. 6), 72.
93 *Yifru/Garforth* (n. 9), 156; also see *Gouritin* (n. 68), 163.
94 *Jean-Baptiste Mihoub* et al., Setting Temporal Baselines for Biodiversity: The Limits of Available Monitoring Data for Capturing the Full Impact of Anthropogenic Pressures, (2017) 7 Sci. Rep. 41591, 1–2.
95 Cf. Synthesis Report on Article 14(2) CBD (n. 65), paras. 42–43.
96 *Ibid.*, para. 6.
97 Article 2(2)(b).

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also into account' is ambiguous.[98] On the one hand, it could refer to only those health risks that occur as a consequence of the adverse effects that an LMO may have on biological diversity.[99] On the other hand, the reference to human health could also be interpreted more broadly as including risks to human health that *directly* result from an LMO (e.g. increased allergenicity) without the LMO necessarily having adverse effects on biodiversity.[100] According to a third view, health impacts are not recognized as a compensable category of damage but merely need to be taken into account 'as one of the factors to determine the significance of adverse effects' to biological diversity.[101]

The Supplementary Protocol's *travaux préparatoires* offer no guidance as to the correct interpretation of the phrase in question. The inclusion of risks or damage to human health in the definition of 'damage to biological diversity' was controversial throughout the negotiations of both protocols.[102] In the context of the Supplementary Protocol, some parties advocated for including damage to human health as a compensable type of damage, while others argued that the reference to 'risks to human health' was merely an aspect when evaluating possible damage to biodiversity.[103]

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98 Cf. *Aarti Gupta*, Governing Trade in Genetically Modified Organisms: The Cartagena Protocol on Biosafety, 42 (2000) Environment: Science and Policy for Sustainable Development 22; *Ruth Mackenzie* et al., An Explanatory Guide to the Cartagena Protocol on Biosafety (2003), MN. 45–51; *Shibata* (n. 8), 22; *Tladi* (n. 5), n. 12 on p. 6; *Espinosa* (n. 68), 326–327; *Jusoh* (n. 6), 191; *Gupta/Orsini* (n. 6), 448.

99 *Mackenzie* et al., IUCN Guide (n. 98), MN. 49; cf. *Eriko Futami/Tadashi Otsuka*, A Japanese Approach to the Domestic Implementation of the Supplementary Protocol, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 201, 203.

100 *Mackenzie* et al., IUCN Guide (n. 98), MN. 50; the same view is apparently taken regarding the CBD by *Glowka* et al., IUCN Guide to the CBD (n. 64), 45–46.

101 *Lim Tung* (n. 6), 73.

102 For the Cartagena Protocol, see *Mackenzie* et al., IUCN Guide (n. 98), MN. 48. For the Supplementary Protocol, see *Shibata* (n. 8), 22, who contends that the reference to human health 'was deliberately left open for the Parties to interpret'.

103 Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, Synthesis of Proposed Texts and Views on Approaches, Options and Issues Identified Pertaining to Liability and Redress in the Context of Article 27 of the Biosafety Protocol: Note by the Co-Chairs, UN Doc. UNEP/CBD/BS/WG-L&R/2/2 (2006), 20–22; also see *Espinosa* (n. 68), 337–338; *Dire Tladi*, Challenges and Opportunities in the Implementation of the Supplementary Protocol: Re-Inter-

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Other parties argued that damage to human health fell into the category of 'traditional damage' and thus was to be addressed by rules on civil liability.[104] Indeed, the substantive provisions of the Supplementary Protocol do not provide a remedy for personal injury but remain strictly focused on biodiversity damage.[105] It thus seems reasonable to conclude that damage to human health, as a type of personal injury, is outside the scope of 'damage to biological diversity'.[106] Instead, the obligation to 'take into account' risks to human health requires considering health risks when determining whether adverse effects of LMOs amount to 'damage to biodiversity' as defined in the preceding parts of the definition.

5. Domestic Criteria to Address Damage

Article 3(6) of the Supplementary Protocol provides that 'Parties may use criteria set out in their domestic law to address damage that occurs within the limits of their national jurisdiction'. Again, the meaning of this provision is far from obvious, because the Protocol does not specify what is meant by 'addressing damage'.[107] However, the drafting history shows that this rule was inserted to provide parties with significant discretion to define for themselves what constitutes *biological diversity* and what constitutes *damage* to the so-defined biological diversity.[108] Thus, parties are allowed to continue using their existing definitions of 'damage' or even to derogate from the concept of *damage to biological diversity* altogether.[109] Consequently, the respective Japanese legislation on liability for damage caused by GMOs only covers adverse effects to native and wild species, which excludes cultivated crops and non-native species.[110] Similarly, the European Union's *Environmental Liability Directive* merely covers damage to certain enlisted protected species and natural habitats, but not to bio-

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pretation and Re-Imagination, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014), 175.

104 Synthesis of Proposed Texts (2006) (n. 103), 21; on civil liability in the Supplementary Protocol see *infra* section D.

105 See *infra* section C.I.

106 On personal injury, see *infra* section D.I.

107 Cf. *Yifru/Garforth* (n. 9), 156.

108 See *Shibata* (n. 8), 37; IISD, Friends of the Co-Chairs Highlights: Monday, 8 February 2010, ENB Vol. 9 No. 491 (2010), 1.

109 *Yifru/Garforth* (n. 9), 156.

110 *Shibata* (n. 8), 37–38; see *Futami/Otsuka* (n. 99), 213–214.

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diversity *per se*.[111] Nevertheless, in light of Article 3(6), these implementations appear to be consistent with the Supplementary Protocol.[112]

6. Types of Damage Not Addressed by the Supplementary Protocol

The preceding sections have shown that the scope of the Supplementary Protocol is clearly restricted to damage to biological diversity, i.e. a particular type of damage to the environment *per se*.[113] Individual damage such as bodily harm, or property damage, is only addressed by the truncated provisions on civil liability in Article 12 and only as long as such damage is 'associated with' biodiversity damage.[114] Personal and material damage which does not result from biodiversity damage is ruled out from the Supplementary Protocol.[115]

Various other types of damage that LMOs might cause are also not covered by the Supplementary Protocol. Most strikingly, it does not address economic loss caused, for instance, by contamination of organic or conventionally grown crops with LMOs or their pollen, which often affects the market value of these crops or even renders them unsaleable.[116] Furthermore, the Supplementary Protocol does not address adverse socio-economic effects in terms of Article 26 of the Cartagena Protocol,[117] which

111 Cf. Article 2(1)(a) of the EU Environmental Liability Directive (n. 18), which defines the term 'environmental damage' as, *inter alia*, 'damage to protected species and natural habitats, which is any damage that has significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species'. Also see *Brans/Dongelmans* (n. 26), 198–199.

112 But see *ibid.*, 198–200, arguing that there are important differences between the Supplementary Protocol and the EU-ELD concerning the scope of both regimes and their measure of damages, and that implementing the Supplementary Protocol into EU law by extending the scope of the EU-ELD required substantive changes to the latter.

113 On the difficulties in defining 'damage to biological diversity', see *Espinosa* (n. 68). On the compensability of damage to the environment *per se* under international law, see chapter 11, section B.I.

114 See *infra* section D.I.

115 *Lefeber* (n. 19), 90.

116 Cf. *Lim Tung* (n. 6), 72–74, referring to a number of cases concerning contamination of conventional or organic crops; *Cullet* (n. 5), 177; *Lim Tung* (n. 6), 72–74; also see *Förster* (n. 5), 336; *Jusoh* (n. 6), 100–103.

117 The inclusion of 'damage to socio-economic considerations' (or 'conditions') was proposed during the negotiations of the Supplementary Protocol, but eventually not adopted in the final text. See CP COP-MOP, Final Report of

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may concern issues such as food security, public health, spiritual and cultural values, traditional practices and market access.[118] This is in line with the object and purpose of the Supplementary Protocol, which is neither meant to establish nor does it actually establish a comprehensive liability regime for any damage other than to biodiversity.[119]

7. Conclusions

The preceding discussion of the types of damage addressed by the Supplementary Protocol has shown that it falls far short of addressing all potential adverse effects of LMOs. Its rigorous focus on damage to biological diversity stands in line with the objective of the CBD but stops short of the Cartagena Protocol. As shown earlier, the Cartagena Protocol's main purpose is less to protect biodiversity as a 'global common' but rather to protect the sovereign decision-making of each party on whether to admit LMOs into its territory.[120] While a transboundary movement, as will be shown in the next section, is a precondition for the Supplementary Protocol to apply, it is far from covering all relevant types of adverse effects that may result from such movements.

The most significant shortcoming is Article 3(6), which expressly allows the member states to determine the occurrence of damage according to any criteria of their own. The European Union has vehemently promoted its *Environmental Liability Directive* as a role model in the negotiations.[121] Hence, the other delegations cannot have overlooked the fact that this very Directive fails to address damage to biological diversity in the sense

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the Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, UN Doc. UNEP/CBD/BS/COP-MOP/4/11 (2008), 9; *Gouritin* (n. 68), 158–159; *Lim Tung* (n. 6), 73; *Espinosa* (n. 68), 338.

118 Article 26 of the Cartagena Protocol expressly allows parties to take socio-economic considerations 'into account' in their decision-making on the import of LMOs. For details, including a closer analysis of the meaning of the term 'socio-economic considerations', see chapter 3, section A.II.1.e). *Förster* (n. 5), 338, argues that due to the vagueness of the concept of socio-economics, liability for adverse socio-economic effects would be unpredictable.

119 *Yifru/Garforth* (n. 9), 160; *Nijar* (n. 15), 113–114; *Lim Tung* (n. 6), 72–74; *Gouritin* (n. 68), 158–159.

120 See chapter 3, section A.III.

121 See *Gouritin* (n. 68), 164–166.

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defined in the CBD but merely covers damage to some of its components that enjoy special legal protection.[122]

III. Damage Resulting from LMOs 'Which Find Their Origin in a Transboundary Movement' (Article 3(1))

Pursuant to Article 3(1), the Supplementary Protocol applies to damage resulting from living modified organisms 'which find their origin in a transboundary movement'. This requirement is semantically confusing. Since 'transboundary movement' is defined as 'the movement of a living modified organism from one Party to another Party',[123] an LMO can hardly 'originate' from a transboundary movement. What is meant is that damage (in the defined sense) must result from an LMO that has previously been subject to a transboundary movement.[124]

Both the Cartagena Protocol and the Supplementary Protocol distinguish between different kinds of transboundary movements, namely *intentional and lawful* transboundary movements (1.), *unintentional* transboundary movements (2.), *intentional but illegal* transboundary movements (3.), and transboundary movements from non-parties (4.). Moreover, damage may also occur from LMOs in transit (5.) and from purely domestic activities involving LMOs (6.).

1. Damage Resulting From Authorized Uses Following Intentional Transboundary Movement (Article 3(2))

With regard to LMOs that have been subject to an *intentional* (and *lawful*[125]) transboundary movement, Article 3(2) provides that the Supplementary Protocol applies 'to damage resulting from any authorized use' of such LMOs. This constitutes a significant restriction of the Supplementary

122 See *Brans/Dongelmans* (n. 26), 198–200.
123 Article 3(k) CP.
124 *Nijar* (n. 6), 273.
125 As shown earlier, any intentional transboundary movement carried out in contravention of a party's domestic measures to implement the Cartagena Protocol is referred to as an 'illegal transboundary movement' (see Article 25(1) CP and chapter 3, section A.II.2.c). Thus, *e contrario*, any transboundary movement carried out *in compliance* with the pertinent implementing measures is a 'lawful' transboundary movement.

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Protocol's scope since it excludes damage resulting from LMOs that were lawfully *imported* but afterwards *used* without appropriate authorization. Such a situation could arise, for instance, when an LMO is (truthfully) declared to be intended for contained use at the time of import (and thus not subject to the AIA mechanism) but later released without authorization.[126]

Since the exclusion of LMOs unlawfully released into the environment seemingly contradicts the overall objective of the Supplementary Protocol, it could be questioned whether such a restriction was indeed intended by the negotiating parties or whether it constitutes an unintended *lacuna* that would justify an extensive interpretation of the Supplementary Protocol or even an analogous application to these cases.[127] However, the *travaux préparatoires* show that a distinction between authorized and unauthorized uses of LMOs was discussed during the drafting process, but the references to unlawful uses were removed later in the course of the negotiations.[128] Furthermore, the list of 'operators' who can be held liable under the Supplementary Protocol includes, among others, the developer, importer, and permit-holder, but not the person who actually released an LMO into the environment.[129] Hence, damage resulting from any *unauthorized use* of an LMO after it has been *lawfully imported* appears to be excluded from the Supplementary Protocol's scope.

126 See chapter 3, section A.II.1.g).

127 See *Silja Vöneky*, Analogy in International Law, in: Wolfrum/Peters (ed.), MPEPIL, MN. 2.

128 See Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, Synthesis of Proposed Operational Texts on Approaches and Options Identified Pertaining to Liability and Redress in the Context of Article 27 of the Biosafety Protocol: Fourth Meeting of the Working Group, Montreal, 22–26 October 2007, UN Doc. UNEP/CBD/BS/WG-L&R/4/2 (2007), 5–6, where several proposals referred to 'damage resulting from any authorized use of the LMO, as well as any use in violation of such authorization'. A separate question was whether the Supplementary Protocol should extend to damage resulting from uses of the LMO for purposes different to that specified at the time of the transboundary movement of the LMO, see Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety (n. 128), 11.

129 Cf. Article 2(2)(c) SP; see *infra* section C.II.

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2. Damage Resulting From Unintentional Movements (Article 3(3))

Article 3(3) clarifies that the Supplementary Protocol also covers damage resulting from *unintentional* transboundary movements. Hence, the Protocol applies to situations where an LMO uncontrolledly spreads into another state[130] and causes biodiversity damage there. These situations are already addressed in Article 17 of the Cartagena Protocol, which provides that when a state 'knows' of a release of an LMO which may lead to an unintentional transboundary movement, it is required to notify and consult the potentially affected states, provided that the LMO in question is likely to have significant adverse effects on biodiversity.[131] After the affected state has been notified, it is that state's sole responsibility to take the necessary action.[132] The Supplementary Protocol obliges neither the state of origin nor the responsible foreign operator to take response measures, nor does it require them to bear the costs of such measures taken by the affected states.[133]

Moreover, the Supplementary Protocol also does not cover 'transboundary damage' *stricto sensu*,[134] that is damage caused by activities under the jurisdiction of one state which also affects the territory of another state.[135] This means that the Protocol does not apply to transboundary harm caused by an LMO which has *not* been subject to a transboundary movement, for instance when an LMO facilitates the spread of a non-altered invasive species into another state's territory. Furthermore, the mere unsolicited presence of an LMO in the territory of another state (if this was

130 An unintended transboundary movement could occur, for instance, by natural migration, carried by animals, pollen or seed, or inadvertently transported by humans, e.g. along with other goods or in clothing.

131 See chapter 3, section A.II.2.b).

132 This is also evidenced by Article 17(4) CP, which provides that the state of origin shall consult the affected states 'to enable them to determine appropriate responses and initiate necessary action, including emergency measures'.

133 Note that the affected state(s) may invoke the international responsibility of the state of origin, provided that there has been a breach of an international obligation which can be attributed to that state, see chapter 9.

134 *Yifru/Garforth* (n. 9), 157–158.

135 Cf. ILC, Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries (2001), YBILC 2001, vol. II(2), p. 148, Article 2(c) and commentary, para. 9; *Hanqin Xue*, Transboundary Damage in International Law (2003), 316; see chapter 4, section B.

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to be considered *transboundary damage* at all[136]) does not give rise to liability under the Supplementary Protocol unless the LMO causes biodiversity damage or threatens to do so.

3. Damage Resulting From Illegal Transboundary Movements (Article 3(3))

Article 3(3) provides that the Supplementary Protocol also applies to damage resulting from illegal transboundary movements. This refers to Article 25 of the Cartagena Protocol, which provides that any movements carried out in contravention of any party's domestic measures to implement the Protocol shall be deemed 'illegal transboundary movements' and shall be prevented by the parties to the Protocol.[137] Since this includes domestic measures to implement the *Advance Informed Agreement* (AIA) mechanism, any damage resulting from an LMO imported without the AIA of the party of import is covered by the Supplementary Protocol. This may be relevant, for instance, when private actors import and release gene drive-equipped organisms without the necessary approvals and authorizations.[138] Against this background, it is even less understandable that LMOs that were lawfully imported but subsequently released illegally are excluded from the scope.[139]

4. Damage Resulting From Transboundary Movements From Non-Parties (Article 3(7))

According to Article 3(7), domestic law implementing the Supplementary Protocol shall also apply to damage resulting from transboundary movements of LMOs from non-parties. This means that LMOs imported from abroad will always be subject to domestic liability provisions established by states parties to the Supplementary Protocol, regardless of whether the state of origin also is a party to the Supplementary Protocol or not. Consequently, operators (such as exporters) situated in a non-party state may still

136 This is assumed by *Yifru/Garforth* (n. 9), p. 158, note 31, but see chapter 4, section B.VII.
137 See chapter 3, section A.II.2.c).
138 In this context, see chapter 3, section A.II.1.g).
139 See *supra* section B.III.1.

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have to comply with the requirements imposed by the importing party in implementing the Supplementary Protocol.[140] The main problem in this context will be that liability may not be enforceable in such situations, as the states are not generally required to recognize foreign judgments establishing the liability of operators situated in their jurisdiction (unless there are international agreements expressly providing for mutual recognition and enforcement of judgments, such as in the EU[141]). However, this problem is not limited to operators from non-party states since, as shown below, the Supplementary Protocol does not even provide for mutual recognition and enforcement of judgments among its parties.[142]

5. Damage Resulting From LMOs in Transit

The Supplementary Protocol does not expressly stipulate whether it applies to damage arising from LMOs in transit. But Article 4 of the Cartagena Protocol expressly provides that the latter shall also apply to the transit of LMOs[143] and, as shown above, the provisions of the Cartagena Protocol apply *mutatis mutandis* to the Supplementary Protocol.[144] Consequently, the Supplementary Protocol also applies to damage resulting from LMOs that are merely in transit through the territory of a state party, for instance when the LMO unintentionally escapes into the environment of the transit state.

6. Damaged Caused by Domestic Activities With LMOs

The Supplementary Protocol does not cover damage caused by LMOs that have not been subject to a transboundary movement. The reason for this lies in the Supplementary Protocol's parent instrument, the Cartagena Protocol, which primarily serves to regulate the transboundary movement

140 *Lima* (n. 58), 134.
141 See chapter 2, section F.
142 See *infra* section F.II.
143 Note that the transit of LMOs is not subject to the AIA procedure provided for by the Cartagena Protocol, nevertheless this is without prejudice to any right of a party of transit to regulate the transport of LMOs through its territory domestically, see Article 6(1) Cartagena Protocol.
144 Article 16(3) SP, see *supra* note 46 and accompanying text.

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of LMOs.[145] However, there is no apparent reason barring states from extending their measures implementing the Supplementary Protocol also to damage caused by LMOs of domestic origin. This could even be required in order to ensure that implementation measures comply with the principle of *domestic treatment* under international trade law,[146] an issue expressly left open by both protocols.[147]

7. Conclusions

The Supplementary Protocol applies when damage to biological diversity results from an LMO that has previously been subject to a transboundary movement, regardless of whether this movement was intentional and authorized, intentional but illegal, unintentional, or occurred due to an accidental release during transit. Against this background, the exclusion of damage resulting from illegal uses following a lawful import is a striking omission. Although it could be questioned whether environmental liability law is an appropriate tool to address criminal behaviour at all, the fact that damage following an illegal transboundary movement is expressly encompassed shows that the parties did not intend to exonerate illegal conduct from liability generally. However, the *travaux préparatoires* unambiguously show that unauthorized uses following a lawful import were meant to be excluded from the Supplementary Protocol's scope.

