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Damage to and Destruction of the Natural Environment

Terraforming Warfare in Gaza and Accountability for Ecocentric Crimes

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ABSTRACT

This contribution considers the significant and well-recorded environmental destruction in Gaza, following Israel's full-scale military operations that started in October 2023. It is argued that, in the absence of ecocentric legal frameworks, war crimes law and international humanitarian law (IHL) more generally provide appropriate avenues for the protection of the environment and to close the accountability gap. In doing so, it argues that despite the lack of ecocentric crimes in the international criminal justice system, the humanitarian imperative, and anthropocentric crimes (including core international crimes like genocide, crimes against humanity, and war crimes) could be used as the tools to hold those responsible for environmental harm in the context of terraforming warfare, a concept which best describes situations of utter infrastructural and environmental destruction and topographic change with long-term, systemic consequences. The war crimes framework is analysed, and a way forward is proposed. The article argues that the humanitarian norm, foundational to IHL and war crimes law, informs both state and individual liability for the violation of primary rules, which include the protection of the natural environment in times of war.

1. INTRODUCTION

The Office of the Prosecutor of the International Criminal Court (OTP) published a Draft Policy on Environmental Crimes under the Rome Statute of the International Criminal Court (ICC)¹ in December 2024. This Draft Policy emphasizes the link between the current Statute crimes (genocide, crimes against humanity, war crimes, and the crime of aggression) and environmental damage, and recognizes that 'numerous crimes under the Rome Statute

¹ The Office of the Prosecutor (OTP), *Draft Policy on Environmental Crimes Under the Rome Statute*, 18 December 2024, available online at www.icc-cpi.int/sites/default/files/2024-12/2024-12-18-OTP-Policy-Environmental-Crime.pdf (all cited websites were last visited on 15 September 2025).

may be committed by means of or result in damage to the environment'.² The Draft Policy further notes that the OTP mandate is structured by the Rome Statute as it currently exists. That is to say, the prosecution of environmental crimes under the current Statute is distinct from proposals to amend the Statute to 'criminalise ecocide or intentional environmental destruction. The [OTP], nevertheless, hopes that a clear accounting of Rome Statute crimes that can be committed by means of or that result in environmental damage will help stakeholders prioritise efforts, international and national, that will complement the [OTP's] efforts to combat impunity in the environmental area'.³ It is notable that the term 'natural environment' as used in the Draft Policy generally follows the international humanitarian law (IHL) approach, meaning that the term should be understood in the 'widest possible sense', because the concept of the environment 'may evolve over time as knowledge about it increases' and because 'the environment itself is constantly changing'.⁴ In IHL, then, the 'natural environment' is 'considered to constitute the natural world, including the general hydrosphere, biosphere, geosphere and atmosphere (including fauna, flora, oceans and other bodies of water, soil, and rocks) and natural elements that are product of human intervention, together with the system of inextricable interrelations between living organisms and their inanimate environment, in the widest sense possible'.⁵ Under IHL, the principle of distinction prohibits attacks on any part of the natural environment unless it is a military objective.⁶ Urban warfare, where one might expect a predominance of civilian infrastructure, can also create environmental risks. Attacks on civilian infrastructure, such as the employment of explosive weapons in densely populated areas, can result in significant (and long-term) environmental damage. This includes pollution of the air, water, and soil due to debris, the release of toxic gases, and the uncontrolled flow of untreated sewage.⁷

While 'environmental crimes' for purposes of the Draft Policy may include all the ICC crimes committed by means of or that result in environmental damage,⁸ the war crime under Article 8(2)(b)(iv) of the Rome Statute is specifically mentioned as the crime that expressly refers to environmental damage as part of its legal elements.⁹ As of September 2025, no ongoing ICC cases involve charges under Article 8(2)(b)(iv), based on the ICC's public records.

We acknowledge that the absence of a discrete ecocentric crime (called 'ecocide' by some proponents¹⁰) constitutes a significant lacuna in international criminal law. Anthropocentric

² *Ibid.*, § 12.b.

³ *Ibid.*, § 10.

⁴ *Ibid.*, § 22.

⁵ International Committee of the Red Cross (ICRC), 'The Protection of the Natural Environment in Armed Conflict', available online at <https://casebook.icrc.org/highlight/protection-natural-environment-armed-conflict>.

⁶ J.-M. Henckaerts and L. Doswald-Beck, *Customary International Humanitarian Law—Volume I: Rules* (Cambridge University Press, 2005), Rule 43, at 143.

⁷ 'How Does War Damage the Environment?', *Conflict and Environment Observatory*, available online at <https://ceobs.org/how-does-war-damage-the-environment/#:~:text=The%20use%20of%20explosive%20weapons,such%20as%20water%20treatment%20plants>.

⁸ Draft Policy on Environmental Crimes, *supra* note 1, § 24.a.

⁹ Art. 8(2)(b)(iv) ICCSt, UN Doc./A/CONF.183/9, *International Legal Materials*, 1998, at 999, provides that 'intentionally launching an attack in the knowledge that such attack will cause incidental loss of life or injury to civilians or damage to civilian objects or 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' is a war crime.

¹⁰ For historical background, see A.H. Westing, *Ecological Consequences of the Second Indochina War* (Taylor and Francis, 1976); R. Falk, 'Environmental Warfare and Ecocide—Facts, Appraisal, and Proposals', 4 *Bulletin of Peace Proposals* (1973) 80–96. For the proposed inclusion of the crime of 'ecocide' in an amended Rome Statute, see A. Bustami and M.-Ch. Hecken, 'Perspectives for a New International Crime Against the Environment: International Criminal Responsibility for Environmental Degradation Under the Rome Statute', 11 *Göttingen Journal of International Law* (2021) 145–189, at 176–180; K.J. Heller, 'Skeptical Thoughts on the Proposed Crime of Ecocide (That Isn't)', *Opinio Juris*, 23 June 2021, available online at <https://opiniojuris.org/2021/06/23/skeptical-thoughts-on-the-proposed-crime-of-ecocide-that-isnt/>; Stop Ecocide Foundation, Independent Expert Panel for the Legal Definition of Ecocide (June 2021), available online at <https://static1.squarespace.com/static/5ca2608ab914493c64ef1f6d/t/60d1e6e604fae2201d03407f/1624368879048/SE+Foundation+Commentary+and+core+text+rev+6.pdf>.

crimes will arguably remain the most appropriate and realistic frameworks for accountability, in addition to any available forms of state liability. It is in this context that we analyse the catastrophic situation in Gaza; a situation of profound humanitarian and environmental concern — not only for the people of the region, but indeed for the whole of humankind.

