


A SLEEPING GIANT? THE ENMOD CONVENTION AS A LIMIT ON INTENTIONAL ENVIRONMENTAL HARM IN ARMED CONFLICT AND BEYOND

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ABSTRACT

This Article reinterprets the 1976 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD) to show how it might rationally strengthen protections for the environment against intentional damage by states, particularly during armed conflict. The Article applies the orthodox rules of treaty interpretation to analyze in depth the Convention text, the travaux préparatoires, and available subsequent state practice, aiming to determine how the somewhat opaque Article II of ENMOD and its definition of “environmental modification technique” is best understood. It concludes that ENMOD has a broader potential application than it has historically been given.

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I. INTRODUCTION

The 1976 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD)¹ is a somewhat obscure arms control treaty with seventy-eight states parties, including Australia, China, India, the United Kingdom, the United States, and, especially relevant given the ongoing international armed conflict in Ukraine, both Russia and Ukraine.²

Environmental concerns had been brought to the collective attention of the United Nations by the 1972 United Nations Conference on the Human Environment, or “Stockholm Conference,” which drew global focus to the dire threat of environmental damage generally. The Declaration issued at the close of the Stockholm Conference provided:

In our time, man’s capability to transform his surroundings, if used wisely, can bring to all peoples the benefits of development and the opportunity to enhance the quality of life. Wrongly or heedlessly applied, the same power can do incalculable harm to human beings and the human environment.³

Although the environmental consequences of armed conflict were not the primary focus of the Stockholm Conference, “some delegations emphasized that any discussion of the problems of the human environment could not exclude international conflicts” and raised, in particular, the risk to the natural environment posed by nuclear weapons and other weapons of mass destruction.⁴

When restrictions on environmental warfare were suggested in the United Nations First Committee in 1974, eventually leading to the conclusion of ENMOD, they were presented as a vitally “important and urgent” measure of arms control and protection for humanity.⁵ The Polish delegate to the Conference of the Committee on Disarmament, Mr. Wyzner, said in March 1975, “[s]triving to protect man’s natural environment from thoughtless abuse, we are

¹ Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Dec. 10, 1976, 1108 UNTS 151 [hereinafter ENMOD].

² Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Ch. XXVI: Disarmament; 1108 UNTS 151 (Jan. 7, 2024), at <https://disarmament.unoda.org/enmod/>.

³ Report of the United Nations Conference on the Human Environment, at 3, para. 3, UN Doc. A/CONF.48/14/Rev.1 (June 1972).

⁴ *Id.* at 48, [62].

⁵ First Committee, Provisional Verbatim Record of the Nineteen Hundred and Ninety-Eighth Meeting, at 11, UN Doc. A/C.1/PV.1998 (Mr. Malik, USSR) (Oct. 21, 1974). See also further emphasis by Mr. Malik (at 16, 21) and comments by Mr. Trepczynski of Poland (at 44–45, 48–50).

now called upon to prevent the slightest chance of its deliberate destruction.”⁶ The Stockholm Conference and its aims were cited as specific motivation by several delegations involved in the drafting of ENMOD, such as Poland⁷ and Italy,⁸ with the Declaration of the Stockholm Conference eventually given express mention in the preamble to ENMOD.⁹

Despite this genesis and the emphasis on the critical importance of the protections ENMOD would provide, ENMOD has often been considered to have an extremely high threshold for application. The concept of “environmental modification technique” has generally been interpreted to apply only to exceptionally technologically advanced methods capable of provoking change akin to that resulting from natural disasters: this conclusion is based largely on the examples of contraventions set out in the “Understandings” produced by the Conference of the Committee on Disarmament to accompany the draft into the First Committee (which explained what the drafting delegations believed the operative provisions did).¹⁰ Assessment of ENMOD on this basis may conclude that it only “prohibits weaponising the natural environment, by prohibiting state parties from artificially creating or manipulating environmental phenomena such as cyclones, or earthquakes or tsunamis, for hostile use against other parties to ENMOD.”¹¹ For example, assessing the widespread destruction of oil wells in the Gulf War, Laura Edgerton concluded that this would not be within the scope of ENMOD, because Iraq was not attempting to induce a resulting climatic change and therefore had not “‘deliberately’ manipulated the Earth’s natural processes.”¹² Adam Roberts drew a distinction between “damage *to* the environment” and “damage *by* the forces of the environment,” asserting that only in the latter case would ENMOD have any relevance.¹³ Yoram Dinstein described ENMOD as applying only where “the natural process is the instrument harnessed (as a weapon) for wreaking havoc.”¹⁴

This assessment does not permit less-contrived means of effecting long-lasting environmental change (for example, direct application of fire, poison, or explosives) to be a potential environmental modification technique pursuant to ENMOD: while it may change the

⁶ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Fifty-Ninth Meeting, at 11, UN Doc. CCD/PV.659 (Mr. Wyzner, Poland) (Mar. 18, 1975).

⁷ First Committee, Provisional Verbatim Record of the Nineteen Hundred and Ninety-Eighth Meeting, *supra* note 5, at 46.

⁸ First Committee, Verbatim Record of the Twenty-Fourth Meeting, at 78, UN Doc. A/C.1/31/PV.24 (Nov. 5, 1976).

⁹ First Committee, Verbatim Record of the Twentieth Meeting, at 28–30, UN Doc. A/C.1/31/PV.20 (Mr. Martin, United States) (Nov. 1, 1976).

¹⁰ Consultative Committee of Experts, *Understandings*, in REPORT OF THE CONFERENCE OF THE COMMITTEE ON DISARMAMENT: VOL. I, at 91, UN Doc. A/31/27 (1976); Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, at 8 (Mr. Martin, United States), UN Doc. CCD/PV.703 (Apr. 20, 1976).

¹¹ Emily Crawford, *Accounting for the ENMOD Convention: Cold War Influences on the Origins and Development of the 1976 Convention on Environmental Modification Techniques*, in INTERNATIONAL LAW AND THE COLD WAR 81 (Matthew Craven, Sundhya Pahuja & Gerry Simpson eds., 2019).

¹² Laura Edgerton, *Eco-terrorist Acts During the Persian Gulf War: Is International Law Sufficient to Hold Iraq Liable?*, 22 GA. J. INT’L & COMP. L 151, 171–72 (1992).

¹³ Adam Roberts, *Environmental Issues in International Armed Conflict: The Experience of the 1991 Gulf War*, in PROTECTION OF THE ENVIRONMENT DURING ARMED CONFLICT 221, 250 (Richard J. Grunawalt, John E. King & Ronald S. McClain eds., 1996).

¹⁴ YORAM DINSTEIN, THE CONDUCT OF HOSTILITIES UNDER THE LAW OF INTERNATIONAL ARMED CONFLICT 269 (4th ed. 2022).

environment, it is not considered a “manipulation of natural processes.” On this reasoning, a scientific technique that somehow triggers a volcanic eruption may be a potential violation of ENMOD, but a kinetic attack on a mountainside to intentionally provoke a landslide would not be—even if both cause the same order of damage to the victim state and the environment.

This distinction seems problematic. After all, there is no such thing as a “man-made” natural disaster—whether the targeted area is altered by lava flows, falling rock, or simple fire, it has been equally changed by human action.

While some academics have tried to give ENMOD greater meaning by demonstrating that some emerging technologies may in fact be quite capable of causing qualifying environmental harm, they have generally still accepted that ENMOD is a treaty focused on preventing environmental catastrophes caused by novel scientific methods.¹⁵

Because means of creating artificial natural disasters were not ultimately developed by states for use as weapons of war, ENMOD has often been viewed as a somewhat nonsensical treaty with no practical impact whatsoever:¹⁶ a “toothless tiger,” perhaps even intentionally so.¹⁷ How can the stated aims of the drafting delegations—to prevent “deliberate destruction” of the environment—be reconciled with this subsequent assessment of ENMOD? Does it truly regulate only outlandish, scientifically improbable actions—actions that would already be prohibited under international humanitarian law due to their uncontrollable and indiscriminate effects,¹⁸ therefore rendering ENMOD’s application redundant? Or could it actually have a broader application to protecting the environment in armed conflict?

This Article argues that environmental modification techniques under ENMOD do not require advanced scientific methods that can provoke some “domino effect” of natural processes, but can also encompass direct methods of altering the human environment. In doing so, it takes the following approach:

Part II briefly canvasses the rather uncertain and relatively minimal protections for the natural environment under international humanitarian law (IHL). Part III outlines a possible role for ENMOD in expanding these protections, setting somewhat more rigid limits on the extent of environmental destruction that can be lawfully carried out by states. However, Part IV notes that, as above, there is a generally accepted view that only futuristic and non-feasible means of changing the environment are qualifying “environmental modification techniques”; this dominant perspective has denied ENMOD any practical utility. Part

¹⁵ See, e.g., Silja Vöneky, *The ENMOD Convention*, in RESEARCH HANDBOOK ON INTERNATIONAL ARMS CONTROL LAW 360, 367–69 (Eric P.J. Myjer & Thilo Marauhn eds., 2022); Jeffrey McGee, Kerry Brent, Jan McDonald & Clare Heyward, *International Governance of Solar Radiation Management: Does the ENMOD Convention Deserve a Closer Look?*, 14 CARBON & CLIMATE L. REV. 294 (2020); ANNE DIENELT, ARMED CONFLICTS AND THE ENVIRONMENT 59–60 (2022).

¹⁶ See, e.g., Jozef Goldblat, *The Environmental Warfare Convention: How Meaningful Is It?*, 6 AMBIO 216, 220 (1977); Laurent R. Hourcle, *Environmental Law of War*, 25 VT. L. REV. 653, 675 (2001); Crawford, *supra* note 11, at 81; Andy Rich, *The Environment: Adequacy of Protection in Times of War*, 12 PENN ST. ENVTL. L. REV. 445, 453 (2004); Mark J. T. Caggiano, *The Legitimacy of Environmental Destruction in Modern Warfare: Customary Substance Over Conventional Form*, 20 B.C. ENVTL. AFF. L. REV. 479, 489 (1993); Vöneky, *supra* note 15, at 376.

¹⁷ Crawford, *supra* note 11, at 95.

¹⁸ The Understandings refer to creating specific phenomena such as earthquakes, tsunamis, or cyclones. Consultative Committee of Experts, *supra* note 10. However, manufactured “natural disasters” of this scale would surely qualify as a use of force under Article 2(4) of the Charter of the United Nations, or (in armed conflict) a prohibited indiscriminate attack under international humanitarian law. See, e.g., Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflict (Protocol I), Arts. 51(4), 51(5), June 8, 1977, 1125 UNTS 3 [hereinafter Additional Protocol I].

IV goes on to identify certain potential interpretive flaws in the adoption of this perspective, in particular because it appears to rely largely on a slight misinterpretation of the “Understanding relating to Article II.” This Part concludes that the breadth of application of ENMOD should therefore be reconsidered.

Part V comprises a lengthy attempt to interpret Article II of ENMOD afresh, in conjunction with the limits set by Article I. It seeks to determine whether ENMOD genuinely applies only to largely speculative, scientifically advanced methods of inducing environmental change, or also to more viable, low-technology methods. This analysis initially confirms that interpretation of Article II under Article 31(1) of the Vienna Convention on the Law of Treaties¹⁹ (VCLT) does not fully clarify the scope of “environmental modification techniques” in the rather opaque Article II of ENMOD. Part V therefore draws on VCLT Articles 31(3) and 32 to arrive at a final meaning informed by: the official Understandings; the *travaux préparatoires*; and, further, the manner in which states themselves have relied on these records to determine that at least one low-technology method (widespread use of herbicides) may contravene ENMOD.²⁰ Cymie R. Payne observed similarly in 2020 that “[t]he important change in position by the parties to include herbicide use suggests a shift to a broader prohibition on the use of any environmental modification expected to exceed the threshold”;²¹ this Article will go a step further in arguing that, based on the preparatory work, ENMOD was always anticipated to apply to more prosaic methods such as burning, poisoning and physical shifting.

Ultimately, in Part VI, the Article concludes that low-technology methods of damaging or otherwise changing the environment may qualify as environmental modification techniques under Article II of ENMOD. Such methods could then be contraventions of ENMOD if they (1) have widespread, long-lasting, or severe effects, especially where they cause a phenomenon identified in the Understandings, such as “an upset in the ecological balance of a region,”²² and (2) are the means of causing damage, destruction, or injury to another state party. Part VI goes on to examine some real-world examples that, based on the final interpretation, may contravene ENMOD. It also addresses a significant shortcoming of ENMOD: its enforcement mechanism, via the United Nations Security Council. As the Article acknowledges, this may practically limit the chance of ENMOD being formally enforced where a major global power is responsible for the environmental damage in question. However, the Article notes that the potential benefit of a reconsideration of ENMOD is not limited to the capacity for the treaty to be enforced. Political and diplomatic pressure is its own deterrent: if states agree that an act is a contravention of ENMOD, they may leverage that “hard law” obligation through political and

¹⁹ Vienna Convention on the Law of Treaties, Art. 31, May 23, 1969 1155 UNTS 331, 8 ILM 679 [hereinafter VCLT]. The interpretation provisions of the VCLT apply to ENMOD as they codify existing customary international law. RICHARD GARDINER, *TREATY INTERPRETATION* 163, 174, 210 (2d ed. 2015); Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosn. & Herz. v. Serb. and Montenegro), Judgment, 2007 ICJ Rep. 43, para. 160 (Feb. 26) [hereinafter ICJ *Genocide Convention* Judgment]; Application of the International Convention on the Elimination of All Forms of Racial Discrimination (Qatar v. U.A.E.), Judgment, 2021 ICJ Rep. 71, para. 75 (Feb. 4) [hereinafter ICJ *Racial Discrimination* Judgment]; Arbitral Award of 3 October 1899 (Guy. v. Venez.), Judgment, 2020 ICJ Rep. 455, para. 70 (Dec. 18) [hereinafter Arbitral Award Jurisdiction Judgment].

²⁰ GA Res. 47/52(E), at 7 (Dec. 9, 1992).

²¹ Cymie R. Payne, *Protection of the Natural Environment*, in *THE OXFORD GUIDE TO INTERNATIONAL HUMANITARIAN LAW* 205, 224 (Dapo Akande & Ben Saul eds., 2020).

²² Consultative Committee of Experts, *supra* note 10, at 92.

diplomatic means to create consequences for the actor. They may lodge a formal complaint, formally denounce the actions on the basis of the treaty, or otherwise exert pressure on the actor to stop. Further, the existence of hard law obligations may add weight to normative frameworks being developed to further protect the natural environment from hostile or military actions.

Part VII provides some concluding remarks, including examining the significance of ENMOD's intentionally evolving meaning and how this could result in further adjustment of interpretation over time.

II. BACKGROUND: THE ENVIRONMENT AND INTERNATIONAL HUMANITARIAN LAW

In an age of increasing environmental crises,²³ the protection of the natural environment from further reckless destruction is a priority for all humanity. Therefore, one might assume that environmental warfare—"warfare in which the environment is manipulated for hostile military purposes"²⁴—would be completely prohibited.

However, the natural environment is not a primary concern of IHL. It does derive some protection from general principles of IHL that protect civilians and civilian objects, which include: the Martens clause;²⁵ the limit on destruction of enemy property in Article 23(g) of the regulations to the 1907 Convention Respecting the Laws and Customs of War on Land;²⁶ and the customary law principles of humanity, military necessity, and proportionality.²⁷ However, much of this protection is dependent on whether the natural environment may be considered a "civilian object," which must be accounted for in, for example, determining whether or not an attack can be considered proportionate. Some states not party to Additional Protocol I²⁸ take the view that because IHL is "anthropocentric in nature," the natural environment should only be considered a protected civilian object where damage to it would have a significant and direct impact on the human population.²⁹ For example, Israel's comments to the International Law Commission indicate that "an element of the

²³ See, e.g., Deena Robinson, *15 Biggest Environmental Problems of 2024*, EARTH.ORG (Jan. 3, 2024), at <https://earth.org/the-biggest-environmental-problems-of-our-lifetime>.

²⁴ Arthur H. Westing, *Environmental Warfare*, 15 ENVTL. L. 645, 646 (1985).

²⁵ See, e.g., Additional Protocol I, *supra* note 18, Art. 1(2); Dieter Fleck, *The Martens Clause and Environmental Protection in Relation to Armed Conflicts*, 10 GOETTINGEN J. INT'L L. 243 (2020); UN Environment Programme, *Protecting the Environment During Armed Conflict: An Inventory and Analysis of International Law*, 12 (2009); Michael N. Schmitt, *Humanitarian Law and the Environment*, 28 DENV. J. ENVTL. L. & POL'Y 265, 295–96, 300, 309 (2000).

²⁶ Regulations Concerning the Laws and Customs of War on Land, Convention (IV) Respecting the Laws and Customs of War on Land and Its Annex, Art. 23(g), Oct. 18, 1907, 36 Stat. 2227; UN Environment Programme, *supra* note 25, at 13–14.

²⁷ See, e.g., UN Environment Programme, *supra* note 25, at 20–21; Schmitt, *supra* note 25, at 307–12; DIENELT, *supra* note 15; Michael Bothe, Carl Bruch, Jordan Diamond & David Jensen, *International Law Protecting the Environment During Armed Conflict: Gaps and Opportunities*, 92 INT'L REV. RED CROSS 569, 576–78 (2010).

²⁸ Which expressly specifies that "civilian objects are all objects which are not military objectives." Additional Protocol I, *supra* note 18, Art. 52(1). However, it should be noted that the environment itself could quite easily be construed as a military objective, especially where it provides cover or enables troop movements.