IV. Temporal Scope (Article 3(4))

According to Article 3(4), the Supplementary Protocol applies to damage resulting from a transboundary movement of LMOs that 'started' after the Supplementary Protocol entered into force for the party of import concerned. In contrast, the Cartagena Protocol's AIA procedure applies to the 'first intentional transboundary movement' of certain LMOs. However,

145 See chapter 3, section A.III.

146 Cf. General Agreement on Tariffs and Trade 1994 (15 April 1994; effective 01 January 1995), 1867 UNTS 187, Annex 1A, Article III(4); see CropLife International/Global Industry Coalition, Implementation Guide to the Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety (2013), 5; also see chapter 3, section C.I.

147 For the Cartagena Protocol, see chapter 3, section C.III. For the Supplementary Protocol, see *infra* section E.V.

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the two provisions seem not to have a substantial difference in meaning, as both refer to the point in time when the LMO in question has reached the territory of the importing party for the first time, regardless of whether the movement was intentional, unintentional or illegal.

V. Spatial Scope (Article 3(5))

According to Article 3(5), the Supplementary Protocol applies to 'damage that occurred in areas within the limits of the national jurisdiction of Parties'. Hence, the Supplementary Protocol does not focus on where damage *originates* but on where it *occurs*, i.e. where the adverse effects on biodiversity materialize.

Besides its land territory, the territorial jurisdiction[148] of a state extends to its internal waters and the territorial sea adjacent to its coast.[149] Hence, the present provision clearly rules out damage that occurs in areas *beyond* the limits of national jurisdiction.[150] The inclusion of such damage was discussed during the negotiations of the Supplementary Protocol[151] but ultimately rejected in favour of a 'narrow' geographical scope.[152] This

148 In public international law, the term 'jurisdiction' generally refers to the lawful power of a state to make and enforce rules. While jurisdiction can be based on a number of bases, its most common form is 'territorial jurisdiction' which is based on a state's sovereignty over its territory and certain adjacent maritime areas (see *Bernard H. Oxman*, Jurisdiction of States, in: Wolfrum/Peters (ed.), MPEPIL, MN. 9–42; *Shaw* (n. 57), 483–488; *Crawford* (n. 57), 192). By referring to '*areas* within the *limits* of national jurisdiction', Article 3(5) clearly indicates that it refers to territorial jurisdiction. The notion is related to the term 'areas beyond the limits of national jurisdiction' used in the international law of the sea, where it denotes the high seas beyond those maritime zones in which individual states may lawfully assert individual claims (see United Nations Convention on the Law of the Sea (10 December 1982; effective 16 November 1994), 1833 UNTS 3 (hereinafter 'UNCLOS'), Article 1(1)(1).

149 Cf. *Oxman* (n. 148), MN. 13–17.

150 *Philippe Sands* et al., Principles of International Environmental Law (4th ed. 2018), 798; see chapter 4, section B.II.2.

151 Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, Report of the […] Fourth Meeting, UN Doc. UNEP/CBD/BS/WG-L&R/4/3 (2007), Operational text 6 on page 15.

152 IISD, Summary of the Fifth Meeting of the Open-Ended Ad Hoc Working Group on Liability and Redress in the Context of the Cartagena Protocol on Biosafety: 12–19 March 2008, ENB Vol. 9 No. 345 (2008), 4.

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appears to be consistent with the Cartagena Protocol, which only governs the *transboundary* movement of LMOs, i.e. the movement 'from one Party to another Party',[153] but remains silent on the movement of LMOs to areas beyond national jurisdiction.[154]

Moreover, it is questionable whether the Supplementary Protocol applies to damage occurring in the *exclusive economic zone* (EEZ) of coastal states. In this area, which extends up to 200 nautical miles from the coastline,[155] the coastal state has 'sovereign rights' to explore, exploit, conserve, and manage the living and non-living resources.[156] In addition to these sovereign rights, the coastal state also enjoys 'jurisdiction' over a number of other matters, including the protection and preservation of the marine environment.[157] At the same time, all other states enjoy the so-called 'freedom of the high sea', which includes, *inter alia*, the freedom to sail ships flying their flag and the freedom of overflight.[158]

There is no express provision in the UNCLOS that confers jurisdiction to the coastal state with respect to liability for damage to the marine environment in the EEZ. However, Article 229 UNCLOS provides that the Convention shall not affect the right to institute civil proceedings for loss or damage caused by pollution of the marine environment.[159] Although it refers to 'civil liability', Article 229 UNCLOS could be interpreted extensively so as to allow not only for civil proceedings but also for the imposition of administrative liability as set out in the Supplementary Protocol. This is supported by Article 235(2) UNCLOS, which requires states to ensure that adequate remedies are available against pollution of the marine environment. Moreover, Article 235(3) UNCLOS requires states to further develop international law relating to liability for damage to the marine environment. Consequently, it can be assumed that the coastal state has jurisdiction for biodiversity damage in the EEZ resulting from LMOs and that the Supplementary Protocol is, therefore, applicable to such damage.

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153 Cf. Article 3(k) CP.
154 *Jusoh* (n. 6), 192.
155 See Articles 55 et seq. UNCLOS (n. 148). See generally *Dolliver Nelson*, Exclusive Economic Zone, in: Wolfrum/Peters (ed.), MPEPIL, MN. 1.
156 See Article 56(1)(a) UNCLOS (n. 148).
157 See Article 56(1)(b)(iii) UNCLOS.
158 See Articles 87(1)(a) and (b) UNCLOS.
159 Cf. *Vasco Becker-Weinberg*, Article 229 UNCLOS, in: Alexander Proelss (ed.), United Nations Convention on the Law of the Sea: A Commentary (2017), MN. 1.

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In any event, it might be challenging to effectively implement the provisions of the Supplementary Protocol in the EEZ with respect to foreign vessels.[160] This is particularly true considering that in most cases, the responsible vessel will have left the coastal state's EEZ long before the release of an LMO is detected or the detrimental effects on biodiversity become evident.

VI. Conclusions

The preceding analysis has shown that, in principle, the Supplementary Protocol has a broad scope of application. It applies to all possible types of damage to biological diversity resulting from an LMO regardless of its intended or actual use, provided that the LMO has been subject to a transboundary movement and damage is both measurable and significant. On closer inspection, however, there are several limitations that leave the parties considerable leeway for their national implementation. The Protocol does not provide conclusive guidance on the circumstances in which adverse effects on biological diversity constitute 'damage' that shall give rise to liability.[161] Parties may even apply their own definitions of 'damage' to biodiversity.[162] Whether damage is 'measurable' and 'significant' (which is a necessary condition for liability to arise at all) is also left up to the determination of the competent national authorities. In sum, it is therefore doubtful whether the Supplementary Protocol signifies a harmonized understanding of when unwanted side-effects of releasing an LMO shall give rise to liability.[163]

C. *Administrative Liability: Response Measures to Redress Damage to Biological Diversity*

As shown above, the term 'liability' is not always used consistently in international law.[164] Most treaties on operator liability for environmental damage refer to liability as *civil liability*, which denotes the obligation of

160 See *ibid.*, MN. 10.
161 *Shibata* (n. 8), 37.
162 See supra, section B.II.5.
163 *Yifru/Garforth* (n. 9), 156.
164 See chapter 2, sections C.

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the operator to pay monetary compensation for the damage caused by its activity. Besides, several more recent instruments follow a so-called *administrative approach*, which is characterized by the requirement for the operator to actively take response measures to mitigate and remediate the damage or to reimburse others for the expenses incurred in taking such measures, instead of simply paying monetary compensation.[165]

During the negotiations of the Supplementary Protocol, it was agreed to develop an instrument that follows the administrative approach but also includes a legally binding provision on civil liability.[166] Consequently, the Supplementary Protocol takes a 'two-pronged approach'[167] – with regard to damage to biological diversity, the instrument provides for the implementation of response measures, while material or personal damage that is 'associated with' damage to biodiversity is addressed by the provision on civil liability. Hence, each of the approaches serves to address different types of damage. The present section analyses the Supplementary Protocol's provisions on administrative liability, while the provision on civil liability is addressed in the subsequent section.[168]

The preamble to the Supplementary Protocol recognizes the need 'to provide for appropriate response measures where there is damage or sufficient likelihood of damage' to biological diversity.[169] Response measures are actions taken to restore the damage that has already occurred and to prevent further damage (I.). The responsibility to implement response measures is imposed on the 'responsible operator' (II.), provided that a causal link between the LMO in question and the damage can be established (III.). The implementation of liability is premised on the existence of a 'competent authority' that identifies the responsible operator and determines which measures shall be taken (IV.) To this end, parties are required to implement the Supplementary Protocol into their domestic law (V.).

165 See chapter 2, section G.
166 IISD (n. 30), 7.
167 *Lim Tung* (n. 6), 69.
168 See *infra* section D.
169 Cf. Recital 4 of the Supplementary Protocol.

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I. Meaning and Scope of 'Response Measures'

Pursuant to Article 5(1)(c), states parties shall require the appropriate operator or operators to take 'appropriate response measures'. The term 'response measures' is defined in Article 2(2)(d) as

> *'reasonable actions to*
> *(i) Prevent, minimise, contain, mitigate, or otherwise avoid damage as appropriate;*
> *(ii) Restore biological diversity through actions to be undertaken in the following order of preference:*
> *a. Restoration of biological diversity to the condition that existed before the damage occurred, or its nearest equivalent; and where the competent authority determines this is not possible;*
> *b. Restoration by, inter alia, replacing the loss of biological diversity with other components of biological diversity for the same, or for another type of use either at the same or, as appropriate, at an alternative location'.*

As can be seen from the definition, the concept of response measures pursues a two-fold objective. In the first place, response measures shall prevent (further) loss of biodiversity, e.g. by containing or removing the noxious LMO from the affected environment. The nature and scope of measures necessary to achieve this aim will very much depend on the individual circumstances. Where damage to biological diversity cannot be prevented by remediation measures, the Supplementary Protocol provides that reasonable actions shall be taken to restore biological diversity to the condition that existed before the damage occurred or to its nearest possible equivalent.[170]

With regard to the envisaged use of engineered gene drives in mosquitoes,[171] researchers have suggested that a 'logical remediation strategy' for small-scale releases could be an intense application of standard pesticides followed by monitoring.[172] In the event of a larger-scale release, remediation would require additional vector control methods such as indoor residual spraying and larval source management.[173] Alternatively, re-

170 Article 2(2)(d)(i) SP.
171 See chapter 1, section C.III.1.
172 *Stephanie James* et al., Pathway to Deployment of Gene Drive Mosquitoes as a Potential Biocontrol Tool for Elimination of Malaria in Sub-Saharan Africa: Recommendations of a Scientific Working Group, 98 (2018) Am. J. Trop. Med. Hyg. 1, 13.
173 *Ibid.*

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mediation could be achieved by releasing a variant of the target organism carrying a drive-resistant gene to halt the spread or by releasing another driving construct designed to 'reverse' the original gene drive.[174]

When the competent national authority determines that restoration of biological diversity to its *status quo ante* is not possible, the loss shall be replaced with other components of biodiversity for the same or another type of use at either the same or an alternative location.[175] By improving biodiversity with other components than those damaged or in other locations, the Supplementary Protocol provides for a form of *compensatory restoration*.[176] This approach is also known in other legal regimes.[177] Usually, compensatory restoration measures are implemented in areas proximate to the injured site or in other locations suitable to compensate for the injured species or ecosystem.[178] However, the Supplementary Protocol does neither determine the nature or scope of 'compensatory' response measures nor how to assess whether the measures taken are sufficient to compensate for the damage.[179]

The Supplementary Protocol also does not provide a mechanism to compensate for biodiversity damage that cannot be reasonably replaced by

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174 *Ibid.*

175 Article 2(2)(d)(ii) SP.

176 *Förster* (n. 5), 391 refers to equivalent replacement measures as 'alternative restitution'. This appears to confuse the terms 'restitution' and 'compensation' since, taxonomically, the term 'restitution' refers to reinstating the *status quo ante*. However, alternative measures are not capable of reinstating specific damage to the environment, but can merely compensate for the incurred loss by improving environmental quality elsewhere. They are thus not a form of restitution, but of compensation. This view appears to be shared by *Förster*, who in the main part of her study refers to 'Ausgleich durch gleichwertige Ersatzmaßnahmen', which translates to 'compensation by equivalent replacement measures', cf. *Förster* (n. 5), 345–346.

177 The EU-ELD follows a similar approach, but distinguishes between 'compensatory remediation', which shall compensate for the interim losses from the date of damage until the environment has been fully restored, and 'complementary remediation', which compensates for environmental losses that will not (fully) return to its baseline conditions, cf. EU Environmental Liability Directive (n. 18), Annex II. On compensatory restoration under international law generally, see chapter 11, section B.II.1.

178 *Michael T. Huguenin* et al., Assessment and Valuation of Damage to the Environment, in: Cymie R. Payne/Peter H. Sand (eds.), Gulf War Reparations and the UN Compensation Commission (2011) 67, 78.

179 Cf. *Förster* (n. 5), 350–351. Also see *Schmitt* (n. 80), 83, who criticizes that the Supplementary Protocol does not specify against which standard the equivalence of alternative measures shall be assessed.

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compensatory restoration.[180] In this regard, it steps short of the *Antarctic Liability Annex*, which provides that in cases where no response action was taken, the responsible operator shall be liable to pay the 'costs of response action which should have been undertaken' to an international fund.[181] The fund shall then be used, *inter alia*, to reimburse costs for response measures when the responsible operator cannot be held liable.[182]

In sum, the response measures provided for by the Supplementary Protocol serve to pursue the following aims. Firstly, response measures shall avert damage wherever possible and as much as possible. Secondly, where damage cannot be avoided, biological diversity shall be restored to the condition that existed before the incident. Thirdly, where restitution is impossible, measures to compensate for the loss of biodiversity shall be taken by improving biological diversity in other components or at other locations. The priority of prevention over restoration, and of restoration over compensation, is clearly stipulated in the Supplementary Protocol and thus binding upon all of its parties. In this respect, the Supplementary Protocol sets out clear and specific objectives. Yet, the nature and extent of response measures remain to be determined by the parties' competent authorities according to their own priorities and the particular circumstances of every individual case.[183]

II. Identification of the Liable Operator

The obligations stipulated in Article 5(1) shall be imposed on the 'appropriate operator'. According to Article 5(2)(a), the competent authority shall 'identify the operator which has caused the damage' and which shall

180 *Förster* (n. 5), 358–360, points out the difficulties associated with the financial assessment of biodiversity damage. Possible components of such a valuation could include economic benefits derived from ecosystem services prior to the incident as well as an intrinsic, immaterial value of biodiversity, see *Unai Pascual* et al., The Economics of Valuing Ecosystem Services and Biodiversity, in: Pushpam Kumar (ed.), The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations (2010) 183, 196–211.

181 Antarctic Liability Annex (n. 19), Article VI(2); see *Silja Vöneky*, The Liability Annex to the Protocol on Environmental Protection to the Antarctic Treaty, in: Doris König/Peter-Tobias Stoll et al. (eds.), International Law Today: New Challenges and the Need for Reform? (2008) 165, 185–187.

182 Antarctic Liability Annex (n. 19), Article XII(1); see *Vöneky* (n. 181), 191.

183 Cf. *Tladi* (n. 103), 176.

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consequently be held liable. The notion of 'operator' is defined in Article 2(2)(c) as

> '*any person in direct or indirect control of the living modified organism which could, as appropriate and as determined by domestic law, include, inter alia, the permit holder, person who placed the living modified organism on the market, developer, producer, notifier, exporter, importer, carrier or supplier*'.

This definition is remarkably broad and covers all persons involved with LMOs in the course of their occupational activities, including those who are only in 'indirect control' of the LMO.[184] Although not expressly mentioned, there is no doubt that the definition refers to natural and legal persons alike.[185] Furthermore, the list of possible operators is only illustrative and non-exhaustive, as indicated by the terms 'which could […] include, *inter alia* […]'.

It is questionable whether the operator held liable must have 'caused' the damage by its own conduct or whether it is sufficient that the damage resulted from the inherent characteristics of the LMO. Since Article 5(2)(a) refers to the 'operator *which has caused* the damage',[186] it could be argued that an operator can only be held liable when it has made a causal contribution to the damage.[187] This would almost always be the person who – whether intentionally or unintentionally – released the LMO into the environment, since the release is a *conditio sine qua non*, i.e. the last necessary link in any possible causal chain between the development of an LMO and the occurrence of damage. At the same time, Article 4 provides that a causal link 'shall be established between the damage and the living modi-

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184 Cf. *Shibata* (n. 8), 39; *Anastasia Telesetsky*, Introductory Note to the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress, 50 (2011) ILM 105, 106.

185 *Brans/Dongelmans* (n. 26), 186; see 'person', in: *Bryan A. Garner* (ed.), Black's Law Dictionary (11th ed. 2019), 1378–1379. Also see the definition of 'exporter' and 'importer' in Article 3(d) and (f) of the Cartagena Protocol, which refer to 'any legal or natural person'.

186 Emphasis added.

187 *Lim Tung* (n. 6), 75–76 contends that '[l]egal causation between the conduct of the suspected operator (or his or her agents) and the harm must be sufficiently compelling' (emphasis added). Similarly, *Jungcurt/Schabus* (n. 6), 202 assume that the competent authority must be able to establish the causal chain from damage to the 'operator's activities', but also admit that the Supplementary Protocol leaves 'unclear […] how the burden of proof and causation would be regulated', *Jungcurt/Schabus* (n. 6), 204–205.

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fied organism in question',[188] which suggests that the operator's conduct is irrelevant when the damage results from the inherent characteristics of the LMO.

According to *Shibata*, 'it is the causal link between the damage and the LMO (and not the activity) that must be proved in order to establish liability'.[189] Consequently, he assumes that there is a presumption that the operator who had direct or indirect control of the LMO at the time of the incident has 'caused the damage' in the sense of Article 5(2)(a).[190] However, the operator in control of an activity involving LMOs might not necessarily be the actor best equipped to take the necessary response measures when damage occurs.[191]

According to a different approach, the Supplementary Protocol allows to distinguish between different causes of damage: If the damage results from a 'development risk', i.e. is caused by the 'intrinsic quality' of the LMO (such as certain noxious traits or behaviours), the developer or the producer would be the appropriate parties to hold liable.[192] On the other hand, when damage results from inappropriate handling of the LMO, such as when the LMO was used outside its intended environment or when necessary precautions were ignored, the person exercising control over the LMO at the time of the incident should be held liable.[193] This interpreta-

188 On the requirement to establish a causal link, see *infra* section C.III.

189 *Shibata* (n. 8), 39.

190 *Ibid.*

191 *Ibid.*, 40. For instance, when the release of an engineered gene drive has unintended adverse effects, those actors who have performed the actual release might be best equipped to implement conventional strategies that involve the spraying of pesticides, while the developer of the gene drive could (hypothetically) provide a 'reversal drive' to undo the genetic modifications performed by the original drive; see *Kevin M. Esvelt* et al., Concerning RNA-Guided Gene Drives for the Alteration of Wild Populations, 3 (2014) eLife e03401, 10; *James* et al. (n. 172), 13.

192 *Förster* (n. 5), 390; *Nijar* (n. 6), 276; *Alvarez-Morales* (n. 54), 107; *Shibata* (n. 8), 39–40. For an economic perspective, see *Michael G. Faure/Andri Wibisana*, Liability in Cases of Damage Resulting from GMOs: An Economic Perspective, in: Bernhard A. Koch/Bjarte Askeland (eds.), Economic Loss Caused by Genetically Modified Organisms (2008) 531, 542–545, who argue that imposing liability for unforeseeable damage on the developer is reasonable since it will induce the developer to invest in research in order to 'acquire as much information about risk and about optimal technologies to prevent the risk'.