The OTP Draft Policy underscores the need for ecocentric crimes in the arsenal of international criminal law. The process of drafting and implementing ecocentric crimes (at least in the context of the Rome Statute) will probably take considerable time, effort, and political will to achieve. In this regard, we argue that the concept of *terraforming warfare* gives content to the elements of the war crime in Article 8(2)(b)(iv) of the Rome Statute. We demonstrate, with reference to the case of Gaza, how the humanitarian norm underpinning IHL and the law of war crimes shapes both state and individual responsibility for violations of primary rules, including those protecting the natural environment during armed conflict. This framework is imperative in addressing instances of terraforming warfare.

2. THE GAZA CASE STUDY: THE WAR IN HISTORICAL AND SYSTEMIC CONTEXT

On 7 October 2023, Hamas carried out a large-scale attack in southern Israel. This attack, which included the firing of rockets into Israel, the killing of civilians and the taking of hundreds of mostly civilian hostages, was met with a fierce response by Israel.¹¹ Heavy military operations of the IDF against the positions of Hamas in and around the Gaza Strip started almost immediately after the attacks.¹² While the impact of the IDF's bombardment of Gaza was most apparent in terms of infrastructure, buildings, and civilian casualties, concerns about the environmental impacts became evident as well. The impact on the environment, *per se*, however, is overshadowed by discussions on different humanitarian aspects of the war, especially the indiscriminate attacks on civilians and civilian objects of particular value, the disproportionality of the attacks on military objectives, and the question of precautions in attack. We contend that the humanitarian and environmental aspects are interconnected¹³ and that this interconnectedness has consequences for accountability for violations of international law, including possible criminal liability under international criminal law. The case for accountability is strengthened if viewed through the conceptual prism of terraforming warfare.

We focus on the situation in Gaza as it has developed since October 2023. However, we are conscious of the fact that systemic and structural factors from *before* October 2023 have already impacted the environment in profound ways.¹⁴

¹¹ H. Gold et al., 'Israel Formally Declares War against Hamas as It Battles to Push Militants Off Its Soil', *CNN World*, 8 October 2023, available online at <https://edition.cnn.com/2023/10/08/middleeast/israel-gaza-attack-hostages-response-intl-hnk>. See also UN Human Rights Council, 'Detailed Findings on Attacks Carried Out on and After 7 October 2023 in Israel', UN Doc A/HRC/56/CRP.3, Fifty-sixth session, 10 June 2024.

¹² For a brief timeline of the events of 7 October 2023 and the immediate aftermath, see 'Israel-Hamas War: Timeline and Key Developments', *ABC News*, 22 November 2023, available online at <https://abcnews.go.com/International/timeline-surface-rocket-attack-hamas-israel/story?id=103816006>.

¹³ Comparative studies show that armed conflict may have detrimental effects on the environment (and ecosystems more broadly) in many ways, from direct effects (for example, shelling and pollution caused by military activities), to indirect effects (for example, due to a breakdown in environmental governance). See, for instance, H. Schulte to Bühne et al., 'Conflict-Related Environmental Degradation Threatens the Success of Landscape Recovery in Some Areas in Tigray (Ethiopia)', *29 Ecology and Society* (2024) 1-14.

¹⁴ IHL in Focus: Spot Report—Water Crisis in War and under Occupation: Current Israeli Policy in Practice in the Occupied Palestinian Territory under International Humanitarian Law (Geneva Graduate Institute, 2025) 5, available online at www.geneva-academy.ch/joomlatools-files/docman-files/IHL%20Spot%20Report%20-%20Water%20Crisis%20in%20War%20and%20Under%20Occupation.pdf.

The infrastructural and environmental impact of the full-scale Israeli military campaign that ensued since Hamas's attacks of 7 October 2023 is well recorded.¹⁵ In particular, it is noted how the intensive use of explosive ordnance in densely populated urban areas, have resulted in 'vast quantities of debris and rubble, along with the widespread destruction of critical civilian infrastructure in Gaza, including environmental infrastructure such as water treatment facilities, sewage systems, rainwater harvesting systems, and waste management facilities essential for the safe disposal of medical and hazardous waste'.¹⁶ The scope, intensity, and purpose of the infrastructural and environmental destruction are of such gravity and scale that the situation is best described with reference to the concept of *terraforming warfare*.

3. TERRAFORMING WARFARE, OVERWHELMING MILITARY FORCE, AND THE IMPACT ON THE ENVIRONMENT

In *The Nutmeg's Curse*, Amitav Ghosh's book on climate change and ecological collapse, analysed through the prisms of settler-colonialism and genocidal warfare, the author references the expression 'terraforming', a neologism coined by the science fiction writer Jack Williamson in a 1942 novella. The term 'terraforming' joins 'terra' (land) with 'forming', the 'making' or 'moulding' of land, land-making. In the settler-colonial projects described in the book, the phenomenon of terraforming was 'fundamentally conflictual; it was a mode of warfare, of a distinctive kind'.¹⁷ Terraforming war aims are more than tactical or strategic in the military sense; they are that, or could be that, but certainly more than that. Military-driven environmental destruction includes deforestation, soil erosion, wildlife loss, waste generation, and pollution. These phenomena can be observed in contemporary conflicts in Ethiopia, Ukraine, and Gaza.¹⁸ Terraforming warfare extends beyond incidental harm to the environment. It is the intentional destruction of the environment to achieve war aims,¹⁹ paving the way for long-term changes to the natural and human environment, including demographic change through forced displacement,²⁰ destruction of long-term agricultural prospects,²¹ or even the annexation of land.²²

¹⁵ UN Environment Programme (UNEP), *Environmental Impact of the Conflict in Gaza: Preliminary Assessment of Environmental Impacts*, Nairobi, 18 June 2024, available online at https://wedocs.unep.org/bitstream/handle/20.500.11822/45739/environmental_impact_conflict_Gaza.pdf?sequence=3&isAllowed=y; 'New Study Reveals High Environmental Cost in the Ongoing Israel-Gaza Conflict' (Lancaster University: Lancaster Environment Centre, 21 June 2024), available online at www.lancaster.ac.uk/lec/about-us/news/new-study-reveals-high-environmental-cost-in-the-ongoing-israel-gaza-conflict; N. Rozanes, 'The Gaza war is an environmental catastrophe', +972 Magazine, 5 September 2024, available online at www.972mag.com/gaza-war-environmental-catastrophe; Forensic Architecture, 'No Traces of Life': Israel's Ecocide in Gaza 2023-2024', 29 March 2024, available online at <https://forensic-architecture.org/investigation/ecocide-in-gaza>.