²⁹ Comments Submitted by Israel to International Law Commission, *Protection of the Environment in Relation to Armed Conflicts: Comments and Observations Received from Governments, International Organizations and Others*, at 17, UN Doc. A/CN.4/749 (Jan. 17, 2022) [hereinafter ILC Comments 2022]; see also *id.*, comments by the U.S. delegation, at 30; Payne, *supra* note 21, at 209.

natural environment constitutes a civilian object only when it is used or relied upon by civilians for their health or survival,”³⁰ while the United States’ submission stated that “the natural environment is not always a ‘civilian object’ but receives the protection afforded civilian objects insofar as it constitutes a civilian object.”³¹ Even if the natural environment is a protected civilian object under IHL, any damage to civilian objects will simply form part of the proportionality assessment for an attack and may be perfectly lawful if the damage to such objects is justified by the military advantage gained.³²

Commentators have observed that “few IHL provisions explicitly address environmental protection during armed conflict, and those that do are inadequate.”³³ Two provisions of Additional Protocol I, the comprehensive 1977 update to the primary Geneva Conventions, give at least some direct protection.³⁴ Article 35 provides that “it is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment.”³⁵ Along similar lines, Article 55 says that “care shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage,” which “includes a prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population.”³⁶

These protections could be read as quite broad: the articles apply whether resulting environmental damage is intentional, collateral, or merely expected. Further, unlike the argument outlined above in regard to customary law protections, these articles do not connect the requirement to protect the environment from such damage to any consequent impact on civilian populations. They are clearly not anthropocentric and constitute a standalone protection, a fact which has not always been well-received by IHL scholars. Michael Schmitt, for example, noted:

[i]f a particular avenue of attack through an unpopulated but ecologically fragile region would likely result in the Article 35(3) level of environmental damage, military forces might be obliged to route an advance through a more densely populated area, thereby increasing the likelihood of incidental injury to civilians or collateral damage to civilian property.³⁷

Despite such misgivings, these protections recognize the inherent need to protect the natural environment, regardless of the specific relationship of an area with the human population. However, their application relies on the interpretation of “widespread, long-term and severe,” terms, which are understood to have a very high threshold. The Official Records from the drafting committees indicate that “long-term” is a decade or more, and that the “battlefield

³⁰ ILC Comments 2022, *supra* note 29, at 17.

³¹ *Id.* at 79.

³² Additional Protocol I, *supra* note 18, Arts. 52, 57.

³³ Bothe, Bruch, Diamond & Jensen, *supra* note 27, at 570. *See also* UN Environment Programme, *supra* note 25, at 4.

³⁴ Additional Protocol I, *supra* note 18, Arts. 35, 55.

³⁵ *Id.* Art. 35(3).

³⁶ *Id.* Art. 55(1).

³⁷ Schmitt, *supra* note 25, at 276.

destruction in France in the First World War [was] outside the scope of the prohibition.”³⁸ Because the phrase is conjunctive, the expected or intended damage must meet all three criteria; the accepted conclusion is that the protection is not engaged unless the expected widespread and severe damage will last for at least a decade or more. Therefore Articles 35 and 55 have a very limited application³⁹—they will only prevent military action expected or intended to cause truly devastating environmental damage. Further, not all states are parties to Additional Protocol I and some (the United States, France, and Israel, for example) do not accept that these rules represent customary international law.⁴⁰

The 2005 study of customary IHL produced by the International Committee of the Red Cross (ICRC) concluded that there are relatively extensive customary law prohibitions on environmental destruction.⁴¹ The ICRC has a well-recognized role in construing and applying IHL, which has been formally acknowledged in the Geneva Conventions and in several provisions of Additional Protocol I.⁴² Therefore, its assessment of the customary law principles that apply in armed conflict deserves significant consideration. Rule 43 of the study provides that “the general principles on the conduct of hostilities apply to the natural environment” and therefore: (1) the environment may not be directly attacked “unless it is a military objective”; (2) may not be destroyed “unless required by imperative military necessity”; and (3) any damage caused to the environment must be proportional to the “concrete and direct military advantage anticipated.”⁴³ Rule 44 requires “due regard to the protection and preservation of the natural environment,” with precautions taken to avoid or minimize environmental damage.⁴⁴ Finally, Rule 45 reflects the prohibition under Additional Protocol I on means and methods of warfare “intended, or . . . expected, to cause widespread, long-term and severe damage.” It also provides that “destruction of the natural environment may not be used as a weapon,”⁴⁵ a rule that is clearly related to the prohibitions set down in ENMOD.

³⁸ OFFICIAL RECORDS OF THE DIPLOMATIC CONFERENCE ON THE REAFFIRMATION AND DEVELOPMENT OF INTERNATIONAL HUMANITARIAN LAW APPLICATION IN ARMED CONFLICTS: GENEVA 1974–1977, VOL. XV, at 268–69 (1978).

³⁹ See, e.g., DANISH MINISTRY OF DEFENCE, MILITARY MANUAL ON INTERNATIONAL LAW RELEVANT TO DANISH ARMED FORCES IN INTERNATIONAL OPERATIONS 424 (Jes Rynkeby Knudsen ed., 2016) [hereinafter DANISH LOAC MANUAL]; BUNDESMINISTERIUM DER VERTEIDIGUNG, LAW OF ARMED CONFLICT MANUAL 61, para. (435) (2013) [hereinafter GERMAN LOAC MANUAL].

⁴⁰ See, e.g., U.S. DEP’T OF DEFENSE, OFFICE OF THE GENERAL COUNSEL, DEPARTMENT OF DEFENSE LAW OF WAR MANUAL 387, n. 218 (updated July 2023) [hereinafter U.S. LOAC MANUAL]; ILC Comments 2022, *supra* note 29, at 18 (comments by Israel).

⁴¹ JEAN-MARIE HENCKAERTS & LOUISE DOSWALD-BECK, INTERNATIONAL COMMITTEE OF THE RED CROSS, CUSTOMARY INTERNATIONAL HUMANITARIAN LAW, VOL. I: RULES, at 143, 147, 151 (2005).

⁴² Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field (Geneva Convention No. I), Arts. 3, 9–11, 23, Aug. 12, 1949, 75 UNTS 31, 6 UST 3114, TIAS No. 3362; Convention for the Amelioration of the Condition of the Wounded, Sick, and Shipwrecked Members of Armed Forces at Sea (Geneva Convention No. II), Aug. 12, 1949, Arts. 3, 9–11, 75 UNTS 85, 6 UST 3217, TIAS No. 3363; Geneva Convention Relative to the Treatment of Prisoners of War (Geneva Convention No. III), Arts. 3, 9–11, 56, 72–73, 75, 79, 81, 123, 125–26, Aug. 12, 1949, 75 UNTS 135, 6 UST 3316, TIAS No. 3364; Convention Relative to the Protection of Civilian Persons in Time of War (Geneva Convention No. IV), Arts. 3, 10–12, 14, 30, 59, 61, 76, 96, 102, 104, 108–09, 111, 140, 142–43, Aug. 12, 1949, 75 UNTS 287, 6 UST 3516, TIAS No. 3365; Additional Protocol I, *supra* note 18, Arts. 5, 6, 33, 97–98.

⁴³ ICRC VOLUME I: RULES, *supra* note 41, at 143.

⁴⁴ *Id.* at 147.

⁴⁵ *Id.* at 151.

However, there is some reason to question whether these rules are, in fact, all customary law. Support for the rules varies between states. New Zealand's IHL manual cites each of them⁴⁶ while the U.S. manual expressly rejects them.⁴⁷ Other state manuals provide more qualified versions of the protections identified by the ICRC study: the manuals of Australia, Germany, and Norway, for example, indicate that destruction of the natural environment can be justified by "military necessity,"⁴⁸ a lesser threshold than the "imperative military necessity" specified in Rule 43. These three manuals provide a more conservative protection overall in comparison with the ICRC study, especially in regard to the application of proportionality and precautions to environmental damage.⁴⁹ The manuals of Denmark, the UK, and Canada reflect only the binding articles from Additional Protocol I.⁵⁰ Overall, the rules specified in the ICRC study appear somewhat broader than state practice supports.⁵¹ In fact, several states protested both the customary status of these rules, and of Additional Protocol I itself, during consultations held by the International Law Commission (ILC) in 2022.⁵²

The ILC consultations were held in regard to their draft principles on "Protection of the Environment in Relation to Armed Conflicts."⁵³ The principles are quite extensive; however, the ILC does not assert that these entirely represent customary international law. Instead, it indicates that they "contain[] provisions of different normative value, including those that reflect customary international law, and those containing recommendations for its progressive development."⁵⁴ This significant body of work will doubtlessly be a valuable platform to provoke further discussion from states, and hopefully to shape development of a more comprehensive normative framework for environmental protection in the future. However, it cannot in and of itself expand the legal framework applicable to state activities. The draft principles attracted quite extensive criticism from states consulted during the process—in particular due to the broad scope the ILC inquiry had given certain customary rules and the mandatory framing of some of the non-binding recommendations—and overall revealed a clear lack of consensus between states as to the applicable law.⁵⁵ This suggests a continuing tension

⁴⁶ NEW ZEALAND DEFENCE FORCE, MANUAL OF ARMED FORCES LAW, VOL. 4: LAW OF ARMED CONFLICT 7-7, 8-45, 14-34 (2d ed. 2019).

⁴⁷ U.S. LOAC MANUAL, *supra* note 40, at 387–88, nn. 218–19.

⁴⁸ AUSTRALIAN DEFENCE FORCE, LAW OF ARMED CONFLICT 5-13–5-14, para. (5.50) (2006) [hereinafter AUSTRALIAN LOAC MANUAL]; GERMAN LOAC MANUAL, *supra* note 39, at 60, para. (434); NORWEGIAN DEFENCE UNIVERSITY COLLEGE, MANUAL OF THE LAW OF ARMED CONFLICT 161 (rev. ed. 2018) [hereinafter NORWEGIAN LOAC MANUAL].

⁴⁹ AUSTRALIAN LOAC MANUAL, *supra* note 48, at 5-13–5-14; GERMAN LOAC MANUAL, *supra* note 39, at 60–61, paras. 434–35; NORWEGIAN LOAC MANUAL, *supra* note 48, at 161–62.

⁵⁰ DANISH LOAC MANUAL, *supra* note 39, at 424; OFFICE OF THE JUDGE ADVOCATE GENERAL, LAW OF ARMED CONFLICT AT THE OPERATIONAL AND TACTICAL LEVELS 4-13, para. (446) (Aug. 2001); JOINT DOCTRINE AND CONCEPTS CENTRE, THE JOINT SERVICE MANUAL OF THE LAW OF ARMED CONFLICT 75–76 (2004).

⁵¹ See, e.g., WILLIAM H. BOOTHBY, WEAPONS AND THE LAW OF ARMED CONFLICT 101–03 (2009).

⁵² ILC Comments 2022, *supra* note 29, at 6, 68–69, 80 (Canada); 10, 70, 81, 91, 102–03 (France); 14, 17–18, 71–73, 92, 102 (Israel); 29, 77, 79, 85–86, 94–95 (United States); 92 (United Kingdom).

⁵³ International Law Commission, Report on the Work of Its Seventy-Third Session, Draft Principles on Protection of the Environment in Relation to Armed Conflicts, at 92, UN Doc. A/77/10 (2022) [hereinafter Draft Principles on Environment in Armed Conflicts].

⁵⁴ *Id.* at 97.

⁵⁵ See generally ILC Comments 2022, *supra* note 29.

about how far the environment is or should be protected in armed conflict, and a reluctance to accept an expansion of such protection via soft law instruments.

In sum, the extent to which IHL applies to protect the natural environment during armed conflict remains debatable and uncertain. What protections are generally accepted by states apply only to egregious forms of environmental damage with significant direct impact on civilians, or are indirect and open to the interpretation of a particular state.

III. WHY ENMOD?

Could ENMOD potentially help bridge this gap? Despite the points of friction in state practice concerning some aspects of the ILC principles, they gave quite a conservative reproduction of the text of Article I of ENMOD⁵⁶ and the commentary to the principles did not seek to further interrogate what could be encompassed by the term “environmental modification techniques.”⁵⁷ Yet, there are several factors which imply that ENMOD could give a broader protection from intentional environmental harm in armed conflict than, for example, Articles 35 and 55 of Additional Protocol I.

ENMOD forbids states parties from “engag[ing] in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party.”⁵⁸ The requirement of harm to another state party means that ENMOD may be considered “essentially anthropocentric.”⁵⁹ However, unlike in much of the body of IHL, the focus is not on protecting the civilian populations of states but on protecting states as a whole. It is therefore the “state Party” more generally that is protected from “destruction, damage or injury” resulting from the use of environmental modification techniques. It may be assumed that a state would construe widespread, long-lasting, or severe effects on its natural environment, whether or not this causes or risks direct harm to civilians, as “destruction, damage or injury” to the state itself. ENMOD may therefore place firmer prohibitions on destruction of or damage to states parties’ “natural and economic resources or other assets”⁶⁰ as part of an environmental modification technique, even where this does not put the civilian population directly at risk and causes only fiscal damage to the state. For example, underground mineral resources, a forest used for timber or paper production, or state nature sanctuaries may not ordinarily be considered protected “civilian objects” due to their fairly distant relationship with the civilian population. But because the protected entity under ENMOD is the state itself, assets that are valuable to the state (and the loss of which would cause harm to the state, including economic harm) benefit from protection under ENMOD. This is directly anticipated by the Understandings, which specify that “severe” damage is understood to include “serious or significant disruption or harm to human life, *natural and economic resources or other assets*” (emphasis added).⁶¹ The protection offered by ENMOD is absolute,

⁵⁶ Draft Principles on Environment in Armed Conflicts, *supra* note 53, at 152.

⁵⁷ *Id.* at 152–53.

⁵⁸ ENMOD, *supra* note 1, Art. I(1).

⁵⁹ Michael N. Schmitt, *Green War: An Assessment of the Environmental Law of International Armed Conflict*, 133 (Advanced Research Project, Naval War College, June 14, 1996).

⁶⁰ Consultative Committee of Experts, *supra* note 10, at 92.

⁶¹ *Id.*

and not dependent on whether or not the damage is disproportionate: if the environmental modification technique will have “widespread, long-lasting or severe effects” and cause “destruction, damage or injury” to another state party, ENMOD prohibits states parties from proceeding with such a technique.⁶²

The terms “widespread’, ‘long-lasting’ or ‘severe’” as used in ENMOD Article I are also understood to have a low threshold compared with that assigned to them under Additional Protocol I. In the Understandings, “long-lasting” was determined to be “a period of months, or approximately a season.”⁶³ “Widespread” required impact to “an area on the scale of several hundred square kilometres,”⁶⁴ while “severe” implied “involving serious or significant disruption or harm to human life, natural and economic resources or other assets.”⁶⁵

This Article has already referred several times to the Understandings, and it is worth considering the status of these and how far their content should be considered in interpreting ENMOD. The Understandings are not part of the binding text, and their authoritative weight is debatable; for example, they may be considered merely part of the broader “preparatory work of the treaty” under Article 32 of the VCLT,⁶⁶ or they may be an “instrument related to the treaty” under Article 31(2)(b). Even within the Understandings, the different aspects of the text have differing origins. The “Understanding relating to Article II” was originally part of the identical drafts submitted by the United States and the United Soviet Socialist Republics (USSR) to the Conference of the Committee on Disarmament in 1975;⁶⁷ however, it was intentionally separated out, as several delegations considered it would be too restrictive to include a list of examples in the operative text.⁶⁸ The balance of the Understandings was never part of the draft Convention, but was instead derived from discussions held during the negotiations. For example, in April 1976 United States delegate Mr. Martin noted that “several delegations have asked for clarification of the terms ‘widespread, long-lasting or severe’ used in article I”⁶⁹ and proceeded to set out thresholds notably similar to those incorporated in the Understandings: “we would interpret the term ‘widespread’ as

⁶² ENMOD, *supra* note 1, Art. I.

⁶³ Consultative Committee of Experts, *supra* note 10, at 91.

⁶⁴ *Id.*

⁶⁵ *Id.*

⁶⁶ *See, e.g.*, Goldblat, *supra* note 16, at 216.

⁶⁷ Union of Soviet Socialist Republics, Report of the Conference of the Committee on Disarmament, Draft Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (CCD/471), at 186, UN Doc. A/10027 (1976) [hereinafter 1975 USSR Identical Draft]; United States of America, Report of the Conference of the Committee on Disarmament, Draft Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (CCD/472), at 189, UN Doc. A/10027 (1976) [hereinafter 1975 United States Identical Draft]; *see also* Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-Fourth Meeting, UN Doc. CCD/PV.684 (Aug. 21, 1975).

⁶⁸ *See, e.g.*, First Committee, Provision Verbatim Record of the Two Thousand and Eighty-Eighth Meeting, at 8 (Mrs. Thorsson, Sweden), UN Doc. A/C.1/PV.2088 (Nov. 14, 1975); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Second Meeting, at 31 (Mr. van der Klaauw, Netherlands), UN Doc. CCD/PV.692 (Mar. 9, 1976); Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Seventeenth Meeting, at 16 (Mr. Saleem, Pakistan), UN Doc. CCD/PV.717 (Aug. 3, 1976).