193 Cf. *Alvarez-Morales* (n. 54), 107; *Shibata* (n. 8), 39–40; *Förster* (n. 5), 390.

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tion seems to better reflect the intention of the Supplementary Protocol to impose liability on the 'operator which has caused the damage'.[194]

Problems may also arise when the operator who has caused the damage is not available because it is not situated within the jurisdiction of the party where the damage occurred.[195] It was suggested that, in these cases, liability could be channelled to any other operator who was involved in the transboundary movement and is available to the authorities of the state concerned.[196] While this would substantially increase the likelihood that the competent authorities find a solvent actor who can be held liable, such an operator would not be held liable on the ground of its own contribution to the damage (if this was regarded to be a relevant factor), but only because the operator is situated in the jurisdiction of the state concerned. It could be questioned whether this approach is consistent with the aforementioned Article 5(2)(a), which stipulates that liability shall be placed on that 'operator *which has caused the damage*'. However, as shown below, the Supplementary Protocol does not provide any mechanism to enforce the liability of foreign operators.[197] Therefore, it would be consistent with the overall approach of the Supplementary Protocol to impose liability on the operators available to the authorities concerned. Any right of redress of these operators would be governed by the domestic laws of the states concerned or, ideally, by contractual arrangements between those actors involved in the LMO's value chain.

A related problem concerns the attribution of liability where multiple operators have had direct or indirect control of the LMO that has caused damage. While Article 5(1) provides that parties shall require 'the appropriate operator *or operators*' to take response measures, Article 5(2) and the following provisions only refer to 'the operator' in singular. However, for reasons of effectiveness, it makes sense to compel all available operators to take response measures, while it can be left to these operators to distribute their individual shares of responsibility among themselves. This resembles the concept of *joint and several liability* in civil liability regimes, where the injured party can assert claims against any of the liable parties, which can subsequently seek redress from the other liable parties according to their

194 Article 5(2)(a) SP.
195 See *infra* section F.II.
196 *Nijar* (n. 6), 276.
197 See *infra* section F.II.

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individual share of responsibility for the damage.[198] Such an approach has already been implemented in the context of administrative liability, for example in CERCLA in the United States[199] and the Antarctic Liability Annex.[200] While the Supplementary Protocol does not expressly prescribe this approach, it does not seem to oppose it either. According to Article 9, the Supplementary Protocol shall not limit or restrict any right of recourse or indemnity that an operator may have against any other person.[201] Thus, parties could implement *joint and several liability* in their domestic law by allowing those operators who have implemented response measures to seek proportionate redress from other operators.

After all, the identification of the liable actor will be subject to the domestic law of each party.[202] This is expressly confirmed in the definition of the term 'operator' in Article 2(2)(c), which provides that the responsible operator shall be 'determined by domestic law'. Thus, the Supplementary Protocol neither establishes clear criteria of who should be liable nor does it give conclusive guidance on the process of identifying the responsible operator.[203] Instead, states parties enjoy a wide margin of discretion to establish respective criteria in their domestic law and to identify a liable operator through their competent national authorities in individual cases of damage.[204] In this regard, states parties seeking a narrow application of the Supplementary Protocol may require that an operator has had some

198 But see *Faure/Wibisana* (n. 192), 556–559, who argue that 'channelling' liability to one single operator (e.g. the developer) who shall then seek redress from the responsible parties might discourage these other parties from preventing damage in the first place.

199 Cf. CERCLA (n. 17), 42 U.S.C.§ 9613(f)(1); see *LeRoy C. Paddock*, Funding Contaminated Site Cleanup in the United States, 3 (1994) RECIEL 133, 135.

200 Antarctic Liability Annex (n. 19), Article 6(4).

201 See *infra* section E.I. Similarly, Article 9 of the EU Environmental Liability Directive (n. 18) merely provides that the Directive is without prejudice to any national rules on cost allocation in cases of multiple party causation.

202 *Shibata* (n. 8), 39.

203 This is unusual compared to other international liability instruments, which usually channel liability to clearly identifiable actors (see *Xue* (n. 135), 80–86; *Yifru* et al. (n. 68), 17). For instance, the Basel Protocol provides that the person who notifies the transboundary movement of hazardous waste shall be liable until the disposer has taken possession of it, after which the disposer shall be liable, cf. Basel Protocol on Liability for Hazardous Wastes (n. 60), Article 4(1). Under the Antarctic Liability Annex, liability is channelled to the person which organizes the activity in the Antarctic from which an environmental emergency arises, cf. Antarctic Liability Annex (n. 19), Article 2(c).

204 Cf. *Yifru/Garforth* (n. 9), 157.

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sort of control of the LMO at the time of the incident or even require proof of causation, while states opting for a broader application may extend liability to any operator who was involved with the LMO in the course of activities that ultimately lead to the occurrence of damage.[205]

III. Establishment of a Causal Link and Standard of Proof (Article 4)

Article 4 of the Supplementary Protocol provides:

> *'A causal link shall be established between the damage and the living modified organism in question in accordance with domestic law.'*

The term 'establish' refers to the proof of the said causal link.[206] Hence, the provision requires that a cause-effect relationship between the LMO in question and the damage can be demonstrated.[207] However, proving such a causal link may be difficult for several reasons.[208] Firstly, there will likely be a significant lapse of time between the importation, release or placing on the market of the LMO on the one hand, and the occurrence of harm or the attempt to prove the causal chain on the other hand.[209] Secondly, in many cases damage will not be caused directly by the LMO but will result from causal chains of effects that the LMO has on ecosystems, food chains or non-target organisms.[210] Thirdly, proof of causality could be hampered by the fact that the causal relationships between noxious traits of an LMO and the occurrence of certain damage patterns cannot be established with scientific certainty even when there is a considerable likelihood that some causal relationship exists.[211]

It has been noted that the Supplementary Protocol requires establishing a causal link but does not stipulate how this shall be done.[212] A similar provision can be found in the EU's Environmental Liability Directive,

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205 *Tladi* (n. 103), 175.
206 Cf. 'established', in: Black's Law Dictionary (n. 185), 688; 'establish', in: Hay (ed.) (n. 206), 827.
207 See *Faure/Wibisana* (n. 192), 552–553, who argue that the requirement of a causal link for liability is necessary in order not to discourage potentially beneficial activities in society.
208 See *Lim Tung* (n. 6), 81–82.
209 *Alvarez-Morales* (n. 54), 107.
210 *Förster* (n. 5), 271.
211 *Ibid.*, 272.
212 *Brans/Dongelmans* (n. 26), 186.

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which requires that it must be 'possible to establish a causal link between the damage and the activities of individual operators'.[213] In the view of the *Court of Justice of the European Union*, this provision 'does not specify how such a causal link is to be established' and that, consequently, EU Member States have a 'broad discretion' when developing respective criteria in their domestic law.[214] Consequently, Member States may provide that a causal link is presumed when the competent authority has plausible evidence justifying such a presumption *prima facie*.[215] Similarly, in the *Pulp Mills* case before the ICJ, Judge *Greenwood* argued that in environmental disputes, the claimant state should be required to establish the facts it asserts only 'on the balance of probabilities', because 'the nature of environmental disputes is such that the application of [a] higher standard of proof would have the effect of making it all but impossible for a State to discharge the burden of proof'.[216]

Like the EU Environmental Liability Directive, Article 4 of the Supplementary Protocol does not stipulate how a causal link shall be established but only provides that this shall be done 'in accordance with domestic law'.[217] It can be seen from the *travaux préparatoires* that, instead of placing the burden of proof either on the claimant or the respondent, the issue was deliberately left to domestic law.[218] Hence, states parties are free to provide in their domestic law that the existence of a causal link can be presumed when facts point to harm being caused by a certain LMO.[219] The operator held liable may rebut such a presumption in accordance with domestic

213 Article 5(4) EU Environmental Liability Directive (n. 18).

214 CJEU, Raffinerie Mediterranee (ERG) SpA et al. v. Ministero dello Sviluppo economico et al., Judgment (Grand Chamber) of 09 March 2010, C-378/08, para. 55.

215 *Ibid.*, paras. 56–57.

216 ICJ, Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment of 20 April 2010, ICJ Rep. 14, Separate Opinion of Judge Greenwood, para. 26.

217 See *Gouritin* (n. 68), 164.

218 Cf. Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety (n. 151), 23–25, see especially operational text 6, which closely resembles the final wording of Article 4; also see IISD (n. 30), 10. Also see *Vanessa Wilcox*, Damage Caused by GMOs Under International Environmental Law, in: Bernhard A. Koch (ed.), Damage Caused by Genetically Modified Organisms (2010) 754, 775–776, assuming that the causality standards elaborated by states parties 'will no doubt reflect domestic policies on LMOs'.

219 *Nijar* et al. (n. 12), 144; *Brans/Dongelmans* (n. 26), 186; on the presumption of liability, see *Fritz Nicklisch*, Rechtsfragen der modernen Bio- und Gentechnologie, 44 (1989) Betriebs-Berater 1, 7–8.

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legal requirements by showing that the damage was *not* caused by the LMO in question.[220] In fact, many domestic regimes contain provisions 'easing' the burden of proving causation.[221]

Another way to reduce evidentiary burdens is by requiring the operator to share relevant information about the LMO in question. The Cartagena Protocol stipulates certain information-sharing obligations,[222] but some domestic GMO liability regimes expressly require the operator to share relevant information with potential claimants in the event of damage.[223] In common law systems, the instrument of *pre-trial discovery* provides a similar means to obtain evidence from the defendant.[224] In the United States, pre-trial discovery can also be used by parties to legal proceedings outside the United States.[225] Moreover, the *Hague Evidence Convention* of 1970,[226] which currently has 64 parties,[227] facilitates the transboundary taking of evidence by national courts.[228]

While the Supplementary Protocol does not bar states from adopting lowered evidentiary thresholds for establishing a causal link between the damage and the LMO in question, it does not *require* that the burden of proof be lowered or even reversed. Such a requirement also seems not to result from general international environmental law, especially the

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220 *Nijar* et al. (n. 12), 144.

221 *Bernhard A. Koch*, Damage Caused by GMOs: Comparative Analysis, in: Bernhard A. Koch (ed.), Damage Caused by Genetically Modified Organisms (2010) 882, MN. 38–43.

222 See Article (8) in conjunction with Annex I, and Articles 17(3), 20(3)(c), and 25(3) CP.

223 See, e.g., Gentechnikgesetz (Genetic Engineering Act) (16 December 1993), last amended by Article 8 of the law of 27 September 2021 (Bundesgesetzblatt, Pt. I, p. 4530), Section 35; *Jane M. Glenn*, Damage Caused by GMOs Under Canadian Law, in: Bernhard A. Koch (ed.), Damage Caused by Genetically Modified Organisms (2010) 663, MN. 29.

224 *Stephen N. Subrin*, Fishing Expeditons Allowed: The Historical Background of the 1938 Federal Discovery Rules, 39 (1998) Boston College Law Review 691.

225 United States, Assistance to Foreign and International Tribunals and to Litigants Before Such Tribunals, 28 U.S.C. § 1782.

226 Convention on the Taking of Evidence Abroad in Civil or Commercial Matters (18 March 1970; effective 17 October 1972), 847 UNTS 241.

227 Hague Conference on Private International Law, Status Table: Convention on the Taking of Evidence Abroad in Civil or Commercial Matters (17 June 2021), available at: https://www.hcch.net/en/instruments/conventions/status-table/?cid=82 (last accessed 28 May 2022).

228 See *Diego Zambrano*, A Comity of Errors: The Rise, Fall, and Return of International Comity in Transnational Discovery, 34 (2016) Berkeley Journal of International Law 101–159.

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precautionary principle.[229] Although it could arguably lead to a lowered evidentiary threshold in situations of risk of harm,[230] the precautionary principle appears not to be recognized as lowering the burden of proof for establishing the causes of environmental harm that has already materialized.[231]

IV. Implementation of Response Measures (Article 5)

Article 5 is the core provision of the Supplementary Protocol on the implementation of response measures. When damage occurs, state parties shall require the 'appropriate operator' to immediately inform the competent authority, evaluate the damage, and take 'appropriate response measures' (para. 1). The 'competent authority' of the state party concerned shall identify the 'operator which has caused the damage', evaluate the damage and determine which response measures the operator should take (para. 2). The competent authority shall also order response measures when there is an 'imminent threat of damage' (para. 3). It may take response measures itself, particularly when the operator has failed to do so (para. 4), and it may recover from the responsible operator its expenses for such measures as well as for evaluating the damage (para. 5). Finally, the competent authority's decisions must be reasoned and open to legal review (para. 6).

1. Requirement of the Operator to Take Response Measures (para. 1)

According to Article 5(1), parties shall, in the event of damage, require the appropriate operator to immediately *inform* the competent authority, *evaluate* the damage, and *take appropriate response measures*. This provision correlates with Article 12(1), which requires parties to provide for rules

229 See chapter 4, section B.VI.

230 *Markus Benzing*, Das Beweisrecht vor internationalen Gerichten und Schiedsgerichten in zwischenstaatlichen Streitigkeiten (2010), 706–724; but see ICJ, Pulp Mills (n. 216), para. 164, where the Court expressly held that the precautionary approach did not operate as a reversal of the burden of proof in situations of (alleged) risk. Also see *Maria Monnheimer*, Due Diligence Obligations in International Human Rights Law (2021), 161–162.

231 *Xue* (n. 135), 178–182; *Benzing* (n. 230), 704–706; see UNCC, Report and Recommendations Made by the Panel of Commissioners Concerning the Fifth Instalment of "F4" Claims, UN Doc. S/AC.26/2005/10 (2005), paras. 204–205.

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and procedures that address damage, including response measures, in their domestic law.[232] Hence, the Supplementary Protocol obliges its parties 'to enact domestic laws that address damage to biodiversity in a way that the operators are required to take response measures'.[233] Consequently, the Supplementary Protocol does not place obligations directly onto the operators but addresses them only indirectly. In other words, the provisions of the Supplementary Protocol are not designed to be *self-executing* or *directly applicable*[234] but need to be transposed into domestic law by additional legislative measures. This is also evidenced by the *travaux préparatoires*, because the inclusion of a provision directly requiring the operator to take response measures was proposed during the negotiations[235] but ultimately rejected.[236]

A different question is whether states are obliged to implement the obligations of operators as self-executing provisions. With regard to the obligation to immediately inform the competent authority, it is obvious that there must be a self-executing provision directly binding the responsible operator(s), as it would be pointless to impose this obligation only when

232 See *infra* section C.V.

233 *Shibata* (n. 8), 32.

234 Cf. *Karen Kaiser*, Treaties, Direct Applicability, in: Wolfrum/Peters (ed.), MPEPIL, MN. 1, who points to the fact that whether a treaty is directly applicable ultimately depends on the reception of international law by a domestic legal order (*ibid.*, MN. 6). Nevertheless, a treaty can only be applicable without further transposition when its terms are sufficiently precise and conclusively govern its legal consequences (see *ibid.*, MN 11–20). This could be assumed for states that are characterized as 'monist', i.e. in which international law and domestic law are deemed to be parts of one and the same legal order, which means that rules of international law in general do not need to be transposed into domestic law. In contrast, 'dualist' states perceive international law and domestic law to constitute separate legal orders, which means that rules of international law need to be transposed into domestic law in order to become effective within the jurisdiction of these states. For details, see *Heinrich Triepel*, Völkerrecht und Landesrecht (1899), 111–155; *Crawford* (n. 57), 45–47.

235 Cf. CP COP-MOP, Proposed Operational Texts on Approaches and Options Identified Pertaining to Liability and Redress in the Context of Article 27 of the Biosafety Protocol: Outcomes of the Meeting of the Friends of the Co-Chairs, Bonn, 7–10 May 2008: Addendum to the Final Report of the Open-Ended Ad Hoc Working Group of Legal and Technical Experts on Liability and Redress in the Context of the Cartagena Protocol on Biosafety, UN Doc. UNEP/CBD/BS/COP-MOP/4/11/Add.1 (2008), Section IV.A., Operational Text 11.

236 Cf. Group of Friends on L&R, Report of the […] First Meeting, UN Doc. UNEP/CBD/BS/GF-L&R/1/4 (2009), Article 7(2) on p. 12; see *Shibata* (n. 8), 32–33.

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the authority has become aware of the damage. However, with regard to the obligation to take response measures, two avenues of implementation seem possible. According to the first alternative, the obligation to take response measures arises directly from a self-executing provision, which is only *concretized* by the competent authority. In the second alternative, the obligation to take response measures is *enacted* by the decision of the competent authority, which is empowered by law to do so.[237] The former approach, which is also followed by the EU Environmental Liability Directive,[238] is preferable since the responsible operator would be required to take response measures even before the competent authority has reacted. Nevertheless, both approaches seem to be consistent with the Supplementary Protocol.

2. Responsibilities of the Competent Authority (para. 2)

Article 5(2) specifies the responsibilities of the competent authority in the implementation of response measures. As soon as the competent authority becomes aware of the damage,[239] it shall *identify* the 'operator which has caused the damage', *evaluate* the damage and *determine* which response measures should be taken by the operator. This determination will culminate in a legally binding decision requiring the operator to undertake the indicated measures. Depending on the domestic legal framework, this

237 The latter interpretation is supported by the wording of Article 5(6) SP, which refers to '[d]ecisions of the competent authority requiring the operator to take response measures'. The present view that both modes of implementation are permissible is shared, with reference to Article 5(8) SP, by *Akiho Shibata*, Conclusion: Beyond the Supplementary Protocol, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 240, 243. On the transposition of the Supplementary Protocol's provisions into domestic law, see *infra* section C.V.

238 Cf. EU Environmental Liability Directive (n. 18), Article 6(1), which directly obliges the operator to take both mitigation and remedial measures; and Article 6(2)(b) and (c), which empowers the competent authority to give instructions to the operator and to require him to take further remedial measures. See *Valerie Fogleman*, Enforcing the Environmental Liability Directive: Duties, Powers and Self-Executing Provisions, 4 (2006) Environmental Liability 127, 130–135.

239 The competent authority might become aware of the occurrence of damage either through a respective notification given by the responsible operator pursuant to Article 5(1)(a), or in any other way.

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decision may either be rendered directly by the competent authority or by a judicial organ on the authority's request.[240]

3. Measures When There Is a Threat of Damage (para. 3)

Article 5(3) provides that 'where relevant information […] indicates that there is a sufficient likelihood that damage will result if timely response measures are not taken', the operator shall be required to take appropriate response measures to avoid such damage. Requiring the operator to engage in response action before damage has actually occurred is one of the main merits of the administrative approach, because it allows the competent authority to require preventive action rather than merely arranging for *ex post* clean-up measures or compensation.[241]

The present provision resembles the concept of 'imminent threat of damage' used widely in international environmental law.[242] However, the terms 'relevant information' and 'sufficient likelihood' used in the present provision could be construed as requiring a higher threshold or standard of proof than that of 'imminent threat of damage'. According to reports from the negotiations, the present wording was introduced to accommodate concerns by some parties that the concept of 'imminent threat of damage' might be used to erect trade barriers.[243] In any event, the responsibility to determine which information is 'relevant' and whether

240 In the United States, CERCLA empowers the Environmental Protection Agency to either issue an administrative order itself or pursue a judicial order through the Department of Justice to require a potentially responsible party to perform clean-up actions, cf. CERCLA (n. 17), 42 U.S.C. 9606(a); see *David M. Bearden*, Comprehensive Environmental Response, Compensation, and Liability Act: A Summary of Superfund Cleanup Authorities and Related Provisions of the Act (2012), 24.