¹⁶ Al Mezan Center for Human Rights, 'Ecocide: Israel's Deliberate and Systematic Environmental Destruction in Gaza', 2024, at 2, available online at <https://reliefweb.int/report/occupied-palestinian-territory/ecocide-israels-deliberate-and-systematic-environmental-destruction-gaza>.

¹⁷ A. Ghosh, *The Nutmeg's Curse: Parables for a Planet in Crisis* (University of Chicago Press, 2021) 55.

¹⁸ A. Abuawad, M. Griffiths et al., 'The Ongoing Environmental Destruction and Degradation of Gaza: The Resulting Public Health Crisis', 11 *American Journal of Public Health* (2025) 1053–1061, at 1042–1052; S. Maruf, 'Environmental Damage in Ukraine as Environmental War Crime under the Rome Statute', 22 *Journal of International Criminal Justice* (2024) 99–126; A. Gebrekirstos and E. Birhane, 'The War on Tigray Wiped Out Decades of Environmental Progress: How to Start Again', *The Conversation*, 2 April 2023, available online at <https://theconversation.com/the-war-on-tigray-wiped-out-decades-of-environmental-progress-how-to-start-again-201062>.

¹⁹ This aspect of terraforming warfare is best encapsulated by the concept of 'offensive ecocide', whereby the natural environment is destroyed or severely harmed as a strategy to defeat the enemy. See P. Hough, 'Trying to End the War on the World: The Campaign to Proscribe Military Ecocide', 1 *Global Security: Health, Science and Policy* (2016) 10–22, at 11.

²⁰ A Human Rights Watch report noted that the level of infrastructural and environmental destruction in Gaza is such that 'many, if not the majority of, Palestinians in Gaza will be permanently displaced' (emphasis in the original). See Human Rights Watch, 'Hopeless, Starving, and Besieged': Israel's forced displacement of Palestinians in Gaza', 14 November 2024, available online at www.hrw.org/report/2024/11/14/hopeless-starving-and-besieged/israels-forced-displacement-palestinians-gaza.

²¹ Forensic Architecture, *supra* note 15; H. Yin, L. Eklund et al., 'Evaluating War-Induced Damage to Agricultural Land in the Gaza Strip Since October 2023 Using PlanetScope and SkySat Imagery', 11 *Science of Remote Sensing* (2025) 1–14.

²² See, for instance, reports on Israel's planned annexation of so-called 'buffer zones'; parts of Gaza (including agricultural land) bulldozed or bombed since October 2023: 'Gaza: Israel's Destruction of Hundreds of Dunams of Agricultural Land Is Expression of its Insistence on Committing Genocide', *Euro-Med Human Rights Monitor*, 26 September 2024, available online

In a letter to the Security Council, dated 27 February 2025, the Republic of South Africa sets out a 'public dossier' of openly available evidence on 'Israel's violations of international law, including violations of IHL and acts of genocide against the Palestinians in Gaza'.²³ The dossier describes the harm to and the destruction of the environment, and productive farmland in particular, and how this affects not only the ability of the current population to produce food, but also future generations.²⁴ Thus, it sets out the long-term impact on the environment and on the population that depends on it. This is a pertinent element of terraforming warfare. This type of warfare has devastating and long-term effects; it alters the very topography of the land. The effects of Israel's bombing of Gaza illustrate this vividly. Reports describe the 'reconfigured' natural and built environment of the Gaza Strip.²⁵ The debris left by bombardments will not only be difficult and costly to remove, but it is also toxic and leading to high levels of air, water, and land pollution.²⁶ The systemic and long-term impact of terraforming warfare concerns virtually all aspects of human and natural existence in a given territory. For Gaza, this has been so extensive that the territory itself has been rendered 'unrecognizable'.²⁷ The 'structures that support the meaningful possibility of life in Gaza' were altered.²⁸

It has been reported that the IDF has used tons of heavy bombs in Gaza since the start of the war.²⁹ It has also been reported that soil is turning infertile,³⁰ and chemicals from white phosphorus weapons used in Gaza will linger in the air for years to come.³¹ In March 2024, Forensic Architecture³² reported that more than 2,000 agricultural sites, including farms and

at <https://euromedmonitor.org/en/article/6487/Gaza:-Israel%20%99s-destruction-of-hundreds-of-agricultural-land-is-expression-of-its-insistence-on-committing-genocide>.

²³ Letter dated 27 February 2025 from the Permanent Representative of South Africa to the United Nations addressed to the President of the Security Council, S/2025/130, 28 February 2025.

²⁴ Annex to the letter dated 27 February 2025 from the Permanent Representative of South Africa to the United Nations addressed to the President of the Security Council, UN Doc. S/2025/130, 28 February 2025, § 32 [hereinafter Annex to the Letter from South Africa to the Security Council].

²⁵ 'Clearing Gaza of Almost 40m Tonnes of War Rubble Will Take Years, Says UN', *The Guardian*, 15 July 2024, available online at www.theguardian.com/world/article/2024/jul/15/clearing-gaza-of-almost-40m-tonnes-of-war-rubble-will-take-years-says-un. The comment by the UN official, reported in the newspaper report, was in reference to the preliminary assessment of the environmental impact of the war in Gaza, published by the UN Environmental Programme in July 2024, available online at https://wedocs.unep.org/bitstream/handle/20.500.11822/45739/environmental_impact_conflict_Gaza.pdf?sequence=3&isAllowed=y.

²⁶ The World Bank, the European Union and the UN, *Gaza Strip—Interim Damage Assessment: Summary Note—March 29, 2024*, 29 March 2024, at 16, available online at <https://thedocs.worldbank.org/en/doc/14e309cd34e04e40b90e19afa7b5d15-0280012024/original/Gaza-Interim-Damage-Assessment-032924-Final.pdf>.

²⁷ Annex to the Letter from South Africa to the Security Council, *supra* note 24, § 74.

²⁸ *Ibid.*

²⁹ See 'UN Report: Israeli Use of Heavy Bombs in Gaza Raises Serious Concerns under the Laws of War', Office of the United Nations High Commissioner for Human Rights—Press Releases, 19 June 2024, available at www.ohchr.org/en/press-releases/2024/06/un-report-israeli-use-heavy-bombs-gaza-raises-serious-concerns-under-laws. For more detailed information, see Office of the United Nations High Commissioner for Human Rights, 'Thematic Report: Indiscriminate and disproportionate attacks during the conflict in Gaza (October — December 2023)', 19 June 2024, available online at www.ohchr.org/sites/default/files/documents/countries/opt/20240619-ohchr-thematic-report-indiscrim-disprop-attacks-gaza-oct-dec2023.pdf.