⁶⁹ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 8.

referring to an area on the scale of several hundred square kilometres”;⁷⁰ “the term ‘long-lasting’ in our view would involve a period of months or about a season”;⁷¹ and “we would interpret ‘severe’ as referring to any very serious disruption of the existing state of the environment as a means of causing very serious damage or injury to persons or property.”⁷²

Notwithstanding their potentially uncertain status, the Understandings were specifically intended as an interpretive aid and have been frequently relied on for this purpose by both states and academics.⁷³ For example, at the First Review Conference, the Italian delegate stated that the interpretations given in the Understandings “had virtually become an integral part of the convention.”⁷⁴ In light of this reliance, the Understandings should likely be considered an “instrument related to the treaty” under Article 31(2)(b) of the VCLT, and the thresholds they assign are therefore persuasive.

The thresholds set out in Article I of ENMOD also use a disjunctive “or”—applying to “widespread, long-lasting *or* severe” effects⁷⁵—as opposed to the cumulative definition in Additional Protocol I. This means that only one of the three criteria need be met for environmental effects to exceed the Article I threshold.

Overall, because of this lower severity threshold compared to Additional Protocol I, ENMOD’s potential application to prevent purely economic damage sustained by states even in areas not directly relied upon by its civilian population, and the absolute nature of the prohibition, ENMOD may prevent certain actions not otherwise contrary to IHL. Of course, this is provided such actions are performed specifically to damage or otherwise change the environment for hostile or military purposes⁷⁶—and there are several further important qualifiers to this proposition. First, actions can only contravene ENMOD where “damage, destruction or injury” actually occurs; it does not cover predicted or expected damage. Second, the resulting damage, destruction, or injury must be caused by one state party to another state party.⁷⁷ Although some state delegations protested that ENMOD should apply regardless of the target, the majority view was that this would create an inherent unfairness where non-parties would have “no incentive to accede to the international agreement.”⁷⁸ Third, unlike the environmental protections in Additional Protocol I, a violation of ENMOD requires that change in the environment be an intended outcome. It does not apply to

⁷⁰ *Id.*

⁷¹ *Id.* at 9.

⁷² *Id.*

⁷³ See, e.g., GA Res. 47/52E, *supra* note 20, at 7; YORAM DINSTEIN, *THE CONDUCT OF HOSTILITIES UNDER THE LAW OF INTERNATIONAL ARMED CONFLICT* 178, 190–91, 194 (2004); Peter J. Richards & Michael N. Schmitt, *Mars Meets Mother Nature: Protecting the Environment During Armed Conflict* 28 *STETSON L. REV.* 1047, 1064 (1999); Schmitt, *supra* note 25, at 279; DIENELT, *supra* note 15, at 60; Rich, *supra* note 16, at 452.

⁷⁴ First Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Summary Record of the Fourth Meeting, at 6 (Mr. Ferrari Bravo, Italy), UN Doc. ENMOD/CONF.1/SR.4 (Sept. 13, 1984).

⁷⁵ ENMOD, *supra* note 1, Art. I (emphasis added).

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ Conference of the Committee on Disarmament, Report of the Conference of the Committee on Disarmament: Vol. I, at 71, UN Doc. A/31/27 (1976).

collateral damage from conventional means and methods of warfare.⁷⁹ So, for example, if artillery strikes on an enemy base result in significant damage to the surrounding environment, or even trigger an unintended severe landslide, this would not violate ENMOD. ENMOD therefore does not engage the fraught issue of collateral environmental damage, which is raised by the provisions of Additional Protocol I.

The final caveat, and the interpretive focus of this Article, is that to contravene ENMOD, a state must be engaged in an “environmental modification technique.” Article II defines this as “any technique for changing—through the deliberate manipulation of natural processes—the dynamics, composition or structure of the earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.”⁸⁰ This is a complex definition. There was confusion over its intended scope even among the drafting delegations: some seemed to believe an environmental modification technique must utilize some futuristic technology not yet developed at the time of drafting,⁸¹ while others held it could also apply to long understood and technologically uncomplicated means of causing intentional environmental damage (such as destroying forests, diverting rivers, or contaminating water sources).⁸²

Arriving at an accurate interpretation of “environmental modification technique” is the general focus of this Article. It is therefore worth examining how it has otherwise been interpreted and the potential issues with these approaches.

IV. THE “TOOTHLESS TIGER”

Academic commentators have, on the whole, concluded that ENMOD was given such a high threshold for application that it has no real-world relevance: it is often portrayed as a somewhat hysterical relic of an era when the accelerating path of scientific progress had nations thinking more speculatively than practically.⁸³

ENMOD Article II is an awkward and complex provision, and a significant challenge to interpret under the VCLT. It is therefore unsurprising that many commentators turn directly to the Understanding relating to Article II for insight.⁸⁴

⁷⁹ This is confirmed by the preparatory work. *See, e.g.*, Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eightieth Meeting, at 23 (Mr. Martin, United States), UN Doc. CCD/PV.680 (Aug. 12, 1975); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-Fourth Meeting, *supra* note 67, at 10 (Mr. Martin, United States); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Fifty-Ninth Meeting, *supra* note 6, at 17 (Mr. Allen, United Kingdom).

⁸⁰ ENMOD, *supra* note 1, Art. II.

⁸¹ *See, e.g.*, Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-Second Meeting, at 18 (Mr. Dugersuren, Mongolia), UN Doc. CCD/PV.682 (Aug. 19, 1975); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eightieth Meeting, *supra* note 79, at 18 (Mr. Fartash, Iran).

⁸² *See, e.g.*, Conference of the Committee on Disarmament, Final Record of the Six Hundred and Seventy-Sixth Meeting, at 9 (Mr. Herder, German Democratic Republic), UN Doc. CCD/PV.676 (July 29, 1975); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-First Meeting, at 28 (Mr. van der Klaauw, the Netherlands), UN Doc. CCD/PV.681 (Aug. 14, 1975); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Seventh Meeting, at 9 (Mr. Schlaich, Federal Republic of Germany), UN Doc. CCD/PV.697 (Mar. 25, 1976).

⁸³ Hourcle, *supra* note 16, at 675; Crawford, *supra* note 11, at 81; Rich, *supra* note 16, at 453; Caggiano, *supra* note 16, at 489; Vöneky, *supra* note 15, at 376.

⁸⁴ *See, e.g.*: Schmitt, *supra* note 59, at 131–32; Schmitt, *supra* note 25, at 279; Crawford, *supra* note 11, at 84; Roberts, *supra* note 13, at 232; DINSTEIN, *supra* note 73, at 178.

The examples of environmental modification techniques listed therein include:

earthquakes; tsunamis; an upset in the ecological balance of a region; changes in weather patterns (clouds, precipitation, cyclones of various types and tornadic storms); changes in climate patterns; changes in ocean currents; changes in the state of the ozone layer; and changes in the state of the ionosphere.⁸⁵

Given that many of these examples can still not be intentionally generated by states, the list is often taken to imply that ENMOD is only concerned with extreme and technologically improbable methods where some force of nature is unleashed as an “instrument of warfare.”⁸⁶ As Emily Crawford puts it:

With the benefit of hindsight, it is striking to look at ENMOD and question how unlikely the central conceit of the Convention seems: that human beings would be able to artificially create natural disasters, such as earthquakes or tsunamis, and that they could, moreover, be able to control such natural phenomena and manage to use them against an enemy, without somehow seriously impacting either themselves or the civilian population? Did the US and USSR genuinely believe that such capabilities were not only possible but capable of being deployed, and soon enough to warrant the adoption of such a treaty?⁸⁷

On this view, ENMOD places a limit only on “directly using nature’s power to attack a hostile enemy”;⁸⁸ i.e., on generating a natural reaction of some kind that itself produces the damaging effect. It therefore “prohibit[s] state parties from artificially creating or manipulating environmental phenomena such as cyclones, or earthquakes or tsunamis, for hostile use against other parties to ENMOD”⁸⁹ but, based on the specific examples included in the Understandings, “other highly destructive techniques, such as bombing dams and other water works to create flooding, are not specifically prohibited and are more practically useful to the military.”⁹⁰

Technologies capable of triggering an apparent natural disaster are very limited (apart from perhaps nuclear weapons), and this avenue of development has not been pursued by states. The conclusion drawn is that while ENMOD may “constrain the decisions of national policymakers in the development of unconventional weaponry, the provisions’ influence does not reach any further.”⁹¹ Even the ICRC takes the position that ENMOD’s application is restricted to preventing “deliberate manipulation of natural processes that could produce phenomena such as hurricanes, tidal waves or changes in climate.”⁹²

⁸⁵ Consultative Committee of Experts, *supra* note 10, at 92.

⁸⁶ Richards & Schmitt, *supra* note 73, at 1078.

⁸⁷ Crawford, *supra* note 11, at 94.

⁸⁸ Caggiano, *supra* note 16, at 489.

⁸⁹ Crawford, *supra* note 11, at 81.

⁹⁰ Caggiano, *supra* note 16, at 489.

⁹¹ Rich, *supra* note 16, at 451–52; *see also* Schmitt, *supra* note 25, at 280.

⁹² ICRC Advisory Service on International Humanitarian Law, 1976 Convention on the Prohibition of Military or any Hostile Use of Environmental Modification Techniques (Fact Sheet, International Committee of the Red Cross, January 2003).

As discussed in Part II above, the Understandings are likely best viewed as an “instrument relating to the Treaty”⁹³ and the meaning they set out therefore has significant interpretive weight. However, relying on the Understanding relating to Article II to determine the scope of Article II is counterintuitively problematic. Not only does that Understanding specify that the examples it provides are not exhaustive,⁹⁴ but it does not actually—through the kind of drafting quirk which seems to plague ENMOD—explain the meaning of Article II. It instead lists examples of outcomes resulting from use of environmental modification techniques where such use would definitely violate ENMOD as a whole: “all the phenomena listed above, when produced by military or any other hostile use of environmental modification techniques, would result, or could reasonably be expected to result, in widespread, long-lasting or severe destruction, damage or injury.”⁹⁵ That is, environmental modification techniques resulting in any of these phenomena would meet both the Article II definition and the Article I thresholds. Therefore, the Understanding relating to Article II is much narrower in scope than Article II itself. This problem was actually foreshadowed in the drafting history, with the Swedish delegate commenting that the “list gives an impression that the threshold of the whole treaty is higher than is actually the case”;⁹⁶ as will be discussed in Section V(C)(1)(d) below, this was clarified at the time to explain that the Understanding relating to Article II intentionally included only egregious examples of potential environmental modification techniques which would always contravene ENMOD.⁹⁷ Using these extreme examples given in the Understandings to limit the scope of Article II as a whole may lead to underestimating the broader potential application of the ENMOD prohibition.

Even in a rare instance where it is noted that the ENMOD text could, in some circumstances, permit low-technology methods to be considered environmental modification techniques, violation may be given an inexplicably high severity requirement. Yoram Dinstein, for example, observed that “[e]xceptionally, environmental modification can be spawned by conventional means and methods of warfare,” but stated that “a hypothetical example would be the systematic destruction by fire of the rain forests of the Amazon River Basin, thereby inducing a global climatic change.”⁹⁸ This scale of effect is massively larger than that mandated by Article I.

Another common method of interpreting ENMOD is to draw on other academic views to help explain the effect of Article II.⁹⁹ This has its own pitfalls, and the criticism of ENMOD can feel like something of an echo chamber. For example, in 1982, Polish diplomat and

⁹³ VCLT, *supra* note 19, Art. 32(2)(b).

⁹⁴ Consultative Committee of Experts, *supra* note 10, at 92.

⁹⁵ *Id.*

⁹⁶ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Seventh Meeting, *supra* note 82, at 27.

⁹⁷ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 10; Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Twenty-Seventh Meeting, at 16–17 (Mr. Martin, United States), UN Doc. CCD/PV.727 (Sept. 3, 1976); First Committee, Verbatim Record of the Twentieth Meeting, *supra* note 9, at 27.

⁹⁸ DINSTEIN, *supra* note 73, at 181.

⁹⁹ See, e.g., John Alan Cohan, *Modes of Warfare and Evolving Standards of Environmental Protection Under the International Law of War*, 15 FL. INT'L L. 482, 519 (2003); Hourcle, *supra* note 16, at 675; Caggiano, *supra* note 16, at 489; Carolyn Stannard, *Legal Protection of the Environment in Wartime*, 14 SYD. L. REV. 373, 376 (1992); Richards & Schmitt, *supra* note 73, at 1063; Alexandre Kiss, *International Humanitarian Law and the Environment*, 31 ENVTL. POL'Y & L. 223, 225 (2001); Rich, *supra* note 16, at 453; International Law

author Jozef Goldblat wrote a brief commentary on ENMOD.¹⁰⁰ He was critical of it for two main reasons. The first was that the examples selected for the Understandings were (as discussed above) excessively far-fetched: “none of these phenomena seems likely to be caused through deliberate action for rational warlike purposes, that is, in such a way that the effects would be felt only, or primarily, by the enemy.”¹⁰¹ The second main critique Goldblat raised was that, in his view, the Article I threshold for application taken together with the Understandings meant that some techniques which “could produce more limited effects . . . have escaped proscription.”¹⁰² Goldblat was adamant that there should be an absolute ban on all techniques capable of inducing environmental change for military purposes, and this was not the first critique he had written on the matter.¹⁰³

In 1989, Goldblat’s commentary was used as the sole supporting reference when Richard Falk wrote that “seemingly only those techniques of environmental modification beyond the scope of rational war-making have been forbidden.”¹⁰⁴ This quote was in turn a single cite used by Mark Caggiano in 1993 to support his observation that: “[u]nfortunately, the En-Mod Convention has been interpreted by scholars as encompassing only a limited variety of environmental manipulations”;¹⁰⁵ and Caggiano’s citation to a citation was in turn cited by Andy Rich in 2004 to indicate ENMOD is “ineffectual.”¹⁰⁶ Futility has become so much the theme of ENMOD that Crawford wrote in 2019, without relying on any particular reference, that ENMOD was a “proverbial ‘toothless tiger,’”¹⁰⁷ a “treaty of no practical value,”¹⁰⁸ and “its aims and objectives, while admirable, seem better suited to the realms of science fiction.”¹⁰⁹

There is naturally nothing wrong with academics finding the views of other academics influential. However, at times this may lead to the perpetuation of a potential error when an academic view originally expressed over forty years ago is cited as evidence of ENMOD’s limitations. Advancing scientific understanding has made clear that at least one of the examples in the Understandings (an “upset in the ecological balance of a region”¹¹⁰) can easily result from military operations, even those that are not intentionally directed at changing the environment.¹¹¹ For example: damage to soil morphology (by physical

Commission, Submitted by Special Rapporteur Marie G. Jacobsson, Second Report on the Protection of the Environment in Relation to Armed Conflicts, at 158, para. (126), UN Doc. A/CN.4/685 (May 28, 2015).

¹⁰⁰ JOZEF GOLDBLAT, AGREEMENTS FOR ARMS CONTROL: A CRITICAL SURVEY 51 (1982).

¹⁰¹ *Id.* at 53.

¹⁰² *Id.*

¹⁰³ See, e.g., Goldblat, *supra* note 16.

¹⁰⁴ RICHARD FALK, REVITALIZING INTERNATIONAL LAW 167 (1989).

¹⁰⁵ Caggiano, *supra* note 16, at 489.

¹⁰⁶ Rich, *supra* note 16, at 453.

¹⁰⁷ Crawford, *supra* note 11, at 95.

¹⁰⁸ *Id.*

¹⁰⁹ *Id.* at 81.

¹¹⁰ Consultative Committee of Experts, *supra* note 10, at 92.

¹¹¹ See, e.g., Michael J. Lawrence et al., *The Effects of Modern War and Military Activities on Biodiversity and the Environment*, 23 ENVTL. REV. 443 (2015); Swapna Pathak, *Ecological Footprints of War: An Exploratory Assessment of the Long-Term Impact of Violent Conflicts on National Biocapacity from 1962–2009*, 10 J. ENVTL. SCI. 380 (2020); Emily Anthes, *A “Silent Victim”: How Nature Becomes a Casualty of War*, N.Y. TIMES (June 22, 2023), at <https://www.nytimes.com/2022/04/13/science/war-environmental-impact-ukraine.html>.

disturbance or contamination) can lead to reduction of viability lasting decades;¹¹² while transport of military supplies to forward bases can introduce invasive exotic species, permanently changing the ecological balance of that area.¹¹³ Nature may overall be much more susceptible to long-term or permanent damage resulting from military action than was once anticipated.

Even more relevant from an international law perspective, there have been notable developments in state practice in the intervening decades which now cast doubt on early academic interpretations.¹¹⁴

V. INTERPRETATION OF ENMOD ARTICLE II

All the above gives significant context as to why ENMOD deserves reconsideration—but it does not address how the term “environmental modification techniques” in ENMOD Article II should be better interpreted.

The VCLT entered into force in 1980, a few years after ENMOD, providing a definitive codification of the key customary law rules of treaty interpretation in its Articles 31 and 32.¹¹⁵ It is these rules that can be applied to discern the meaning of the definition in Article II. Doing so will ultimately suggest that ENMOD prohibits serious intentional environmental damage as a hostile act between states parties, no matter the technological sophistication of the methods by which it is caused.

However, it is worth reiterating at the outset that of course not every environmental modification technique encompassed by Article II would be a violation of ENMOD; this will still depend on whether it exceeds the thresholds set out in Article I.