241 Cf. *Lago Candeira* (n. 9), 98.

242 See, e.g., 1992 Oil Pollution Convention (n. 60), Article I(8); Basel Protocol on Liability for Hazardous Wastes (n. 60), Article 2(h); Bunker Oil Convention (n. 60), Article 1(8); EU Environmental Liability Directive (n. 18), Article 2(9); Antarctic Liability Annex (n. 19), Article 2(b); for more examples, see CBD Secretariat, The Concept of Imminent Threat of Damage and Its Legal and Technical Implications: Note by the Executive Secretary, UN Doc. UNEP/CBD/BS/GF-L&R/3/INF/2 (2010); *Yifru* et al. (n. 68), 23–26.

243 *Jungcurt/Schabus* (n. 6), 200; cf. CBD Secretariat (n. 242), para. 2; *Lago Candeira* (n. 9), 104. Retrospectively, this fear was unfounded, because any measures taken under the Supplementary Protocol also need to comply with applicable rules of international trade law. In this respect, the conclusions reached on

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it indicates a 'sufficient likelihood' of damage lies with the states parties and their competent authorities. Hence, there is no clearly discernible difference between the concept of an 'imminent threat of damage' used in other instruments and that of 'sufficient likelihood that damage will result if timely response measures are not taken' used in the Supplementary Protocol.[244] In particular, it is not required that damage would occur *immediately* if no timely response measures were taken. Thus, response measures can also be required when there is a sufficient likelihood that damage will otherwise occur in the long term.[245]

4. Response Measures Taken Instead of the Responsible Operator (para. 4)

Article 5(4) provides that the competent authority may implement appropriate response measures itself, particularly when the operator has failed to do so. Notably, this does not stipulate an obligation of the party concerned but merely clarifies that it has the right to take response measures instead of the responsible operator.[246] The competent authority has full discretion to decide whether it implements response measures or not. Thus, at first sight, the present provision has only a declaratory effect. However, it might also serve to justify interference with fundamental rights necessary to implement certain response measures, such as the destruction of property (e.g. LMO seeds or crops) or the treatment of dwellings with pesti-

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the relationship between the WTO law and international biosafety law (see chapter 3, section C) also apply to the Supplementary Protocol.

244 Cf. *Lago Candeira* (n. 9), 103–104, who describes the wording used in Article 5(3) SP as a 'diffuse reference to the imminent threat of damage'.

245 In this context, see ICJ, Gabčíkovo-Nagymaros Project (Hungary v. Slovakia), Judgment of 25 September 1997, ICJ Rep. 7, para. 55, noting that 'a "peril" appearing in the long term might be held to be "imminent" as soon as it is established, at the relevant point in time, that the realization of that peril, however far off it might be, is not thereby any less certain and inevitable.'

246 *Caroline E. Foster*, Diminished Ambitions? Public International Legal Authority in the Transnational Economic Era, 17 (2014) J. Int. Econ. L. 355, 368. In contrast, the Antarctic Liability Annex encourages the party of the operator and other parties to take prompt and effective response action, 'including through their agents and operators specifically authorised by them to take such action on their behalf', see Article 5(2) of the Antarctic Liability Annex (n. 19). This goes along with a mechanism to coordinate multiple actors willing to take response actions, see Article 5(3)–(5).

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cides.[247] In any case, the express authorization of the competent authority to take response measures may also help to justify subsequent claims for reimbursement of expenses.

5. Recovery of Expenses by the Competent Authority (para. 5)

Under Article 5(5), the competent authority has the right 'to recover the costs and expenses of, and incidental to, the evaluation of the damage and the implementation of any such appropriate response measures'. It could be questioned whether this obligation is limited to response measures that the operator was required to but failed to take, or whether it also extends to response measures that the competent authority took without first requesting the operator to do so.[248] In other words, it is questionable whether the operator has the right to take the measures itself rather than just covering their costs.

Article 5(5) refers to 'any *such* appropriate response measures'.[249] The term 'such' refers to the measures specified in the preceding paragraph, which stipulates the right of the competent authority to implement appropriate response measures, 'in particular, when the operator has failed to do so'. Thus, the Supplementary Protocol makes clear that response action by the responsible operator is preferred over action taken by the competent authority. This resembles the approach taken by the Antarctic Liability Annex, under which the operator is only liable to pay the costs of response action taken by parties when it has itself failed to take prompt and effective response action.[250] In contrast, the EU's Environmental Liability Directive[251] and the United State's CERCLA[252] do not limit the right of the respective competent authorities to take action themselves (and, consequently, to recover the costs thereby incurred from the operator) to

247 See *James* et al. (n. 172), 13.
248 Arguably, this problem is less relevant when the obligation to take response measures pursuant to Article 5(1) SP (or the respective implementing law) is self-executing, as in this case the operator would be required to take appropriate response measures even without being explicitly ordered to do so by the competent authority.
249 Emphasis added.
250 Cf. Antarctic Liability Annex (n. 19), Article 6(1).
251 Cf. EU Environmental Liability Directive (n. 18), Articles 5(4), 6(2)(b) and 6(2)(e).
252 Cf. CERCLA (n. 17), 42 U.S.C. § 9607(a)(4)(A)-(D).

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situations where the responsible operator has failed to act. Consequently, under the Supplementary Protocol the competent authority may only recover its expenses from the responsible operator when the latter has failed to implement appropriate response measures.

This entails the question of whether the phrase 'has failed' in Article 5(4) implies a requirement of fault in the sense that the responsible operator must have culpably omitted to take the required measures. But other language versions of the Supplementary Protocol show that 'has failed' is used synonymously to 'has not taken',[253] and that the notion 'failed' therefore does not imply a requirement of fault. The corresponding provision of the Antarctic Liability Annex also uses the term 'has failed' but additionally stipulates that liability shall be strict, which clarifies that fault of the operator is no requirement for liability to arise.[254] Consequently, the responsible operator must reimburse the costs for any appropriate response measures it was required to take but (culpably or not) failed to take. At the same time, the operator must cover all the costs incurred by the competent authority in evaluating the damage, regardless of whether it also undertook its own evaluation measures.

The second sentence of Article 5(5) authorizes states parties to provide, in their domestic law, 'for other situations in which the operator may not be required to bear the costs and expenses'. The reference to '*other* situations' might suggest a limitation to the effect that there are certain situations in which the operator may not be exempted from liability at all. However, the Supplementary Protocol does not indicate such situations in which the operator shall always be held liable.[255] Furthermore, the authoritative language versions of the Supplementary Protocol appear not

253 The French version refers to 'lorsque l'opérateur ne l'a pas fait', which translates to 'when the operator has not done so'. Similarly, the Spanish uses reads 'cuando el operador no las haya aplicado', which means that the operator has not applied them (i.e., the appropriate measures). See Vienna Convention on the Law of Treaties (23 May 1969; effective 27 January 1980), 1155 UNTS 331 (hereinafter 'VCLT'), Article 33(1), which provides that: 'When a treaty has been authenticated in two or more languages, the text is equally authoritative in each language.'

254 Article 6(1) and (3) Antarctic Liability Annex (n. 19); see *Vöneky* (n. 181), 184; also see chapter 2, section E.

255 In contrast, the Article VIII of the EU Environmental Liability Directive (n. 18) contains a conclusive list of cases in which an operator shall not be required to bear the cost of preventive or remedial action. Similarly, Article VIII of the Antarctic Liability Annex (n. 19) contains a conclusive list of cases in which an operator shall not be liable to pay the cost of response action.

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to be consistent in this regard, as the French version merely refers to 'situations',[256] while the Spanish version also refers to 'other situations'.[257] When there is a difference in meaning between the authentic texts of a treaty, the meaning that best reconciles the texts, having regard to the object and purpose of the treaty, shall be adopted.[258] However, the different language versions are sufficiently clear that parties shall have the discretion to define situations in which the operator is exempted from liability. This also becomes clear when comparing Article 5(5) with Article 6, which also stipulates an option to adopt far-reaching exemptions from liability as parties 'may deem fit'.[259] In any event, such exemptions must not defeat the general object and purpose of the Supplementary Protocol,[260] which is to impose liability for biodiversity damage caused by LMOs on the responsible operator(s) by requiring them to take appropriate response measures or at least to cover their costs.

6. Reasoning and Legal Review of Decisions (para. 6)

Article 5(6) SP provides that decisions requiring the operator to take response measures shall be reasoned and shall be notified to the operator. Furthermore, domestic law shall provide for remedies, including the opportunity to seek administrative or judicial review of such decisions, and the operator shall be informed of these remedies. Depending on the domestic legal system, an appeal by the operator against the decision may have a suspensory effect, which means that the administrative act ordering the operator to take response measures might not be enforceable until the review process has been concluded. For this reason, Article 5(6) clarifies that recourse to such remedies shall not impede the competent authority from 'taking response measures in appropriate circumstances'. Having in mind that the competent authority may recover the costs for such response measures from the operator,[261] the term 'appropriate circumstances' can

256 The French wording is 'situations dans lesquelles l'opérateur peut ne pas être tenu de supporter ces coûts et dépenses'.
257 The Spanish version reads 'otras situaciones según las cuales pudiera no requerirse que el operador se haga cargo de los costos y gastos'.
258 Article 33(4) VCLT (n. 253).
259 See *infra* section E.I; also see *Yifru/Garforth* (n. 9), 158–160.
260 Cf. *Oliver Dörr*, Article 31 VCLT, in: Oliver Dörr/Kirsten Schmalenbach (eds.), Vienna Convention on the Law of Treaties (2nd ed. 2018), MN. 52–58.
261 Cf. Article 5(5), see *supra* section C.IV.5.

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be construed as limiting the response measures under Article 5(6) to those which must be taken timely in order to contain the LMO and to avoid further damage. In other words, the competent authority shall not prejudice the outcome of the review process by taking measures that are not urgent and which can equally be taken at a later stage. The same applies to the liability of the operator for expenses incurred by the competent authority in implementing response measures.[262] When the administrative or judicial review results in the overturn of the order requiring the operator to carry out response measures, the operator should also not be liable to pay the costs incurred by the competent authority in the meantime.

V. Transposition into Domestic Law

The Supplementary Protocol addresses its implementation into its parties' domestic legal systems in three provisions. Article 12(1) requires parties to provide, in their domestic law, for rules and procedures that address damage (1.). At the same time, Article 5(7) allows parties to assess whether response measures are already addressed by their domestic law on civil liability (2.). Furthermore, Article 5(8) provides that response measures shall be implemented 'in accordance with domestic law' (3.).

1. Provision of 'Rules and Procedures That Address Damage' (Article 12(1))

Article 12(1) addresses the transposition of the Supplementary Protocol into the domestic legal system of parties. The provision reads:

> *'Parties shall provide, in their domestic law, for rules and procedures that address damage. To implement this obligation, Parties shall provide for response measures in accordance with this Supplementary Protocol and may, as appropriate:*
> *(a) Apply their existing domestic law, including, where applicable, general rules and procedures on civil liability;*
> *(b) Apply or develop civil liability rules and procedures specifically for this purpose; or*
> *(c) Apply or develop a combination of both.'*

262 *Ibid.*

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Both the exact meaning and the rationale of this provision are unclear, especially concerning the references to 'rules and procedures on civil liability'. As shown earlier, the term 'civil liability' generally denotes the liability of an operator to make reparation to an injured person for damage sustained to the health, property or income of that person.[263] Thus, civil liability is a different approach than the 'administrative liability' approach followed by the Supplementary Protocol, which implies that liability is not enforced by injured persons seeking relief, but by an administrative authority requiring the operator to implement response measures to mitigate and repair the damage.[264] That the operator may also have to recover expenses incurred by others in implementing such measures[265] is only a corollary of the primary obligation to take appropriate response measures. Hence, at first sight, it appears to make little sense to require state parties to implement the administrative approach by adopting rules and procedures on civil liability.

On closer inspection, it becomes clear that Article 12(1) consists of a compulsory part and a voluntary part. According to the first sentence, parties shall 'provide for' (i.e. enact or maintain) rules and procedures that address biodiversity damage in their domestic law. This obligation is further specified by the first part of the second sentence, which stipulates that parties 'shall' (i.e. are legally required to) provide for response measures in accordance with the Supplementary Protocol. Hence, the first part of Article 12(1) closely relates to Article 5(1), which obliges parties to require the appropriate operator to take appropriate response measures in the event of damage.[266] Insofar, the provision merely restates the obligation already stipulated in Article 5(1), albeit with a specific focus on the provision of respective rules under the parties' domestic laws.[267]

The remainder of Article 12(1) SP provides that parties 'may' (i.e. are allowed to) additionally address biodiversity damage by either (a) applying their 'general rules and procedures on civil liability', (b) developing or applying civil liability rules 'specifically for this purpose' (i.e. to address biodiversity damage), or (c) applying or developing a combination of

263 See chapter 2, section G; also see *Sands* et al. (n. 150), 735.
264 Cf. *Lefeber* (n. 19), 84–87.
265 Article 5(5) SP; see *supra* section C.IV.4.
266 See *supra* section C.IV.1.
267 *Yifru/Garforth* (n. 9), 160.

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both.[268] A close reading of the second sentence of Article 12(1) reveals the distinction between the compulsory part and the voluntary part: parties '*shall* provide for response measures' and, besides, '*may*, as appropriate' take said steps with regard to civil liability. Hence, developing and applying civil liability rules to address biodiversity damage as envisaged in subparagraphs (a)-(c) is not a legal obligation but an option expressly left to the parties' discretion. The present provision merely clarifies that parties may use domestic civil liability rules and procedures to address biodiversity damage caused by LMOs *in addition* to providing for response measures in their domestic law. This is also confirmed by the negotiating history of the Supplementary Protocol, since the second part of Article 12(1) was characterized as an 'enabling provision referencing civil liability approaches for damage to biodiversity'.[269]

At the same time, states are not allowed to adopt civil liability rules for biodiversity damage *instead* of providing for response measures. This results from Article 5(7), pursuant to which the obligation to provide for separate rules on response measures is only waived when the civil liability law of a party already yields the ordering of response measures.[270]

2. Response Measures Already Addressed by Domestic Civil Liability Law (Article 5(7))

Article 5(7) stipulates that parties have the right, when implementing the Supplementary Protocol's provisions on response measures, to 'assess whether response measures are already addressed by their domestic law on civil liability'. This provision was reportedly included on the demand of the delegation of Brazil, who argued that their national civil liability system already provided for the implementation of response measures, which would usually be ordered by a court.[271] It can thus be assumed that when the result of such an assessment is positive (i.e. when response measures

268 This interpretation is also supported by a comparison with Article 12(2), where 'shall' is used to indicate that parties must choose one of the options listed in the subparagraphs listed there.

269 IISD, Summary of the Second Meeting of the Group of Friends of the Co-chairs on Liability and Redress (n. 25), 10; also see IISD, Summary of the Second Meeting of the Group of Friends of the Co-chairs on Liability and Redress (n. 25), 7.

270 See next section.

271 *Shibata* (n. 8), 29 at footnote 36.

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are indeed already addressed by a state's domestic law on civil liability), the party in question is not required to adopt specific legislation providing for response measures, because this would result in a mere restatement of law already in place.

In the view of some authors, Article 5(7) could also be interpreted extensively as allowing to maintain the *status quo ante* when a state has civil liability law in place that has the *same scope of application* as the provision of response measures envisaged by the Supplementary Protocol, even when such law does not actually require response measures.[272] But such an interpretation would jeopardize the effective implementation of the administrative approach, as it allowed parties to maintain 'business as usual'.[273] For this reason, it is doubtful that such an interpretation is permissible. Not only would it militate against the Supplementary Protocol's object and purpose, which is to establish a regime of administrative liability for damage resulting from the transboundary movement of LMOs,[274] but it would also allow bypassing the specific obligations contained in paragraphs 1 to 6 of Article 5.[275] Therefore, it must be assumed that parties may only rely on existing provisions of civil liability law when the application of these provisions will result in the implementation of effective measures to contain, mitigate, and restore damage to biodiversity resulting from LMOs. According to an even stricter interpretation, the application of civil liability law is only permissible when it is 'more effective in responding to biodiversity damage than implementing an administrative approach to liability established in accordance with Articles 5 and 12 of the Supplementary Protocol'.[276] In any event, the mere payment of financial compensation for the loss of biodiversity is insufficient under the Supplementary Protocol as long as it cannot be guaranteed that response measures are actually implemented.

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272 *Lago Candeira* (n. 9), 104; *Shibata* (n. 8), 29 at footnote 36; also see *Yifru/Garforth* (n. 9), 159.

273 Cf. *Lago Candeira* (n. 9), 104.

274 See Recital 4 of the Supplementary Protocol, which recognizes 'the need to provide for appropriate response measures where there is damage or sufficient likelihood of damage'. Article 31(1) of the VCLT (n. 253) provides that an international treaty shall be interpreted, *inter alia*, in light of its object and purpose.

275 *Shibata* (n. 8), 29 at footnote 36.

276 *Shibata* (n. 237), 245.

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3. Implementation of Response Measures 'in Accordance With Domestic Law' (Article 5(8))

Article 5(8) provides that response measures 'shall be implemented in accordance with domestic law'. Again, the wording of this provision is ambiguous. In the first place, it is unclear whether the term 'implemented' refers to the adoption of domestic laws and regulations, their execution by the competent authority in the event of damage, or both.[277] Furthermore, it has been argued that Article 5(8) might be 'subjecting the provision on response measures to domestic law', which could mean that parties are allowed to deviate from the Supplementary Protocol's substantive rules on response measures.[278] However, it appears more reasonable to construe Article 5(8) as stipulating that the domestic implementation of response measures shall be accommodated within the existing national legal framework. For instance, it is left to domestic law whether the obligation of the operator to take response measures originates directly from a self-executing legal provision or is created by an order rendered in the individual case.[279] In other words, parties are free to choose their own ways of implementing response measures in accordance with their existing legal order as long as they do not compromise the objective of the Supplementary Protocol.[280] After all, Article 5(8) created the flexibility desired by parties who already had in place domestic systems of administrative liability and wanted to avoid having to modify these already-existing regimes.[281]

VI. Conclusions

As noted earlier, by providing for 'administrative liability' of operators, the Supplementary Protocol follows a recent trend in international law-

277 As explained above, the Protocol uses the term 'implementation' for both the adoption of domestic legislation and the enforcement of response measures by the competent authority in the event of damage. See *supra* C.IV.6.

278 *Yifru/Garforth* (n. 9), 159.

279 See *supra* section C.IV.1.

280 *Shibata* (n. 237), 245.

281 IISD, Summary of the First Meeting of the Group of Friends of the Co-Chairs on Liability and Redress in the Context of the Cartagena Protocol on Biosafety: 23–27 February 2009, ENB Vol. 9 No. 457 (2009), 11.

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making on environmental liability.[282] However, the preceding section has shown that the administrative approach as reflected in the Supplementary Protocol also has weaknesses and disadvantages. Most importantly, there is usually no pre-emptive obligation of the operator to take certain measures once damage occurs.[283] Instead, the general duty to take response measures must first be translated into specific deliverables, which requires evaluating the damage, identifying the responsible operator, and determining the measures required in each individual case. Hence, the administrative approach is 'premised on the existence of a robust administrative apparatus'.[284] Many developing countries invoked that they did not have the expertise and capacity needed to implement the administrative approach.[285]

However, most of these weaknesses seem not to be owed to the administrative approach *per se* but rather to its lenient implementation. Already the Supplementary Protocol's scope of application is highly flexible, as parties may use their own criteria to determine whether there is a case of 'damage to biological diversity'.[286] Furthermore, states are largely free to identify the liable operator, which can be any person in direct control of the LMO.[287] With regard to the substantive content of response measures, the Supplementary Protocol clearly stipulates that the prevention of damage shall take priority over restoration, and that replacement measures shall be taken where the primary damage cannot be avoided. However, apart from these general principles, the Supplementary Protocol remains rather vague on how to determine which measures are 'reasonable' and 'appropriate' in a certain case.[288] There is also no obligation for parties to implement response measures when the responsible operator fails to do so.[289] After all, parties enjoy more or less full discretion on how to implement the administrative approach in their domestic law.[290]

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282 Cf. *Shibata* (n. 8), 31–38, 46–48. The approach is termed by some as 'regulatory liability', cf. *Lefeber* (n. 19), 84; see chapter 2, section G.
283 This is assumed by *Shibata* (n. 237), 242. But see *supra* section C.IV.1.
284 *Shibata* (n. 8), 36.
285 *Jungcurt/Schabus* (n. 6), 202; *Thomas/Teshome Kebede* (n. 22), 126–127.
286 The most striking example is the European Union's implementing legislation, which only applies when there is damage to certain protected species and habitats, see *supra* section B.II.5.
287 See *supra* section C.II.
288 See *supra* section C.I.
289 *Foster* (n. 246), 368, see *supra* section C.IV.4.
290 *Lim Tung* (n. 6), 74; *Foster* (n. 246), 367; *Telesetsky* (n. 184), 106.

