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Limiting the Misuse of the Environment during Peacetime and War – The ENMOD Convention

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Limiting the Misuse of the Environment during Peacetime and War – The ENMOD Convention*

I. Introduction

The ENMOD Convention of 1976¹ that entered into force in 1978 is an outlier in the area of arms control law and even more in the field of controlling conventional weapons via international treaty law. The Convention consists of ten articles and does not protect against the use of a conventional weapon in a narrow meaning, but rather it protects against the use of new means of warfare. The Convention tries to close loopholes that existed until the 1970s by laying down the prohibition of the misuse of the environment as a weapon or for non-peaceful purposes. It prohibits the hostile use of techniques that modify the environment and the use of environmental degradation as a weapon. Because of the advances of science and technologies, and as the protection of the environment is one of the key challenges of the 21st century, the object and purpose of the Convention is even more relevant today as it was during the 1970s. As long as powerful states like the USA, China, and Russia are states parties to the ENMOD Convention, there is at least some protection by virtue of international treaty law against the hostile use of techniques changing the environment. Whether the examples of these techniques might be part of a science-fiction scenario, as it appears at first glance, is doubtful and will be seen in the future. Although the ENMOD Convention does not protect against biological, chemical or nuclear weapons, and the aim is not to protect the environment as such, the areas of the ENMOD Convention overlap with other international treaties, as the Biological Weapons Convention and the Chemical Weapons Convention, and it can be seen today as one element of a multilayered disarmament regime.

II. Historical Context

At the international plane, the ENMOD Convention dates back to a bilateral initiative of the USA and the former Soviet Union (USSR). The USA and the USSR agreed to diminish the dangers of the use of environmental modification techniques for military purposes. After holding bilateral negotiations at the Moscow summit meeting on 3 July 1974, both states stressed in a joint statement to the UN Secretary General that they „advocate the most effective measures possible to overcome the dangers of the use of environmental modification techniques for military purposes.”² The universal threat of such techniques

* This article is a draft version of my chapter “7.5 ENMOD Convention” in Eric Myjer and Thilo Marauhn (eds), *Research Handbook on International Arms Control Law* (forthcoming 2020).

1 Convention on the Prohibition of Military or Any Other Hostile Use of the Environmental Modification Technique (10 December 1976, entered into force on 5 October 1978 (cf. Article IX para. 3 ENMOD Convention), the Convention was opened for signature and ratification on 18 May 1977 until entry into force), 1108 UNTS (1978) 151–178; 16 ILM (1977) 88–94, and Adam Roberts and Richard Guelff (eds), *Documents on the Laws of War* (3rd ed., OUP 2000) 409–413. Authentic languages are Arabic, Chinese, English, French, Russian and Spanish (Article X ENMOD Convention).

2 UNSC ‘Letter dated 8 August 1974 from the Acting Permanent Representative of the United States of America and the Permanent Representative of the Union of Soviet Socialist Republics addressed to the Secretary-General’ (8 August 1974) UN Doc. S/11428, 5, and UNGA ‘Letter dated 8 August 1974 from the representatives of the Union of Soviet Socialist Republics and the United States of America to the United Nations addressed to the Secretary-General’ (9 August 1974) 29th Session (1974) UN Doc. A/9698, Annex IV: Joint Statement by the USA and the USSR on the Most Effective Measures Possible to Overcome the Dangers of the Use of Environmental Modification Techniques for Military Purposes.

was recognized by both states, as they mentioned the “potential danger to mankind from possible new means of warfare”.³

It seems almost as a kind of natural evolution of international law that such a treaty was proposed during the mid-1970s to shield humankind against the misuse of the environment. Two years earlier, the so-called *Stockholm Declaration* of the United Nations Conference on the Human Environment of 1972,⁴ although soft law, constituted a milestone in developing the normative framework for the international environmental law during peacetime;⁵ the *Stockholm Declaration* at least mentioned nuclear weapons and others weapons of mass destruction as a threat for individuals and the environment.

Another cause for this bilateral initiative of the two superpowers of that time during the cold war, however, have been actions to modify the weather during the Vietnam War by the USA. The secret operations caused a dispute in the responsible US administration at that time about the legality of these actions. Press reports⁶ led to a resolution by the US Senate in favor of banning environmental warfare in 1973.⁷ In its resolution, the Senate proposed

*“that the United States Government should seek the agreement of other governments to a proposed treaty prohibiting the use of any environmental or geophysical modification activity as a weapon of war, or the carrying out of any research or experimentation directed thereto”.*⁸

The US operations can be seen as the first confirmed example of “meteorological warfare”. They included seeding clouds as part of a rainmaking program in South and North Vietnam and over Laos. The purpose was to increase the rainfall and the duration of the monsoon for military purposes. The military aims had been to reduce trafficability of roads, to cause the flooding of lines of communication and to hamper the ability of anti-aircraft missiles during the Vietnam War.⁹ It was even reported that new kinds of chemical agents had been developed and were included into the program; if true, the rain could have had an acidic quality and would have been able to damage military equipment, like radars and trucks.¹⁰ After reports about these operations have been published the lacunae of international public law became obvious. Before the ENMOD Convention entered into force, artificial rainmaking or other ways of environmental warfare had not been prohibited by a specific international treaty.

3 Ibid.

4 Cf. UNGA ‘*Report of the United Nations Conference on the Human Environment*’, (5–16 June 1972) UN Doc. A/CONF.48/14Rev.1, (1973), 3–5, Principle 26: “Man and his environment must be spared the effects of nuclear weapons and all other means of mass destruction. States must strive to reach prompt agreement, in the relevant international organs, on the elimination and complete destruction of such weapons.”

5 Cf. Astrid Epiney, ‘Gegenstand, Entwicklung, Quellen und Akteure des internationalen Umweltrechts’ in Alexander Proelss (ed.), *Internationales Umweltrecht* (de Gruyter 2017), 4, 10.

6 The program had been started in 1963 by the CIA, but from 1967 to 1972 the US Air Force had become involved. Nevertheless, the legality of the cloud seeding operation (especially the operation “Pop-Eye”) was not undisputed in the Johnson administration; cf. Seymour Hersh, ‘Rainmaking is Used as Weapon by U.S.’ *The New York Times* (New York, 3 July 1972) 1.

7 On 26 July 1972, the US Senate Subcommittee on Oceans and International Environment opened its hearings on a resolution the USA should seek agreement with other states about a new international treaty; cf. Adam Roberts and Richard Guelff (eds), note 1, 407.