A. Article 31(1)

According to Article 31(1) of the VCLT, “a treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.”¹¹⁶ Article II of ENMOD is a fairly difficult provision to interpret under 31(1). In full it reads:

As used in article I, the term “environmental modification techniques” refers to any technique for changing—through the deliberate manipulation of natural processes—the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.¹¹⁷

¹¹² Giacomo Certini, Riccardo Scalenghe & William I. Woods, *The Impact of Warfare on the Soil Environment*, 127 *EARTH-SCI. REV.* 1 (2013); Eef Meerschman, Liesbet Cockx, Mohammad Monirul Islam, Fun Meeuws & Marc Van Merivenne, *Geostatistical Assessment of the Impact of World War I on the Spatial Occurrence of Soil Heavy Metals*, 40 *AMBIO* 417 (2011).

¹¹³ Lawrence et al., *supra* note 111, at 444; Alberto Santini, Giorgio Maresi, David M. Richardson & Andrew M. Liebhold, *Collateral Damage: Military Invasions Beget Biological Invasions*, 21 *FRONTIERS ECOLOGY & ENV'T* 469, 470–71 (2023).

¹¹⁴ See Section V(B) *infra*.

¹¹⁵ These apply to ENMOD due to their customary law status. Gardiner, *supra* note 19, at 163, 174, 210; ICJ *Genocide Convention* Judgment, *supra* note 19, para. (160); ICJ *Racial Discrimination* Judgment, *supra* note 19, para. (75); Arbitral Award Jurisdiction Judgement, *supra* note 19, para. (70).

¹¹⁶ VCLT, *supra* note 19, Art. 31(1).

¹¹⁷ ENMOD, *supra* note 1, Art. II.

The sentence is long and cumbersome in its construction, each item of punctuation like the handover in a relay race. Its meaning relies on numerous highly technical terms, but even more challenging from an interpretive perspective, several ambiguous words (such as “techniques,” “processes,” and “manipulation”). The first stage is therefore to identify where the key ambiguities lie so that these can then be further examined to ascertain meaning.

1. “*Any technique . . .*”

“Technique” is a versatile word: it can mean simply a “way of doing something,”¹¹⁸ or, “a skilful or efficient means of achieving a purpose; a strategy, a knack.”¹¹⁹ This suggests the definition would include any planned method for achieving the “deliberate manipulation of natural processes” as specified in the rest of the provision. However it could also imply that the method used must be scientific or technical in some way, as sometimes “technique” is given a slant of this nature: “a particular way of carrying out an experiment, procedure or task, esp. in a scientific discipline or craft; a technical or scientific method.”¹²⁰ This is therefore one key potential pivot point for the ultimate meaning of the provision: does “technique” specifically imply the use of technologically advanced methods, or could it encompass any method? Which meaning is more accurate here relies on the context and the object and purpose of the treaty: the role of these influences on the provision as a whole is addressed in Section V(A)(7) below.

2. “*for changing . . . the dynamics, composition or structure . . .*”

“Changing” refers to some alteration, i.e., that the relevant aspects of the environment would be different in some way after application of the technique. Given the context provided by Article I, which provides the scale of effect required for ENMOD to apply, there appears to be no specific severity of “change” that must occur to qualify a method as an environmental modification technique under Article II. However, the change must be to the “dynamics, composition or structure” of the Earth or outer space. Dynamics refers to the “branch of mechanics concerned with those forces which cause or affect the motion of bodies.”¹²¹ For example, a technique that stops a river from flowing, or causes rocks to shift and become a landslide, would change the “dynamics” of those phenomena. This would also presumably encompass thermodynamics, which concerns the relationship between kinetic energy and heat, given that warming of the atmosphere and ocean were explicitly raised as potential examples of ENMOD contraventions during its drafting.¹²² “Composition” refers to “the

¹¹⁸ *Technique* (def. 1), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/technique_n?tab=meaning_and_use#19090189 (last visited Sept. 26, 2023); see also *Technique* (def. 1), MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=technique (last visited Aug. 27, 2023).

¹¹⁹ *Technique* (def. 3), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/technique_n?tab=meaning_and_use#19090189 (last visited Sept. 26, 2023).

¹²⁰ *Id.*

¹²¹ *Dynamics* (def. 1), MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=dynamics (last visited Aug. 27, 2023); see also *Dynamics* (def. 1), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/dynamic_adj?tab=meaning_and_use#5876255 (last visited Aug. 27, 2023).

¹²² First Committee, Provisional Verbatim Record of the Nineteen Hundred and Ninety-Eighth Meeting, *supra* note 5, at 17 (Mr. Malik, USSR); Conference of the Committee on Disarmament, Final Record of the

manner in which a thing is composed, compounded or made up.”¹²³ This would implicate techniques that change the amounts of certain substances in a natural feature—such as how much of a particular mineral or chemical is in water or air. Finally, “structure” refers to the physical organization of a feature: “the existing arrangement and mutual relation of the constituent parts of a material object, esp as determining its distinctive nature or character.”¹²⁴ A change in “structure” would therefore encompass such effects as melting ice or freezing a body of water. These categories may clearly overlap: for example, causing a rockslide is directly changing the “dynamics” of the shifted material, but will also affect the “structure” of the natural area impacted.

3. “of the Earth . . .”

The idea that a technique must affect “the Earth” (or “outer space”—see below) *prima facie* suggests that the impact must be of significant scale. Changing the composition, structure, or dynamics of the whole Earth would clearly require an immensely powerful technique—such as, in Dinstein’s example mentioned above, burning all of the Amazon rainforests in order to induce global climate change.¹²⁵ But, as noted, Article II does not include any indication that a certain severity of result must occur for an act to be considered an environmental modification technique. The broad scope for application of Article II is further emphasized by the qualifiers following “the Earth,” which indicate that it can be any component of the Earth’s natural state that is affected.

4. “including its biota, lithosphere, hydrosphere or atmosphere . . .”

These terms are, perhaps surprisingly, the most straightforward to interpret, as they are technical terms with only one possible meaning. The biota of the Earth is its “animal and plant life.”¹²⁶ The lithosphere is the “crust of the Earth,”¹²⁷ being the surface and underground. The hydrosphere is “the waters of the earth’s surface collectively,”¹²⁸ so would

Six Hundred and Seventy-Eighth Meeting, at 9 (Mr. Herder, German Democratic Republic), UN Doc. CCD/PV.678 (Aug. 5, 1975); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-First Meeting, *supra* note 82, at 30 (Mr. Roshchin, USSR).

¹²³ *Composition* (def. II.13.b.), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/composition_n?tab=meaning_and_use#8850634 (last visited Aug. 27, 2023); see also *Composition* (defs. 1–2), MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=composition (last visited Aug. 27, 2023).

¹²⁴ *Structure* (def. I.2.), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/structure_n?tab=meaning_and_use#20269001 (last visited Aug. 27, 2023).

¹²⁵ DINSTEIN, *supra* note 73, at 181.

¹²⁶ *Biota*, OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/biota_n?tab=meaning_and_use#20038639 (last visited Aug. 27, 2023); see also *Biota*, MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=biota (last visited Aug. 27, 2023).

¹²⁷ *Lithosphere*, OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/lithosphere_n?tab=meaning_and_use#9938970877 (last visited Aug. 27, 2023); see also *Lithosphere*, MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=lithosphere (last visited Aug. 27, 2023).

¹²⁸ *Hydrosphere*, OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/hydrosphere_n?tab=meaning_and_use#1002741 (last visited Aug. 27, 2023); see also *Hydrosphere*, MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=hydrosphere (last visited Aug. 27, 2023).

encompass all bodies of both fresh and salt water. The atmosphere is “the mass of aeriform fluid surrounding the earth; the whole body of terrestrial air.”¹²⁹ Taken together, these descriptors encompass all aspects of the natural environment on Earth.

5. “*or of outer space. . .*”

Article II also makes clear that ENMOD applies to techniques used in outer space, “the region of space beyond the earth’s atmosphere.”¹³⁰ The way the phrase flows indicates that this encompasses any technique intended to change the “dynamics, composition or structure . . . of outer space.”

6. “. . . *through the deliberate manipulation of natural processes . . .*”

“Deliberate” is straightforward enough: the manipulation of natural processes must be intentional, i.e., environmental change of some kind is a planned result of the military operation. It is notable that the actual outcome of the act need not be intended by the responsible state. If the technique involves the intentional manipulation of natural processes with the purpose of inducing some environmental change (even where the intended change is relatively minor), it will satisfy the Article II definition. Then, if such a technique: (1) is used for a hostile or military purpose; (2) actually results in “widespread, long-lasting or severe” effects; and (3) causes “destruction, damage or injury” to another state party, it may contravene ENMOD regardless of the subjective intention of the state responsible.¹³¹

“Manipulation” is concerned with intentionally making use of something: “skilled or artful management.”¹³² It is sometimes given a negative connotation: “the exercise of subtle, underhand, or devious influence or control over a person, organization, etc.”¹³³ But either way, “manipulation of natural processes” in this context suggests the act of using a change or alteration in one or more natural processes to achieve a certain effect.

A process is “a continuous action, operation, or series of changes taking place in a definite manner,”¹³⁴ while natural is “existing in or formed by nature.”¹³⁵ On the plainest meaning a

¹²⁹ *Atmosphere* (def. 1.b.), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/atmosphere_n?tab=meaning_and_use#34954782 (last visited Aug. 27, 2023); see also *Atmosphere* (def. 1), MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=atmosphere (last visited Aug. 27, 2023).

¹³⁰ *Outer Space* (def. 1), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/outer-space_n?tab=meaning_and_use#10492548 (last visited Aug. 27, 2023); see also *Outer space* (def. 1), MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=outer+space (last visited Aug. 27, 2023).

¹³¹ See, e.g., DINSTEIN, *supra* note 73, at 180.

¹³² *Manipulation* (def. 1), MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=manipulation (last visited Aug. 27, 2023).

¹³³ *Manipulation* (def. 3), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/manipulation_n?tab=meaning_and_use#37927755 (last visited Aug. 27, 2023).

¹³⁴ *Process* (def. 2), MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=process (last visited Aug. 27, 2023); see also *Process* (def. 1.8.), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/process_n?tab=meaning_and_use#28491255 (last visited Aug. 27, 2023).

¹³⁵ *Natural* (def. 1), MACQUARIE DICTIONARY, at https://www.macquariedictionary.com.au/features/word/search/?search_word_type=Dictionary&word=natural (last visited Aug. 27, 2023); see also *Natural* (defs. I, I.1., III.18.b.), OXFORD ENGLISH DICTIONARY, at https://www.oed.com/dictionary/natural_adj?tab=meaning_and_use#35405502 (last visited Aug. 27, 2023).

“natural process” is any process that occurs organically in the environment: gravity, weather, the flow of water, tidal movements, photosynthesis, plant growth, wildfire, even the death of living things.

The implication may be that “deliberate manipulation of natural processes” occurs when any such process is caused or changed by the actions of the state party (or its agents). On this understanding, something as basic as lighting a forest fire, poisoning plant life, or deliberately rolling a boulder down a hill could be construed as an environmental modification technique: such events may occur naturally, but in these examples are caused by a deliberate manipulation. As discussed above, due to the reliance on the Understanding relating to Article II to explain the scope of “environmental modification technique,” straightforward methods causing simple *interruptions* in environmental processes would not traditionally have been viewed as being within the concept of “deliberate manipulation of natural processes.” The text in the actual article, however, does not suggest that ENMOD’s application should be limited only to situations where military operations generate what Roberts terms “damage *by* the forces of the environment.”¹³⁶

7. *Synthesis*

The apparent textual meaning is not the final meaning, as the VCLT stipulates several further steps.

Interpretation under Article 31(1) must also consider the context and the object and purpose of the treaty.¹³⁷ ENMOD’s preamble states that it aimed to “sav[e] mankind from the danger of using new means of warfare” and “recogni[z]ed that scientific and technical advances may open new possibilities with respect to modification of the environment.” Article III, as part of the context, promotes “the fullest possible exchange of scientific and technological information on the use of environmental modification techniques for peaceful purposes.” Both of these extracts imply that ENMOD’s object and purpose was to prevent future developments in environmental warfare. It does not seem to follow that low-technology methods such as burning forests or destroying dams could violate ENMOD. The concentration on futuristic “techniques” is also reinforced by some of the extreme phenomena listed in the Understanding relating to Article II, such as earthquakes, tsunamis, cyclones, and changes to the ozone layer,¹³⁸ which were not (and are not) possible to generate as a result of human action. The above consideration of “technique”¹³⁹ identified that it had several possible meanings, and could perhaps be limited to actions requiring the application of scientific or technical expertise—the object and purpose, as well as the context, may reinforce this specific meaning. Further, they may imply that an environmental modification technique must be some method requiring scientific/technological expertise even to develop, especially given the inclusion of numerous hypothetical techniques in the examples listed in the Understanding.

That said, the Understanding relating to Article II also specifically notes that the phenomena listed are “not exhaustive” and that “other phenomena which could result from the use of

¹³⁶ Roberts, *supra* note 13, at 250.

¹³⁷ VCLT, *supra* note 19, Art. 31(1).

¹³⁸ Consultative Committee of Experts, *supra* note 10, at 92.

¹³⁹ See Section V(A)(1) *supra*.

environmental modification techniques as defined in article II could also be appropriately included.”¹⁴⁰ Additionally, it specifically lists “an upset in the ecological balance of a region” as one of the outcomes which would almost certainly result only from the use of a prohibited environmental modification technique.¹⁴¹ Unlike some of the other examples in the Understanding relating to Article II, an “upset” to such balance would not require any specific technological or scientific development to create. Ecological balance refers to “[a] state of dynamic equilibrium within a community of organisms in which genetic, species, and ecosystem diversity remain relatively stable, subject to gradual changes through natural succession”;¹⁴² or, as was explained in the negotiation process for ENMOD by U.S. delegate Mr. Martin, “the equilibrium existing in the region among various species of plant and animal life in terms of numbers and proportions.”¹⁴³ During these negotiations, Mr. Likhachev of the USSR further clarified that such an “upset” could comprise “any violation of the ecological balance of any part of the world,”¹⁴⁴ suggesting a low threshold for such a phenomenon. As noted above, even fairly innocuous military operations have been found capable of causing long-term changes in the ecology of a region.¹⁴⁵

Given these competing emphases in the context, Article 31(1) interpretation leaves it unclear whether the Article II definition could encompass low-technology methods of causing intentional environmental destruction or whether it is limited only to those which are technologically advanced and likely specially developed for the purpose of generating certain phenomena.

B. Article 31(3)

The VCLT provides that (1) any subsequent agreement between the parties of a treaty, and (2) any subsequent practice in the application of the treaty, are also a primary means of interpretation that must be considered “together with the context.”¹⁴⁶ State practice can only be used as a primary method of interpretation under Article 31(3) where it demonstrates “agreement” among the parties as to the correct interpretation of the treaty.¹⁴⁷ If such agreement

¹⁴⁰ Consultative Committee of Experts, *supra* note 10, at 92.

¹⁴¹ *Id.*

¹⁴² U.S. Dep’t of Agriculture, *Ecological Balance*, NAL AGRICULTURAL THESAURUS (Mar. 11, 2020), at <https://agclass.nal.usda.gov/vocabularies/nalt/concept?uri=https://lod.nal.usda.gov/nalt/358>.

¹⁴³ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 10.

¹⁴⁴ First Committee, Verbatim Record of the Thirty-Fourth Meeting, at 16, UN Doc. A/C.1/31/PV.34 (Nov. 16, 1976).

¹⁴⁵ See notes 111–13 *supra* and corresponding text.

¹⁴⁶ VCLT, *supra* note 19, Arts. 31(3)(a)–(b).

¹⁴⁷ *Id.*; International Law Commission, Georg Nolte, Special Rapporteur, Second Report on Subsequent Agreements and Subsequent Practice in Relation to the Interpretation of Treaties, at 125, para. (43), 128, para. (55), UN Doc. A/CN.4/671 (Mar. 26, 2014) [hereinafter Second ILC Report]; Report of the International Law Commission on the Work of Its Seventieth Session, Subsequent Agreements and Subsequent Practice in Relation to the Interpretation of Treaties, at 13–14, 75–77, UN Doc. A/73/10 (2018) [hereinafter ILC Subsequent Agreements and Practice Draft Conclusions]; Arbitral Award of 3 October 1899 (*Guya. v. Venez.*), Judgment, para. 103, (Apr. 6, 2023), at <https://www.icj-cij.org/sites/default/files/case-related/171/171-20230406-JUD-01-00-EN.pdf>; Whaling in the Antarctic (*Austl. v. Japan*), Judgment, 2014 ICJ Rep. 226, para. 83, (Mar. 31, 2014) [hereinafter *Whaling in the Antarctic*]; World Trade Organization, Appellate Body Report, Japan — Taxes on Alcoholic Beverages, 12–13, WTO Docs. WT/DS8/AB/R, WT/DS10/AB/R, WT/DS11/AB/R (adopted Oct. 4, 1996).

exists, this can expand or narrow the available interpretations under Article 31(1), or in exceptional circumstances even result in an interpretation at odds with the ordinary meaning of treaty terms.¹⁴⁸

Article 31(3)(a) requires an overt agreement about the interpretation of a treaty provision between the states parties. Of the two, it is therefore less complex to identify. Article 31(3)(b) recognizes that in certain cases, the practice of states in applying the provisions of a treaty can also be considered a primary means of interpretation.¹⁴⁹ However, such practice must be relatively widespread and consistent between all states parties, with their clear intention that this relates to the meaning of the treaty.¹⁵⁰ The ILC noted that common understanding of a provision's application may arise even in circumstances where some parties to the treaty have not engaged in the relevant practice or agreement and have accepted it only by "silence or omission";¹⁵¹ however, they emphasized, consistent with commentary by international tribunals, that such acceptance was "not established easily."¹⁵²

For guidance in interpreting Article II of ENMOD, there are two obvious sources of potential subsequent state agreement and/or practice under Article 31(3): the ENMOD review conferences held in 1984 and 1992.