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D. Civil Liability for Material and Personal Injury

As mentioned above, it was agreed during the negotiations that the Supplementary Protocol should focus on the administrative approach but also include a legally binding provision on civil liability.[291] The outcome of this agreement can be found in paragraphs 2 and 3 of Article 12, which address civil liability for material or personal damage that is 'associated' with damage to biodiversity (I.). Parties shall aim at providing for adequate rules and procedures on civil liability in their domestic law (II.). To this end, Article 12(3) provides a list of elements that parties shall address when developing specific legislation (III.). An essential question in this context is under which circumstances such rules are deemed 'adequate' (IV.).

I. Scope: Material or Personal Damage Associated with Biodiversity Damage

Article 12(2) applies to material or personal damage (1.), provided that such damage is associated with damage to biological diversity (2.).

1. Material or Personal Damage

Article 12(2) refers to 'material or personal' damage. Both terms are not defined in the Supplementary Protocol. 'Personal damage' appears to be used in place of the more common phrase 'personal injury', which means 'bodily or mental injury to a human person'.[292] Personal damage thus encompasses costs for medical treatment[293] but might also include compensation for pain and suffering as well as any consequential income losses.[294]

The meaning of 'material damage' is less clear, because 'material' can mean 'relating to physical matter' but can also denote a threshold in the

291 See *supra* section A.
292 Cf. 'personal injury', in: Black's Law Dictionary (n. 185), 939.
293 Note that the reference to 'risks to human health' in the definition of biodiversity damage might, in the view of some authors, give rise to compensation of these costs under the administrative approach, cf. *Espinosa* (n. 68), 326–327; see *supra* section B.II.4.
294 Cf. *ibid.*, 337–338.

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sense of 'significant' or 'relevant'.[295] However, as shown above, the Supplementary Protocol refers to 'significant' rather than 'material' adverse effects to define the minimum threshold required for liability to arise.[296] Furthermore, 'material' is used in Article 12(2) as an alternative to 'personal' damage, which shows that it is not used *quantitatively* to define the amount or degree of injury, but *qualitatively* to describe the types of damage encompassed by the provision. Consequently, 'material damage' refers to a loss of, or damage to, tangible property. Nevertheless, it could be questioned whether it also includes damage to immaterial goods, economic loss and other negative socio-economic effects, such as loss of or damage to cultural, social and spiritual values (especially of indigenous and local communities), loss of or reduction of food security, damage to agricultural biodiversity or loss of economic competitiveness.[297]

According to the *travaux préparatoires*, the rules on civil liability were meant to address damage 'to legally protected interests', as opposed to the environment as such.[298] More specifically, civil liability was meant to address 'damage not redressed through [the] administrative approach' to avoid a double recovery of the same damage through both approaches.[299] Hence, the Supplementary Protocol clearly distinguishes between damage to biodiversity on the one hand and 'traditional damage' to individual rights and goods on the other.[300] However, whether certain detrimental effects of an LMO constitute compensable 'material damage' essentially depends on whether these effects impair a right or good that enjoys legal protection under the national laws of the state concerned. This is also true for economic loss and negative socio-economic impacts, which are both not mentioned in the Supplementary Protocol.[301]

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295 Cf. 'material, adj.', in: Black's Law Dictionary (n. 185), 1170; 'material, adj., n., and adv.', in: Oxford English Dictionary (n. 69).

296 Article 2(2)(b)(ii) and 2(3) SP; see *supra* section B.II.3.

297 During the negotiations, some parties proposed a definition of 'damage to socio-economic conditions' which referred to the factors mentioned here, cf. Final report of WG L&R 2008 (n. 117), 9–10. However, all references to socio-economic considerations in the definition of damage were removed from the draft text in 2008; cf. CP COP-MOP Decision BS-IV/12 (2008) (n. 30). Also see *Gouritin* (n. 68), 157–158. On socio-economic considerations in the Cartagena Protocol, see chapter 3, section A.II.1.e).

298 Final report of WG L&R 2008 (n. 117), 8.

299 *Ibid.*

300 See *supra* section B.II.1 and chapter 2, section B.

301 *Lim Tung* (n. 6), 73–74; *Gouritin* (n. 68), 157–158; see *supra* section B.II.6.

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After all, the Supplementary Protocol does not formulate a harmonized understanding of what is meant by 'material or personal damage'. Consequently, parties have large discretion in implementing this element, which will likely mean that such damage will be compensated differently, or even not at all, depending on where it occurs.[302]

2. Damage 'Associated' With Biodiversity Damage

In order to be addressed by the present provision, material and personal damage must be 'associated with the damage as defined in Article 2, paragraph 2 (b)'. The said provision defines the term 'damage' as 'an adverse effect on the conservation and sustainable use of biological diversity, taking also into account risks to human health'.[303] Hence, Article 12(2) applies to material and personal damage that is 'associated' with the damage to biodiversity resulting from an LMO.

The Supplementary Protocol does not indicate under which circumstances traditional damage is deemed 'associated' with biodiversity damage. The adjective 'associated' denotes something as 'combined locally, circumstantially, or in classification (with)' something else.[304] Hence, a possible interpretation of the notion 'associated with biodiversity damage' would encompass all kinds of traditional damage that occur in relationship with (or alongside) damage to biodiversity, while a causal relationship between the two types of damage would not be necessarily required. But 'associated with' could also be construed as 'consequential to',[305] which would mean that only personal and material injury *resulting* from biodiversity damage caused by the LMO, but not damage directly caused by the LMO, was covered by Article 12(2).

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302 *Lim Tung* (n. 6), 74.

303 Cf. Article 2(2)(b); see *supra* section B.II.

304 Cf. 'associated, adj.', section 3, in: Oxford English Dictionary (n. 69).

305 Cf. *Nijar* (n. 6), 274, who argues that that 'the [traditional] damage must be a consequence of damage to biodiversity'. However, the argument becomes inconsistent when the author provides an example where an LMO contaminates the environment and causes damage to the environment, and at the same time causes 'material and physical loss to a farmer whose field is affected by the contamination'. Here, it remains unclear whether the author deems a causal relationship between the biodiversity damage and the material and physical loss suffered by the farmer to be a requirement for the applicability of Article 12(2).

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Contrary to what it may seem at first glance, this distinction is not only a terminological one. If a circumstantial relationship between biodiversity damage and traditional damage was sufficient, the occurrence of biodiversity damage would give rise to the full range of claims that may be related to the use of LMOs, which in many cases will relate to the contamination of non-LMO seeds or crops with the LMO. However, many developed countries strongly opposed to developing a liability regime for these types of damages in the context of the Cartagena Protocol, arguing that the latter was only concerned with protecting biological diversity.[306] Therefore, it must be assumed that the term 'associated with' requires that personal or material damage must be 'consequential to' biodiversity damage.[307] Traditional damage that occurs only coincidentally alongside biodiversity damage is not covered by Article 12(2), leaving it for the parties to decide whether and how they address this type of damage in their domestic law.[308] Consequently, it appears 'not easy to envision' what the damage covered by Article 12(2) could be.[309]

II. Provision of Adequate Rules and Procedures on Civil Liability (Article 12(2))

Article 12(2) addresses the measures that parties shall take with regard to civil liability for personal and material damage in the aforementioned sense. The provision reads:

> *'Parties shall, with the aim of providing adequate rules and procedures in their domestic law […]:*
> *(a) Continue to apply their existing general law on civil liability;*
> *(b) Develop and apply or continue to apply civil liability law specifically for that purpose; or*
> *(c) Develop and apply or continue to apply a combination of both.'*

306 Cf. *Shibata* (n. 8), 22; *Jungcurt/Schabus* (n. 6), 201; IISD, Summary of the Second Meeting of the Group of Friends of the Co-chairs on Liability and Redress (n. 25), 7; but see *Lefeber* (n. 19), 90, who argues that 'there is no legal impediment to address traditional damage in a liability instrument in the context of these Conventions'.

307 *Nijar* (n. 15), 113 reports that during the negotiations of the Supplementary Protocol, countries insisting 'on this narrowly circumscribed definition' were unable 'to concretely identify what such damage may be'.

308 *Yifru/Garforth* (n. 9), 160; *Brans/Dongelmans* (n. 26), 184.

309 *Nijar* (n. 15), 113.

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This list closely resembles that contained in Article 12(1), which refers to the domestic implementation of response measures.[310] However, while Article 12(1) only provides that parties 'may' take any of the described steps, the present provision is formulated in a binding manner. Parties must either 'continue to apply' existing laws on civil liability or 'develop and apply' specific liability laws, and they must do so 'with the aim of providing adequate rules and procedures' to address material and personal damage. This means that parties are required to make *bona fide* and concrete efforts to provide for adequate rules on civil liability.[311] Hence, Article 12(2) can be characterized as being 'formulated in a binding manner, yet [having] a procedural nature'.[312] Parties are free to apply existing laws or to adopt new ones, and the content of such laws is completely left at the discretion of the parties, provided that the resulting level of protection is 'adequate'.[313]

III. List of Elements to be Addressed When Developing Civil Liability Law (Article 12(3))

Article 12(3) provides that when developing specific civil liability law for material and personal damage, parties shall

> '*address, inter alia, the following elements:*
> *(a) Damage;*
> *(b) Standard of liability, including strict or fault-based liability;*
> *(c) Channelling of liability, where appropriate;*
> *(d) Right to bring claims.'*

These elements are commonly found in international agreements dealing with liability for damage resulting from hazardous activities or substances.[314] However, in contrast to most of these instruments, the Supplementary Protocol does not define a substantive content or standard for these elements.[315] For example, most international agreements commonly require their parties to provide for *strict liability*, which means that liability

310 See *supra* section C.V.1.
311 *Nijar* (n. 15), 113.
312 *Lefeber/Nieto Carrasco* (n. 12), 65.
313 *Ibid.*; on the adequacy of rules and procedures, see *infra* section D.IV.
314 See the instruments referred to in n. 60.
315 *Nijar* (n. 15), 113–114.

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arises irrespectively of whether the responsible actor has culpably caused the damage (i.e. acted with negligence or intention) and whether such fault can be proven by the plaintiff (which may be difficult in complex environmental damage situations).[316] The Supplementary Protocol only requires parties to 'address' the standard of liability but expressly leaves them free to choose a strict, fault-based or any other standard of liability.[317]

IV. The Meaning of 'Adequate' Rules and Procedures

As shown above, Article 12(2) obliges parties to aim to provide 'adequate' rules and procedures on civil liability. This poses the question of what is required for such rules to be 'adequate'. In legal English, the term 'adequate' is used to denote something as 'legally sufficient'[318] or 'satisfactory'.[319] Hence, the term does not represent an objective, generally applicable standard but requires a case-by-case evaluation of whether a particular measure, in the individual circumstances, is sufficient to achieve or preserve the objectives or values at stake.[320]

In international environmental law, the term 'adequate compensation' provides – as a quantitative element – that compensation must be sufficient to make good the damage, although it does not necessarily require 'full' compensation.[321] In the current context, the term appears to have a wider meaning, as it is not only used to describe compensation but more generally the rules and procedures on civil liability adopted by parties in their domestic law. However, it is difficult to identify an overarching objective that shall be pursued by establishing such national civil liability rules, in particular since the express objective of the Supplementary Protocol is not to ensure compensation for material and personal injury suffered

316 Cf. *Julio Barboza*, The Environment, Risk and Liability in International Law (2011), 25; see *supra* section C.III and chapter 2, section E.
317 Cf. *Jusoh* (n. 6), 193–195.
318 Cf. 'adequate', in: Black's Law Dictionary (n. 185), 49.
319 Cf. 'adequate, adj.', section 3, in: Oxford English Dictionary (n. 69).
320 See 'Adequate', in: Hay (ed.) (n. 206), 66–68, for examples on the meaning of the term 'adequate' in different contexts, including in 'adequate knowledge of either official language' and 'adequate fence'.
321 Cf. *René Lefeber*, Transboundary Environmental Interference and the Origin of State Liability (1996), 323–324; ILC, Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising Out of Hazardous Activities, with Commentaries (2006), YBILC 2006, vol. II(2), p. 56, Principle 3 and commentary, paras. 3–5.

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by individuals, but only to provide for response measures to mitigate and repair biodiversity damage.[322] This is even aggravated by the fact that the aforementioned list of elements to be addressed by national laws on civil liability is formulated indifferently and without establishing specific requirements.[323] Arguably, there may be situations in which such laws are obviously *inadequate*, for instance when plaintiffs who have suffered injury from an LMO have no legal basis to claim compensation or when they have no standing to bring their claims to court. However, above this minimum threshold, the term 'adequate' does not appear to denote an agreed standard for domestic civil liability laws in the context of traditional damage arising from LMOs.[324]

V. Conclusions

The preceding analysis has shown that the Supplementary Protocol does not impose any substantive obligations upon parties with regard to civil liability. The most striking limitation is the narrow scope of these provisions, as they only apply to damage 'associated' with biodiversity damage. But even within this scope, parties are free to decide whether they continue to apply their existing civil liability rules, develop new rules specifically for LMO damage, or combine both approaches. States are also not required to establish strict liability (which is commonly used in the context of liability for hazardous activities, because the fault of the operator may be difficult to prove for the plaintiff and because harm may also occur despite the operator acting diligently[325]), but may also adopt a fault-based liability standard.[326]

The Supplementary Protocol remains similarly vague about several other elements such as channelling of liability, standard of proof and the right to bring claims. In contrast to many other international civil liability instruments, which generally aim to harmonize the national law to certain minimum standards, the Supplementary Protocol merely requires states

322 Cf. Article 1 SP.
323 Cf. Article 12(3) SP; see *supra* section D.III.
324 Cf. *Lefeber/Nieto Carrasco* (n. 12), 65, who argue that the negotiators 'forewent the development of guidance for rules and procedures in domestic law on civil liability and, hence, what would be "adequate"'. On the draft civil liability guidelines, see *infra* section D.VI.
325 Cf. *Barboza* (n. 316), 25.
326 Cf. Article 12(3)(b) SP; see *Jusoh* (n. 6), 193–195.

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parties to 'address' the aforementioned elements in their domestic liability regimes without establishing any substantive standards. In fact, the Supplementary Protocol does not offer *any* guidance on how domestic liability regimes should be designed in order to be 'appropriate'. Furthermore, it remains silent on a number of issues critical in transboundary situations, e.g. access to court for foreigners, or mutual recognition and enforcement of judgments.[327]

In conclusion, Article 12(2) contains an important procedural obligation with regard to traditional damage, as parties are required to assess their existing civil liability regimes and determine whether they are (still) adequate to deal with damage resulting from LMOs.[328] However, the Supplementary Protocol cannot be considered to establish a 'hard' obligation of international law to establish a civil liability system, which is mainly due to the lack of specific standards for such a regime.[329] As a result, some parties to the Supplementary Protocol have special liability for regimes for LMO damage, while others continue to rely on pre-existing general liability rules.[330]

VI. Excursus: Draft Guidelines on Civil Liability and Redress

As mentioned above,[331] Article 12 is the result of a compromise reached during the negotiations of the Supplementary Protocol in 2008, where it was agreed to develop a legally binding instrument that follows an administrative approach but also includes a provision on civil liability.

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327 Cf. *Jungcurt/Schabus* (n. 6), 201–202, who point to the fact that recognition of foreign judgments remains a complex procedural issue, as countries use different approaches to take into account the specific characteristics of their own legal systems and those of other countries when deciding whether to recognize foreign judgments. Also see *Lim Tung* (n. 6), 74; *Jusoh* (n. 6), 201–202 and *infra* section F.II.

328 *Nijar* (n. 15), 123; *Thomas/Teshome Kebede* (n. 22), 129–130; but see *Yifru/Garforth* (n. 9), 160, who assume that Article 12(2) SP 'may provide legitimate grounds for a Party to ignore traditional damage associated with damage to biodiversity if that Party so wishes'.

329 *Jungcurt/Schabus* (n. 6), 203; *Nijar* (n. 15), 117; *Nijar* (n. 15), 117; *Lim Tung* (n. 6), 73–74; also see *John M. Marshall*, Commentary: The Cartagena Protocol in the Context of Recent Releases of Transgenic and Wolbachia-Infected Mosquitoes, 19 (2011) Asia-Pacific Journal of Molecular Biology and Biotechnology 91, 96.

330 See *Wilcox* (n. 218), 777–778, and the country reports contained in that volume.

331 See *supra* section A.

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Initially, this provision was meant to be complemented by a set of legally non-binding *Guidelines on Civil Liability*. An outline for these Guidelines was compiled from proposals for operative provisions on civil liability submitted by parties,[332] and a consolidated draft was circulated by the co-chairs at a late stage of the negotiations.[333] However, as discussions on civil liability focused on the legally binding provisions now contained in Article 12, the Guidelines were never subject to substantive negotiations. Ultimately, the negotiating parties agreed not to further elaborate the Guidelines[334] and all references to them were removed from the text of the Supplementary Protocol.[335]

Although the Draft Guidelines were never finalized, they still offer some insight into the degree of agreement among parties about rules on civil liability. The stated objective of the Guidelines was 'to provide guidance to Parties regarding domestic rules and procedures on civil liability'.[336] The Guidelines' scope should extend to personal injury and material damage, although it was disputed whether such damage should only be covered when it was 'incidental' to biodiversity damage.[337] Economic loss was also meant to be covered, but only when it was incurred as a result of damage to the conservation and sustainable use of biodiversity.[338] Another proposed category of damage was socio-economic losses, which referred

332 *Jungcurt/Schabus* (n. 6), 203.

333 Draft Guidelines on Civil Liability and Redress, Proposal by the Co-Chairs of 7 June 2010 (n. 33); see Third World Network, Comments on the Draft Guidelines on Civil Liability and Redress in the Field of Damage Resulting from Transboundary Movements of Living Modified Organisms, in: Third World Network (ed.), Liability and Redress for Damage Resulting from GMOs (2012) 46.

334 Cf. Report of COP-MOP 5 (n. 34), para. 129.

335 For details, see *Jungcurt/Schabus* (n. 6), 203.

336 Group of Friends on L&R, Draft Guidelines on Civil Liability and Redress: Consolidated Text, UN Doc. UNEP/CBD/BS/GF-L&R/3/4, p. 16–22 (2010), Guideline 1, para. 2.

337 *Ibid.*, Guideline 2, Option 1, para. 2(a). This issue is also virulent with regard to the Supplementary Protocol, see *supra* section D.I.2.

338 Cf. *ibid.*, Guideline 2, Option 1, para. 2(c); the limitation that economic loss should only be covered when it was incurred as a result of biodiversity damage was already contained in the consolidated draft presented by the Co-Chairs, cf. Draft Guidelines on Civil Liability and Redress, Proposal by the Co-Chairs of 7 June 2010 (n. 33), Guideline 2, para. 2(c).