8 Senate Resolution 71, passed on 11 July 1973, cf. S.Res.71, 93rd Congress (1973–1974).

9 Cf. Seymour Hersh, ‘Rainmaking is Used as Weapon by U.S.’ *The New York Times* (New York, 3 July 1972) 1.

10 Ibid.

Hence, after discussions at the Conference of the Committee on Disarmament (CCD),¹¹ the USSR requested the inclusion of this topic in the agenda of the twenty-ninth session of the UN General Assembly in August 1974.¹² In September 1974, the USSR submitted a draft resolution including a draft convention to the UN General Assembly.¹³ The General Assembly adopted resolution 3264 (XXIX) in December 1974¹⁴ agreeing to the need to adopt an international convention to prohibit the use of environmental modification techniques for hostile purposes. Afterwards, informal meetings on this topic were held by the CCD in 1975.¹⁵ In August of the same year, the USA and the USSR tabled identical drafts of the proposed ENMOD Convention at the CCD.¹⁶

As there was no final consensus, the General Assembly asked the CCD to continue negotiations¹⁷, and the CCD established a Working Group in 1976.¹⁸ On 2 September 1976, the CCD transmitted a revised text to the UN General Assembly together with a set of so-called *Understandings* relating to four articles of the draft Convention (Articles I, II, III and VIII).¹⁹ Finally, the First Committee of the General Assembly recommended the draft convention to the General Assembly for its adoption²⁰ and the General Assembly adopted the text of the ENMOD Convention as an annex to resolution 31/72 on 10 December 1976.²¹

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- 11 UNGA ‘Report of the Conference of the Committee on Disarmament to the General Assembly’ (16 April–22 August 1974), 28th session (1975) UN Doc. Supp. No 27 (1/9727) Annex I: Documents issued by CCD; Annex II: Documents of CCD annexed to report; Annex III: List of Verbatim records of meetings of CCD, UN Doc. A/9627-A/9708-DC/237.
- 12 UNGA ‘Letter dated 7 August 1974 from the Minister of Foreign Affairs to the Union of Soviet Socialist Republics to the Secretary General’ (7 August 1974) 29th session (1974) Un Doc. A/9702/Corr.1.: “Prohibition of action to influence the environment and climate for military and other purposes incompatible with the maintenance of international security, human well-being and health”. The item was allocated to the First Committee of the General Assembly, UNGA ‘Report of the First Committee’ (6 December 1974) 29th session (1974) UN Doc. A/9910.
- 13 UN Doc. A/C.1/L.675, 24 September 1974; cf. UNGA Res 3264 (XXIX) (9 December 1974).
- 14 UNGA Res 3264 (XXIX) (9 December 1974): Prohibition of action to influence the environment and climate for military and other purposes incompatible with the maintenance of international security, human well being and health.
- 15 Informal meetings of the CCD about this topic took place from March to August 1975 in Geneva, including experts and, inter alia, UNEP observers. Before, the US-USSR agreement from summer 1974 to “overcome the dangers of the use of environmental modifications techniques for military purposes” had been brought forward at the CCD in 1974; cf. UNGA ‘Report of the Conference of the Committee on Disarmament to the General Assembly’ (16 April–22 August 1974), 28th session (1975) Un Doc. Supp. No 27 (A/9727).
- 16 For the discussion cf. Report of the Conference of the Committee on Disarmament, UN Doc. A/31/27 (1976), 61–85, para. 273 et seq., available at <<http://unoda-web.s3.amazonaws.com/documents/library/A-31-27-Vol-I.pdf>>.
- 17 UNGA Res 3475 (XXX) (11 December 1975); cf. as well UNGA ‘Report of the First Committee’ (10 December 1975) 30th Session (1975) UN Doc. A/10444.
- 18 UNGA ‘Report of the Conference of the Committee on Disarmament Volume II’ (17 February– 3 September 1976) 31st Session (1976) UN Doc. Supp No 27 (A/31/27) Annex I, 86 et seq.
- 19 UNGA ‘Report of the Conference of the Committee on Disarmament Volume II’ (17 February–3 September 1976) 31st Session (1976) UN Doc. Supp No 27 (A/31/27), Annex I, Report of the Working Group on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Understandings, 91-96; reprinted with regard to Article I in Adam Roberts and Richard Guelff (eds), note 1, 407.
- 20 UNGA ‘Report of the First Committee’ (9 December 1976), 31st Session UN Doc. A/31/382. For the drafting history, see UNGA ‘Draft Resolution’ (4 November 1976) 31st Session (1976) Un Doc. A/C.1/31/L.5); UNGA ‘Draft Resolution’ (10 November 1976) 31st Session (1976) UN Doc. A/C.1/31/L.5/Rev.1; UNGA ‘Draft Resolution’ (29 November 1976) 31st Session (1976) UN Doc. A/C.1/31/L.5/Rev.2); UNGA ‘Draft Resolution (30 November 1976) 31st Session (1976) UN Doc. A/C.1/31/L.5/Rev.2/Corr.1; UNGA ‘Draft Resolution’ (2 December 1976) 31st Session (1976) Un Doc. A/C.1/31/L.5/Rev.3.
- 21 UNGA Res 31/72 (10 December 1976) UN Doc A/RES/31/72. 96 States voted in favor of the resolution, eight States voted against the resolution (Albania, Ecuador, Grenada, Kenya, Kuwait, Mexico, Panama, Zambia) and 30 states abstained, see UNGA, Voting Records, available at <<https://digitallibrary.un.org/record/649688?ln=en>>.

The short time of negotiations was possible as there was an overlapping consensus of the superpowers of that time about the object and purpose of this new ENMOD Convention. Besides, the states could refer to the Biological Weapons Convention (BWC)²² as a kind of model treaty. The BWC was negotiated and opened for signature in April 1972, hence shortly before the negotiations of the ENMOD Convention began. It is not astonishing that the structure of both disarmament treaties are similar and the wording of core rules of both treaties are nearly identical,²³ as well as implementation and dispute resolution clauses and the exceptions for peaceful purposes.²⁴ Both conventions prohibit the development and use of weapons that have been and are perceived rightly as inherently unethical.²⁵

Hence, even during the Cold War²⁶ and intense bilateral tensions between the USA and the USSR a short time after the US Senate proposed such a convention the ENMOD Convention entered into force on 5 October 1978. As the wording of the Convention's preamble shows, states taking part in the negotiations had been aware of the dangers of scientific and technical advances and new ways to modify the environment by using disruptive technologies as well as of the dangers of the use of the environment as a weapon.²⁷ With this scope, the ENMOD Convention differs from other rules protecting the environment negotiated during the 1970s, most importantly Articles 35 para. 3 and 55 para. 1 First Protocol Additional to the Geneva Conventions (AP I).²⁸ The latter aims to protect the environment during an international armed conflict against the use of every kind of weapon, rather than to prevent the misuse of the environment as a weapon.

The ENMOD Convention constituted a major step forward by closing a loophole in the area of international disarmament law during the 1970s. It was backed by an effort of state parties at least for some years after the negotiation of the Convention. In accordance with Article VIII para. 1 ENMOD Convention, the first meeting of states parties (First Review Conference) took place in 1984, five years

22 Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (adopted on 10 April 1972, entered into force on 26 March 1975) 1015 UNTS 163, see its Articles I para. 1 and X.

23 See inter alia Article I BWC (“undertakes never”) and Article II (“undertakes to destroy”), Article I para. 1 and para. 2 ENMOD Convention (“undertakes not to”); Article I para. 1 BWC (“no justification for (...) peaceful purposes”), Article III ENMOD Convention (“not hinder the use (...) for peaceful purposes”); Article I para. 2 BWC (“for hostile purposes or in armed conflict”), Article I para. 1 ENMOD Convention (“in military or any other hostile use”); Article III BWC (“undertakes (...) not in any way to assist, encourage, or induce”), Article I para. 2 ENMOD Convention (“undertakes not to assist, encourage or induce”).