The First Review Conference in 1984 was attended by thirty-four states parties¹⁵³ (out of a total of forty-three at that time).¹⁵⁴ At this conference, some state delegations supported that ENMOD was focused on preventing development of new techniques,¹⁵⁵ while others held that existing techniques had also been prohibited.¹⁵⁶ However, the First Review Conference ultimately did not reach any generally accepted agreement helping inform the meaning of "environmental modification technique" under Article II, with the conference merely "reaffirm[ing] its support for this Article."¹⁵⁷ The resolution subsequently adopted

¹⁴⁸ ILC Subsequent Agreements and Practice Draft Conclusions, *supra* note 147, at 12, 51–52, para. (3), 54, para. (11), 60, para. 27; Second ILC Report, *supra* note 147, at 120–21, para. 20; Dispute Regarding Navigational and Related Rights (Costa Rica v. Nicar.), Judgment, 2009 ICJ Rep. 213, paras. 64, 66 (July 13, 2009) [hereinafter *Dispute Regarding Navigational Rights*].

¹⁴⁹ VCLT, *supra* note 19, Art. 31(3)(b).

¹⁵⁰ Second ILC Report, *supra* note 147, at 125, para. (43), 128, para. (55); ILC Subsequent Agreements and Practice Draft Conclusions, *supra* note 147, at 75–77; IRINA BUGA, MODIFICATION OF TREATIES BY SUBSEQUENT PRACTICE 20 (2018); *Whaling in the Antarctic*, *supra* note 147, para. (83); World Trade Organization, Appellate Body Report, European Communities — Customs Classification of Frozen Boneless Chicken Cuts, paras. 26, 259, WTO Docs. WT/DS269/AB/R, WT/DS286/AB/R (adopted Sep. 12, 2005) [hereinafter *Chicken Cuts* Appellate Body Report].

¹⁵¹ Second ILC report, *supra* note 147, at 129, para. (59).

¹⁵² *Id.* at 131, para. 66. See also Question of the Delimitation of the Continental Shelf Between Nicaragua and Colombia Beyond 200 Nautical Miles from the Nicaraguan Coast (Nicar. v. Colom.), Judgment, 2016 ICJ Rep. 100, para. 44 (Mar. 17, 2016); *Chicken Cuts* Appellate Body Report, *supra* note 150, para. 259.

¹⁵³ First Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Final Document, Article II, UN Doc. ENMOD/CONF.I/13 (Sept. 24, 1984) [hereinafter RC1 Final Document].

¹⁵⁴ First Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Summary of Negotiations Leading to the Conclusion of the Convention on the Prohibition of Military or any Other Hostile Use of Environmental Modification Techniques and of Subsequent Developments Related to the Convention, Annex III, UN Doc. ENMOD/CONF.I/2 (Aug. 20, 1984).

¹⁵⁵ See, e.g., First Review Conference of the Parties to the Convention, *supra* note 74, at 3, paras. 9–10, (Mr. Middleton, United Kingdom).

¹⁵⁶ See, e.g., *id.* at 2, para. (2) (Mr. Vejvoda, Czechoslovakia).

¹⁵⁷ RC1 Final Document, *supra* note 153, at 3.

by the General Assembly similarly did not contain any potential guidance for interpreting Article II.¹⁵⁸

The Second Review Conference, held in 1992, was attended by thirty-two delegations out of the fifty-five states parties at that time.¹⁵⁹ This conference occurred in the wake of environmental destruction committed by Iraq during the first Gulf War, including widespread deliberate burning of oil wells and pollution of ocean waters. Argentina claimed this was “a clear-cut example of the hostile use of environmental modification techniques prohibited by the 1977 Convention”¹⁶⁰—or at least would have been, if Iraq were a party, a sentiment echoed by at least three other states.¹⁶¹ This event led to calls for a review of ENMOD’s protections.¹⁶² As a result, the Second Review Conference had as a specific topic for its discussion “whether activities such as deliberate ‘low-tech’ environmental damage came within its purview.”¹⁶³

This conference concluded definitively that one such technique could indeed contravene ENMOD:

[T]he military or any other hostile use of herbicides as an environmental modification technique in the meaning of Article II is a method of warfare prohibited by Article I if such use of herbicides upsets the ecological balance of a region, thus causing widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State party.¹⁶⁴

This also formed part of the General Assembly resolution confirming the outcome of the conference.¹⁶⁵

As identified above, not all states parties attended the Second Review Conference, and as a result this conclusion was not agreed between all of them. It may therefore be fairly questioned whether this is sufficient to establish relevant agreement under Article 31(3)(a) of

¹⁵⁸ GA Res. 39/151(A) (Dec. 17, 1984).

¹⁵⁹ Preparatory Committee for the Second Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, List of Participants, UN Doc. ENMOD/CONF.II/PC/INF.2 (Apr. 6, 1992); Second Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Summary of Negotiations Leading to the Conclusion of the Convention on the Prohibition of Military or Any Other Hostile Use of the Environmental Modification Techniques and of Subsequent Developments Related to the Convention, Annex III, UN Doc. ENMOD/CONF.II/2 (Aug. 3, 1992).

¹⁶⁰ Sixth Committee, Summary Record of the Eighteenth Meeting, at 5 (Mr. Martinez Gondra, Argentina), UN Doc. A/C.6/46/SR.18 (Oct. 22, 1991).

¹⁶¹ Second Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Working Paper Submitted by Finland and the Netherlands, at 2–3, paras. 12–14, UN Doc. ENMOD/CONF.II/8 (Sept. 8, 1992); Sixth Committee, Summary Record of the Nineteenth Meeting, at 8 (Tunku Dato’Nazihah Mohammed Rus, Malaysia), UN Doc. A/C.6/46/SR.19 (Oct. 23, 1991).

¹⁶² Sixth Committee, *supra* note 161, at 3 (Mr. Winkler, Austria); 9 (Mr. Sardenburg, Brazil); 10 (Mr. Villagran Kramer, Guatemala); Sixth Committee, Summary Record of the Twentieth Meeting, at 2 (Mr. van de Velde, on Behalf of the Netherlands and Eleven Other European States), UN Doc. A/C.6/46/SR.20 (Oct. 30, 1991).

¹⁶³ Second Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Final Document, at 17–18, UN Doc. ENMOD/CONF.II/12 (Sept. 22, 1992) [hereinafter RC2 Final Document].

¹⁶⁴ *Id.* at 11–12.

¹⁶⁵ GA Res. 47/52(E), *supra* note 20, at 7, para (3).

the VCLT. However, the conference had been organized via consultations with all states parties,¹⁶⁶ and the conference conclusions confirmed by the General Assembly, without protest by non-attendees. Given that all states parties had significant notice and opportunity to participate and/or respond, this would appear to be a situation where “circumstances were such as called for some reaction” on the part of states parties who did not attend, if they did not agree with the interpretation of those who did.¹⁶⁷ It is therefore likely that the unanimous conclusion between the conference attendees was agreed by sufficient states parties to be considered “subsequent State agreement” under Article 31(3)(a) and therefore to have primary relevance to the meaning of “environmental modification technique.” This is supported by the fact that Article VIII of ENMOD specifically foreshadows the need to “review the operation of the Convention with a view to ensuring that its purposes and provisions are being realized”;¹⁶⁸ numerous states parties—including Bulgaria, Canada, Italy, and the Netherlands—had only supported the draft ENMOD during the First Committee deliberations on the understanding that any shortcomings and misunderstandings could later be reviewed and refined.¹⁶⁹ The conclusions reached at the Second Review Conference were therefore part of a process explicitly provided for in the text, and sanctioned by the states parties on accession. Several State Law of Armed Conflict manuals now also reflect the position that widespread use of defoliants would be a violation of ENMOD.¹⁷⁰

Herbicides were used extensively in the Vietnam War and thus were definitively not a futuristic “technique” at the time of ENMOD’s conclusion. Further, application of herbicides, even over large areas, is technologically straightforward—it is so similar to crop dusting that the U.S. operation against Vietnam was code named “Ranch Hand.”¹⁷¹ Therefore, state practice under Article 31(3)(a) of the VCLT would seem to exclude the interpretation that ENMOD can only be contravened by futuristic methods that were not yet developed in 1976. Direct destruction of plants using herbicides being construed as a prohibited “manipulation of natural processes” also indicates that phrase should be given a broad meaning. Application of herbicides does not involve any “natural process” being triggered to itself cause destruction in the manner of a volcanic explosion or a tidal wave. Instead, the only resultant manipulation of natural processes is their premature interruption by, for example, preventing photosynthesis or ending the plants’ lifecycle.

¹⁶⁶ GA Res. 46/36(A), at 1–2 (Jan. 3, 1992).

¹⁶⁷ See, for example, the court’s reasoning in: *Case Concerning the Temple of Preah Vihear (Cambodia v. Thai.)*, Judgment, 1962 ICJ Rep. 6, 23 (June 15, 1962); *Certain Expenses of the United Nations*, Advisory Opinion, 1962 ICJ Rep. 151, 174–75 (July 20, 1962). See also ILC Subsequent Agreements and Practice Draft Conclusions, *supra* note 147, at 75–80; BUGA, *supra* note 150, at 65.

¹⁶⁸ ENMOD, *supra* note 1, Art. VIII(1).

¹⁶⁹ See, e.g., First Committee, Verbatim Record of the Twenty-Fourth Meeting, *supra* note 8, at 52 (Mr. Jay, Canada), 78 (Mr. Vinci, Italy); First Committee, Verbatim Record of the Twenty-Eighth Meeting, at 17 (Mr. Yankov, Bulgaria), UN Doc. A/C.1/31/PV.28 (Nov. 10, 1976); First Committee, Verbatim Record of the Thirty-Sixth Meeting, at 7 (Mr. Gutierrez, Bolivia), UN Doc. A/C.1/31/PV.36 (Nov. 17, 1976); First Committee, Verbatim Record of the Forty-Eighth Meeting, at 71 (Mr. van der Zee, the Netherlands), UN Doc. A/C.1/31/PV.48 (Dec. 1, 1976).

¹⁷⁰ See, e.g.: AUSTRALIAN LOAC MANUAL, *supra* note 48, at 4-4, para. (4.11); GERMAN LOAC MANUAL, *supra* note 39, at 60, para. (436); U.S. LOAC MANUAL, *supra* note 40, at 425, para. (6.17.3).

¹⁷¹ See, e.g., Jeanne Mager Stellman et al., *The Extent and Patterns of Usage of Agent Orange and Other Herbicides in Vietnam*, 422 NATURE 681 (2003).

However, despite these indications, the Second Review Conference did not make clear whether the conclusion about herbicides can be generalized to other low-technology methods. The conference unfortunately did not reproduce full records of meetings, but based on the available materials only some states believed that “any and all environmental modification techniques, regardless of the level of the technology employed, were covered by the Convention.”¹⁷² Some other (unidentified) states apparently, in the words of the Canadian delegate, accepted the view that ENMOD “was a futuristic document which covered exotic technologies yet to be invented and, at the same time, assert[ed] that it also covered the use of herbicides, a decidedly low-technology environmental modification technique.”¹⁷³ As a result of this “fundamental disagreement among States parties,”¹⁷⁴ there is no subsequent state agreement applicable under Article 31(1) of the VCLT as to whether or not other low-technology methods may contravene ENMOD.

The Second Review Conference conclusion in regard to herbicides relied wholly on an explanation given to the Conference of the Committee on Disarmament by the United States delegate (as one of two delegations responsible for the original identical drafts) during the negotiations in 1976. The United Kingdom delegate had queried whether the use of “herbicides as an instrument for upsetting the ecological balance of a region would be prohibited,”¹⁷⁵ and the United States delegate Mr. Martin confirmed that “[i]n our view, the convention would prohibit such use of herbicides as the means of destruction . . . if the effects were widespread, long-lasting or severe. An upset of the ecological balance of a region through the use of such techniques would be, at a minimum, a widespread effect.”¹⁷⁶ In the 1992 discussions leading to the Second Review Conference, this acknowledgement was first raised by the Netherlands delegate Mr. Meerburg in the Conference on Disarmament when he stated “the use of herbicides for military or any other hostile purposes is already prohibited by the ENMOD Convention. This is clear from an uncontested interpretative statement made by the United States delegation on 20 April 1976 in the plenary of the then CCD.”¹⁷⁷ This argument appears to have been wholly accepted by the states parties at the Second Review Conference.¹⁷⁸ The conference’s reliance on this single comment by the United States delegate in the *travaux* therefore assigned it unusually high weight.

¹⁷² RC2 Final Document, *supra* note 163, at 35 (Ms. Mason, Canada); 36 (Mr. Lang, Austria; Mr. Patokallio, Finland); 38 (Mr. Gevers, the Netherlands); Second Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, *supra* note 161, at 4–5.

¹⁷³ RC2 Final Document, *supra* note 163, at 35 (Ms. Mason, Canada).

¹⁷⁴ *Id.*

¹⁷⁵ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 10 (Mr. Martin, United States); see original query by the United Kingdom Delegate Mr. Allen at Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Fifth Meeting, at 24, UN Doc. CCD/PV.695 (Mar. 18, 1976).

¹⁷⁶ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 10 (Mr. Martin, United States).

¹⁷⁷ Conference on Disarmament, Final Record of the Six Hundred and Eighteenth Plenary Meeting, at 2 (Mr. Meerburg, the Netherlands), UN Doc. CD/PV.618 (Mar. 24, 1992). See also Conference on Disarmament, Final Record of the Six Hundred and Thirty-Fifth Plenary Meeting, at 13 (Mr. von Wagner, Germany), UN Doc. CCD/PV.635 (Sept. 3, 1992).

¹⁷⁸ Second Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, *supra* note 161, at 4, paras. (24)–(26); RC2 Final Document, *supra* note 163, at 2–3, paras. 8–9 (Ms. Mason, Canada).

However, this is unsurprising if considered in context: as this Article has already demonstrated in its approach to understanding Article II, ENMOD may be challenging to interpret. The United States and USSR, jointly responsible for initial drafting, were often asked by other delegations to explain what certain provisions were intended to mean¹⁷⁹—for example, to clarify the Article I thresholds.¹⁸⁰

Even though the United States and USSR proposed the identical drafts jointly, there are indications that the text was primarily a United States creation. It directly replicates phrases used in earlier internal United States foreign policy documents: for example, the expression “long-lasting, widespread or severe,” as eventually appeared in ENMOD Article I, was stipulated by the U.S. Office of the Secretary of Defense, in 1974, as the minimum scale of impact to which any proposed convention should apply.¹⁸¹ This was apparently because they wanted to preserve the capacity to generate effects such as fog or precipitation for tactical purposes.¹⁸² The identical drafts are also markedly different from an original draft convention proposed by the USSR in 1974.¹⁸³ It is therefore reasonable that other delegations, and later also the Second Review Conference, relied particularly on the U.S. delegate’s explanation of what certain provisions meant.

On this note, it is worth considering the perspectives put forward by drafting delegations in the *travaux préparatoires* in more detail, to further clarify whether low-technology means, aside from herbicides, may be a qualifying environmental modification technique.

C. Article 32

Supplementary means of interpretation can be used under Article 32 of the VCLT to confirm a particular interpretation under Article 31, or, to “determine the meaning when the interpretation according to Article 31 . . . [l]eaves the meaning ambiguous or obscure; or . . . [l]eads to a result which is manifestly absurd or unreasonable.”¹⁸⁴ This is arguably the case with the meaning of “environmental modification techniques” under ENMOD Article II.

¹⁷⁹ See, e.g., Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-Eighth Meeting, at 25–26 (Mr. Martin, United States), UN Doc. CCD/PV.688 (Feb. 17, 1976); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-First Meeting, at 12–15 (Mr. Martin, United States), UN Doc. CCD/PV.691 (Mar. 4, 1976); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Fifth Meeting, *supra* note 175, at 9 (Mr. Berasategui, Argentina); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Seventh Meeting, *supra* note 82, at 27 (Mrs. Thorsson, Sweden); 29–31 (Mr. Fartash, Iran); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Ninth Meeting, at 10 (Mr. Ogiso, Japan), UN Doc. CCD/PV.699 (Apr. 1, 1976); Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 8–10 (Mr. Martin, United States); Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Fifth Meeting, at 17 (Mr. Likhatchev, USSR), UN Doc. CCD/PV.705 (June 22, 1976).

¹⁸⁰ See notes 69–72 *supra* and corresponding text.

¹⁸¹ Memorandum from the President’s Assistant for National Security Affairs (Kissinger) to President Nixon: Washington, August 6, 1974, in U.S. DEP’T OF STATE, FOREIGN RELATIONS OF THE UNITED STATES, 1973–1976: VOL. E–14, PT. 2, DOCUMENTS ON ARMS CONTROL AND NONPROLIFERATION, 1973–1976 214 (2015), at <https://static.history.state.gov/frus/frus1969-76ve14p2/pdf/frus1969-76ve14p2.pdf> [hereinafter Memorandum to President Nixon August 1974].