³⁰ First Post Explainers, 'Bodies Rotting, Dangerous Chemicals: The Environmental Hazard Unfolding in Gaza', *First Post*, 20 October 2023, available online at www.firstpost.com/explainers/israel-hamas-war-bodies-rotting-dangerous-chemicals-environmental-hazards-gaza-strip-13276482.html.

³¹ Human Rights Watch, 'White Phosphorus Used in Gaza, Lebanon: Use in Populated Areas Poses Grave Risks to Civilians', 12 October 2023, available online at [www.hrw.org/news/2023/10/12/israel-white-phosphorus-used-gaza-leb anon#:~:text=\(Beirut%2C%20October%2012%2C%202023,answer%20document%20on%20white%20phosphorus](http://www.hrw.org/news/2023/10/12/israel-white-phosphorus-used-gaza-leb anon#:~:text=(Beirut%2C%20October%2012%2C%202023,answer%20document%20on%20white%20phosphorus); Human Rights Watch, 'Questions and Answers on Israel's Use of White Phosphorus in Gaza and Lebanon', 12 October 2023, available online at www.hrw.org/news/2023/10/12/questions-and-answers-israels-use-white-phosphorus-gaza-and-lebanon; Meg Kelly, 'Israel Appears to Use White Phosphorus in Gaza, Video Shows', *The Washington Post*, 12 October 2023, available online at <https://www.washingtonpost.com/world/2023/10/12/white-phosphorus-israel-gaza-strike-video/>; S.J. Lyons, 'Despite Its Pledge, Israel (Again) Resorts to Using White Phosphorus Weapons', *The Defense Post*, 2 January 2024, available online at www.thedefensepost.com/2024/01/02/israel-white-phosphorus/#google_vignette.

³² Forensic Architecture is a research agency based at Goldsmiths, University of London. Its mandate is to 'develop, employ, and disseminate new techniques, methods, and concepts for investigating state and corporate violence'. For more background, see <https://forensic-architecture.org/about/agency>. Reports and analyses by Forensic Architecture are often cited by

greenhouses, have been destroyed in Gaza since 9 October 2023,³³ as the IDF launched a large-scale offensive on the Gaza Strip to defeat Hamas. More than 8 months into Israel's military operations in Gaza, evidence indicated the devastating impacts of these operations on the natural environment.³⁴ In particular, it has been reported that farms have been devastated, and nearly half of the trees in Gaza were razed.³⁵

The scale of the harm to civilian infrastructure³⁶ and the impact of this on the environment in Gaza is apparent from the many news and expert reports,³⁷ with some reports even resorting to terms like 'ecocide' to describe the destruction of farmland, the pollution of fresh and ocean water, the air pollution, and long-term negative effects on ecosystems and biodiversity.³⁸ We contend that the destruction of agricultural land and long-term harm to the natural environment in Gaza should be seen not only as side-effects of the conflict, but indeed as central, deliberate features of it. In 2009, the UN Environment Programme (UNEP) reported that the removal and uprooting of trees by military equipment 'will impact future cultivation [and] make the land vulnerable to desertification'.³⁹ The rationale for military harm to the environment may be presented as neutralizing cover for Hamas; however, now, as in 2009, one can note the long-term harmful effects.

A UN report described the destruction emblematic of the IDF's operations in Gaza, notably the 'complete destruction of life-sustaining infrastructure'.⁴⁰ While the destruction of infrastructure, housing, and farmland has been a hallmark of past Israeli military operations in Palestine,⁴¹ such destruction must now be seen within the context of the broader, global ecological calamity of climate change, which could have catastrophic consequences for the people of Gaza even after the current military conflict has ended. We assume that climate change will likely exacerbate the dire situation in Gaza,⁴² with the deliberate destruction of the natural environment by Israel serving as a compounding factor in terms of the risks posed to the impoverished people of Gaza.

non-governmental organisations, states and other actors in their advocacy and litigation. See, for instance, Forensic Architecture reports cited in South Africa's submissions before the International Court of Justice, representative example: ICJ, Application Instituting Proceedings containing a Request for the Indication of Provisional Measures, Application of the Convention on the Prevention and Punishment of the Crime of Genocide in the Gaza Strip (*South Africa v. Israel*), 29 December 2023, at 116, fn 341, available online at www.icj-cij.org/sites/default/files/case-related/192/192-20231228-app-01-00-en.pdf.

³³ Forensic Architecture, *supra* note 15.

³⁴ See generally UNEP, *Environmental Impact of the Conflict in Gaza*, *supra* note 15.

³⁵ K. Ahmed, D. Gayle and A. Mousa, 'Ecocide in Gaza': Does Scale of Environmental Destruction Amount to a War Crime?, *The Guardian*, 29 March 2024, available online at www.theguardian.com/environment/2024/mar/29/gaza-israel-palestinian-war-ecocide-environmental-destruction-pollution-rome-statute-war-crimes-aoe.

³⁶ Council of Europe, Note of the Office of the EU Special Representative for Human Rights, CFSP/PESC 949, 20 June 2025, at 2.

³⁷ See, for instance, this map of destroyed agricultural land in Gaza, compiled by Forensic Architecture, available online at [https://gaza.forensic-architecture.org/database](http://gaza.forensic-architecture.org/database).

³⁸ For instance, Ahmed, Gayle and Mousa, *supra* note 35.

³⁹ UNEP, *Environmental Impact of the Conflict in Gaza*, *supra* note 15, at 35.

⁴⁰ Report by UN Special Rapporteur Francesca Albanese, 'Anatomy of a Genocide: Report of the Special Rapporteur on the Situation of Human Rights in the Palestinian Territories Occupied Since 1967', 25 March 2024, available online at <https://documents.un.org/doc/undoc/gen/g24/046/11/pdf/g2404611.pdf>.

⁴¹ Forensic Architecture, 'Herbicidal Warfare in Gaza', 19 July 2019, available online at <https://forensic-architecture.org/investigation/herbicidal-warfare-in-gaza>.

⁴² See, for instance, this ICRC report, which preceded the war that started in October 2023: ICRC, 'Gaza: On the Frontlines of Climate Change', 7 April 2022, available online at <https://www.icrc.org/en/document/gaza-frontlines-climate-change>.