24 See Article IV BWC and Article IV ENMOD Convention; Article V BWC and Article V para. 1 ENMOD Convention; Article VI para. 1 and 2 BWC and Article V para. 3 and 4 ENMOD Convention; Article VII BWC and Article V para. 5 ENMOD Convention; Article X BWC and Article III para. 2 ENMOD Convention.

25 However, the number of states parties (183 in 2020) of the BWC is significantly higher as of the ENMOD Convention. A reason for this might be that the techniques of environmental modification have been and are viewed by some states as part of science fiction without a real or imminent risk of development or use apart from high tech states.

26 Cf. Emily Crawford, ‘Accounting for the ENMOD Convention: Cold War Influences on the Origins and Development of the 1976 Convention on Environmental Modification Techniques’ in Matthew Craven, *International Law and the Cold War* (CUP 2019) 81 et seq.

27 Cf. preamble para. 3 ENMOD Convention. For the procedural history and a list of selected preparatory documents prepared by the UN Codification Division, cf. UN Audiovisual Library of International Law, available at <<https://legal.un.org/avl/ha/cpmhuemt/cpmhuemt.html>>.

28 Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflict (adopted on 8 June 1977, entered into force on 7 December 1978) 1125 UNTS 3. For negotiations the Swiss government convened in Geneva the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts, four sessions took place during 1974–1977.

after the Convention entered into force. A second meeting of states parties (Second Review Conference) was convened in accordance with Article VIII para. 2 ENMOD Convention and took place in 1992.²⁹

However, this was the last meeting of states parties to the ENMOD Convention. Against the background of Article VIII para. 3 ENMOD Convention, the UN Secretary-General tried to initiate the next meeting in 2013,³⁰ but the minimum number of ten positive replies by state parties was not met.³¹ Since the 1990s and after the end of the Cold War divide to fight the threat of environmental warfare may have seemed less important and imminent to the states parties, compared to new threats as the rise of international terrorism after 9/11, the risks of cyber-attacks, drone warfare and the development of autonomous weapons. But, as the advances of biotechnology are speedy and disruptive in recent years,³² one does not have to be an alarmist to argue that the ENMOD Convention, that seems to be a “sleeping” treaty, is highly relevant today and might become most relevant in the not so far future.

III. Current Status and Specific Modes of Interpretation

Although the ENMOD Convention is not universally applicable today, there are nearly 80 states parties to the convention,³³ including Australia, China, Brazil, Canada, Chile, Egypt, Ghana, Germany, India, Japan, Russia, United Kingdom and the USA. Some states have signed but not ratified the convention, like Turkey, Lebanon, Iran, Iraq and Syria.³⁴ Other states are neither signatories nor state parties, such as South Africa and – contrary to most of the European states – France.³⁵

Because of its drafting history, the *Understandings* adopted by the Working Group of the CCD are relevant for the interpretation of the ENMOD Convention. As mentioned above,³⁶ they have been an

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- 29 First Review Conference of the Parties to the Convention, Final Document, 25 September 1984, ENMOD/CONF.I/13/I, available at <<https://s3.amazonaws.com/unoda-web/documents/library/conf/ENMOD-CONF-1-13-1.PDF>>; Second Review Conference of the Parties to the Convention, Final Document, 22 September 1992, ENMOD/CONF.II/12, available at <<https://s3.amazonaws.com/unoda-web/documents/library/conf/ENMOD-CONF-11-12.pdf>>; Antoine Bouvier, ‘Umweltschutz in bewaffneten Konflikten’ (1991/92) 42/43 RJCR 311, 318 et seq.
- 30 UN Secretary-General, Communication to the state parties of the ENMOD Convention of 20 March 2013, ODA/32-2013/ENMOD, available at <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/639911CFE7D2087EC1257B82005B713A/\\$file/13-099nve.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/639911CFE7D2087EC1257B82005B713A/$file/13-099nve.pdf)>.
- 31 UN Secretary-General, Communication to the state parties of the ENMOD Convention of 27 January 2014, ODA/63-2013/ENMOD, available at <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/6AE93F4C89FEF143C1257C740055C00B/\\$file/UNSG+NV+re+ENMOD.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/6AE93F4C89FEF143C1257C740055C00B/$file/UNSG+NV+re+ENMOD.pdf)>.
- 32 Most prominent is CRISPR-Cas9 as new and non-expensive tool for editing the genome; CRISPR (clustered regularly-interspaced short palindromic repeats) are segments of bacterial DNA that, when paired with specific guide protein such as Cas9, can be used to make targeted cuts in an organism’s genome; cf. National Academies of Sciences, *Gene Drives on the Horizon* (The National Academies Press 2016), 1; Ethics Council of the Max Planck Society (ed.), *Discussion paper focusing on genome editing* (2019), available at <<https://www.mpg.de/13811476/DP-Genome-Editing-EN-Web.pdf>>.
- 33 78 Parties (September 2020), available at <https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVI-1&chapter=26&lang=en>. The Convention was open for signature by states until 4 October 1978, cf. note 1.
- 34 For declarations and reservations by states parties and signatories see <https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVI-1&chapter=26&lang=en>.
- 35 Most of the member states of the European Union are parties to the Convention; no parties are, however, Croatia, France, Latvia and Malta, see <https://treaties.un.org/Pages/showDetails.aspx?objid=08000002800385c9&clang=_en>.
- 36 Cf. above II and note 19.

outcome of the negotiations of the CCD to which all thirty member states³⁷ took part. The *Understandings* are, as some scholars argue convincingly, part of the *travaux préparatoires*,³⁸ and are relevant as a subsidiary means of interpretation according to Article 32 Vienna Convention of the Law of Treaties (VCLT)^{39, 40}.

IV. Scope and Core Provisions

According to Article I para. 1 ENMOD Convention, each state party “undertakes not to engage in military or any other hostile use” of an environmental modification technique, if they have “widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party”. Besides, according to Article I para. 2 ENMOD Convention, every state party “undertakes not to assist, encourage or induce any State, group of States or an international organization” to engage in activities that would constitute a violation of Article I para. 1 ENMOD Convention.

This means that the Convention governs, first of all, *environmental modification techniques*. Article II lays down a definition of what constitutes such a technique. It is 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.”

The term “earth” is defined in the broadest sense in the Convention. According to Article II ENMOD Convention, it includes the biota, that is all animal and plant life, the lithosphere, hydrosphere, and atmosphere, even outer space. From this broad definition, it can be deduced that the notions of “dynamics, composition or structure” of the earth have to be interpreted extensively as well.

Because of the requirement of a “deliberate manipulation of natural processes”, it is not sufficient that the manipulation of natural processes is a by-product of the use of a certain technique. With reference to the ordinary meaning – relevant for the interpretation of the Convention according to Article 31 para. 1 VCLT – the notion “deliberate” means that it is necessary and sufficient that the manipulation of a natural process is committed with knowledge.⁴¹

Besides, the wording of Article I para. 1 and Article II ENMOD Convention shows, that a manipulation of natural processes cannot be given, even if the result is damage *to* the environment if human-

37 Adam Roberts and Richard Guelff (eds), note 1, 407.

38 Cf. Stephanie Simonds, ‘Conventional Warfare and Environmental Protection: A Proposal for International Legal Reform’ (1992) 29 *Stanf.JIntL* 165, 186; Richard Tarasofsky, ‘Legal Protection of the Environment during International Armed Conflict’ (1993) *NYIL*, 17, 46; Michael Schmitt, ‘Green War: An Assessment of the Environmental Law of International Armed Conflict’ (1997) 22 *Yale JIntL* 1, 83.