¹⁸² *Id.*

¹⁸³ Union of Soviet Socialist Republics, Draft Convention on the Prohibition of Action to Influence the Environment and Climate for Military and Other Purposes Incompatible with the Maintenance of Intentional Security, Human Well-Being and Health, Annexed to GA Res. A/RES/3264(XXIX) (Dec. 9, 1974) [hereinafter 1974 USSR draft].

¹⁸⁴ VCLT, *supra* note 19, Art. 32.

The interpretation that only technologically advanced means of manipulation would qualify as “environmental modification techniques” seems both absurd and unreasonable, given the strong confirmation from states that extensive application of herbicides is prohibited by ENMOD. This apparent paradox could be justification to immediately dismiss the possibility that ENMOD does not apply to low-technology methods more broadly. However, some states involved in the Second Review Conference appeared to believe that herbicides were a special exception.¹⁸⁵ This is itself rather absurd: herbicides were singled out for mention in the deliberations because a specific question was asked about them,¹⁸⁶ not because of some unique property that means they, of all low-technology methods of destroying the environment, are the only one relevant under ENMOD.

But even setting possible absurdity aside, the meaning of environmental modification technique also remains “ambiguous and obscure.”¹⁸⁷ Article 31 of the VCLT alone cannot conclusively resolve the query as to whether other low-technology methods of causing environmental change, aside from herbicides, may potentially qualify.

VCLT Article 32 specifically allows recourse to the *travaux préparatoires* and other “circumstances of [ENMOD’s] conclusion”¹⁸⁸ to help resolve this ambiguity. It has also been identified by commentators, such as the ILC, that subsequent state practice that does not specifically demonstrate agreement between the parties may still be a source of “supplementary” interpretation best applied under this article (even though not specifically listed therein):¹⁸⁹ tribunals have made it clear that such practice does have some relevance to the interpretive process, even if it cannot be applied under Article 31(3).¹⁹⁰

1. Travaux Préparatoires

The question as to whether Article II encompasses methods other than (1) future-developed techniques and (2) herbicides can therefore be informed by reference to the *travaux* and the circumstances of ENMOD’s conclusion.

The confusion over what constitutes an “environmental modification technique” can be traced back to the very earliest origins of ENMOD as a concept. As will be discussed below, the United States did originally seek a convention to proscribe only futuristic, technologically advanced methods of causing environmental change (particularly to the weather and climate). However, due to several factors, it lost control of the narrative of ENMOD. The issue came to the United Nations through the USSR in October 1974, and was then referred on to the Conference of the Committee on Disarmament before the United States had prepared its own draft convention. There was quite extensive deliberation in the Conference during

¹⁸⁵ RC2 Final Document, *supra* note 163, at 35.

¹⁸⁶ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 10.

¹⁸⁷ VCLT, *supra* note 19, Art. 32(a).

¹⁸⁸ *Id.* Art. 32.

¹⁸⁹ ILC Subsequent Agreements and Practice Draft Conclusions, *supra* note 147, at 13–14, 17, 20–21; *see also* BUGA, *supra* note 150, at 75–76.

¹⁹⁰ *See, e.g.*, Case Concerning Kasikili/Sedudu Island (Bots./Namib.), Judgment, 1999 ICJ Rep. 1045, paras. 79–80 (Dec. 13, 1999) [hereinafter *Case Concerning Kasikili/Sedudu Island*]; World Trade Organization, Appellate Body Report, European Communities — Customs Classification of Certain Computer Equipment, para. 93, WTO Docs. WT/DS62/AB/R, WT/DS67/AB/R, WT/DS68/AB/R (adopted Jun. 5, 1998) [hereinafter *Customs Classification of Certain Computer Equipment*].

the summer 1975 session: this included consideration of an original (more explicitly inclusive) USSR draft; submission of working papers by other delegations outlining a broad scope for the issue; and consultations with experts.¹⁹¹ The “identical drafts” prepared by the United States and USSR, which were more closely related to the eventual ENMOD, were not submitted for consideration by the Conference of the Committee on Disarmament until August 21, 1975. Although the identical drafts seemed more aligned with the U.S. delegation’s intention to have a future-focused treaty, which the USSR had now seemingly been convinced to support, the drafts were interpreted more expansively by other delegates in the light of previous discussions. Ultimately, the United States delegation had to agree with some of these interpretations to ensure that ENMOD was recommended by the Conference of the Committee on Disarmament and then the First Committee.

This Section will consider the influence of these background events and documents, and how they suggest that ENMOD should be interpreted to cover low-technology methods more generally.

a. U.S. Senate Initiative and Bilateral Negotiations

During the Vietnam War, the U.S. military made significant use of environmental warfare. The most notorious example of this was the use of so-called “Rainbow Herbicides,” particularly Agent Orange, to defoliate large sections of Vietnamese jungle.¹⁹² But it was not herbicides that led to the United States’ impetus for ENMOD: the environmental warfare attempts that most alarmed the U.S. Senate were instead the trials of “weather modification,” particularly rain seeding, conducted in Laos.¹⁹³ Even though the trials produced negligible results, a potential capacity to create large-scale changes to weather patterns as a means of warfare was deemed unacceptably risky. In July 1972, the Senate resolved to negotiate an international convention prohibiting the use of specific, extreme forms of environmental interference or “weather war”—such as inducing damaging storms or earthquakes.¹⁹⁴

Behind the scenes, the U.S. government had also accepted that the military applications of manipulating the actual weather were limited, and that undertaking to stop such research would therefore not be a significant loss.¹⁹⁵

The United States opened bilateral discussions on the matter with the USSR in 1974.¹⁹⁶ The U.S. concern continued to be with the development of futuristic weather manipulation,

¹⁹¹ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eightieth Meeting, *supra* note 79, at 15 (Mr. Nikolov, Bulgaria).

¹⁹² See generally Stelman et al., *supra* note 171; INSTITUTE OF MEDICINE (US) COMMITTEE TO REVIEW THE HEALTH EFFECTS IN VIETNAM VETERANS OF EXPOSURE TO HERBICIDES, VETERANS AND AGENT ORANGE: HEALTH EFFECTS OF HERBICIDES USED IN VIETNAM 23–60 (1994).

¹⁹³ *Foreign Relations of the United States, 1964–1968, Vol. XXVII, Laos — 274. Memorandum from the Deputy Under Secretary of State for Political Affairs (Kohler) to Secretary of State Rusk: Washington, January 13, 1967*, OFFICE OF THE HISTORIAN, at <https://history.state.gov/historicaldocuments/frus1964-68v28/d274>.

¹⁹⁴ 119 Congressional Record S23303–5 (daily ed., July 11, 1973).

¹⁹⁵ 21. *Action Memorandum from the Director of the Office of International Scientific and Technological Affairs (Pollack) to Secretary of State Kissinger: Washington, November 1, 1973*, in U.S. DEP’T OF STATE, *supra* note 181, at 47.

¹⁹⁶ See, e.g., 40. *Memorandum of Conversation: Washington, April 12, 1974, 2:15 pm*, in U.S. DEP’T OF STATE, *supra* note 181, at 91; 61. *Memorandum of Conversation: Moscow, July 1, 1974, 5:10–9:30 pm*, in U.S. DEP’T OF STATE, *supra* note 181, at 163, 178–81 [hereinafter Memorandum of Conversation July 1, 1974].

and they did not conceive of any potential agreement applying to existing methods of war that might negatively impact the environment.¹⁹⁷ Forgoing development of other environmental warfare methods outside the area of weather manipulation appeared to be genuinely a “hard sell” for the U.S. Department of Defense;¹⁹⁸ then-Secretary of State Henry Kissinger advised Soviet Minister of Foreign Affairs Andrey Gromyko in July 1974 that the United States could not agree to a total ban.¹⁹⁹

b. 1974 USSR Draft

To the surprise and consternation of the United States,²⁰⁰ the USSR took the matter directly to the United Nations.²⁰¹ The USSR letter raising the issue was focused on the possibility that scientific development would “be used to create new types of weapons of mass destruction and to devise new means of waging war.”²⁰² This therefore appeared to adopt a similar perspective as expressed by the U.S. Senate: the USSR did not seek to prohibit intentional environmental damage per se, but instead to prevent the future development of new and unpredictable methods for causing such damage.

But in 1974, the USSR proposed a draft convention on environmental warfare that was ambiguous on this issue.²⁰³ Article I of the draft proposed that parties undertake “not to develop meteorological, geophysical or any other scientific or technological means of influencing the environment, including the weather and climate, for military and other purposes”;²⁰⁴ this repeated the intention to prevent states from developing and using new techniques. But its Article II, a list of the kind of environmental change that may be caused by environmental modification techniques, featured some decidedly low-technology examples. These included: (1) “[m]odification of the natural state of the rivers, lakes, swamps and other aqueous elements of the land by any methods or means, leading to reduction in the water-level, drying up, flooding, inundation, destruction of hydrotechnical installations or having other harmful consequences”;²⁰⁵ (2) “[d]isturbance of the natural state of the lithosphere, including the land surface, by mechanical, physical or other means, causing erosion, a

¹⁹⁷ See, e.g., 74. *Memorandum from Michael Gubin of the National Security Council Staff to Secretary of State Kissinger: Washington, August 27, 1974*, in U.S. DEP’T OF STATE, *supra* note 181, at 229–30; 75. *Minutes of a Senior Review Group Meeting: Washington, August 28, 1974, 10:37–10:57 am*, in U.S. DEP’T OF STATE, *supra* note 181, at 241, 243.

¹⁹⁸ 34. *Memorandum of Conversation: Washington, March 20, 1974*, in U.S. DEP’T OF STATE, *supra* note 181, at 77, 80 [hereinafter *Memorandum of Conversation March 1974*].

¹⁹⁹ *Memorandum of Conversation July 1, 1974*, *supra* note 196, at 181; see also 62. *Memorandum of Conversation: Moscow, July 2, 1974, 12:45–3:15 pm*, in U.S. DEP’T OF STATE, *supra* note 181, at 182, 186.

²⁰⁰ 87. *Memorandum from David Elliott of the National Security Council Staff and the Counselor of the Department of State (Sonnenfeldt) to Secretary of State Kissinger: Washington, October 4, 1974*, in U.S. DEP’T OF STATE, *supra* note 181, at 298 [hereinafter *Memorandum from David Elliott*]; 135. *Telegram 2490 from the Mission in Geneva to the Department of State: Geneva, April 11, 1975, 0845Z*, in U.S. DEP’T OF STATE, *supra* note 181, at 447 [hereinafter *Telegram 2490*]; see also Lawrence Juda, *Negotiating a Treaty on Environmental Modification Warfare: The Convention on Environmental Warfare and Its Impact upon Arms Control Negotiations*, 32 INT’L ORG. 975, 977–79 (1978).

²⁰¹ UN General Assembly, Letter Dated 7 August 1974 from the Minister for Foreign Affairs of the Union of Soviet Socialist Republics Addressed to the Secretary-General, UN Doc. A/9702 (Aug. 7, 1974).

²⁰² *Id.* at 2.

²⁰³ 1974 USSR Draft, *supra* note 183.

²⁰⁴ *Id.* Art. I.

²⁰⁵ *Id.* Art. II(1)(i).

change in the mechanical structure, desiccation or flooding of the soil, or interference with irrigation or land improvement systems";²⁰⁶ and (3) "[t]he burning of vegetation and other actions leading to a disturbance of the ecology of the vegetable and animal kingdom."²⁰⁷ While reading Article I in isolation could suggest that the Convention would only prohibit inchoate techniques, Article II seemed to set the threshold far lower and implicate many ancient military strategies—for example burning forests, poisoning water supplies or destroying dams.²⁰⁸ Given that Article I also included an undertaking "never under any circumstances to resort to such means of influencing the environment and climate or to carry out preparations for their use,"²⁰⁹ this appeared a very significant prohibition.

The presentation of the draft to the First Committee in October 1974 did little to clarify the confusion. USSR delegate Mr. Malik mentioned numerous improbable techniques such as: redirecting hurricanes; destroying targeted portions of the ozone layer; using fields of sound to cause mental instability; causing tidal waves; and melting the ice caps.²¹⁰ Again, this implied the draft Convention was primarily aimed at preventing development of such novel technologies. However, Mr. Malik also referred to the destruction of forests by "herbicides, defoliants and fire storms" and the painstaking process of rehabilitating areas of Vietnam affected by herbicides and mechanical destruction.²¹¹

Regardless of what the subjective USSR intention was, the draft text suggested a complete prohibition on many known forms of environmental warfare. David Elliott of the United States National Security Council observed, in October 1974, that the proposed USSR draft was "broader in concept than [the US] envisaged."²¹² After the later introduction of the identical drafts (which removed the references to all of the above feasible techniques) a need for "examples of a somewhat less fanciful character" was one common suggestion by delegations in the Conference of the Committee on Disarmament, such as those of Sweden, Argentina, the Federal Republic of Germany and Pakistan.²¹³ The Mongolian delegation expressly "prefer[red] article II of the original Soviet draft convention, paragraph 1 of which gives a fairly exhaustive list of actions to be prohibited."²¹⁴ The Republic of Korea later used wording extracted from the 1974 USSR draft in its accession to the finalized ENMOD, noting its understanding that "deliberately changing the natural state of rivers falls within the

²⁰⁶ *Id.* Art. II(1)(j).

²⁰⁷ *Id.* Art. II(1)(k).

²⁰⁸ For a wide-ranging review of historical examples of environmental warfare, see generally Westing, *supra* note 24.

²⁰⁹ 1974 USSR Draft, *supra* note 183, Art. I.

²¹⁰ First Committee, Provisional Verbatim Record of the Nineteen Hundred and Ninety-Eighth Meeting, *supra* note 5, at 11–12.

²¹¹ *Id.* at 14–15.

²¹² Memorandum from David Elliott, *supra* note 200, at 298.

²¹³ First Committee, Provision Verbatim Record of the Two Thousand and Eighty-Eighth Meeting, *supra* note 68, at 8–9–10 (Mrs. Thorsson, Sweden); see also Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Fifth Meeting, *supra* note 179, at 13 (Mr. Berasategui, Argentina); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Seventh Meeting, *supra* note 82, at 8–9 (Mr. Schlaich, Federal Republic of Germany); Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Seventeenth Meeting, *supra* note 68, at 16 (Mr. Saleem, Pakistan).

²¹⁴ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Second Meeting, at 24 (Mr. Erdenechuluun, Mongolia), UN Doc. CCD/PV.702 (Apr. 13, 1976).

meaning of the term ‘environmental modification techniques’” and quoting verbatim the possible effects on the hydrosphere provided by the 1974 draft.²¹⁵

In December 1974, the General Assembly took note of the draft USSR convention and referred the issue to the Conference of the Committee on Disarmament for further consideration with the aim of concluding a treaty.²¹⁶

c. 1975 Working Papers

Environmental warfare was first discussed in the Conference of the Committee on Disarmament during the summer 1975 session.²¹⁷ Two delegations submitted research studies in an attempt to delineate the scope of the problem. The most influential of these was a document compiled by Canada, which set out both hypothetical and feasible techniques for environmental modification.²¹⁸ The feasible techniques listed included: introducing nuclear material into the ocean;²¹⁹ large-scale burning of vegetation;²²⁰ generating avalanches and landslides;²²¹ and diversion of rivers.²²² This document was well-received by fellow delegations and was periodically referred to during the deliberations at the Conference of the Committee on Disarmament leading to the draft ENMOD.²²³ It was also condensed into a short-form list by the Swedish delegation, which again included feasible techniques: “[m]aking of avalanches and landslides”; “[d]iversion and pollution of rivers and destruction of dams”; and “[b]urning of vegetation.”²²⁴

These documents suggest an early understanding that even though a hypothetical treaty on environmental modification might focus on preventing the development of new techniques, it would also prohibit extensive environmental change caused by known, low-technology methods.

d. Identical Drafts and Negotiations

By April 1975, the United States had determined to introduce a “draft EnMod convention at the summer session to counter the troublesome and unacceptable [USSR] text.”²²⁵ It is

²¹⁵ UN Office for Disarmament Affairs, Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques: Declarations, Statements, Reservations and Notes, at <https://treaties.unoda.org/enmod/declarations>.

²¹⁶ 1974 USSR Draft, *supra* note 183.

²¹⁷ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Fifty-Ninth Meeting, *supra* note 6.

²¹⁸ UN General Assembly, Report of the Conference of the Committee on Disarmament, Annex II, at 93, UN Doc. A/10027 (1976).

²¹⁹ *Id.* at 100.

²²⁰ *Id.* at 101.

²²¹ *Id.* at 102.

²²² *Id.* at 103.

²²³ See, e.g., Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eightieth Meeting, *supra* note 79, at 19 (Mr. Fartash, Iran); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-Third Meeting, at 22 (Mrs. Thorsson, Sweden), UN Doc. CCD/PV.683 (Aug. 21, 1975); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Ninth Meeting, *supra* note 179, at 9 (Mr. Ogiso, Japan), 11 (Mr. Barton, Canada).

²²⁴ UN General Assembly, Report of the Conference of the Committee on Disarmament, *supra* note 218, at 118.