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to damage to cultural, social or spiritual values, damage to indigenous or local communities, or a reduction of food security.[339]

With regard to the applicable standard of liability, it remained disputed whether liability should be generally strict, strict only for LMOs that had been identified as hazardous, or whether the standard of liability should be fully left to the discretion of the parties.[340] Like the Supplementary Protocol, the Draft Guidelines do not contain provisions that would allow to conclusively identify the liable operator or operators, albeit they provided for channelling of liability and, in the case of multiple liable parties, for joint and several liability.[341] The provisions on exemptions, time and financial limits, and financial security remained similarly vague as those in the Supplementary Protocol.[342]

The Draft Guidelines provide that any affected person should be entitled to bring claims for compensation and that parties should provide for civil law procedures to settle such claims.[343] Where agreed by all parties, claims could also be submitted to arbitration under the *Optional Rules for Arbitration of Disputes Relating to Natural Resources and/or the Environment* of the *Permanent Court of Arbitration*.[344] Depending on the circumstances, arbitration could be preferable over litigation in regular courts since the recognition of foreign arbitral awards is governed by the *New York Convention* of 1958,[345] which currently has 170 parties.[346] In contrast, there is

339 Cf. Draft Guidelines on Civil Liability and Redress, Draft as per 19 June 2010 (n. 336), Guideline 2, Option 1, para. 2(a)(vi).

340 Cf. *ibid.*, Guideline 4.

341 Cf. *ibid.*

342 Cf. *ibid.*, Guidelines 5–8; see *infra* sections E.I and II.

343 *Ibid.*, Guidelines 9–10; see *Jusoh* (n. 6), 201–202.

344 Draft Guidelines on Civil Liability and Redress, Draft as per 19 June 2010 (n. 336), Guideline 10, para. 2; see PCA, Optional Rules for Arbitration of Disputes Relating to Natural Resources and/or the Environment (2001); *Dane P. Ratliff*, The PCA Optional Rules for Arbitration of Disputes Relating to Natural Resources and/or the Environment, 14 (2001) Leiden J. Int'l L. 887; *Tamar Meshel*, Optional Rules for Arbitration of Disputes Relating to Natural Resources And/or the Environment, MPILux Working Paper 1 (2017).

345 Convention on the Recognition and Enforcement of Foreign Arbitral Awards (10 June 1958; effective 07 June 1959), 330 UNTS 3; see *Jan Kleinheisterkamp*, Recognition and Enforcement of Foreign Arbitral Awards, in: Wolfrum/Peters (ed.), MPEPIL, MN. 14–15.

346 Cf. UN OLA, Status of the Convention on the Recognition and Enforcement of Foreign Arbitral Awards, available at: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXII-1&chapter=22&clang=_en (last accessed 28 May 2022).

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no comparable treaty providing for the recognition and enforcement of foreign judgments at the global level.[347]

In conclusion, the Draft Guidelines offer some interesting perspectives on how the negotiating parties conceived the issue of civil liability. However, they also share most of the Supplementary Protocol's weaknesses, including the restriction to losses incidental to biodiversity damage, the lack of agreement regarding the applicable standard of liability, and the consideration of problems arising in situations involving multiple jurisdictions. Furthermore, as the Supplementary Protocol does not contain a clear obligation to adopt an effective civil liability regime, it has been argued that the importance of the Guidelines as a soft law element of the international regime would have been very limited.[348] For these reasons, the fact that the Guidelines were never finally adopted cannot be said to be a great loss.

E. Other Provisions

Besides the operative provisions on response measures and civil liability discussed above, the Supplementary Protocol also contains a number of other provisions.

I. Exemptions From Liability, Time and Financial Limits, and Right of Recourse (Articles 6 to 9)

Pursuant to Articles 6 to 8, states parties may restrict the liability of the operator in their domestic law on a number of grounds. Article 6 stipulates that parties may provide for exemptions in case of *force majeure*, war or civil unrest (para. 1). Besides, parties are allowed to provide 'for any other exemptions or mitigations as they may deem fit' (para. 2). According to Article 7, parties may provide for relative and/or absolute time limits and the commencement of the period to which such time limits apply. This expressly includes time limits 'for actions related to response measures', which refers to actions challenging administrative orders requiring such

347 See *infra* section F.V and chapter 2, section F.
348 *Jungcurt/Schabus* (n. 6), 203.

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response measures.[349] Article 8 allows parties to provide for financial limits for the recovery of costs and expenses related to response measures. Article 9 provides that the Supplementary Protocol shall not limit or restrict any recourse or indemnity that an operator may have against any other person.[350]

In principle, exemptions from liability and financial limits are deemed to be fundamental prerequisites for the availability of private insurance policies, as insurers generally do not accept coverage of risks that are unlimited in both amount and time and that do not exclude certain events outside the influence of the insured persons, such as war or *force majeure*.[351] On the other hand, financial caps on liability seriously impair the victims' right to full compensation as well as the 'polluter-pays principle', which provides that the costs of environmental damage shall be fully internalized.[352] This concern could be (partially) resolved by establishing supplementary compensation schemes.[353]

However, the present provisions are problematic as they do not clearly indicate whether they refer to the administrative approach, civil liability, or both. Against this background, it has been argued that the provisions 'do not seem to fit well with the administrative approach' but were rather 'suited to the adversarial nature of civil liability'.[354] Indeed, other liability instruments following the administrative approach provide for exemptions and limitations only with respect to the liability of the operator for response measures it failed to take.[355] However, in the absence of such an express limitation, it must be assumed that Article 6 allows parties to provide for exemptions not only from financial liability but also from the principal requirement to take response measures.

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349 See Article 5(6) and *supra* section C.IV.6. In addition, 'actions related to response measures' may also refer to actions in which a competent authority seeks a judicial order of the operator to take response measures. See *supra* note 240 and accompanying text, and *supra* section C.V.2.

350 On the role of Article 9, see *supra* section C.II.

351 *Jungcurt/Schabus* (n. 6), 205. In the context of the Biodiversity Compact, see *J. T. Carrato* et al., The Industry's Compact and Its Implications for the Supplementary Protocol, in: Akiho Shibata (ed.), International Liability Regime for Biodiversity Damage (2014) 218, 233.

352 Cf. *Faure/Wibisana* (n. 192), 565–566.

353 Cf. *Jungcurt/Schabus* (n. 6), 205; see *Yifru* et al. (n. 68), 32–40; *Förster* (n. 5), 365–370.

354 *Yifru/Garforth* (n. 9), 163.

355 See Antarctic Liability Annex (n. 19), Articles 8 and 9; EU Environmental Liability Directive (n. 18), Article 10.

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A similar problem is posed by Article 8 on financial limits, which only addresses 'the recovery of costs and expenses related to response measures'. If limits were to be imposed on the obligation to make financial payments, but not on the obligation to take response measures in the first place, operators could refrain from taking such measures and opt for financial liability. This perverse incentive could be avoided by penalizing deliberate failures to take response measures. Furthermore, a limitation of liability should not only be applied to the obligation of the operator to recover costs and expenses incurred by others, but also to its own obligation to take response measures (e.g. by providing that, when taking response measures, an operator does not need to incur expenses exceeding the maximum amount for which it would be liable to third parties).

In any event, the provisions contained in Articles 6 to 8 grant a considerable degree of liberty to states parties to limit the liability of operators under their jurisdiction. This contrasts sharply with other civil liability instruments, which usually precisely outline the circumstances in which liability may be capped or limited.[356] In particular, the right to provide for 'any other exemptions or mitigations' in domestic law as parties 'may deem fit' considerably limits the Supplementary Protocol's effectiveness in harmonizing liability rules for LMO damage.[357]

II. Financial Security (Article 10)

Article 10 addresses the right of states parties to provide for 'financial security' in their domestic law. The first paragraph retains the right of parties

356 Cf. e.g. 1992 Oil Pollution Convention (n. 60), Articles III-V; HNS Convention (n. 60), Article 9; 1997 Vienna Convention on Civil Liability for Nuclear Damage (n. 60), Articles IV-V; Kiev Liability Protocol (n. 60), Articles 4(2), 9 and 10; but see Antarctic Liability Annex (n. 19), Articles 8 and 9, which also limits the financial liability to recover costs for response measures taken by others, but not the principal obligation of the operator to take response measures itself; also see *Johan G. Lammers*, International Responsibility and Liability for Damage Caused by Environmental Interferences, 31 (2001) Environmental Policy and Law 42–50 and 94–105, 100–103.

357 *Lim Tung* (n. 6), note 92 at p. 83 suggested that this may be used to exempt the operator from liability when damage is caused exclusively by an act or omission of other states or non-state actors or a third party. However, in these situations it would be more adequate not to hold the operator liable on grounds of him not having 'caused' the damage in the sense of Article 5(2)(a) SP. See *supra* section C.II.

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to provide for financial security (1.). The second paragraph provides that this right shall be applied consistently with the parties' other rights and obligations under international law (2.). The third paragraph envisages a comprehensive study of issues related to financial security (3.).

1. Right of Parties to Provide for Financial Security (para. 1)

Article 10(1) stipulates that parties 'retain the right to provide, in their domestic law, for financial security'. Unlike most other international liability regimes,[358] the Supplementary Protocol does not establish an obligation to provide for financial security but only states that parties 'retain the right' to do so. Contrary to what the provision implies, the right to provide for financial security is not expressly recognized elsewhere, but rather flows directly from the general sovereignty of states under international law.[359] Article 10(1) thus only has a declaratory effect. Moreover, the Supplementary Protocol remains silent on the modalities of such financial security requirements. Hence, whether or not to adopt a financial security requirement at all, as well as the question of how such a requirement would be implemented under domestic law, is left to the discretion of the parties.[360]

The Supplementary Protocol does not define the meaning of the term 'financial security'. Generally, financial security denotes instruments like insurance policies or compensation funds established to ensure that sufficient financial resources are available when damage occurs, regardless of whether the responsible operator still exists and is solvent.[361]

In the context of damage arising from LMOs, three types of mechanisms can be envisaged. First, potentially liable operators might obtain financial security to cover the risk of being held liable for damage resulting from an

358 Cf. e.g. 1992 Oil Pollution Convention (n. 60), Article VII; HNS Convention (n. 60), Article 12; Bunker Oil Convention (n. 60), Article VII; 1997 Vienna Convention on Civil Liability for Nuclear Damage (n. 60), Article VII; Basel Protocol on Liability for Hazardous Wastes (n. 60), Article 14; Kiev Liability Protocol (n. 60), Article 11; Antarctic Liability Annex (n. 19), Article XI; see *Yifru* et al. (n. 68), 31–32.

359 See *supra* n. 57.

360 *Jusoh* (n. 6), 196.

361 See *Michael G. Faure*, Economic Criteria for Compulsory Insurance, 31 (2006) The Geneva Papers on Risk and Insurance 149, 154–155; *Förster* (n. 5), 362–364; *Jungcurt/Schabus* (n. 6), 204; *Yifru* et al. (n. 68), 27; *Lim Tung* (n. 6), 85–86; *Jusoh* (n. 6), 107–122.

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LMO under their control (so-called *third party insurance*).[362] Besides insurance policies, financial security may take various forms, including bonds, bank guarantees, internal reserves, and industry pooling schemes.[363] Secondly, potential victims might also seek protection against damage caused by LMOs, such as farmers obtaining cover for possible income losses due to the contamination of conventionally grown crop stocks with LMOs (so-called *first party insurance*).[364] A third possible group of instruments are private or public compensation funds which enable rapid response measures in situations where the responsible operator has not yet been identified or to cover damage when no responsible party can be identified at all.[365]

Because the Supplementary Protocol only addresses operator liability but does not contain provisions on supplementary sources of compensation, it can be assumed that Article 10 primarily concerns the first scenario, i.e. financial security obtained by operators to cover their risk of being held liable. In this context, it should be recalled that the Supplementary Protocol also does not conclusively determine the liable party but leaves it with the parties to identify the responsible operator (which may be any person in direct or indirect control of the LMO[366]) in accordance with the criteria laid down in their domestic law.[367] Consequently, the Supplementary Protocol also does not stipulate which of the potentially liable operators shall be required to maintain financial security.[368] This could result in situations in which, depending on the jurisdiction, different operators have to maintain financial security for the one and the same LMO.[369] Moreover, since the Supplementary Protocol also applies to transboundary movements from non-parties,[370] maintenance of financial security may theoretically also be required from exporters situated in non-party states.[371]

In principle, it appears appropriate to impose the obligation to maintain financial security on the developer or producer of an LMO rather than on individual traders or farmers. In contrast to the latter, the developer or

362 Cf. *Yifru* et al. (n. 68), 19; *Faure/Wibisana* (n. 192), 567; *Jusoh* (n. 6), 108.
363 *Jungcurt/Schabus* (n. 6), 204; *Lim Tung* (n. 6), 86; *Jusoh* (n. 6), 122.
364 *Faure/Wibisana* (n. 192), 567–568; *Jusoh* (n. 6), 108.
365 *Jungcurt/Schabus* (n. 6), 204; *Lim Tung* (n. 6), 85; *Yifru* et al. (n. 68), 19.
366 Cf. Article 2(2)(c) SP.
367 Cf. Article 5(2)(a) SP; see *supra* section C.II.
368 *Lima* (n. 58), 135.
369 *Ibid.*
370 Cf. Article 3(7) SP, also see *supra* section B.III.4.
371 *Lima* (n. 58), 135.

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patent-holder should be able to fully internalize the costs associated with obtaining financial security by incorporating these costs in the price of the product (e.g. the seeds). This approach would also implement the idea of 'channelling' liability to a specific party.[372] If, however, a distinction is made between damage caused by a 'development risk' (for which the developer or patent-holder would be held liable) and damage caused by inappropriate handling of the LMO (for which the operator in control at the relevant time would be held liable),[373] the obligation to maintain financial security should be imposed accordingly on each of the potentially liable operators.

2. Consistency of Financial Security Provisions With Existing International Law (para. 2)

Article 10(2) provides that parties shall exercise the aforementioned right 'in a manner consistent with their rights and obligations under international law, taking into account the final three preambular paragraphs of the [Cartagena] Protocol'.[374] These preambular paragraphs state that the relationship between trade and environmental agreements should be mutually supportive and that the Cartagena Protocol shall neither imply a change to rights and obligations arising from existing international agreements nor be subordinate to such other agreements.[375] Hence, Article 10(2) of the Supplementary Protocol primarily addresses the compatibility

372 Cf. *Xue* (n. 135), 80–86; but see *Jing Liu*, Compensating Ecological Damage (2013), 110, who argues that channelling of liability 'creates more uncertainties threatening the insurability of environmental liability', since the policy-holder may have to bear the costs produced by other parties.

373 See *supra* section C.II.

374 Throughout the text of the Supplementary Protocol, the Cartagena Protocol is referred to as 'the Protocol', while the Supplementary Protocol is expressly referred to as 'this Supplementary Protocol'.

375 The last three preambular paragraphs of the Cartagena Protocol, to which Article 10(2) of the Supplementary Protocol refers, read as follows: '*Recognizing* that trade and environment agreements should be mutually supportive with a view to achieving sustainable development,
Emphasizing that this Protocol shall not be interpreted as implying a change in the rights and obligations of a Party under any existing international agreements,
Understanding that the above recital is not intended to subordinate this Protocol to other international agreements.'

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of domestic rules on financial security with international trade law. The provision was included in the Supplementary Protocol to accommodate concerns that requirements to obtain financial security could result in unwarranted obstacles to international trade,[376] because it may be difficult or even impossible to obtain insurance cover for the strict liability attached to LMOs.[377] For this reason, the reference to said paragraphs of the Cartagena Protocol's preamble can be construed as an affirmation that any financial security measure adopted by a party would need to comply with international trade law.[378]

3. Study on Financial Security Mechanisms (para. 3)

Article 10(3) required the first COP-MOP after the entry into force of the Supplementary Protocol to request the CBD Secretariat to undertake a comprehensive study addressing, *inter alia*, the modalities of financial security mechanisms, an assessment of the environmental, economic and social impacts of such mechanisms and an identification of the appropriate entities to provide financial security. After the request was formally made by COP-MOP 9 in 2018,[379] the study was commissioned from an external contractor and tabled in October 2021.[380]

The study finds that there was little information available on existing financial security mechanisms for damage to biodiversity caused by LMOs and that existing literature on the subject rather focused on traditional

376 Cf. *Lefeber/Nieto Carrasco* (n. 12), 66; *Tladi* (n. 103), 176–177; *Nijar* et al. (n. 12), 283–293.

377 Cf. *Paul Brown*, Insurers Refuse to Cover GM Farmers, The Guardian, 08 October 2003, available at: https://www.theguardian.com/science/2003/oct/08/gm.sciencenews (last accessed 28 May 2022); PartnerRe, GMO: Not New, but Still an Emerging Liability Risk, PartnerReviews May 2013, available at: https://partnerre.com/wp-content/uploads/2017/08/GMO_-_Not_New_But_Still_An_Emerging_Liability_Risk.pdf (last accessed 28 May 2022); see *Jusoh* (n. 6), 226–230.

378 On the relevant rules of international trade law and their relationship to the Cartagena Protocol, see chapter 3, section C.

379 CP COP-MOP, Decision 9/15. Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress, UN Doc. CBD/CP/MOP/DEC/9/15 (2018), para. 8.

380 *Michael G. Faure/Minzhen Jiang*, Study on Financial Security Mechanisms (Article 10 of the Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress), UN Doc. CBD/CP/MOP/10/INF/1, Annex (2021).

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damage.[381] It then generally describes different types of financial security mechanisms, namely *first party* and *third party insurance*, *self-insurance*, *risk pooling* and *compensation funds*.[382] It discusses the suitability of each of these mechanisms to cover damage to biodiversity caused by LMOs and assessed their economic, environmental and social impacts, particularly on developing countries. The authors note that, given the uncertainties surrounding the risk type, there was a high reluctance among insurers to provide cover for LMO-related damage to biodiversity.[383] However, they suggest that other actors, such as large operators in the supply chain, could be willing to provide financial security either via self-insurance or via risk-sharing agreements.[384] The study concludes that governments could play a facilitative role by creating enabling conditions for the development of a variety of mechanisms and that it would be beneficial that information on existing financial security mechanisms was shared.[385]

4. Conclusions

Requiring the operator to hold appropriate financial security is an important element of any strict liability scheme because it ensures that liquid funds are available when damage occurs. By making import authorizations contingent upon proof that appropriate financial security is available in the receiving state, it is even possible to place the burden on foreign operators, such as the developer or producer of an LMO. However, the Supplementary Protocol does not oblige its parties to introduce compulsory insurance for LMOs in their domestic regimes but merely provides that the parties 'retain the right' to do so. Moreover, compulsory insurance schemes also run the risk of creating trade barriers that may not be justifiable under international trade law. It remains to be seen whether the treatment of the topic by the meeting of the parties to the Supplementary Protocol will yield any further development.