39 Adopted on 23 May 1969, entered into force on 27 January 1980, 1155 UNTS 331.

40 As the *Understandings* have been drafted by a small group of states, taking part in the CCD negotiations, it seems not convincing to argue that the *Understandings* are part of the Convention according to Article 31 para. 2 VCLT. For another view see, however, Erik Koppe, *The Use of Nuclear Weapons and the Protection of the Environment during International Armed Conflict* (Hart Publishing 2008) 137; Anthony Aust, *Modern Treaty Law and Practice* (CUP 2013) 211; Britta Sjöstedt, *The Role of Multilateral Environmental Agreements: A Reconciliatory Approach to Environmental Protection in Armed Conflict* (Hart Publishing, 2020) 37, who argue that the *Understandings* form part of the Convention’s context.

41 As this rule is not the basis for international criminal responsibility of an individual the threshold of intent would be too high; as a general rule intent and knowledge as cumulative requirements are necessary according to international criminal law, cf. Rome Statute of the International Criminal Court (Rome Statute) (adopted on 17 July 1998, entered into force on 1 July 2002), 2187 UNTS 3, Article 30 para 1: “Unless otherwise provided, a person shall be criminally responsible and liable for punishment for a crime within the jurisdiction of the Court only if the material elements are committed with intent and knowledge.”.

made installations are destroyed, and human-made (i.e. artificial) processes are changed. Hence, according to Article I para. 1 ENMOD Convention (potential) causality must be given, and damage must be caused by the modified environment. Most scholars agree, therefore, that no environmental modification technique is used, if oil wells are set on fire, as during the second Gulf War in 2003.⁴² It is argued that the latter is no manipulation of natural processes, but the destruction of human-made installations, even if it is a technique for changing the composition or structure of the earth.⁴³ A similar argument can be made for the mere pollution of the water or air that are not governed by the Convention.

Examples of phenomena that could be caused by the use of these techniques are included in an (expressly non-exhaustive) list in the *Understandings* relating to Article II.⁴⁴ These are

“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.”

These would, as it is argued in the *Understandings*, result or “could reasonably be expected to result” in widespread, long-lasting or severe destruction, and they are therefore prohibited. It would be a misunderstanding, however, to conclude from the last sentence, that (*ex ante*) knowledge about the causality between the modification and the damage or knowledge about the extent of the damage is a *conditio sine qua non* for a violation of the prohibition. If a state deliberately is manipulating the environment and the manipulation causes the damage, a breach of Article I ENMOD Convention is given if the threshold of harm, that will be discussed below,⁴⁵ is met and no peaceful purposes are given.⁴⁶ According to the clear wording of Article II ENMOD Convention, only the manipulation of the environment has to be deliberate.⁴⁷

According to the drafting history, it is not surprising that the modification of the weather by certain means, as for instance the seeding of clouds by injecting silver iodide into clouds as during the Vietnam War⁴⁸ is governed by the ENMOD Convention. Even the use of herbicides can be seen as an environmental modification technique according to the view of the state parties if it changes the ecological balance of a region.⁴⁹

42 Michael Schmitt, ‘Green War: An Assessment of the Environmental Law of International Armed Conflict’ (1997) 22 Yale JIntL 1, 84; Department of Defense, Conduct of the Persian Gulf War: Final Report to Congress, 1992, O-26 et seq., printed in ILM 31 (1992), 612 et seq.; Adam Roberts, ‘Environmental Issues in International Armed Conflict: The Experience of the 1991 Gulf War in Richard Grunawalt et al. (eds), *Protection of the Environment During Armed Conflict* (1996) 69 International Law Studies, 222, 432; Silja Vöneky, *Die Fortgeltung des Umweltvölkerrechts in internationalen bewaffneten Konflikten* (Springer 2001) 53.

43 Adam Roberts, ‘Environmental Destruction in the Gulf War’ (1992) 291 IRRC 538, 544.

44 Understanding relating to Article II, note 19, 92.

45 See below at V.

46 This is different from the wording of the prohibition to damage the environment during an international armed conflict enshrined in Article 35 para. 3 and Article 55 para. 1 AP I (“methods and means of warfare which are *intended, or may be expected, to cause (...) damage (...)*.”)

47 See as well William Boothby, *Weapons and the Law of Armed Conflict* (2nd ed., OUP 2016) 81: “But a failure to foresee the extent of the damage or injury occasioned by the environmental modification activity does not excuse the acting State as long as there is a causal nexus between the deliberate act and the result.”

48 Cf. Seymour Hersh, ‘Rainmaking is Used as Weapon by U.S.’ *The New York Times* (New York, 3 July 1972) 1.

49 Second Review Conference of the Parties to the Convention, Final Document, 22 September 1992, ENMOD/CONF.II/12, available at <<https://s3.amazonaws.com/unoda-web/documents/library/conf/ENMOD-CONF-11-12.pdf>> Part II Final Declaration, 11–12. The Final Declaration can be seen as a subsequent agreement in accordance with Article 31 para 3 lit. a VCLT; Luan Low and David Hodgkinson, ‘Compensation for Wartime Environmental Damage: Challenges to International Law After the Gulf War (1995) 35 VaJIntL 405, 432 et seq.

Even more, the relevance of the ENMOD Convention in the 21st century increased significantly as techniques of modern biotechnology usually fall under the scope of the Convention. *Prima facie* the notion biotechnology – if it does not refer to techniques altering humans – refers to a deliberate manipulation of natural processes for changing the composition of plants or animals.⁵⁰ The latter is, for instance, the case, if via gene drives⁵¹ mosquitos are altered, or other self-dispersing genetic elements based on modern biotechnology are used as a deliberate manipulation of natural processes for changing the composition of plants or animals.⁵² This is true as well if a technique aims to disperse infectious genetically modified viruses that are engineered to edit crop plants in the field. Modern genetic engineering through so-called *horizontal transfer* is even more speedy and flexible, but at the same time more dangerous and unpredictable with regard to the effects than *vertical*⁵³ inheritance – the latter usually used as an agricultural genetic technology.⁵⁴

Besides, the ENMOD Convention is an important treaty to govern modern technologies with regard to new techniques used in the field of so-called geoengineering. These include sunlight reflection strategies that involve atmospheric interventions, as marine cloud brightening, stratospheric aerosol injection and cirrus cloud modification.⁵⁵ The techniques are an advanced form of the techniques used during the environmental warfare in the 1970s; hence the main question is whether they are developed and used for peaceful purposes within the meaning of Article III ENMOD – in order to reverse global warming – or for military or any other hostile use.⁵⁶ Therefore it is not convincing to argue that geoengineering falls outside the scope of the ENMOD Convention; quite to the contrary, the technique is one

50 The notion of modern biotechnology is part of international treaty law, as for instance the Cartagena Protocol on Biosafety to the Convention on Biological Diversity (adopted on 29 January 2000, entered into force on 11 September 2003) 2226 UNTS 208. According to Article 3 lit. i Cartagena Protocol modern biotechnology can be defined as “*the application of (a) in vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or (b) fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection.*”

51 Gene drive systems promote the spread of genetic elements through populations by ensuring that they are inherited more frequently than Mendelian inheritance would predict; cf. Nuffield Council on Bioethics, *Genome Editing: An Ethical Review* (2016), 79. Natural populations of species with short intervals between generations, such as mosquitos, could be changed or wiped out through gene drives. For current approaches to mitigate the risks and neutralize gene drives, cf. Xiang-Ru Shannon Xu, Emily A. Bulger, Valentino M. Gantz, et al, *Active Genetic Neutralizing Elements for Halting or Deleting Gene Drives*, *Molecular Cell* 2020, 18 September 2020, available at <<https://doi.org/10.1016/j.molcel.2020.09.003>>.