²²⁵ Telegram 2490, *supra* note 200, at 447.

unclear how a compromise was arrived at, but on August 21, 1975, the United States and the USSR introduced identical drafts to the Conference of the Committee on Disarmament.²²⁶

It could be imagined that, with the two Cold War superpowers in complete agreement, other delegations at the Conference of the Committee on Disarmament and the First Committee might have been easily convinced to accept the proposed text. However, this was not so. In fact, it took significant negotiations and concessions at each stage of its progress to see ENMOD only very narrowly accepted for referral to the General Assembly.²²⁷ The delegate for the Netherlands, Mr. Kooijmans, observed during the deliberations held in the First Committee at the end of 1976:

The draft convention on the prohibition of military or any other hostile use of environmental modification techniques is the result of intensive negotiations in the CCD. . . . We consider the draft convention before us a considerable improvement on the one submitted in August 1975 by the United States and the Soviet Union.²²⁸

It seems clear that, in proposing the identical drafts, the United States and the USSR were focused on preventing development of new techniques of environmental modification. Some other states appeared to accept this as the sole purpose of ENMOD: for example, the delegate for Mongolia indicated that “prohibition of action to influence the environment for military purposes is still—fortunately—of a preventive nature,”²²⁹ while the delegate for Iran indicated that “it would seem that to date the only possible methods of environmental warfare are in the area of weather modification, and even here the possibilities are still very restricted.”²³⁰ The very avenue in which it was discussed, the Conference of the Committee on Disarmament, suggested that the draft convention would be geared toward preventing the development and use of potential environmental weapons.

However, although future technological developments remained the focus overall,²³¹ the majority of delegations (including the USSR and the United States) acknowledged that some

²²⁶ 1975 USSR Identical Draft, *supra* note 67, at 186; 1975 United States Identical Draft, *supra* note 67, at 189; *see also* Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-Fourth Meeting, *supra* note 67.

²²⁷ *See* First Committee, Verbatim Record of the Fifty-First Meeting, UN Doc. A/C.1/31/PV.51 (Dec. 3, 1976); *see also* Conference of the Committee on Disarmament, Report of the Conference of the Committee on Disarmament: Vol. I, *supra* note 78 at 86.

²²⁸ First Committee, Verbatim Record of the Twenty-Sixth Meeting, at 18–20, UN Doc. A/C.1/31/PV.26 (Nov. 9, 1976); *see also* Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Twenty-Second Meeting, at 6–7 (Mr. Wyzner, Poland), UN Doc. CCD/PV.722 (Aug. 19, 1976); Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Twenty-Seventh Meeting, *supra* note 97, at 16; First Committee, Verbatim Record of the Twenty-Fourth Meeting, *supra* note 8, at 27 (Mr. Pastinen, Finland); First Committee, Verbatim Record of the Twenty-Seventh Meeting, at 38 (Mr. Issraelyan, USSR), UN Doc. A/C.1/31/PV.27 (Nov. 10, 1976).

²²⁹ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-Second Meeting, *supra* note 81, at 18 (Mr. Dugersuren, Mongolia).

²³⁰ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eightieth Meeting, *supra* note 79, at 18 (Mr. Fartash, Iran).

²³¹ *See, e.g.*, First Committee, Provisional Verbatim Record of the Nineteen Hundred and Ninety-Eighth Meeting, *supra* note 5, at 48–50 (Mr. Treczynski, Poland) (“The conclusion of the proposed convention would be tantamount to an important, pre-emptive measure.”); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Fifty-Ninth Meeting, *supra* note 6, at 16 (Mr. Allen, United Kingdom) (“We should recognize from the outset that these environmental techniques are fortunately still for the most part in their infancy.”); Conference of the Committee on Disarmament, Final Record of the

techniques which would be prohibited by ENMOD were already possible. For example, Mr. Martin of the United States noted that “*some* of the activities we are discussing are still largely speculative and may remain so,”²³² and of course explicitly affirmed that widespread use of herbicides could qualify.²³³ The USSR delegation, while generally vague about the limits of the Convention, acknowledged that some ENMOD techniques were “already capable of practical application”²³⁴ and had specifically raised when introducing the item to the First Committee the need to control use of “herbicides, defoliant and fire storms.”²³⁵ Other feasible methods suggested by the drafting delegations included destruction of large forests,²³⁶ pollution of the ocean with “specific agents,”²³⁷ diversion of rivers,²³⁸ and introduction of invasive species.²³⁹

Further, several delegations were critical of the examples that had originally been part of the identical drafts, and were eventually included in the Understandings, for their “fanciful character.”²⁴⁰ Mr. Berasategui of Argentina noted that there should be “additions which would illustrate more clearly what is prohibited, particularly in the case of countries which are far from possessing the technological capacity presupposed by most of the examples given in this article,”²⁴¹ while Mr. Schlaich of the Federal Republic of Germany said “the examples selected should have a certain relevance to reality, for we should avoid giving the impression that we are talking of the world of science fiction and should concentrate rather on the dangers in the real world.”²⁴² The Swedish delegate, Mrs. Thorsson, observed that the “list [gave the] impression that the threshold of the whole treaty is higher than [was] actually

Six Hundred and Ninety-Ninth Meeting, *supra* note 179, at 7 (Mr. Ogiso, Japan) (“The convention . . . encompasses mainly the environmental modification techniques which may be developed in future.”).

²³² Conference of the Committee on Disarmament, Final Record of the Six Hundred and Sixty-Fifth Meeting, at 28, UN Doc. CCD/PV.665 (Apr. 10, 1975) (emphasis added).

²³³ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 10 (emphasis added).

²³⁴ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-First Meeting, *supra* note 82, at 30.

²³⁵ First Committee, Provisional Verbatim Record of the Nineteen Hundred and Ninety-Eighth Meeting, *supra* note 5, at 14–15.

²³⁶ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Seventy-Sixth Meeting, *supra* note 82, at 9 (Mr. Herder, German Republic).

²³⁷ *Id.*

²³⁸ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-First Meeting, *supra* note 82, at 28 (Mr. van der Klaauw, the Netherlands); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Fifth Meeting, *supra* note 175, at 23 (Mr. Allen, United Kingdom); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Seventh Meeting, *supra* note 82, at 9 (Mr. Schlaich, Federal Republic of Germany).

²³⁹ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-First Meeting, *supra* note 82, at 28 (Mr. van der Klaauw, the Netherlands).

²⁴⁰ First Committee, Provisional Verbatim Record of the Two Thousand and Eighty-Eighth Meeting, *supra* note 68, at 8–10 (Mrs. Thorsson, Sweden); *see also* Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Fifth Meeting, *supra* note 175, at 13 (Mr. Berasategui, Argentina); Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Seventh Meeting, *supra* note 82, at 8–9 (Mr. Schlaich, Federal Republic of Germany); Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Seventeenth Meeting, *supra* note 68, at 16 (Mr. Saleem, Pakistan).

²⁴¹ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Fifth Meeting, *supra* note 175, at 13.

²⁴² Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Seventh Meeting, *supra* note 82, at 8–9.

the case,”²⁴³ which was later echoed by the delegate for Yugoslavia, Mr. Lalovic.²⁴⁴ Mr. Lalovic additionally noted that the Convention would cover “means and techniques for altering the human environment, which are already known or which may be discovered.”²⁴⁵

The fact that more realistic examples were not included in the Understanding to Article II, despite all of these requests, could be taken as evidence that they were simply not intended to be within the scope of ENMOD. On this, an “important clarification” was provided by United States delegate Mr. Martin to the various delegations who had raised the issue.²⁴⁶ He explained examples were selected that would always be unambiguous violations of ENMOD: any action that produced such phenomena necessarily “would result . . . in widespread, long-lasting, or severe damage, destruction or injury”²⁴⁷—contravening both Articles I and II, as also noted above.²⁴⁸ In other words, “[t]he hostile use of environmental modification techniques so as to cause such phenomena as the means of destruction, damage or injury to another State party would therefore be prohibited.”²⁴⁹ This means that according to the United States drafting delegation (and presumably as understood by the other drafting delegations after this clarification), the Understanding to Article II simply give examples of phenomena that, if created by the actions of a state, will always be considered a violation of ENMOD. This same point was reiterated by him at least twice more during the deliberations both in the Conference of the Committee on Disarmament and the First Committee.²⁵⁰

Mr. Martin also explained the intended scope of “environmental modification technique” generally on two occasions. The first instance occurred in August 1975, during the deliberations in the Conference of the Committee on Disarmament and immediately before the introduction of the identical drafts:

We take the term “environment” in the universal sense, i.e., what is encompassed by the planet Earth, its surface and subsurface, its waters, its atmosphere, and its living things, and outer space. The use of techniques for modifying the environment for military or other hostile purposes then becomes the deliberate manipulation of natural processes. . . . It has become apparent in our discussions that there are types of weapons and military activities other than environmental modification techniques which can also cause environmental damage—bombs leave craters, the movement of men and equipment leaves traces on the earth’s surface, and vehicles emit exhausts which can contribute to the pollution of their surroundings. It is clear, however, that these effects are not what we should call hostile uses

²⁴³ *Id.* at 27.

²⁴⁴ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and First Meeting, at 20, UN Doc. CCD/PV.701 (Apr. 8, 1976).

²⁴⁵ *Id.* at 17.

²⁴⁶ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 10.

²⁴⁷ *Id.*

²⁴⁸ See notes 94–95 *supra* and corresponding text.

²⁴⁹ Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Third Meeting, *supra* note 10, at 10.

²⁵⁰ See, e.g., Conference of the Committee on Disarmament, Final Record of the Seven Hundred and Twenty-Seventh Meeting, *supra* note 97, at 16–17; First Committee, Verbatim Record of the Twentieth Meeting, *supra* note 9, at 27.

of environmental modification techniques. Much as we would like to see the scourge of war eliminated completely, limitations on the use of environmental modification techniques for military and other hostile purposes should not be extended to cover these cases of incidental environmental damage.²⁵¹

Mr. Martin's indication that "deliberate manipulation of natural processes" is "the use of techniques for modifying the environment for military or any other hostile purposes" seems quite a circular definition. However, taken in the context of the rest of the quotation, he explains that the main point was to differentiate between "environmental modification techniques," understood as instances where effects on the environment are the intended outcome, and collateral damage resulting from other military or hostile actions. The implication that vehicle exhaust or traces left on the earth's surface by troop movements would have to be expressly excluded supports that "environmental modification technique" does not apply only to futuristic technology, with herbicides as some special exception. This impression is reinforced by another statement made by Mr. Martin to the Conference of the Committee on Disarmament while introducing the identical drafts the following week, that "this draft provides a basis for distinguishing between the use of environmental modification techniques as weapons, which is covered by the prohibition, and the environmental impact of other weapons, which is not covered."²⁵²

In March 1976, the draft Convention was under debate in the First Committee. Mr. Martin was therefore required to explain Article II to another audience:

This definition is intended, among other things, to make clear that the draft convention is concerned with the manipulation of natural forces in such a way as to cause an intended environmental effect. It follows, therefore, that the convention is not concerned with effects on the environment that are incidental to the use of other weapons or techniques of warfare.²⁵³

This emphasizes even more clearly that Article II primarily differentiates between collateral damage to the environment, where impacts on natural processes are a side-effect of conventional weaponry—say, for example, if the use of an explosive sparked a forest fire—and where they result from intentional effort to cause environmental change—such as where the sole purpose of detonating the explosive was to induce the fire or other environmental consequence. Neither of these explanations from Mr. Martin suggest that "technique" is necessarily something futuristic; indeed, the use of the phrase "techniques of warfare" in Mr. Martin's explanation supports the argument that "technique" should be given a general interpretation.

The resulting accepted reading of both Article II and the Understanding relating to Article II among the drafting delegations is demonstrated clearly by Mr. van der Zee of the Netherlands, speaking in the First Committee to correct what he considered a misinterpretation:

²⁵¹ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eightieth Meeting, *supra* note 79, at 23.

²⁵² Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-Fourth Meeting, *supra* note 67, at 10; *see also* Conference of the Committee on Disarmament, Final Record of the Six Hundred and Fifty-Ninth Meeting, *supra* note 6, at 17 (Mr. Allen, United Kingdom).

²⁵³ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-First Meeting, *supra* note 179, at 13.

[T]he use of environmental modification techniques to cause any of the phenomena listed as examples in the agreed understandings on article II is always—I repeat, always—prohibited. Only with respect to activities which are not mentioned in the examples, but which clearly fall under the description in article II, the question arises if these are “widespread”, “long-lasting” or “severe.” I have tried to find examples of possible hostile activities in this field which would not be prohibited by the convention. Frankly, they are not easy to find. Taking into account the definitions given of the words, “widespread, long-lasting or severe” and taking into account that the activity is prohibited when only one of the three elements applies, there is really very little left. As far as I know, no one has mentioned as yet any example of a permitted activity. The only examples I could find refer to the stimulation or dissipation of fog, the diversion of a creek near a border area or other such small activities.²⁵⁴

Several other delegates concurred that ENMOD was quite a comprehensive prohibition on hostile environmental change.²⁵⁵ As Mr. Likhachev of the USSR noted, in an unusually direct manner:

The scope of the prohibition envisaged in the draft convention is not only broad but—and this is the main thing—the prohibition applies to all the most dangerous forms of military techniques for modifying the natural environment. It applies to any manipulation technique of the environment that would produce any changes whatsoever in the dynamics, composition or structure of the earth, including its biota, lithosphere, hydrosphere and atmosphere, as well as in outer space. More specifically, it applies to the use for military or any other hostile purposes of changes in the elements of the weather: clouds, precipitation, cyclones, storms and so on; to artificially induced earthquakes, tidal waves and changes in the climatic elements, in ocean currents, and in the ozone layer, and to any violation of the ecological balance of any part of the world.²⁵⁶

Overall, the *travaux* support the interpretation that “environmental modification technique” under Article II should be considered to encompass low-technology methods of intentionally creating environmental effects, and is not limited only to technologically sophisticated methods.

2. State Practice Under Article 32

The ILC has found that subsequent state practice that does not demonstrate sufficient agreement between the parties to be relevant under Article 31(3) of the VCLT can still inform “supplementary” interpretation under Article 32 (even though not specifically listed in that article).²⁵⁷ This is consistent with international tribunal decisions, which do allow such sporadic state practice to have some relevance to interpretation despite being inapplicable under

²⁵⁴ First Committee, Verbatim Record of the Forty-Eighth Meeting, *supra* note 169, at 68–71.

²⁵⁵ *See, e.g.*, First Committee, Verbatim Record of the Thirty-First Meeting, at 2, 4–5 (Mr. Wyzner, Poland), 72 (Mr. Pastinen, Finland), UN Doc. A/C.1/31/PV.31 (Nov. 12, 1976); First Committee, Verbatim Record of the Thirty-Fourth Meeting, *supra* note 144, at 16 (Mr. Likhachev, USSR).

²⁵⁶ First Committee, Verbatim Record of the Thirty-Fourth Meeting, *supra* note 144, at 16.

²⁵⁷ ILC Subsequent Agreements and Practice Draft Conclusions, *supra* note 147, at 17, 20–21.

Article 31(3).²⁵⁸ Such state practice can therefore have some relevance, together with the *travaux préparatoires*, to help confirm or clarify an interpretation derived under Article 31.²⁵⁹

The examples cited above from the Second Review Conference may therefore apply here.²⁶⁰ However, as noted in the *chapeau* to this Section, these examples are equivocal: some states explicitly indicated that low-technology methods could be violations of ENMOD,²⁶¹ while others apparently (though not on record) had the opposite view.²⁶² Therefore these views do not provide much additional strength to either side of the argument. However, bearing in mind that treaty interpretation must lean away from “absurd or unreasonable” interpretations, it is worth revisiting the point made by Canadian delegate MS Mason to the Second Review Conference: holding that ENMOD covers only “exotic technologies yet to be invented” and herbicides, specifically, is absurd.²⁶³ The more “consistent approach that any and all environmental modification techniques, regardless of the level of the technology employed, were covered by the Convention”²⁶⁴ is not only more logically supportable but more strongly supported by the *travaux*. On balance, this interpretation should therefore be preferred and “technique” as used in the Article II definition taken to encompass low-technology methods. The fact that some states apparently do not agree influences this conclusion but does not prevent it—the absence of widespread state agreement clearly cannot prevent a treaty provision from having meaning when all available relevant information is weighed.

VI. WHAT DOES ENMOD PROHIBIT?

The goal of this Article has been to winnow down the fairly winding text of ENMOD Article II and the Understandings and answer the question of what ENMOD actually prohibits. On the basis of the above analysis, the interpretation arrived at is that ENMOD prohibits acts which satisfy the following five criteria:

1. A state party is responsible; and
2. It employs any method (whatever its technological complexity) to intentionally provoke a change in the environment; and
3. It is motivated by a military or other hostile purpose; and
4. It causes, whether intended or not:
 - a. a phenomenon listed in the Understanding relating to Article II; or
 - b. any other impact on natural processes
 - c. that has widespread, long-lasting or severe effects; and
5. It results in damage, destruction, or injury to another state party.

²⁵⁸ See, e.g., *Case Concerning Kasikili/Sedudu Island*, *supra* note 190, paras. 79–80; *Customs Classification of Certain Computer Equipment*, *supra* note 190, para. 93.

²⁵⁹ VCLT, *supra* note 19, Art. 32.

²⁶⁰ See notes 172–174 *supra* and corresponding text.

²⁶¹ RC2 Final Document, *supra* note 163, at 35 (Ms. Mason, Canada); see also *id.* at 36 (Mr. Lang, Austria; Mr. Patokallio, Finland); 38 (Mr. Gevers, the Netherlands); Second Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, *supra* note 161, at 4–5.

²⁶² RC2 Final Document, *supra* note 163, at 35 (Ms. Mason, Canada).

²⁶³ *Id.* at 35, paras. 8–9 (Ms. Mason, Canada).

²⁶⁴ *Id.* at 35, para. 10 (Ms. Mason, Canada).