4. THE ENVIRONMENT-HUMANITARIAN NEXUS: AGGRAVATED STATE RESPONSIBILITY AND INDIVIDUAL CRIMINAL LIABILITY

The starting point is an issue of central importance, namely that even legally proportionate but unwarranted damage to the natural environment must be discerned in the context of basic considerations of humanity as the core of IHL, prohibiting unnecessary suffering and destruction during armed conflicts.⁴³

We contend that the destruction of the natural environment during armed conflicts, required by imperative military necessity, will not be satisfied if the attacker fails to strike a reasonable balance between military necessity and the principle of humanity, which prohibits unnecessary suffering and destruction during armed conflicts. None of the parties involved in armed conflicts may target, destroy, or render useless any objects that are indispensable to the survival of the civilian population.⁴⁴ A similar obligation exists under customary IHL. Rule 54 of the International Committee of the Red Cross's (ICRC) Customary IHL Study provides that 'attacking, destroying, removing or rendering useless objects indispensable to the survival of the civilian population are prohibited'.⁴⁵ We contend that terraforming warfare falls within the ambit of this prohibition.

The legal analysis is based on the dual responsibility of states and individuals under international law. There is an overlap between these two legal regimes, and this is, first and foremost, based on the common origin of aggravated state responsibility and individual criminal liability, namely the 'serious breach of obligations owed to the international community as a whole'.⁴⁶ This overlap between state and individual responsibility for international crimes is based on a 'certain unity as far as primary norms are concerned'.⁴⁷ 'Primary norms' in this context refer to obligations under international law, while secondary norms refer to the legal consequences attached to the violations of primary obligations.⁴⁸ What we are concerned with is the content and structure of the *primary norms* (aimed at the protection of the 'same collective interests of the entire international community'⁴⁹). Since our aim is to make an abstract assessment of individual responsibility of state agents, we need to consider whether the following two conditions apply: (a) an overlap between the material (objective) elements of breaches entailing state and individual responsibility; and (b) an overlap between their subjective elements (the prohibited conduct must be attributed to both the state and to an individual).⁵⁰

It is noted that war crimes are the paradigmatic example of violations of international law that attract both state and individual liability. This has been the case even before the historic trial at Nuremberg.⁵¹ In the wake of the Second World War and subsequent to the

⁴³ For a comprehensive discussion, see H. Meyrowitz, 'The Principle of Superfluous Injury or Unnecessary Suffering: From the Declaration of St. Petersburg of 1868 to Additional Protocol I of 1977', 34 *International Review of the Red Cross* (1994) 98–112; T. Meron, 'The Martens Clause, Principles of Humanity, and Dictates of Public Conscience', 94 *American Journal of International Law* (2000) 78–89.

⁴⁴ Article 54 of the 1977 Additional Protocol I to the 1949 Geneva Conventions (hereinafter API).

⁴⁵ Henckaerts and Doswald-Beck, *supra* note 6, at 189.

⁴⁶ B. Bonafè, *The Relationship between State and Individual Responsibility for International Crimes* (Martinus Nijhoff, 2009) 23.

⁴⁷ *Ibid.*, at 24.

⁴⁸ J. Crawford, 'First Report on State responsibility', UN Doc. A/CN.4/490, 24 April, 1, 5, 11 and 26 May, 22 and 24 July, 12 August 1998, §§ 12–18, available online at https://legal.un.org/ilc/documentation/english/a_cn4_490.pdf.

⁴⁹ Bonafè, *supra* note 46, at 24.

⁵⁰ *Ibid.*, at 25.

⁵¹ *Ibid.*, at 27. Note that individual responsibility for war crimes was first affirmed in the post-World War I Treaty of Versailles (1919) and subsequently established during the Leipzig trials of 1921. For more on the significance of the Leipzig Trials, see W. Schabas, 'International Sentencing: From Leipzig (1923) to Arusha (1996)', in M. Cherif Bassiouni (ed.), *International Criminal Law: Enforcement–Vol. III* (Martinus Nijhoff, 1999) 171–193.

Nuremberg Trial, the Geneva Conventions of 1949 provide for the punishment of individuals responsible for 'grave breaches', while state responsibility for the same underlying conduct already had a basis in customary international law.⁵² It is further noted that the 'intransgressible' character of the basic rules of IHL applicable in armed conflict⁵³ justifies their status as peremptory norms. The violation of these rules can lead to aggravated state responsibility.⁵⁴ This responsibility, then, is derived from the conduct of state organs committing serious violations of IHL in armed conflict, and from the violation of specific obligations regarding the punishment of perpetrators. This 'dual responsibility' for war crimes is now well-established,⁵⁵ but the overlap between the two forms of responsibility is not complete.⁵⁶ Bonafe has noted that the scope of the overlap differs, considering the subjective and material elements of war crimes.⁵⁷ Since both private individuals and state agents can commit war crimes, depending on the material element/context and the required subjective element/intent, the only overlap between individual and state liability is in situations where the war crimes are committed by state organs.

Our focus is on the material and subjective elements of potential war crimes resulting from terraforming warfare in Gaza, or, in the language of IHL, destructive military advantages against the environment during warfare. We assume that the conduct in question is committed by state agents (including IDF soldiers and officers), which leads to an overlap between possible state and individual responsibility.

5. THE RELEVANT LEGAL STANDARDS

IHL prohibits the use of any methods and means of warfare that may cause 'widespread, long-term and severe damage' to the natural environment.⁵⁸ This principle is rooted in both historical precedent and long-standing normative traditions. For instance, in both Christendom's⁵⁹ and Islamic⁶⁰ traditions of Just War, excessive civilian (including environmental) damage was proscribed. Towards the end of the 19th century, the Declaration of St Petersburg (1868) incorporated the principle that only military targets should be regarded as legitimate.⁶¹ Although it does not explicitly address the environment as a non-military target, the preamble of the Declaration articulates that the sole legitimate objective for States during warfare is to weaken the enemy's military forces.⁶² Thereafter, the Second Hague Convention (1907) specifically outlawed 'wanton destruction' in war. At the Post-Second World War Nuremberg trials, scorched earth tactics without a clear military purpose were

⁵² Bonafe, *supra* note 46, at 27.

⁵³ *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, ICJ Reports 1996, § 79.

⁵⁴ International Law Commission (ILC), Draft Articles on Responsibility of States for Internationally Wrongful Acts, with Commentaries (Report of the ILC on the Work of its 53rd Session), UN Doc. A/56/10, *Yearbook of the International Law Commission* (2001) Vol. II (2) 113, § 5. See also the recognition of aggravated State responsibility for serious violations of the Geneva Conventions or of Article 89 of API.

⁵⁵ Bonafe, *supra* no 46, at 28.

⁵⁶ *Ibid.*

⁵⁷ *Ibid.*

⁵⁸ Art. 35(3) and Art. 55(1) of API.

⁵⁹ On Augustine's stipulations for limiting war and proportionality, see L. Miller, 'The Contemporary Significance of the Doctrine of Just War', *16 World Politics* (1964) 254–286, at 258–259.