381 *Ibid.*, 11.
382 *Ibid.*, 15–43; see *supra* section E.III.1.
383 *Ibid.*, 14.
384 *Ibid.*, 45.
385 *Ibid.*

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III. Relationship to State Responsibility (Article 11)

Article 11 provides that the Supplementary Protocol shall not affect the rights and obligations of states under the rules of general international law on state responsibility for internationally wrongful acts.[386] This relates to the Supplementary Protocol's general *leitmotif*, which is to impose liability on the 'appropriate operator' rather than the state where a noxious LMO was developed, produced, or into which it was imported.[387] Language providing for residual state liability in cases where a claim for damages has not been satisfied by an operator was proposed during the negotiations[388] but eventually not included in the Supplementary Protocol.[389]

IV. Review of Effectiveness (Article 13)

According to Article 13, the effectiveness of the Supplementary Protocol shall be reviewed every five years after its entry into force. Since the Supplementary Protocol entered into force in March 2018,[390] its first review is due in 2023. Article 13 also provides that the review shall be undertaken 'in the context of' the review of the Cartagena Protocol under its Article 35 unless otherwise decided by the parties to the Supplementary Protocol. The Cartagena Protocol's review cycles usually comprise two of the biannual COP-MOP meetings, and its fourth review will be concluded at COP-MOP 10 (currently scheduled for the third quarter of 2022[391]).[392] As a result, the first review of the Supplementary Protocol will likely be initiated along with the fifth review of the Cartagena Protocol at COP-MOP 11 (currently expected to take place in 2024) and concluded at the following

386 See chapter 9.
387 Cf. *Shibata* (n. 8), 38–39; *Jusoh* (n. 6), 189–190.
388 Cf. Group of Friends on L&R, Report of the […] Third Meeting, UN Doc. UNEP/CBD/BS/GF-L&R/3/4 (2010), 23.
389 *Shibata* (n. 8), 39.
390 Cf. UN OLA (n. 37).
391 The tenth meeting of the parties to the Cartagena Protocol (COP-MOP) will be held as part of the face-to-face segment of CBD COP 15, which was postponed several times due to the COVID-19 pandemic and, as of May 2022, is scheduled for the third quarter of 2022; see CBD Secretariat, Calendar of SCBD Meetings (25 May 2022), available at: https://www.cbd.int/meetings/ (last accessed 28 May 2022).
392 Cf. CP COP-MOP, Decision 9/6. Assessment and Review of the Effectiveness of the Cartagena Protocol (Article 35), UN Doc. CBD/CP/MOP/DEC/9/6 (2018).

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COP-MOP two years later. However, the parties to the Supplementary Protocol could also decide to launch an independent review process already at COP-MOP 10.

The first review shall specifically review the effectiveness of Articles 10 and 12 (on financial security) and Article 12 (relating to implementation and civil liability). With regard to the latter, it has been argued that the review might provide an opportunity to assess whether parties have made efforts to assess their domestic laws and put in place the necessary 'adequate' laws on civil liability.[393] Indeed, the review might be an opportunity to strengthen certain terms of the Supplementary Protocol by way of interpretation.[394] As a downside, the subsequent reviews of the Supplementary Protocol are under the condition that the parties submit 'information requiring such a review', which essentially puts the performance of these reviews at the discretion of the parties.[395]

V. Relationship to Rights and Obligations Under International Law (Article 16)

Article 16 addresses the Supplementary Protocol's relationship with the CBD, the Cartagena Protocol, and international law generally. Paragraphs 1 and 2 clarify that the Supplementary Protocol shall only supplement the Cartagena Protocol and shall neither modify nor otherwise affect the rights and obligations stipulated in the Cartagena Protocol and the CBD. Paragraph 3 provides that the provisions of these instruments shall apply *mutatis mutandis* to the Supplementary Protocol.[396]

According to Article 16(4), the Supplementary Protocol 'shall not affect the rights and obligations of a Party under international law'. Since it is the very nature of international treaties to create – and thus to 'affect' the – legal rights and obligations of their parties,[397] the purpose and effect of Article 16(4) were called into question.[398] If Article 16(4) indeed meant

393 *Nijar* (n. 15), 123.
394 *Tladi* (n. 103), 174; see chapter 5, section B.II.
395 *Nijar* (n. 6), 289.
396 Article 16(3) SP; for an example of the practical implications of this provision, see *supra* text at n. 46.
397 *Crawford* (n. 57), 29–30: cf. VCLT (n. 253), Article 26; see *Kirsten Schmalenbach*, Article 26, in: Oliver Dörr/Kirsten Schmalenbach (eds.), Vienna Convention on the Law of Treaties (2nd ed. 2018), MN. 33.
398 *Yifru/Garforth* (n. 9), 162.

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that the Protocol had no legal effect on the rights and obligations of its parties, it would undermine the objective of the Supplementary Protocol of 'providing international rules and procedures in the field of liability and redress relating to living modified organisms'.[399] Therefore, Article 16(4) should be construed as a *conflict clause* in the sense of Article 30(2) VCLT, pursuant to which the Supplementary Protocol is not meant to affect rights and obligations deriving from other sources of international law.[400] Although this still might have the questionable effect of subordinating the Supplementary Protocol to any other – in particular, older – rules of international law,[401] Article 16(4) does not render the Supplementary Protocol legally non-binding as long as no conflicting obligations arise from other sources of international law.[402]

VI. Governance- and Process-Related Provisions (Articles 14 to 21)

Six out of the twenty-one Articles of the Supplementary Protocol do not concern the instrument's subject matter but address governance- and process-related issues.[403] Articles 14 and 15 assign the Supplementary Protocol to the institutions already established by its framework instruments, namely the meeting of the parties to the Cartagena Protocol (COP-MOP) and the CBD Secretariat. Article 19 provides that parties may make no reservations to the Supplementary Protocol,[404] which is a provision that the Supplementary Protocol shares with both the Cartagena Protocol[405] and the CBD.[406] The remaining Articles 17 to 21 contain formal provisions relating to signature, entry into force, withdrawal, and the authentic language versions.

399 Cf. Article 1 SP.
400 Cf. *Nele Matz-Lück*, Treaties, Conflict Clauses, in: Wolfrum/Peters (ed.), MPEPIL, MN. 8.
401 *Yifru/Garforth* (n. 9), 162 assert that Article 16(4) is both retrospective and prospective and thus could even subordinate the Supplementary Protocol to any possible future rules of international law.
402 See chapter 3, section C.III.
403 *Yifru/Garforth* (n. 9), 150.
404 Cf. VCLT (n. 253), Article 19(a).
405 Cf. Article 38 Cartagena Protocol.
406 Cf. Article 37 CBD.

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F. Issues Not Addressed by the Supplementary Protocol

The preceding part of this chapter has focused on the provisions that are included in the Supplementary Protocol. However, there are also a number of problems that the Supplementary Protocol addresses only insufficiently or not at all. In terms of scope, the Supplementary Protocol does not apply to transboundary harm *stricto sensu* (I.). Substantively, the provisions on administrative liability do not address the designation of a competent authority by the parties (II.), the right of affected individuals to request action (III.), and the international coordination of response measures (IV.). Finally, the Supplementary Protocol contains no provisions relating to jurisdiction, applicable law, and the mutual recognition and enforcement of judgments (V.)

I. Transboundary Harm

As discussed earlier, the Supplementary Protocol only applies to biodiversity damage resulting from LMOs that find their origin in a *transboundary movement*, i.e. a movement of the LMO from one party to another.[407] Apart from *intentional* transboundary movements, this also includes situations in which an LMO *unintentionally* moves into another state (e.g. by natural gene flow or as an unintended consequence of human activity) and subsequently causes – or threatens to cause[408] – damage to biodiversity in that state.[409]

While the scope of the Supplementary Protocol is premised on transboundary *movements*, it does not encompass transboundary *damage*. The mere unsolicited presence of an LMO in the environment of another state is not regarded as 'damage' covered by the Supplementary Protocol as long as the LMO does not cause or threaten to cause harm to the biological diversity in that state.[410] In this respect, the Supplementary Protocol is in line with general international law on the prevention of transboundary harm, since the mere presence of an LMO does not *per*

407 Cf. Article 3(1) SP and Article 3(k) CP, see *supra* section B.III.
408 Cf. Article 5(3) SP, see *supra* section C.IV.3.
409 Cf. Article 3(3) SP. In these situations, Article 17 of the Cartagena Protocol requires the state of origin to notify and consult with the (potentially) affected states, which can arrange for the necessary response measures to be taken. See chapter 3, section A.II.2.b).
410 See *supra* section B.II.6.

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se reach the threshold of 'significant harm' required for the preventive obligations under customary international law to apply.[411] Besides, the Supplementary Protocol also does not apply to *significant transboundary harm* to biodiversity that is not related to the transboundary movement of an LMO, namely secondary effects on biodiversity such as the spread of an invasive species into neighbouring states following the removal of a predator species by means of an engineered gene drive.[412] Given that the Supplementary Protocol does not address these situations, they are only subject to the general customary rules on the prevention of transboundary harm[413] and, in case of a breach, the rules of state responsibility.[414]

II. Designation of a Competent Authority

As shown above, the Supplementary Protocol provides for a number of tasks to be carried out by a 'competent authority'.[415] The Protocol thus presupposes that a competent authority exists in each state party. However, it does neither define the term nor expressly require its parties to establish or designate such an authority. Such an obligation can be found in Article 19(1) of the Cartagena Protocol, which provides that:[416]

> *'Each Party shall designate one or more competent national authorities, which shall be responsible for performing the administrative functions required by this Protocol and which shall be authorized to act on its behalf with respect to those functions.'*

According to Article 19(2) CP, parties must notify the name and address of their competent national authority and, in the case of multiple authorities, information on their respective responsibilities to the CBD Secretariat. In line with Article 19(3) CP, the CBD Secretariat maintains a list of

411 See chapter 4, section B.VII.2. In the context of engineered gene drives, see chapter 5, section D.II.
412 See *supra* section B.III.2.
413 See chapter 4.
414 Cf. *Jusoh* (n. 6), 202; see chapter 9.
415 See *supra* section C.IV.2.
416 Note that the Cartagena Protocol uses a slightly different terminology, as it refers to 'competent *national* authorities'.

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all competent national authorities, which is available online and updated weekly.[417]

As the provisions of the Cartagena Protocol apply *mutatis mutandis* to the Supplementary Protocol,[418] it could be assumed that the obligations stipulated in Article 19 CP also apply to the designation of competent authorities responsible for implementing the Supplementary Protocol. This would result in an obligation to notify the name, address and responsibilities of the respective 'competent authority' (which does not necessarily need to be identical with the 'competent national authority' responsible for implementing the Cartagena Protocol[419]) to the CBD Secretariat. As of May 2022, however, only 12 parties to the Supplementary Protocol have expressly notified a competent authority responsible for issues concerning liability and redress.[420]

III. Right of Affected Individuals to Request Action

As shown above, the process of implementing the liability of the responsible operator is largely left to the discretion of the competent national authorities, which are responsible for deciding whether and to what extent

417 Cf. CBD Secretariat, Cartagena Protocol on Biosafety, Biosafety Clearing-House and Article 17 National Focal Points (27 May 2022), available at: https://www.cbd.int/doc/lists/cpb-bch-a17-fp.pdf (last accessed 28 May 2022).

418 Article 16(3) SP, see *supra* note 46 and accompanying text.

419 In Germany, for example, the federal government regulates the release of LMOs (see Gentechnikgesetz (Genetic Engineering Act) (n. 223), Section 14, while the *Länder* (federated states) are responsible for implementing administrative liability for environmental damage (including biodiversity damage caused by LMOs) in accordance with the EU Environmental Liability Directive (see Umweltschadensgesetz (Environmental Damage Act) (10 May 2007), revised version promulgated on 5 March 2021, Bundesgesetzblatt Pt. I, p. 346 in conduction with Article 83 of the Grundgesetz (Basic Law) (23 May 1949), revised version published in Bundesgesetzblatt, Pt. III, classification number 100–1, as last amended by Articles 1 and 2, second sentence, of the Act of 20 September 2020 (Bundesgesetzblatt Pt. I, p. 2048)).

420 Slovakia, Slovenia, the Czech Republic and Italy have each notified a designated 'Supplementary Protocol Competent Authority' to the BCH, while Colombia, Denmark, Hungary, Ireland, Mongolia, Uganda, the United Kingdom, and Vietnam have notified competent authorities that have an 'administrative function' for liability and redress, see Biosafety Clearing-House, Search for National Contacts, available at: https://bch.cbd.int/en/search?schema=contact&schema=authority&schema=supplementaryAuthority (last accessed 28 May 2022).

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response measures shall be taken in each case.[421] Concerns have been raised that this might lead to 'arbitrary or uneven implementation', particularly because affected individuals have no right to demand the competent authority to take action.[422] In the EU Environmental Liability Directive, this issue has been solved by providing natural or legal persons affected by the environmental damage or who have a legal interest (e.g. environmental non-governmental organizations) the right to request the competent authority to take action.[423] Such a request for action must be accompanied by relevant information, and the competent authority is obliged to render a reasoned decision whether it does or does not take action.[424] Moreover, the decision shall be subject to a legal review by a court at the request of the affected individual.[425] However, no similar provisions have been included in the Supplementary Protocol.

IV. International Coordination of Response Measures

The Supplementary Protocol also does not provide rules on cooperation between affected states or international coordination of response measures. In the event of an *unintentional* transboundary movement, the only relevant provision is Article 17(4) of the Cartagena Protocol, which requires the state of origin to consult the affected states to enable them to determine appropriate responses.[426] With regard to LMOs subject to an *intentional* transboundary movement, Article 18(2)(c) of the Cartagena Protocol merely provides that such LMOs shall be accompanied by documentation specifying, *inter alia*, 'any requirements for the safe handling, storage, transport and use' of the LMO in question.[427] In addition, the importing party will be in possession of the information it has received during the AIA procedure. Hence, the Cartagena Protocol and the Supplementary Protocol merely provide for minimal information-sharing with the affected party. In contrast to other liability instruments, such as the Antarctic

421 See *supra* section C.IV.2.
422 *Lago Candeira* (n. 9), 99.
423 EU Environmental Liability Directive (n. 18), Article 12.
424 *Ibid.*, Article 12(2).
425 *Ibid.*, Article 13.
426 See chapter 3, section A.II.2.b).
427 See chapter 3, section A.II.2.d).

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Liability Annex,[428] there is no substantive obligation to cooperate and consult with other states concerned.

V. Jurisdiction, Applicable Law, and Mutual Recognition and Enforcement of Judgments

Finally, the Supplementary Protocol does not address issues relating to the transboundary enforcement of liability. This is unproblematic as long as the responsible operator is a national of, or situated in, the state where the damage occurs.[429] However, in many cases, the responsible operator will not be situated under the jurisdiction of the state where the LMO was imported and subsequently caused damage. Hence, enforcing the liability of these actors requires that the state which has jurisdiction over the responsible operator recognizes and enforces the administrative or judicial decisions of the state where the damage occurred.[430]

As shown above, states have no general obligation to recognize and enforce foreign judgments.[431] Therefore, comparable liability instruments contain specialized rules on jurisdiction, applicable law, and mutual recognition and enforcement of judgments, which allows holding operators liable even if they are not located in the state where the damage occurred.[432] But the Supplementary Protocol contains no such rules.[433] Thus, whether the liability of foreign operators can be enforced will depend on the legal systems and eventually also on the goodwill of the states involved.[434]

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428 Cf. Antarctic Liability Annex (n. 19), Article 5.

429 *Yifru/Garforth* (n. 9), 158.

430 *Jungcurt/Schabus* (n. 6), 201–202; *Yifru/Garforth* (n. 9), 158; *Lefeber* (n. 19), 90.

431 See chapter 2, section F.

432 See *ibid.*, n. 93.

433 A rule providing that parties 'shall recognize and enforce foreign judgments' was proposed during the negotiations on civil liability, see Report of the First Meeting of the Group of Friends of the Co-Chairs on Liability and Redress (2009) (n. 236), 14. Eventually, no such rule was included in the Supplementary Protocol since 'some countries upheld their categorical opposition' to such a provision, cf. IISD, Summary of the Second Meeting of the Group of Friends of the Co-chairs on Liability and Redress (n. 25), 7.

434 *Yifru/Garforth* (n. 9), 158. Within the European Union, the applicable law, jurisdiction and the enforcement of judgments are subject to harmonized rules. Rules relevant in the present context are Regulation (EU) No 1215/2012 on Jurisdiction and the Recognition and Enforcement of Judgments in Civil and Commercial Matters (12 December 2012), OJ L 351, p. 1, and Regulation (EC)

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This omission is particularly striking given that a transboundary situation is a precondition for the Supplementary Protocol to apply. As shown above, the Supplementary Protocol only applies when the LMO that caused the damage has previously been subject to a transboundary movement.[435] This usually implies that the development or production of the LMO has taken place in a state other than where the damage occurred.[436] Furthermore, the Supplementary Protocol suggests that the range of potentially liable operators extends to the developer, producer, and exporter of the LMO[437] who, by definition, are not situated in the territory of the party of import. This means that the Supplementary Protocol proposes to hold operators liable who are located in foreign jurisdictions but does not provide the legal means for accomplishing this.[438] Consequently, liability will most likely be imposed on domestic operators, regardless of whether they are actually responsible for the damage[439] and capable of taking the

No 864/2007 on the Law Applicable to Non-Contractual Obligations (11 July 2007), OJ L 199, p. 40; see *Thomas Kadner Graziano/Matthias Erhardt*, Cross-Broder Damage Caused by Genetically Modified Organisms: Jurisdiction and Applicable Law, in: Bernhard A. Koch (ed.), Damage Caused by Genetically Modified Organisms (2010) 784.

435 See *supra* section B.III.

436 It may well be that the responsible operators are spread over multiple foreign jurisdictions. An example for this is the case of transgenic mosquitoes imported to Burkina Faso by Target Malaria, which were developed in the United Kingdom, tested in laboratories in the United States and Italy, and subsequently exported to Burkina Faso, cf. *Keith R. Hayes* et al., Risk Assessment for Controlling Mosquito Vectors with Engineered Nucleases: Controlled Field Release for Sterile Male Construct: Risk Assessment Final Report (2018), 137; also see chapter 3, section A.II.1.g)aa).

437 See the definition of the term 'operator' in Article 2(2)(c) SP and *supra* section C.II.

438 *Jungcurt/Schabus* (n. 6), 201–202, see *Lefeber* (n. 19), 90, who points to the Compact, which allows for recourse against foreign developers and thus 'adds value to the Supplementary Protocol', but overlooks that the Compact is designed not as an *additional* but an *alternative* liability scheme, see chapter 7.

439 Pursuant to Article 5(2)(a) SP, liability shall be imposed on the 'operator which has caused the damage'. It has therefore been suggested above that where the damage results from the inherent characteristics of an LMO rather than its circumstances of release or application, liability should be imposed on the developer or producer of the LMO which, in most cases to which the Supplementary Protocol applies, will be located in a foreign jurisdiction, see *supra* section C.II.

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necessary response measures or meeting the consequential financial obligations.[440]

G. Excursus: CropLife International's Implementation Guide

In 2013, *CropLife International*, an industry association of crop protection and agrochemical corporation, published an *Implementation Guide* to the Supplementary Protocol.[441] Being published by a private entity, the Guide has no direct bearing on the legal obligations of states under the Supplementary Protocol. Nevertheless, it may be considered relevant by states seeking to implement the Supplementary Protocol into their domestic law, particularly considering the relative sparsity of in-depth assessments of the Protocol's provisions.[442]

The Guide's stated objective is to 'assist countries that do not have existing mechanisms to address damage to the conservation and sustainable use of biological diversity to develop a system for identifying responsible operators and requiring response measures in conformity with the […] Supplementary Protocol'.[443] The Guide provides an example text for implementing the Supplementary Protocol in a stand-alone legal instrument. This draft legislation essentially restates the text of the Supplementary Protocol while making modifications and additions where the Supplementary Protocol refers to domestic law.[444]

In terms of scope, the Implementation Guide proposes to treat alike imported and domestically-developed LMOs (I.). To identify the liable operator, it fully relies on the 'control test' stipulated by the Supplementary Protocol (II.). Damage shall be determined only on the basis of peer-reviewed or peer-reviewable scientific information (III.). The Implementation Guide also addresses the determination of suitable response measures (IV.). Concerning civil liability, the Guide suggests that states would not have to take any implementation measures (V.).

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440 In can be assumed that in most cases, developer, patent-holder or producer of the LMO may also be better equipped to take response measures than local actors and may also have higher financial resources to cover the costs of response measures and to serve compensation.