52 Cf. Felix Beck, *Responsibility and Liability for Transboundary Harm Caused by Living Modified Organisms Under International Law*, Chapter 2, D. VII (forthcoming 2021).

53 Agricultural genetic technologies usually work by introducing laboratory-generated modifications into target species' chromosomes; they must be vertically inherited from one generation to the next.

54 This is not science fiction but part of current research on some states, cf. Guy Reeves, Silja Vöneky, Derek Caetano-Anolles, Felix Beck, Christophe Boete, ‘Agricultural research, or a new bioweapon system? Insect-delivered horizontal genetic alteration is concerning’ (2018) 362 *Science* 35 et seq.

55 Cf. National Academies of Sciences, *Developing a Research Agenda and Research Governance Approaches for Climate Intervention Strategies that Reflect Sunlight to Cool Earth* (forthcoming 2021), available at <<https://www.nationalacademies.org/our-work/developing-a-research-agenda-and-research-governance-approaches-for-climate-intervention-strategies-that-reflect-sunlight-to-cool-earth>>. Some researchers propose to inject sulfate aerosols into the stratosphere to produce the same global cooling effect as a large volcanic eruption (stratospheric aerosol injection (SAI)), cf. The Royal Society, *Geoengineering the Climate* (2009). Field trials are planned in the US near the Mexican Border by a research project of a university located in the USA, cf. Stratospheric Controlled Perturbation Experiment (SCoPEX).

56 Grant Wilson, ‘Murky Waters: Ambiguous International Law for Ocean Fertilization and Geoengineering’ (2014) 49 *Tex. Int. LJ.* 507, 532; Kerry Brent, Jeffrey McGee, Jan McDonald, ‘Governance of Geoengineering: An Emerging Challenge for International and Domestic Legal Systems’ (2015) 2 *J.L. INF. & SCI.* 1, 9.

regulated by the core norms of the Convention: solar radiation management and other forms of geoengineering changing the climate or weather are prohibited as long as a peaceful purpose is not given.

These examples might show that it would be incorrect to claim that the ENMOD Convention is outdated or irrelevant. It is one of the few international treaties that frames some of the most innovative, but potentially disruptive technologies, as biotechnology and geoengineering, of our century and prohibit their hostile use.

V. Thresholds, Limits and the Peaceful Purposes Clause

Although the technique and the conduct that is prohibited according to Article I ENMOD Convention shall be interpreted broadly according to the wording and the systematics, thresholds have to be met, exceptions and limitations exist.

A *first* limitation of the prohibition of the development and use of environmental modification techniques is the threshold that relates to the effect of the use of such a technique. The military or hostile use of these techniques is prohibited by the ENMOD Convention if and only if it has

“widespread, long-lasting or severe effects as the means of destruction, damage or injury to another State Party”.

Although, the wording is partly identical to the one laid down in Article 35 para. 3 and Article 55 para. 1 AP I (prohibiting “widespread, long-term and severe damage to the natural environment”)⁵⁷ the correct interpretation of “widespread, long-lasting or severe effects” as part of the ENMOD Convention has to refer to the *Understandings*.⁵⁸

These *Understandings* state that for the purpose of the ENMOD Convention,

“the terms “widespread”, “long-lasting” and “severe” shall be interpreted as follows:

- a. “widespread”: encompassing an area on the scale of several hundred square kilometres;*
- b. “long-lasting”: lasting for a period of months, or approximately a season;*
- c. “severe”: involving serious or significant disruption or harm to human life, natural and economic resources or other assets.”*⁵⁹

Although the *Understanding* leaves still grey areas for interpretation, as it was criticized by a state,⁶⁰ there are no convincing reasons to argue that the interpretation of the ENMOD Convention shall be made in the light of Article 35 para. 3 and Article 55 para. 1 AP I. Although the scope of both treaties can overlap, as the AP I is relating to all methods and means of warfare during an international armed conflict, and they have been negotiated during the same time⁶¹ both treaties have different objects and

57 Article 35 (3) AP I generally prohibits “*methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment*”, while Article 55 (1) AP I provides specifically that “*care shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage. This protection 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 prejudice the health or survival of the population.*”

58 Besides being part of the *travaux préparatoires*, for instance, Argentina, as a state party, made the declaration that they interpret the terms in accordance with the definitions agreed upon in the *Understanding* on that Article.

59 *Understanding* relating to Article I, cf. note 19, 91. The CCD stressed that this interpretation of the terms is intended exclusively for the ENMOD Convention, cf. note 19.

60 Turkey made an interpretative statement upon signature and did not ratify the Convention: “In the opinion of the Turkish Government the terms ‘wide-spread’, ‘long lasting’ and ‘severe effects’ contained in the Convention need to be clearly defined. So long as this clarification is not made, the Government of Turkey will be compelled to interpret itself the terms in question and consequently it reserves the right to do so as and when required.”

61 See as well William Boothby, note 47, 80.

purposes: AP I is an international treaty that is part of humanitarian law (*ius in bello*), regulating the conduct of hostilities during an international armed conflict and prohibiting certain severe damages to the environment by the use of any conventional weapon or weapon of mass destruction;⁶² the ENMOD Convention is an arms control treaty applicable during peacetime and wartime.⁶³ Even if the formal status of the *Understandings* is not fully clear,⁶⁴ there is no evidence that state parties of the ENMOD want to change the interpretation put forward and laid down in the *Understandings* in the light of the wording and interpretation of Article 35 and 55 AP I.

Additionally, Article I ENMOD Convention – other than Article 35 para. 3 and Article 55 para. 1 AP I⁶⁵ – lays down *alternative* criteria, not cumulative criteria, as the effects of the environmental modification technique must not be “widespread, long-lasting *or* severe”. This means that the threshold for the prohibition to be applicable is not as high as Article 35 para. 1 and Article 55 para. 1 AP I threshold. The rationale for this difference is that ENMOD Convention aims to regulate the use of very specific weapons (misusing the modified environment as a weapon) and the scope and practical relevance of the ENMOD Convention is limited by this narrow approach already significantly.