⁶⁰ See generally (and the sources cited), F. Malekian, *Corpus Juris of Islamic International Criminal Justice* (Cambridge Scholars Publishing, 2017) 163–165.

⁶¹ Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight (St. Petersburg Declaration), Saint Petersburg, 29 November/11 December 1868.

⁶² *Ibid.*

prosecuted as war crimes.⁶³ There are also several other general political and legal declarations and statements by international bodies on the illegitimacy and unlawfulness of environmental destruction in the context of armed conflict.⁶⁴ For instance, several UN Security Council Resolutions⁶⁵ condemned the Iraqi government for environmental damage after Iraq's unlawful invasion of Kuwait in 1990. For its part, the African Union (AU) regards the destruction of agricultural inputs, products, and infrastructure in the context of armed conflict as potential 'grave circumstances'⁶⁶ under Article 4(h) of the Constitutive Act of the AU.⁶⁷ This provision establishes 'the right of the Union to intervene in a member State pursuant to a decision of the [AU] Assembly in respect of grave circumstances, namely, war crimes, genocide and crimes against humanity'.⁶⁸ And, the UN Conference on Environment and Development stated in their Rio Declaration (Principle 24),⁶⁹ that the environment should generally be respected in times of war.

Moving from the broad historical and normative foundations, we now turn to the obligations imposed on states under two cardinal provisions enshrined in Articles 35(3) and 55(1) of API to the 1949 Geneva Conventions, whereby states undertake not to engage in warfare having 'widespread, long-term and severe damage' to the natural environment.⁷⁰ This section will briefly discuss the nature and scope of application of the two provisions as the regulatory framework protecting the natural environment during armed conflicts.

A. Ecological Concerns Associated with the Restrictions of Methods and Means of Warfare

The relevant IHL provision on the protection of the natural environment during armed conflict is codified in Article 35(3) of API, which restricts the selection of methods and means of warfare by conflict parties as follows:

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.

This is also the position in Rule 45 of the ICRC's Customary Law Study, which provides:

The use of methods or means of warfare that are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment is prohibited. Destruction of the natural environment may not be used as a weapon.⁷¹

⁶³ *The United States of America v. Wilhelm List, et al.*, Nuremberg Military Tribunals, Trial No. 7 (The Hostages Trial), 8 July 1947 to 19 February 1948. For a discussion of this issue, see B. Leebaw, 'Scorched Earth: Environmental War Crimes and International Justice', 2 *Perspectives on Politics* (2014) 770–788.

⁶⁴ For an overview, see, P. Hough 'Military Ecocide', in S. Sayapin et al. (eds), *International Conflict and Security Law—Volume 2* (T.M.C. Asser Press, 2022) 1149–1154.

⁶⁵ UNSC Res 674 (1990); UNSC Res 686 (1991); UNSC Res 687 (1991); UNSC Res 692 (1991).

⁶⁶ 'Food Security and Conflict in Africa', 9 May 2022, available online at <https://amaniafrica-et.org/food-security-and-conflict-in-africa/?print=print>.

⁶⁷ Constitutive Act of the African Union, 11 July 2000, available online at https://au.int/sites/default/files/pages/34873-file-constitutiveact_en.pdf.

⁶⁸ For commentary, see G. Amvane, 'Intervention Pursuant to Article 4(h) of the Constitutive Act of the African Union without United Nations Security Council Authorisation', 15 *African Human Rights Law Journal* (2015) 282–298.

⁶⁹ Report of the United Nations Conference on Environment and Development, UNGA, A/CONF.151/26 (Vol. I), 12 August 1992.

⁷⁰ For a relevant discussion on the existing norms protecting the natural environment during armed conflicts, see H.-P. Gasser, 'For Better Protection of the Natural Environment in Armed Conflict: A Proposal for Action', 89 *American Journal of International Law* (1995) 637–644; J. Goldblat, 'Legal Protection of the Environment Against the Effects of Military Activities', 22 *Bulletin of Peace Proposals* (1991) 399–406, at 400–403.

⁷¹ Henckaerts and Doswald-Beck, *supra* note 6, at 151.

Although Israel is not a party to API, there is now sufficient state practice to support the proposition that the obligation to protect the natural environment from 'widespread, long-term and severe damage' during armed conflicts is considered a rule of customary international law,⁷² which applies to international armed conflicts (IACs) and non-international armed conflicts (NIACs).⁷³ In the context of API, however, it remains uncertain what the term 'widespread' in Article 35(3) refers to. The term 'severe' is understood to refer primarily to ecological concerns.⁷⁴ Although the meaning of the term 'long-term' damage to the natural environment contained in Article 35(3) is still disputed, it seems that it is understood to refer to 'a period of decades'.⁷⁵

A method or a means of warfare would be considered lawful under Article 35(3) of API unless it *cumulatively* causes damage that is simultaneously 'widespread, long-term, and severe'. That is, each condition must be present to fulfil the threshold of environmental harm. It is of note here that the 1976 UN Convention on the Prohibition of Military or Any Other Use of Environmental Modification Techniques (ENMOD)⁷⁶ considers three criteria of 'widespread, long-lasting or severe' as 'alternatives'. However, the ICRC's apparent position is that they are cumulative and therefore must be present thoroughly in order for a military operation to be unlawful under Articles 35(3) and 55 of API.⁷⁷ For our purposes, the question is thus whether Israel's air strikes and other destructive military operations on Gaza have violated Rule 45 of the ICRC Study, which has already been accepted in state practice to be a customary rule of IHL in both IACs and NIACs.⁷⁸

B. Environmental Degradation and the Health or Survival of the Population

The prohibition of widespread, long-lasting, and severe damage to the natural environment because of conflict is also regulated by Article 55(1) of API, which stipulates the obligation to protect the natural environment during armed conflicts:

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 to prejudice the health or survival of the population.

⁷² It should be noted that although France, the United Kingdom, and the United States have objected to the customary status of the rule, the determination of the customary nature of this rule cannot rest solely on their views. To clarify, their position on the customary nature of the rule reflects only their own *opinio juris* and applies exclusively to the impacts of nuclear weapons, as they cited in the *Nuclear Weapons* case. However, their stance does not necessarily extend to the impacts of conventional methods and means of warfare, such as white phosphorus weapons, as demonstrated in the case of Gaza. Therefore, the obligation to protect the natural environment from 'widespread, long-term, and severe damage' during armed conflicts remains a rule of customary international law. See Henckaerts and Doswald-Beck, *supra* note 6, at 154–155.