One point of uncertainty that could be raised about this interpretation is the lack of subsequent state practice supporting the extension to 4(b) above. The Second Review Conference and the associated General Assembly resolution indicated that use of herbicides may violate ENMOD where they cause an “upset in the ecological balance of the region,” a criterion included as an example in the Understandings.²⁶⁵ This may *prima facie* indicate that low-technology methods (and, indeed, any methods) could only be considered a violation of ENMOD where they cause a phenomenon listed in the Understandings. However, Article I and the non-exhaustive nature of the Understandings make it absolutely clear that an environmental modification technique need not cause these specified outcomes to be unlawful.²⁶⁶ Given the expansive potential meaning of “natural processes,” this means this interpretation of ENMOD does in essence support the ICRC customary law study rule that “destruction of the natural environment may not be used as a weapon”²⁶⁷ (at least between states parties, and where the effects are widespread, long-lasting, or severe).

On the basis of this interpretation, some real-world examples can be identified that would be possible violations of ENMOD.

The first is the destruction of the Kakhovka Dam in the Russia-Ukraine War. This also seems a clear violation of Additional Protocol I Article 56; however, Article 56 does allow exceptions in extreme circumstances.²⁶⁸ ENMOD does not allow exceptions, creating a more rigid prohibition. If the destruction of Kakhovka was an intentional act by Russia, it was conducted by one state party against another for a military purpose, as part of fighting an international armed conflict. It aimed to change the dynamics and composition of the hydrosphere through the manipulation of water flow (being a natural process) to induce damaging flooding. It would therefore be an environmental modification technique under Article II. It caused massive damage, destruction, and injury to Ukraine and satisfied the criteria of widespread (7,300 km²) and severe (based on the “serious or significant disruption or harm to human life, natural and economic resources or other assets”).²⁶⁹ Further, the release of an enormous volume of water that carried “oil products, toxic metals . . . and certain chlororganic compounds” to the ocean will have “long-term consequences for marine ecosystems” in the Black Sea,²⁷⁰ therefore being both long-lasting and resulting in an “upset in the ecological balance.”²⁷¹ It would therefore likely have contravened ENMOD.

Another example would be the intentional destruction of objects in orbit in outer space, such as via ASAT weapons. ENMOD applies explicitly to space.²⁷² If a space object were destroyed with the specific intention of permanently making an orbit unusable, this would be a hostile purpose (during armed conflict, but also at any other time). The presence of

²⁶⁵ Consultative Committee of Experts, *supra* note 10, at 92.

²⁶⁶ *Id.* at 91–92.

²⁶⁷ HENCKAERTS & DOSWALD-BECK, *supra* note 41, at 151.

²⁶⁸ Additional Protocol I, *supra* note 18, Art. 56(2)(a) (“The special protection against attack provided by paragraph 1 shall cease . . . [f]or a dam or a dyke only if it is used for other than its normal function and in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support.”).

²⁶⁹ Consultative Committee of Experts, *supra* note 10.

²⁷⁰ Viktor Vyshnevskiy et al., *The Destruction of the Kakhovka Dam and Its Consequences*, 48 WATER INT’L 631, 639, 643 (2023).

²⁷¹ Consultative Committee of Experts, *supra* note 10, at 92.

²⁷² ENMOD, *supra* note 1, Art. II.

significant debris would be at minimum both “widespread” and “long-lasting.” The damaging effect of such debris relies on the manipulation of a natural process, being the force exerted by gravity to create orbit. If fouling of an orbit, attributable to an ENMOD party, caused “destruction, damage or injury to any other State Party”²⁷³ it could then be considered a violation of ENMOD. Brazil has recently made this point in a working paper submitted to the Open-Ended Working Group on Reducing Space Threats.²⁷⁴

An example of ENMOD’s application to actions outside armed conflict—though certainly with potential armed conflict in mind—is the construction of artificial islands to support military bases by the Peoples’ Republic of China (PRC), also an ENMOD party, on coral reefs in the South China Sea. These actions were already found to violate the United Nations Convention on the Law of the Sea (UNCLOS) by the International Tribunal for the Law of the Sea²⁷⁵—although, of course, the PRC does not agree with this assessment.²⁷⁶ However, there is also an argument that they may be contrary to ENMOD. The bases were built for a military purpose. ENMOD applies to any military or hostile use regardless of the context, and so is clearly applicable outside of armed conflict.²⁷⁷ The development on the reefs and construction of the military bases changed the environment in the affected areas by impacting: (1) the structure of the lithosphere (due to mechanical alteration of the natural state of the reefs); (2) the composition of the biota (due to death of coral and reduction of available reef habitats); and (3) the dynamics of the hydrosphere (due to impact on ocean currents). This was achieved through “manipulation of natural processes” by preventing the natural growth/photosynthesis of the coral and instead using the platform created by the reefs to support dredged material.²⁷⁸ This would seem to be an environmental modification technique under Article II. The effects are at minimum long-lasting, but presumably also widespread and severe based on the likely impact on fish stocks and fish breeding grounds in an area which is already heavily overfished.²⁷⁹ While the Philippines is not a party to ENMOD, Vietnam is (another nation detrimentally affected by the development of the reefs).²⁸⁰ The Understandings include “serious or significant disruption [to] . . . natural and economic resources or other assets”²⁸¹ in the assessment of what a “severe” effect is deemed to be. On this basis, if the construction has caused such disruption for Vietnam it could be a violation of ENMOD. This seems quite possible, due to the complete loss of certain natural reefs

²⁷³ *Id.* Art. I(1).

²⁷⁴ Brazil, Destructive Anti-Satellite Weapons, at 2, UN Doc. A/AC.294/2023/WP.13 (Feb. 6, 2023).

²⁷⁵ South China Sea Arbitration (Phil. v. China), PCA Case No. 2013-19, Award, at 41–42 (July 12, 2016).

²⁷⁶ Mission of the People’s Republic of China to the European Union Press Release, China Has Indisputable Sovereignty Over the South China Sea Islands (June 20, 2016), at http://eu.china-mission.gov.cn/eng/more/SouthChinaSeaIssue160420001/201606/t20160620_8302834.htm.

²⁷⁷ ENMOD, *supra* note 1, Art. I.

²⁷⁸ See, e.g., Matthew Southerland, US-China Economic and Security Review Commission, *China’s Island Building in the South China Sea: Damage to the Marine Environment, Implications and International Law 3* (Staff Research Report, Apr. 12, 2016).

²⁷⁹ *Id.* at 6–7; Pratinashree Basu & Aadya Chaturvedi, *In Deep Water: Current Threats to the Marine Ecology of the South China Sea*, OBSERVER RES. FOUND. (Issue Brief, Mar. 8, 2021), at https://www.orfonline.org/wp-content/uploads/2021/03/ORF_IssueBrief_449_SouthChinaSea-Marine.pdf.

²⁸⁰ Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Ch. XXVI Disarmament (Dec. 10, 1976), at https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVI-1&chapter=26&clang=_en.

²⁸¹ Consultative Committee of Experts, *supra* note 10, at 92.

in the Paracel and Spratly archipelagos. These actions have also caused an “upset in the ecological balance” of the region,²⁸² further supporting that they may be contrary ENMOD.

Importantly, the PRC’s contention that the features of the South China Sea are its own sovereign territory (on which it bases its argument against any violation of UNCLOS²⁸³) is arguably irrelevant in the context of ENMOD. ENMOD does not include any requirement that the detrimental effects occur on the territory of another state party, only that they are “the means of destruction, damage or injury to any other State party.”²⁸⁴ Significant economic impact on other countries bordering the South China Sea is therefore arguably sufficient to render these actions a violation of ENMOD, regardless of the status of the maritime features themselves. On this basis, if Vietnam were to build similar military bases in the Paracels and, in doing so, caused extensive loss of natural resources such as fish stocks to the detriment of the PRC, this could also be a possible violation. ENMOD was specifically anticipated to be applicable to damage caused by one state party to another through actions undertaken on its own territory, despite the potential limitations this may place on its sovereign rights.²⁸⁵

As with so many international law issues, all the technical analysis in the world may not solve the problem of enforcement. ENMOD shares a similar enforcement mechanism as breaches of the peace under the Charter of the United Nations: states are to refer violations of ENMOD to the UN Security Council,²⁸⁶ with the Council to investigate the allegation and organize the appropriate response by other states.²⁸⁷ Given that two of the states named in the examples above are permanent members of the Security Council, with associated veto rights, even if a state were to formally refer these incidents on the basis of an alleged ENMOD violation there would be no chance of the Council taking any decisive action.

However, that does not render the exercise useless. After all, many important treaty obligations (such as UNCLOS, mentioned above) do not have any specified mechanism by which state obligations can be truly “enforced.” The assessment by some states that the actions of another are unlawful may ultimately generate its own momentum capable of effecting legal change; this has been witnessed, for example, in the resurgence of the doctrine of qualified neutrality during the war in Ukraine.²⁸⁸ There are many reasons why states comply with international law, when not actually forced to do so, and many approaches used by states to encourage others of their number to comply.²⁸⁹ States are rarely flagrant in their violations of international law, and generally seek to create a narrative of compliance, both

²⁸² *Id.*

²⁸³ *See, e.g.*, Mission of the People’s Republic of China to the European Union Press Release, *supra* note 276.

²⁸⁴ ENMOD, *supra* note 1, Art. I.

²⁸⁵ *See, e.g.*, First Committee, Verbatim Record of the Thirty-Sixth Meeting, *supra* note 169, at 3 (Mr. Gutierrez, Bolivia).

²⁸⁶ ENMOD, *supra* note 1, Art. V(3).

²⁸⁷ *Id.* Art. V(4)–(5).

²⁸⁸ *See, e.g.*, Michael N. Schmitt, “Strict” Versus “Qualified” Neutrality, ARTS. WAR (Mar. 22, 2023), at <https://lieber.westpoint.edu/strict-versus-qualified-neutrality>; Joanna Jarose, *Optional and Ill-Defined? Reconsidering Strict and Qualified Neutrality in Light of State Responses to Russia’s Invasion of Ukraine*, 44 ADEL. L. REV. 638 (2023).

²⁸⁹ *See, e.g.*, Ingrid Wuerth, *Compliance*, in CONCEPTS FOR INTERNATIONAL LAW 117 (Jean d’Aspremont & Sahib Singh eds., 2019); Harold Hongju Koh, *Why Do Nations Obey International Law?*, 106 YALE L.J. 2599 (1997).

internationally and domestically.²⁹⁰ International pressure from other states claiming an ENMOD violation may not prevent the potentially unlawful actions; the state may simply reject the applicability of the Convention, or find some other justification or interpretation excusing its actions. But there is also the possibility that a state seeking to enact large-scale environmental destruction will be hesitant to risk attracting accusations of violating a treaty obligation. Compared to rules which are based only on norms of behavior, a basis for protest anchored in hard law will be likely to excite additional resistance from states and additional political pressure on the non-conforming state, as well as further assistance for the victim of such actions. Of course, rethinking ENMOD will not, alone, be some panacea capable of single-handedly saving our natural world. But at this dire stage, any possible source of additional protection merits serious consideration.

VII. CONCLUSION

Environmental protection under IHL is relatively minimal and qualified in its application. Because ENMOD prevents only deliberate manipulation of the environment, and does not attempt to limit collateral environmental damage from other forms of warfare, it has an intentionally low threshold for application to any act that can be considered an environmental modification technique. As the delegate for the Netherlands, Mr. van der Klaauw, noted in 1975—some two years before Additional Protocol I would be finalized—this meant that ENMOD would cover an important potential gap in the law, because “although hopefully some of the mentioned [environmental modification] activities will be banned by the new Geneva Conventions, other possibly important ones will not.”²⁹¹

Although ENMOD has commonly been interpreted as applying only to events so extraordinary they are not even scientifically possible, this does not accord with the intentions of most states involved in its drafting, nor with the perspectives adopted by many states parties since. Instead, ENMOD should be considered to apply to any methods used to cause intentional environmental change for hostile or military purposes, regardless of their technological sophistication; these may then be considered unlawful where their effects exceed the Article I thresholds. A violation may be particularly clear where any environmental impact leads to an upset in the ecological balance of a region, which has been specifically held out by the Second Review Conference and the General Assembly as rendering the use of herbicides unlawful.

Further events, especially further state practice, may clarify the interpretation arrived at above. The ILC has observed that treaty terms can have a meaning that is intended to potentially evolve over time:²⁹² this is based on the conclusion of the International Court of Justice that in a longstanding treaty employing general terms “the parties must be presumed, as a general rule, to have intended those terms to have an evolving meaning.”²⁹³ The provisions of ENMOD are treaty terms of this kind by very clear design. ENMOD was always intended to

²⁹⁰ See, e.g., Aurel Sari, *Legal Resilience in an Era of Grey Zone Conflicts and Hybrid Threats*, 33 *CAMB. REV. INT'L AFF.* 846, 849, 856; (2020); Rob McLaughlin, *The Law of the Sea and PRC Grey-Zone Operations in the South China Sea*, 116 *AJIL* 821, 823, 831 (2022); PETER LAYTON, *CHINA'S ENDURING GREY-ZONE CHALLENGE* 19 (2021).

²⁹¹ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Eighty-First Meeting, *supra* note 82, at 29 (Mr. van der Klaauw, Netherlands).

²⁹² ILC Subsequent Agreements and Practice Draft Conclusions, *supra* note 147, at 64.

²⁹³ *Dispute Regarding Navigational Rights*, *supra* note 148, para. 66; see also para 64.

be regularly reviewed under Article VIII, and a number of states used this as justification for accepting it as-is despite any lingering deficiencies or uncertainties.²⁹⁴ Mr. Berasategui of Argentina specifically noted during the deliberations that “there is no guarantee that other Governments . . . will agree in the future with what a Government today considers should be included in the prohibition.”²⁹⁵

Evolving meaning can also be applied in the context of the phrase “an upset in the ecological balance” in the Understandings. Humanity has a constantly improving understanding of how easily irreversible environmental effects can result from human intervention such as logging, pollution, and fishing.²⁹⁶ As observed by the ILC, implementation of laws and legal principles regarding environmental protection “must take into account current scientific knowledge of ecological processes.”²⁹⁷

The protection of the natural environment has become a primary need for humanity, “one of the key challenges of the 21st century.”²⁹⁸ As far back as 1991, Abdullah Toukan wrote that

[t]his planet and its inhabitants cannot tolerate the shocking waste of human and natural resources caused by the destructive violence of war. If a new world order is to arise in the aftermath of the Gulf conflict, the protection of the environment must be a central issue. We have reached the rim of our world: there are no more assets to vandalize, and there are already many areas, such as Sudan and Ethiopia, which suffer from extreme deprivation. The world simply cannot afford to lose further resources.²⁹⁹

Possible contraventions of ENMOD have only rarely been raised by states³⁰⁰ and it has been referred to as a “sleeping” treaty.³⁰¹ However, states parties and their defense forces should consider its requirements before approving planned environmental damage as part of military action, particularly where it could have any significant impact on the ecology of an area. As environmental protection becomes a critical need for a continually growing global population relying on continually dwindling natural resources, the first formal complaint regarding a violation of ENMOD may become increasingly likely. Whether or not the Security Council acts

²⁹⁴ See, e.g., First Committee, Verbatim Record of the Twenty-Fourth Meeting, *supra* note 8, at 52 (Mr. Jay, Canada); 77 (Mr. Vinci, Italy); First Committee, Verbatim Record of the Twenty-Eighth Meeting, *supra* note 169, at 17 (Mr. Yankov, Bulgaria); First Committee, Verbatim Record of the Thirty-Sixth Meeting, *supra* note 169, at 7 (Mr. Gutierrez, Bolivia); First Committee, Verbatim Record of the Forty-Eighth Meeting, *supra* note 169, at 71 (Mr. van der Zee, Netherlands).

²⁹⁵ Conference of the Committee on Disarmament, Final Record of the Six Hundred and Ninety-Fifth Meeting, *supra* note 179, at 10.

²⁹⁶ See generally BILL MAGUIRE, IAN MASON & CHRIS KILBURN, NATURAL HAZARDS AND ENVIRONMENTAL CHANGE (2002); Jochen Krauss et al., *Habitat Fragmentation Causes Immediate and Time-Delayed Biodiversity Loss at Different Trophic Levels*, 13 ECOLOGY LETTERS 597 (2010); WWF, LIVING PLANET REPORT 2022: BUILDING A NATURE-POSITIVE SOCIETY 30 (2022).

²⁹⁷ Draft Principles on Environment in Armed Conflicts, *supra* note 53, at 142.

²⁹⁸ Vöneky, *supra* note 15, at 360.

²⁹⁹ Abdullah Toukan, *The Gulf War and the Environment: The Need for a Treaty Prohibiting Ecological Destruction as a Weapon of War*, 15 FLETCHER F. WORLD AFF. 95 (1991).

³⁰⁰ See, e.g., Sixth Committee, *supra* note 160, at 5 (Mr. Martinez Gondra, Argentina); Sixth Committee, *supra* note 161, at 8 (Tunku Dato' Nazihah Mohammed Rus, Malaysia); Sixth Committee, Summary Record of the Twentieth Meeting, *supra* note 162, at 5–6 (Ms. Fearnley, New Zealand); Second Review Conference of the Parties to the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, *supra* note 161, at 2–3, paras. 12–14.

³⁰¹ Vöneky, *supra* note 15, at 365.

on such a complaint, there is a potential for reinterpretation of ENMOD to create normative change and influence the actions of other states toward potential violators—and toward states who are victims of significant environmental damage at the hands of those seeking to further hostile or military goals.