A *second* limitation relates to the question whether the destruction, damage or injury must be possible to happen with regard to “*another state party*” (Article I para. 1 ENMOD). One could argue that the need for a prohibition is even more relevant if the effects materialize in areas beyond national jurisdiction, as for instance, with regard to the High Seas or outer space. Hence, the *telos* prohibiting the hostile use of a potentially devastating environmental modification technique would support a broad interpretation. This is even more convincing as many parts of the environment beyond national jurisdiction are seen as a common concern of mankind in peacetimes environmental treaties.⁶⁶

Because of the clear wording and the underlying *do-ut-des*⁶⁷ structure of the ENMOD Convention, however, such a broad interpretation would have to be backed by declarations or practice of states parties. Such evidence is not given: one state party even limits its duties towards those states parties of the ENMOD Convention that does abide by the prohibitions of the Convention themselves stressing the *do-ut-des* character.⁶⁸ Some states expressly accept the obligations laid down in Article I ENMOD Convention extending to states which are not a party if they act in conformity with Article I.⁶⁹ The latter does not mean, however, that they would accept duties with regard to the protection of areas beyond national jurisdiction. Besides, attempts of a small number of states during the deliberations as well as during the First Review Conference to attribute to Article I ENMOD Convention the qualification of an obligation

62 The latter is true if a state party to AP I did not limit the scope of Art 35 para. 3 AP I to govern conventional weapons only via a reservation upon signature or ratification, as did most NATO states.

63 It is disputed whether the ENMOD Convention applies during non-international armed conflicts; cf. note 94.

64 Cf. notes 38 and 40.

65 Jean-Marie Henckaerts and Dana Constantin, ‘Protection of the Natural Environment’ in Andre Clapham and Paola Gaeta (eds), *International Law in Armed Conflict* (OUP 2014) 469, 480.

66 Silja Vöneky, note 42, 76 et seq.

67 Lat.: I give so that you give.

68 Reservation by Kuwait, cf. note 34.

69 Declaration by UK and Netherlands, cf. note 34.

erga omnes failed.⁷⁰ Furthermore, the wording of the provision excludes damage caused to the acting State's own territory from the field of the Convention's application.⁷¹

Another major – *third* – limitation of the prohibition is given because of the peaceful purposes clause. According to the ENMOD Convention, there is no prohibition to use an environmental modification technique, as stated expressly in Article III, if it is used for *peaceful purposes* (“shall not hinder the use of (...) for peaceful purposes”). Even more, the preamble of the ENMOD Convention stresses that environmental modification techniques used for peaceful purposes can help to preserve and improve the environment.⁷² Hence, according to a systematic interpretation of the Convention in light of Article III ENMOD Convention, a “military or any other hostile use”, as mentioned in Article I para. 1 ENMOD Convention is given if an environmental modification technique is not used for peaceful purposes.⁷³

A core question is, therefore, similar to the interpretation of the BWC, how to interpret the peaceful purposes clause and what kind of proof to demand from a state party if it invokes the peaceful purposes. There is no explicit provision in the ENMOD Convention – or in the BWC – that spells this out in more detail. A state stressed the disadvantage of not defining what peaceful purposes means and when this condition is met.⁷⁴ However, according to general rules of international law, it cannot be sufficient that a state party merely claims that the use of an environmental modification technique is aimed at peaceful purposes.⁷⁵ If there is no other plausible explanation⁷⁶ than that a technique described above is used for hostile purposes, i.e. if there is no plausible peaceful use scenario, a breach of the ENMOD Convention is given as long as a state cannot prove otherwise.⁷⁷ To argue that the mere statement by a state is sufficient that there are no intentions for a military or hostile use of a certain technique is not convincing. The latter interpretation would make the prohibition of Article I ENMOD meaningless as no state party would admit that research, development or field trials are conducted to use a technique governed by the ENMOD Convention in a hostile way.

70 Cf. Georges Fischer, ‘La Convention sur l’interdiction d’utiliser des Techniques de Modification de l’Environnement a des fins hostiles’ (1977) 23 AFDI 820, 830–831; Yoram Dinstein, *The Conduct of Hostilities under the Law of International Armed Conflict* (3rd ed., CUP 2016) 234.

71 Rüdiger Wolfrum, ‘The Protection of the Environment in Armed Conflict’ (2015) *IsraelYBHumRts*, 67, 73.

72 Preamble, para. 5.

73 According to the wording, a difference can be made between the military use during an (international or non-international) armed conflict, and other hostile uses, even during peacetime. However, as both alternatives are prohibited, it is irrelevant whether the threshold of armed conflict according to the *ius in bello* is met.

74 Turkey made an interpretative statement upon signature: “(...) Furthermore, the Government of Turkey believes that the difference between ‘military or any other hostile purposes’ and ‘peaceful purposes’ should be more clearly defined so as to prevent subjective evaluations.”

75 For this argument cf. Guy Reeves, Silja Voeneke, Derek Caetano-Anolles, Felix Beck, Christophe Boete, note 54, 35 et seq.

76 With regard to state practice for the “no other plausible explanation” as standard of proof for responsibility of a certain state for conduct that constitutes a violation of international law, cf. Joint statement by the heads of state and government of France, Germany and the UK, 23 September 2019, with regard to the attacks on oil facilities on Saudi territory, on September 14th, 2019: “It is clear to us that Iran bears responsibility for this attack. There is no other plausible explanation.” Available at <<https://www.bundesregierung.de/breg-de/aktuelles/gemeinsame-erklaerung-der-staats-und-regierungschefs-von-frankreich-deutschland-und-dem-vereinigten-koenigreich-1674286>>.

77 This does not mean that I argue that there is a shift of the burden of proof. It is rather submitted that a lower standard of proof applies; this is similar to cases when the claimant state has no access to information and it would be impossible for an injured or claimant state to prove that the conditions for a breach of international law are met, cf. Markus Benzing, *Das Beweisrecht vor internationalen Gerichten und Schiedsgerichten in zwischenstaatlichen Streitigkeiten* (Springer 2010) 690 et seq.

With regard to dual use research and technologies the peaceful purpose clause, however, means that there is no prohibition or limitation by the ENMOD Convention, as long as at least one peaceful purpose for the research and development of an environmental modification technique exists and a peace use scenario is plausible. The mere possibility of misuse of a technique is not sufficient for a violation of the Convention. Nevertheless, the lack of spelling out clear state duties how to frame dual use research of concern is a major disadvantage of the ENMOD Convention that is mirrored by lacunae found in other disarmament treaties, as the BWC.

VI. Comprehensive Duties of States Parties during Peacetime and Armed Conflict

As each state party “*undertakes not to engage*” in hostile use (“*s`engage à ne pas utiliser / se compromete a no utilizar*”) of these techniques (Article I para. 1 ENMOD Convention), any involvement of a state in the hostile use of the techniques described above is already prohibited.⁷⁸ Even more, there is the duty that every state party “*undertakes not to assist, encourage or induce* any State, group of States or international organization” (“*aider, encourager ou inciter / no ayudar, ni alentar ni inciter*”) to engage in activities that would constitute a violation of Article 1 para. 1 ENMOD Convention. These alternatives spell out clearly that the duties of a state, with regard to the prevention of a hostile use of environmental modification techniques, are very broad and comprehensive. Even if a state’s conduct was a cause for the hostile use of those techniques by another subject of international law, this would be a violation of Article I ENMOD Convention by this state party.⁷⁹

According to Article IV ENMOD Convention, a state party has “to take any measure it considers necessary” in accordance with its constitution “to prohibit and prevent any activity in violation of the provisions of the Convention *anywhere under its jurisdiction or control.*” This lays down the extraterritorial application of the Convention. Even in areas beyond national jurisdiction, as in outer space or the high seas, jurisdiction or control of a certain activity by a state party is sufficient to spark state obligation according to Article IV. Hence, no action contrary to Article I ENMOD Convention must be allowed or supported by a state on a ship under the flag of that state party.