⁷³ See Henckaerts and Doswald-Beck, *supra* note 6, Rule 45, at 151. For a discussion, see J.-M. Henckaerts, 'Study on Customary International Humanitarian Law: A Contribution to the Understanding and Respect for the Rule of Law in Armed Conflict', 87 *International Review of the Red Cross* (2005) 191.

⁷⁴ ICRC, *Guidelines on the Protection of the Natural Environment in Armed Conflict: Rules and Recommendations Relating to the Protection of the Natural Environment under International Humanitarian Law, with Commentary* (ICRC, 2020), Rule 2, at 29–39 (hereinafter ICRC Guidelines). For a discussion thereof, see H. Obregón Gieseke and V. Murphy, 'The Protection of the Natural Environment under International Humanitarian Law: The ICRC's 2020 Guidelines', 105 *International Review of the Red Cross* (2023) 1180–1207, at 1191–1194.

⁷⁵ IHL Databases, Commentary of 1987 on Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977, Commentary on Article 35—Basic Rules, § 1452, available online at <https://ihl-databases.icrc.org/en/ihl-treaties/api-1977/article-35/commentary/1987?activeTab=undefined>.

⁷⁶ Convention on the Prohibition of Military or Any Hostile Use of Environmental Modification Techniques, UN Doc. 3475 (XXX), 10 December 1976, UN Treaty Series, Vol. 1108, I. Nos. 1712–17123 (1978) at 151 [hereinafter ENMOD Convention].

⁷⁷ See ICRC Guidelines, *supra* note 74, Rule 3.B, § 86, at 44.

⁷⁸ Henckaerts and Doswald-Beck, *supra* note 6, Rule 45, at 151–158.

State practice has matured the provision of Article 55(1) into customary law.⁷⁹ However, neither the API nor its commentaries nor the *travaux préparatoires* define the phrase 'widespread, long-term and severe damage' contained in Article 55(1). What is certain, however, is that Article 55(1) implies a connection between the environment and humankind.⁸⁰ This meaning stretches back to the ICRC Commentary on Article 55 (1987) that advises that the term 'natural environment' should be interpreted in general terms. This means that the natural environment does not only consist of objects that are indispensable to the survival of a civilian population — such as foodstuffs, agricultural areas for the production of foodstuffs, crops, livestock, drinking water supplies, and irrigation works — but also includes forests and other vegetation as well as fauna and other biological or climatic elements.⁸¹

That being so, the objective of Article 55(1) is the survival of the civilian population and the environment, which is protected against attacks during armed conflict. Article 55(1) recognizes the protection of the environment as an essential element of protecting the civilian population, given the dependence of civilians on their natural environment for sustenance and development. Yet the inclusion of the phrase, 'care shall be taken in warfare to protect the natural environment' seems to reduce the effect of the provision by allowing some latitude of judgement, as it excludes a great deal of short-term environmental damage in war.⁸² It can therefore be reasonably assumed that this provision requires conflict parties to refrain from resorting to any lethal methods and means of warfare, which could produce 'widespread, long-term, and severe damage' to the natural environment.⁸³ We submit that terraforming warfare, as on display in Gaza, and in situations of systemic violations of other rules of international law, strengthens the presumption of possible Article 55(1) violations.

The meaning of the term 'widespread' in Article 55(1) remains uncertain. The term 'severe' is nevertheless generally understood to refer to damage prejudicing the health or survival of the population.⁸⁴ As with Article 35(3), the term 'long-term' in Article 55(1) is understood to refer to *decades* in the context of Article 55(1).⁸⁵

Bearing these definitions or understandings in mind, uncertainty in the three required components may enable conflict parties to resort to using conventional methods and means of warfare, such as cluster munitions or any other internationally non-banned weapons, simply because they are not of a nature to affect the natural environment in the long term.⁸⁶ In all cases, however, it is widely accepted that the impact of such weapons goes beyond civilian casualties, as extensive submunition contamination can have far-reaching and widespread environmental consequences, hindering post-conflict reconstruction and development.⁸⁷

⁷⁹ *Ibid.*, at 152.

⁸⁰ See A. Roberts, 'Environmental Issues in International Armed Conflict: The Experience of the 1991 Gulf War', 69 *International Law Studies* (1996) 222–277.

⁸¹ IHL Databases, *supra* note 75, Commentary on Article 55, § 2126.

⁸² *Ibid.*, § 2133.

⁸³ On the long-term environmental impact of chemical weapons, see J.R. Learn, 'Chemical Weapons Dumped after World War II Are Polluting the Baltic Sea', 98 *Chemical & Engineering News* (2020), available online at <https://cen.acs.org/environment/pollution/Chemical-weapons-dumped-World-War/98/137> (It is reported that some of the chemical agents can actively contaminate the environment decades, even centuries, after deployment).

⁸⁴ ICRC Guidelines, *supra* note 74, Rule 2, § 69, at 36–37; Gieseke and Murphy, *supra* note 74, at 1194.

⁸⁵ ICRC Guidelines, *supra* note 74, Rule 2, § 61, at 36.

⁸⁶ For a particularly sophisticated discussion of the inadequacy of the existing norms to protect the natural environment during armed conflicts, see generally W.D. Verwey, 'Protection of the Environment in Times of Armed Conflict: In Search of a New Legal Perspective', 8 *Leiden Journal of International Law* (1995) 7–40. See also R. Falk, 'The Inadequacy of Existing Legal Approach to Environmental Protection in Wartime', in J.E. Austin and C.E. Bruch (eds), *The Environmental Consequences of War: Legal, Economic, and Scientific Perspectives* (Cambridge University Press, 2000) 137–155, at 138 (arguing that 'the present legal framework does not provide a realistic basis for acceptable levels of implementation under wartime conditions').

⁸⁷ See K. Riordan, 'Convention on Cluster Munitions: Introductory Note', *United Nations Advisory Library of International Law* (2014), available online at <https://legal.un.org/avl/ha/ccm/csm.html>.

What can be said with certainty is that state practice considers the natural environment to be a *prima facie* civilian object, which includes all components of the natural environment — the earth's biosphere, cryosphere, lithosphere, hydrosphere, and atmosphere, including outer space⁸⁸ — and does not present an advantage to a military operation.⁸⁹ Therefore, the natural environment is not considered to be a military objective under the ICRC Customary Law Study, whereby civilian objects are protected against attack in both IACs and NIACs, unless and for such time as they are military objectives.⁹⁰

6. TERRAFORMING WARFARE AND ENVIRONMENTAL DESTRUCTION IN GAZA AND THE APPLICATION OF IHL

This section draws attention to the implications of IHL obligations to protect the natural environment during the war in Gaza. It considers two issues that are shrouded in legal controversy, namely: (i) insight into the IDF's actions in Gaza by looking at the applicable rules of IHL and possible scenarios in relation to violations of states' obligation to prevent environmental harm during armed conflicts, and (ii) environmental destruction as evidence of wrongdoing in Gaza that give rise to the criminal responsibility of individual state agents.