441 CropLife Implementation Guide (n. 146).

442 See *supra* n. 6.

443 CropLife Implementation Guide (n. 146), 4.

444 See text at n. 482.

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I. Proposed Scope of Domestic Implementing Legislation

As shown earlier, the Supplementary Protocol only applies to LMOs which have been subject to a transboundary movement, but not to LMOs which have only been developed and used domestically.[445] But the Implementation Guide argues that it was 'irrelevant' whether the damage was caused by domestic or foreign operators. Consequently, the Guide suggests that national legislation implementing the Supplementary Protocol should apply equally to domestic activities and those involving a transboundary movement, 'thus avoiding any WTO implications or violations'.[446]

Furthermore, the Guide proposes that the scope of domestic implementing legislation should extend to damage resulting from 'unapproved activities and activities that are illegal under national law'.[447] This would rectify a major shortcoming of the Supplementary Protocol, which excludes damage resulting from LMOs that were lawfully *imported*, but subsequently *used* without appropriate authorization.[448]

II. Identification of the Liable Operator and Exemptions

Concerning the identification of the responsible operator, the Implementation Guide proposes to fully rely on the 'control test' as introduced by the Supplementary Protocol,[449] under which liability should be placed on the 'the person in direct or indirect control of the product or the activity that caused the Damage'.[450] The Implementation Guide advises not to adopt the examples of who might be an 'operator' contained in Article 2(2)(c) SP, arguing that the 'control' test was sufficient to establish the identity of the operator.[451] However, as shown above, it will often be difficult to attribute damage to a single event or a particular activity.[452] Hence, the Implementation Guide not only fails to provide additional guidance in this respect but even increases the ambiguity created by the Supplementary Protocol.

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445 See *supra* section B.III.6.
446 CropLife Implementation Guide (n. 146), 12.
447 *Ibid.*
448 See *supra* section B.III.1.
449 Cf. Article 2(2)(c) SP.
450 CropLife Implementation Guide (n. 146), 10.
451 *Ibid.*
452 See *supra* section C.II.

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The Implementation Guide also proposes that an operator should not be held liable when the damage was caused by the realization of a risk that was specifically assessed in the risk assessment carried out as part of the AIA procedure under the Cartagena Protocol.[453] This would result in exempting the operator from liability for all risks known in advance and despite which the competent national authority authorized the import and release of the LMO. Consequently, the scope of liability would be limited to the realization of risks that were unknown when the import was authorized. But it is hardly conceivable how this could be in line with the overall objective of the Supplementary Protocol, which makes no distinction between known and unknown risks.

III. Determination of Damage

Determination of damage is addressed by the Implementation Guide in an annex to the draft legislation. The annex proposes two alternative texts, which are based on the *EU Environmental Liability Directive*[454] and the *Biodiversity Compact*,[455] respectively. Under both alternatives, damage shall be established by comparing the nature and quantum of change in the species or ecosystem with the *baseline*, i.e. the conditions that prevailed before the incident.[456] The baseline shall be established by referring to the 'best available information', which is defined as 'peer-reviewed or peer-reviewable information obtained through the generally accepted scientific methodology used in the relevant scientific community of endeavour'.[457] The annex provides numerous criteria that shall be taken into account when establishing the baseline and comparing it with subsequent changes, including the number of species, their density or the area covered, the role of the particular species in relation to other species and their capacity to propagate and recover naturally.[458] Compared to the Supplementary Protocol,[459] the Implementation Guide sets a high threshold for determining the existence of damage, particularly because peer-reviewed (or peer-re-

453 CropLife Implementation Guide (n. 146), 15.
454 See EU Environmental Liability Directive (n. 18).
455 See Biodiversity Compact (n. 66); for details on the Compact, see chapter 7.
456 CropLife Implementation Guide (n. 146), 19–20.
457 *Ibid.*, 11.
458 *Ibid.*, 19.
459 See *supra* section B.II.3.

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viewable) information about the *status quo ante* may not necessarily be available.

IV. Identification of Suitable Response Measures

A second annex to the Implementation Guide addresses the determination of response measures by the competent authority.[460] Again, two alternative texts are provided that build upon the EU Environmental Liability Directive and the Biodiversity Compact. Although the alternatives use different terminology, both emphasize the primacy of restoration over compensation, i.e. the principle that response measures should preferably *restore* the affected components of biodiversity to their baseline condition rather than *compensate* for losses by improving other elements of biodiversity. Notably, the text adapted from the Biodiversity Compact goes beyond the Supplementary Protocol by providing that the operator should pay financial compensation where restoration is not possible.[461] At the same time, the Implementation Guide remains silent on who should be the beneficiary of such financial compensation and how it should be spent.[462]

V. Civil Liability

With regard to Article 12(2) SP, which requires parties to provide rules and procedures on civil liability for material and personal damage, the Implementation Guide asserts that parties would not need to take any measures to discharge this obligation.[463] It argues that 'nearly every country already has a system providing for civil liability and redress' and that parties could thus simply apply existing law to discharge the obligation to provide for civil liability.[464] But this overlooks that parties are required to provide for *adequate* rules to address damage, which requires at least

460 CropLife Implementation Guide (n. 146), 21–23.
461 *Ibid.*
462 Cf. *ibid.*
463 See *supra* section D.II.
464 CropLife Implementation Guide (n. 146), 5, pointing to *Lucas Bergkamp*, Liability and Redress: Existing Legal Solutions for Traditional Damage, in: CropLife International (ed.), Compilation of Expert Papers Concerning Liability and Redress and Living Modified Organisms (2004) 21.

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that parties evaluate whether their existing rules are equipped to address personal and material injury caused by LMOs.[465]

VI. Conclusions

It is doubtful that the Implementation Guide published by CropLife International provides a real added value for states seeking to implement Supplementary Protocol. Instead of providing specific guidance on how to establish the administrative apparatus required to effectively implement administrative liability, the Guide proposes to implement the Supplementary Protocol into domestic law by largely restating its terms.

Substantial additions can only be found in a few aspects, where the Implementation Guide tries to fill gaps left by the Supplementary Protocol by adapting language from the EU Environmental Liability Directive and the Biodiversity Compact. For instance, the Guide suggests specifying the rudimentary definitions of 'damage' and 'response measures' in the Supplementary Protocol by adopting the procedural approaches to these issues taken by the aforementioned instruments. Yet, the proposition that the occurrence of damage should always be established on the grounds of peer-reviewed or peer-reviewable information[466] appears to be rather unrealistic, especially considering that damage might often occur in situations where the receiving environment, and the risks posed to it by the LMO in question, have not been assessed carefully enough.

In addition, the Implementation Guide offers no helpful solutions for some of the most significant weaknesses of the Supplementary Protocol, including the question of how the 'control test' can be practically applied to identify the responsible operator. Against this background, it is quite astonishing that the co-chairs of the negotiations leading to the adoption of the Supplementary Protocol contributed a foreword in which they commended the Implementation Guide as a 'valuable tool for governments to better understand and consequently better apply at the domestic level the provisions of the Supplementary Protocol'.[467]

465 See *supra* section D.IV.
466 CropLife Implementation Guide (n. 146), 11.
467 *Ibid.*, 3.

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H. Summary and Outlook

While the Supplementary Protocol's adoption in 2010 was hailed as a great success, its entry into force in 2018 was barely noticed by the international community, although it was by far the more remarkable event. For more than three decades, international law-making efforts on environmental liability have suffered from persistent failure due to the refusal of states to ratify the instruments they had previously agreed to in negotiations.[468] Therefore, the Supplementary Protocol is not only the first global agreement on liability for damage to a global common, and the first global agreement providing for an administrative approach to liability,[469] but also the first global agreement dealing with environmental liability outside the context of maritime oil pollution and nuclear damage that has ever entered into force.

One of the main keys to success of the Supplementary Protocol was certainly its 'administrative approach' to liability. Instead of providing simply for the payment of monetary compensation by the responsible operators, the Supplementary Protocol stipulates that damage shall be prevented, mitigated and restored by implementing response measures. However, parties to the Supplementary Protocol enjoy too much leeway in implementing the administrative approach in their domestic legal and administrative systems. Apart from stipulating the primacy of prevention over restoration, and of restoration over compensation,[470] the Supplementary Protocol does not define any specific criteria for what constitutes damage to biological diversity, how to identify the liable actor, and what kinds of response measures shall be taken. It has been criticized that this might result in 'discretionary implementation' of the Supplementary Protocol by its parties.[471] At the same time, it might be an inherent necessity of

468 See the surveys in *Robin R. Churchill*, Facilitating (Transnational) Civil Liability Litigation for Environmental Damage by Means of Treaties, 12 (2002) YB Int'l Env. L. 3, 31–32; *Noah Sachs*, Beyond the Liability Wall: Strengthening Tort Remedies in International Environmental Law, 55 (2007) UCLA Law Review 837, 854–857; *Daniel* (n. 28), 225–235; *Jutta Brunnée*, Of Sense and Sensibility: Reflections on International Liability Regimes as Tools for Environmental Protection, 53 (2004) ICLQ 351, 356–364. The last notable entry into force of any international treaty on environmental liability was that of the Bunker Oil Convention (n. 60) in 2008.

469 *Lefeber* (n. 19), 89.

470 See *supra* section C.I.

471 *Lim Tung* (n. 6), 74.

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the 'administrative liability' approach to grant states a certain margin of appreciation, as it is not possible to pre-emptively regulate what measures will be required in individual cases of damage.

In any event, the administrative approach is 'premised on the existence of a robust administrative apparatus' which has both the capacity and expertise to implement liability in individual cases.[472] It has been argued that many developing countries do not have these capacities and that the administrative approach thus might reinforce pre-existing imbalances between developing and developed countries.[473] There is a consensus that the Supplementary Protocol must be accompanied by extensive capacity-building measures,[474] and such measures have indeed been organized by the CBD Secretariat.[475]

With respect to personal injury and property damage, the Supplementary Protocol does not even attempt to harmonize substantive and procedural rules on civil liability. This is not surprising if one considers that states widely refuse to accept the harmonization approach, as aptly demonstrated by the numerous civil liability treaties that have failed to enter into force.[476] Had the Supplementary Protocol attempted to provide substantive rules on civil liability in the context of LMO damage, it would have likely suffered a similar fate. This also became clear during the Supplementary Protocol's negotiations, where many states strongly opposed the inclusion of substantive rules on civil liability.[477] Therefore, the resulting provisions represent a carefully balanced compromise between those parties who sought a fully-fledged international civil liability regime and those who opposed the adoption of rules on civil liability altogether.[478] Consequently, the Supplementary Protocol does not commit the parties

472 *Shibata* (n. 8), 36.

473 *Jungcurt/Schabus* (n. 6), 206; *Thomas/Teshome Kebede* (n. 22), 126–127.

474 Cf. CP COP-MOP Decision BS-V/11 (2018) (n. 35), paras. 8–9; *Shibata* (n. 237), 248–249; *Jungcurt/Schabus* (n. 6), 206.

475 See CBD Secretariat, The N–KL Supplementary Protocol: Capacity Building Activities (01 January 2018), available at: https://bch.cbd.int/protocol/supplementary/NKL_workshops.shtml#tab=0 (last accessed 28 May 2022).

476 See *supra* n. 468.

477 Also see ILA, International Law on Biotechnology: Draft Final Report and Draft Final Recommendations (2010), para. 68, assuming that 'international law should be limited to adopting a minimal standard of product liability while allowing nations to impose stricter standards commensurate with their interests', since the matter was 'not suitable for legal harmonization'.

478 See *supra* section A, text at n. 21; cf. *Nijar* (n. 15), 120–123; *Thomas/Teshome Kebede* (n. 22); *Nijar* (n. 6), 277–278; *Gupta/Orsini* (n. 6), 449–450.

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to particular standards on civil liability but only stipulates a procedural duty requiring states to 'aim' for 'appropriate rules and procedures' in their domestic law.[479] It has been assumed that as a result of these provisions, 'the parliamentary approval processes in many States will involve a comprehensive assessment and discussion of domestic law related to personal injury, property damage and economic loss (traditional damage) caused by LMOs'.[480] But this prediction has not come true, at least concerning the approval processes in the European Union and Germany, during which the provisions on civil liability were largely ignored.[481]

There are 18 references to 'domestic law' spread over nine articles of the Supplementary Protocol. Only four of these occurrences are used in provisions relating to the implementation of the Supplementary Protocol *into* domestic law.[482] All of the other 14 references are used in provisions that subordinate certain rules of the Supplementary Protocol to the domes-

479 Cf. Article 12(2); see *supra* section D.V.

480 *Lefeber* (n. 19) also see *Lim Tung* (n. 6), 89; *Thomas/Teshome Kebede* (n. 22), 130.

481 The European Commission assumed that '[t]he liability provisions of the Nagoya-Kuala Lumpur Supplementary Protocol are covered by the Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004, on environmental liability with regard to the prevention and remedying of environmental damage', cf. European Commission, Proposal for a Decision of the European Parliament and of the Council on the Conclusion of the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety (05 June 2012), COM(2012) 236, Explanatory Memorandum, para. 12. This assessment was not challenged during the legislative processes, see EUR-Lex, Procedure 2012/0120/NLE, available at: https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:32013D0086 (last accessed 28 May 2022). In the parliamentary approval process, the Federal Government of Germany assumed that there is no need for implementation measures, as the existing national rules already complied with the content and obligations of the Supplementary Protocol, cf. Federal Government, Entwurf eines Gesetzes zu dem Zusatzprotokoll von Nagoya/Kuala Lumpur vom 15. Oktober 2010 über Haftung und Wiedergutmachung zum Protokoll von Cartagena über die biologische Sicherheit (Draft Law on the Nagoya/Kuala Lumpur Supplementary Protocol of 15 October 2010 on Liability and Redress to the Cartagena Protocol on Biosafety), BT-Drs. 17/12337 (2012).

482 Article 3(7) provides that domestic law shall also apply to damage resulting from transboundary movements of LMOs from non-parties. Article 5(6) provides that domestic law shall provide for remedies against the decisions of the competent authority. Pursuant to Article 12(1) parties shall provide, in their domestic law, for rules and procedures that address damage. Article 12(2) commits parties to the 'aim of providing adequate rules and procedures in their domestic law on civil liability' for traditional damage.

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tic law of its parties.[483] In fact, almost all of the Supplementary Protocol's substantive provisions are either 'subject' to domestic law or shall only be implemented 'in accordance with' domestic law.[484] The sweeping use of domestic law safeguards results in an instrument that may have more optional than binding rules.[485] Consequently, parties enjoy more or less full discretion on how to implement the Supplementary Protocol into their domestic legal systems.[486] For this reason, it has been rightly criticized as a treaty that is largely 'subject to domestic law'.[487] As a result, it is difficult to predict whether the resulting domestic regimes will provide satisfactory responses to biodiversity damage caused by LMOs.[488]

One of the most striking omissions of the Supplementary Protocol is its failure to address transboundary recognition and enforcement. Although it only applies to damage resulting from LMOs that find their origin in a transboundary movement,[489] it remains silent on how to deal with situations in which the responsible operator is located in one state and biodiversity damage occurs in another.[490] The Supplementary Protocol fails to address the issues that naturally arise in these situations, including jurisdiction, applicable law, and recognition and enforcement of judgments.[491] Thus, the Supplementary Protocol only applies to transboundary situations but treats liability in these situations as if they were a purely domestic matter.[492]

Against this background, it is doubtful that the Supplementary Protocol will be of particular use when LMOs have unintended transboundary effects. As shown above, the emergence of so-called *self-spreading LMOs*, which can disseminate genetic modifications at much higher rates than under the Mendelian rules of inheritance or even 'horizontally' to already-living organisms, substantially increases the likelihood of uncontrolled transboundary spreads.[493] Although the Supplementary Protocol expressly

483 These provisions can be found in Articles 2(2)(c), 3(6), 4, 5(5), 5(6), 5(7), 5(8), 6(1), 6(2), 7, 8, 10(1) and 12(2) SP.
484 *Yifru/Garforth* (n. 9), 155.
485 Cf. *ibid.*
486 *Foster* (n. 246), 367; *Lim Tung* (n. 6), 74.
487 *Yifru/Garforth* (n. 9), 165; *Gupta/Orsini* (n. 6), 448.
488 *Sands* et al. (n. 150), 799.
489 Article 3(1) SP.
490 See *supra* section F.V.
491 *Yifru/Garforth* (n. 9), 158; see chapter 2, section F.
492 Cf. *Jungcurt/Schabus* (n. 6), 201–202; *Lefeber* (n. 19), 90.
493 See chapter 1, sections C and D.

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applies to unintentional transboundary movements, it does not provide any means to deal with such situations.[494] Unless the 'operator which has caused the damage' has assets in the affected state that can be seized to enforce liability, and in the absence of other instruments, a state facing adverse effects of an LMO that uncontrolledly entered its territory has no remedies to enforce either the civil or administrative liability of foreign operators. In such situations, the only options are seeking civil law remedies in states where the responsible operator is situated or has assets, or invoking the international responsibility of the state that has authorized the release, provided it has breached preventive obligations under international law.

Despite the criticism, some positive conclusions can be drawn as well. Most importantly, the Supplementary Protocol represents a general agreement that LMOs may cause damage to biological diversity and that speedy restoration measures are the most effective response to such damage.[495] Moreover, the Supplementary Protocol is innovative in that it distinguishes between damage to the environment *per se* on the one hand and 'traditional damage', i.e. injury to rights and interests of individuals, on the other.[496] Biodiversity damage shall be addressed by response measures to mitigate and restore the damage, whereas material and personal damage shall be subject to conventional rules on civil liability. The obligation of states to implement domestic legal frameworks that provide for 'response measures' to address environmental damage is the principal contribution made by the Supplementary Protocol to the 'toolbox' of international environmental law-making.[497]

Finally, it should again be recognized that the Supplementary Protocol is one of the few multilateral agreements on environmental liability concluded in the last three decades that have attracted enough ratifications to enter into force. It is also the first international treaty on environmental liability to enter into force that adopts the administrative approach to liability.[498] At least in its specific context and institutional framework, the Supplementary Protocol has overcome the paralysis under which the

494 Article 3(3) SP, see *supra* section B.III.2.
495 *Yifru/Garforth* (n. 9), 164–165; *Shibata* (n. 237), 242.
496 *Shibata* (n. 237), 242.
497 *Telesetsky* (n. 184).
498 The other instruments which provide for an administrative approach is the Antarctic Liability Annex (n. 19) which, as of May 2022, still required nine more approvals to enter into force (see *Alan D. Hemmings*, Liability Postponed: The Failure to Bring Annex VI of the Madrid Protocol into Force, 8 (2018) The

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development of international rules on environmental liability has been suffering for many years.[499] However, it also demonstrates the low level of agreement among states about substantive standards for environmental liability. This becomes particularly visible in the context of civil liability, where the sense of negotiating agreements with little prospect of ever entering into force has been repeatedly called into question.[500] Hence, it remains to be seen whether the Supplementary Protocol indeed signifies the urgently-needed 'paradigm evolution' in international liability law[501] and whether it will serve as a role model for developing other instruments in the future.[502] In any event, adopting instruments on transboundary environmental liability that do not actually address the challenges arising from transboundary situations will likely prove to be a Pyrrhic victory.

Polar Journal 315), and the Kiev Liability Protocol (n. 60), which has received only one out of 16 required ratifications.

499 Cf. *Shibata* (n. 237), 241, who characterizes the phenomenon as 'liability occlusion'. Also see *Lefeber* (n. 19), 91, who sees the adoption of the Supplementary Protocol as part of a 'paradigm evolution' away from harmonisation of domestic civil liability and towards the administrative approach.

500 See, in particular, *Daniel* (n. 28); *Brunnée* (n. 468), 98.

501 Cf. *Lefeber* (n. 19), 91.

502 Cf. *Telesetsky* (n. 184), 106; *Lefeber* (n. 19), 90–91; *Li C. Lim/Li L. Lim*, Gene Drives: Legal and Regulatory Issues (2019), 40–43.

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