With regard to research and developments that are not prohibited as they have peaceful purposes, there is the duty of states parties to undertake to facilitate the exchange of scientific and technological information and the right to participate in the “fullest possible exchange of scientific and technological information on the use” of these techniques (Article III para. 2 ENMOD Convention). There is even an obligation for states to contribute to international economic and scientific co-operation in the “peaceful utilization of the environment”. To follow from the last rule that the aim of the ENMOD Convention is not primarily a prohibition of the development of techniques that allow the misuse of the modified environment as a weapon but rather the promotion of the modification and utilization of the environment during peacetime is, however, a misinterpretation of the object and purpose of the treaty and is not backed by the systematics and the drafting history of the ENMOD Convention.

78 Some scholars argue that the mere attempt of causing damage through the application of environmental modification techniques is not sanctioned by the ENMOD Convention, Rüdiger Wolfrum, note 71, 74. This is not convincing as “undertakes not to engage” encompasses actions even before there is a clear attempt to use the techniques described in the ENMOD Convention. It includes even the development of such techniques for hostile purposes.

79 This is broader than to Article 16 Articles on the Responsibility of States for internationally wrongful acts, Annex UNGA Res 56/83 (12 December 2001) UN Doc A/RES/56/83.

VII. Dispute Settlement, Implementation and Drawbacks

Article V lays down a duty to consult and to co-operate for states parties in order to solve problems that might arise. For this purpose reference is made to the norms of the UN Charter (cf. Article 33 UN Charter) and para. 2 in conjunction with the Annex to the Convention provides for the convention of a Consultative Committee of Experts (Article V para. 2 ENMOD Convention and Annex to the Convention para. 1–5). Notwithstanding the view of some states expressed during the Second Review Conference, that such Committee shall be convened in order to clarify the scope of the Convention,⁸⁰ the latter has never been activated. According to the structure of the Consultative Committee of Experts pursuant to Article V para. 2 ENMOD Convention, the Committee could and should play a major role in fact-finding⁸¹ even if it is not competent, to decide upon a breach of the Convention.

In this regard, the task of the Committee differs from the task of the Security Council: as the BWC,⁸² the ENMOD Convention entails an article that states that “each State Party to the Convention which has reason to believe that any other State Party is acting in breach of an obligation deriving from the provisions of the Convention may lodge a complaint with the UN Security Council” (Article V para. 3 ENMOD Convention) that should include all relevant information and all possible evidence. The Security Council can initiate an investigation if such a complaint is brought forward and states parties have to co-operate. Besides, states parties have to provide assistance after a decision of the Security Council that a party has been harmed or is likely to be harmed as a result of a violation of the Convention (Article V para. 5 ENMOD Convention). Because of the veto power of the five permanent members of the UN Security Council according to Articles 23 and 27 UN Charter, however, in practice there are not a sufficient complaints mechanisms and the ENMOD Convention is toothless with regard to possible violations of the Convention by China, UK, USA or Russia as states parties.⁸³

As with regard to the BWC, but different to the Chemical Weapons Convention,⁸⁴ there is no Protocol to the ENMOD Convention spelling out the rules for implementation. Hence, there is no possibility that research facilities in the territory of another state party are inspected without the consent of such a state party. This means that if there is a secret state-driven weapons program, as during the Vietnam War, and nobody reports about it, even today there is no procedure to verify whether the conduct of a state constitutes a breach of Article I ENMOD Convention.

80 Second Review Conference of the Parties to the Convention, Final Document, 22 September 1992, ENMOD/CONF.II/12, 13, available at <<https://s3.amazonaws.com/unoda-web/documents/library/conf/ENMOD-CONF-11-12.pdf>>.

81 Rosario Dominguez-Matés, ‘New Weaponry Technologies, Environment and Hostile Purposes: The Revival of the Convention on Environmental Modification Techniques of 1976 up to day’ (2006) JILAC 93, 98–100; Allan Krass, ‘The Environmental Modification Convention of 1977: the question of verification’ in Arthur Westing, *Environmental Warfare* (Taylor & Francis 1984) 65, 66 et seq.

82 Article VI para. 1 BWC.

83 This is backed by the wording that the Security Council acts “in accordance with the provisions of the Charter of the United Nations”, Article V para. 4 ENMOD Convention. France is the only permanent member and veto power that is not a state party to the ENMOD Convention, cf. note 33.

84 Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (adopted on 3 September 1992, entered into force 29 April 1997) 1975 UNTS 45.

VIII. Customary Law, the Influence on Subsequent Legal Developments and Questions of State Responsibility

It is disputed whether the core duty of the ENMOD Convention that prohibits the misuse and manipulation of the environment for hostile use is part of customary international law. While the relevant ICRC Report on Customary International Humanitarian Law does not state that the provisions of the ENMOD Convention as such are customary law⁸⁵ some scholars argue against this.⁸⁶ However, the ICRC report states that there is “sufficiently widespread, representative and uniform practice to conclude that the *destruction of the natural environment* may not be used as a weapon”. This “ecocide” prohibition overlaps at least partly with the Article I ENMOD Convention prohibition. Hence one could argue that the “ecocide” prohibition can be seen as one core element of customary international law during an armed conflict.

Besides, one could argue that there is a rule of customary law in *statu nascendi* with regard to the more specific content of Article I ENMOD Convention. The USA stated already in 1992, at the Second Review Conference, that the ENMOD Convention reflected “the international community’s consensus that the environment itself should *not be used as an instrument of war.*”⁸⁷ It is correct, that soft law rules such as the Guidelines on the Protection of the Environment in Times of Armed Conflict as adopted by the General Assembly⁸⁸ are not a sufficient bases for the customary law status of the ENMOD Convention prohibition.⁸⁹ Nevertheless, it is striking that – although the aim of the ENMOD Convention is not the protection of the environment as such – the first ILC draft principles dealing with the protection of the environment in relation to armed conflict includes a prohibition of the misuse of the environment as a weapon.⁹⁰

The ILC draft principle 19 refers expressly to environmental modification techniques and is drafted nearly identical with the wording of Article 1 para. 1 ENMOD Convention. Only two elements differ: *firstly*, according to the ILC draft principle 19, a duty exists for states only “(i)n accordance with their international obligations”. This has to be interpreted in the sense that principle 19 stresses the prohibition to use the environment for hostile purposes that obliges states parties and that it stresses the relevance for other states as far as a rule of customary law exists;⁹¹ *secondly*, the ILC draft principle 19 does not mention that states shall “not undertake” to engage in military or any other hostile use of these techniques. This might be an effort to narrow down the scope as the prohibition “to undertake” to engage has a broad meaning. However, such a broad scope is relevant for the peacetime disarmament object and

85 The ICRC report states, that “it is unclear whether the provisions in the ENMOD Convention are customary law”. According to this Israel, South Korea and New Zealand’s military manuals seem to indicate that the ENMOD Convention binds states parties only. ICRC, Customary IHL, IHL Database, Rule 45 summary, available at <https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule45#Fn_4C6D6F6B_00026>.

86 Against the qualification of the ENMOD provision as customary international law of armed conflict see Yoram Dinstein and Arne Dahl, *Oslo Manual on Select Topics of the Law of Armed Conflict* (Springer 2020) 14.

87 Cf. ICRC, Customary IHL, IHL Database, Rule 45 summary, note 89.

88 UNGA Res 49/50 (9 December 1994) UN Doc A/RES/49/50.

89 See as well the ICRC Guidelines for Military Manuals and Instruction on the Protection of the Environment in Times of Armed Conflict, guideline 12 in line with Article I and II ENMOD Convention, 30 April 1996, available at <<https://www.icrc.org/en/doc/resources/documents/article/other/57jn38.htm>>.

90 ILC, ‘Report Protection of the Environment During Armed Conflict’, Report 2019, Doc. A/74/10, Text of draft principles on protection of the environment in relation to armed conflicts, adopted by the Commission on first reading, available at <<https://legal.un.org/ilc/reports/2019/english/chp6.pdf>>.

91 ILC, Report 2019, *ibid.*, Principle 19, Commentary, 264.

purpose of the ENMOD Convention; it is not as decisive if the prohibition is limited for the conduct during an armed conflict as it is done in the ILC draft principles.⁹²

Different from the use of chemical weapons or biological weapons, the misuse of the environment as a weapon in the sense of the ENMOD Convention does not constitute a war crime pursuant to the Rome Statute.⁹³ Nevertheless, it is clear from the wording and purpose of the Convention that the prohibition of Article I ENMOD Convention extends to acts during an armed conflict, national or international, if they constitute the use of such a weapon and the other thresholds are met.⁹⁴ Therefore, the international disarmament law of the ENMOD Convention complements the humanitarian law duties of states parties. As the war crime of the use of chemical weapons during a non-international armed conflict was introduced on a later stage by an amendment of the Rome Statute⁹⁵ the same would be possible and feasible *de lege ferenda* with regard to the modification and misuse of the environment for hostile purposes during international and non-international armed conflict.

Besides, as the use of chemicals and modified organisms, as modified mosquitos or modified viruses, falls under the scope of the ENMOD Convention the scope of the ENMOD Convention overlaps with the scope of the CWC and the BWC without one of the treaties being *lex specialis*.

The same is true with regard to the Cartagena Protocol, as a peacetime treaty protecting the environment, as the modification of a living organism by using tools of modern biotechnology *prima facie* constitutes a deliberate manipulation of natural processes in the sense of Article II ENMOD Convention.⁹⁶ Again neither the ENMOD Convention, applicable during peacetime and during wartime, nor the Cartagena Protocol is *lex specialis*, and none of the treaties overrides the other one.

Although areas that are governed by the ENMOD Convention in some parts overlap with the rules and prohibitions of other regimes and treaties, as mentioned before, the relevance of the Convention is not only given with regard to the duty to omit certain undertakings. As any violation of a rule of international law, i.e. every internationally wrongful act of a state, is the basis for the responsibility of that state the breach of the ENMOD Convention can be the basis for claims to pay compensation because of damages caused by such a violation.⁹⁷ The general rules of the international law of state responsibility are applicable, as the ENMOD Convention does not constitute a self-contained regime and is not *lex specialis* in the meaning of Article 55 of the Articles on the Responsibility of States.

92 With the reasoning that an armed conflict is the most likely situation in which the Convention would be applied, cf. ILC, Report 2019, *ibid.*, Principle 19, Commentary, 265.

93 However, as a combination of Article 35 III and Article 55 I AP I and the prohibition of excessive collateral damage (Article 51 V lit. b AP I), pursuant to Article 8 para. 2 lit. b (iv) Rome Statute a war crime is given if during an international armed conflict there is the launching of an attack “in the knowledge that such attack will cause (...) widespread, long-term and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated”.

94 Some argue with regard to a non-international armed conflict that this is the case at least if the use of the environmental modification technique causes transboundary effects, cf. ILC, Report 2019, note 91, Principle 19, Commentary, 264 para. 3.

95 Article 8 para. II lit. e (xiii and xiv) Rome Statute, RC/Res.5 (10 June 2010).

96 Cf. IV above.

97 Cf. Responsibility of States for internationally wrongful acts, Annex, Article 1 et seq., Article 36 UNGA Res 56/83 (12 December 2001) UN Doc A/RES/56/83.

IX. Summary and Outlook

Eric Myjer and Thilo Marauhn write convincingly in the first chapter of the *Research Handbook on International Arms Control Law* that “states will only agree on binding arrangements that increase their security, or at least to not diminish their security”.⁹⁸ With regard to the ENMOD Convention a long time the only narrative was that states, and especially the super-powers USA and Russia, agreed to be parties of this treaty as the weapons that are prohibited by the Convention are so unpredictable or science fiction like that they are not relevant for waging war or for using them in an act of self-defence. Hence, the argument was, that the security of a state is not diminished but increased by the ENMOD Convention because the risk is lowered to be damaged by another state that might use these techniques as a last resort or a means of state terrorism.

Today, in the 21st century, this narrative has to be complemented as it is convincing to argue that the ENMOD Convention is more important today as it was during the 1970ies. The treaty does not only protect against modern techniques of environmental modification and its hostile use that form part of science fiction or that are irrelevant. As the scientific progress speeds up and more disruptive technologies are developed to modify the environment, may it be via biotechnology or geoengineering, the prohibition of any undertaking that can be a basis of a hostile use of an environmental modification techniques is important – not only during an armed conflict but already in peacetime – to prevent the development of new kinds of weapons that might operate in secret, are hard to detect, but might cause massive damages. Because the damage caused by an environmental modification technique is hard to predict it is necessary that the ENMOD Convention restricts the development and use of these techniques similar to the development and use of biological weapons according to the BWC. *De lege ferenda* one can only hope that the development of international customary law will be the same with regard to environmental modification techniques for hostile purposes as with the absolute and universal customary law prohibition of the use and development of biological weapons.

Additionally, the ENMOD Convention shows that the international community has to think about a treaty-based dual use and implementation regime governing the development of these techniques. The gray area of the development for – on the one hand – peaceful purposes that are legal and legitimate or – on the other hand – hostile aims that are prohibited, illegal and unethical has to be spelled out in more detail as well as a dual use research of concern regime in order to implement in practice the limitations the Convention already lays down. The more the different states, and new main actors as China, that are states parties become technologically advanced the more the relevance of the prohibitions of the Convention will become obvious – and the more it will be an area of concern for the international community as a whole if the ENMOD Convention is toothless and not advanced by the states parties.

98 Eric Myjer and Thilo Marauhn (eds), forthcoming 2020; *ibid.* Eric Myjer and Thilo Marauhn, ‘Arms control Law and International Conflict and Security Law’, chapter 1.1.



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