A. Insights into the IDF's Actions in Gaza

If the IDF asserts that it is targeting the military objectives of Hamas within the meaning of IHL, it must acknowledge the fact that there is still a need to avoid excessive long-term damage to the natural environment. Military objectives should not be targeted if the attack is likely to cause incidental harm to the environment that would be excessive in relation to the direct military advantage that the attack would be expected to confer. This is evident from Rule 43 (C) of the ICRC Customary Law Study⁹¹ and Rule 7 of the ICRC's Guidelines on the Protection of the Natural Environment in Armed Conflict,⁹² whereby 'launching an attack against a military objective which may be expected to cause incidental damage to the natural environment which would be excessive in relation to the concrete and direct military advantage anticipated is prohibited'.⁹³

It was illustrated earlier that state practice establishes the eco-centric provisions of Articles 35(3) and 55(1) as rules of customary international law applicable in IACs and NIACs.⁹⁴ The common basis of both Articles is the prohibition of 'widespread, long-term and severe damage' to the natural environment during armed conflicts. While it remains dubious what the term 'widespread' refers to, the term 'severe' in Article 35(3) is perceived to imply ecological concerns and limits on methods and means of warfare.⁹⁵ Yet the term 'severe' is construed to mean damage prejudicing the health or survival of the population in Article 55(1).⁹⁶ Whether damage to the natural environment would lead to a violation of IHL within the meaning of Articles 35(3) and 55(1) (and at what threshold) is not always clear. This is in great part because of the disputed nature of the phrase 'widespread,

⁸⁸ For a definition of the 'natural environment' as accepted in IHL and international criminal law, see Independent Expert Panel for the Legal Definition of Ecocide, 'Definition, Commentary, and Core Text' (June 2021) at 11, and as employed in the OTP Draft Policy on Environmental Crimes under the Rome Statute, §§ 21 and 22.

⁸⁹ See M.N. Schmitt, 'War and the Environment: Fault Lines in the Prescriptive Landscape', 37 *Archiv des Völkerrechts* (1999) 25–67, at 35.

⁹⁰ Henckaerts and Doswald-Beck, *supra* note 6, Rule 10, at 34.

⁹¹ *Ibid.*, at 143.

⁹² ICRC Guidelines, *supra* note 74, Rule 2, § 69, at 53–55.

⁹³ *Ibid.*, at 53.

⁹⁴ Henckaerts and Doswald-Beck, *supra* note 6, Rule 45, at 151.

⁹⁵ See *supra* Section 5.A.

⁹⁶ See *supra* Section 5.B.

long-term and severe damage', especially the term 'long-term', which is referred to as 'a period of decades' in the ICRC Commentary on Article 35,⁹⁷ while under Article 1 of the ENMOD Convention,⁹⁸ it is formally understood to be a matter of 'months or approximately a season'.⁹⁹ It is perhaps worth making explicit here that although the ENMOD Convention is not of a customary nature and is binding only upon states which are parties to the Convention, it has undeniably strengthened legal protection of the natural environment during armed conflict.

B. Environmental Destruction as Evidence of Wrongdoing in Gaza

It should come as no surprise when Israeli officials continue to justify the environmental destruction, particularly the devastation of farms and agricultural land in Gaza, under two basic scenarios: destruction deemed necessary by imperative military necessity to achieve a defined military objective; and the reality that there seems to be little evidence of 'widespread, long-term, and severe damage' to the natural environment resulting from Israel's air strikes on heavily civilian-populated Gaza. For instance, an IDF spokesperson argued in 2024 that the IDF was fully committed to respecting international legal obligations and it 'does not aim to inflict excessive damage to civilian infrastructure and strikes exclusively on the grounds of military necessity and in strict accordance with international law'.¹⁰⁰

As we mentioned earlier, the military necessity requirement for environmental destruction will not be satisfied in situations where a reasonable balance between military necessity and the principle of humanity is absent. This is to say, none of the parties to armed conflicts can target, destroy or render useless any objects indispensable to the survival of civilians, 'such as foodstuffs, agricultural areas for the production of foodstuffs, crops, livestock, drinking water installations and supplies and irrigation works, for the specific purpose of denying them for their sustenance value to the civilian population or to the adverse Party, whatever the motive, whether in order to starve out civilians, to cause them to move away, or for any other motive'.¹⁰¹ The natural environment is a system of unified ecosystems and sequences that has its own life; it is indeed indispensable for sustaining human life and for its development. For instance, the destruction of agricultural land that undeniably contributes to the sustenance of the civilian populations in Gaza is conceivably an inhumane means of warfare conducted by the IDF.

The second scenario, derived from a lack of evidence on the 'widespread, long-term, and severe damage' to the Gazan environment, remains questionable. This scenario would be the case only if the present and long-term environmental impacts of the lethal weapons and explosions used by the IDF in Gaza are not known *at present*, and measuring them will be difficult and complex, if not impossible. There is no denying that determining pollution levels and assessing the risks to the civilian population and their environment in Gaza will depend on precise studies and scientific certainty, as well as the

⁹⁷ IHL Databases, *supra* note 75, Commentary on Article 35, § 1452.

⁹⁸ See ENMOD Convention (1976), *supra* note 76.

⁹⁹ See 'Understandings: Understanding Relating to Article 1', in Report of the Conference of the Committee on Disarmament, Vol. I, General Assembly, Official Records: Thirty-First Session, Supplement No. 27 (A/31/27), U.N. Doc. A/31/2, New York, 1976, 91–92. On this issue and for a discussion on the nature of the ENMOD prohibitions, see L. Juda, 'Negotiating a Treaty on Environmental Modification Warfare: The Convention on Environmental Warfare and its Impact Upon Arms Control Negotiations', 32 *International Organization* (1987) 975–991, at 980–984. See also J.P. Terry, 'The Environment and the Laws of War: The Impact of Desert Storm', 45 *Naval War College Review* (1992) 61–67, at 64.

¹⁰⁰ Z. Saifi and J. Diamond, 'Going to a very bad place': Israeli Reservists Who Refuse to Return to Gaza Cite Military's Destructive Approach', CNN, 6 August 2024, available online at <https://edition.cnn.com/2024/08/06/europe/israeli-reservists-refuse-gaza-return-intl-cmd>.

¹⁰¹ Art. 54(2) of API. See also Henckaerts and Doswald-Beck, *supra* note 6, Rule 54, at 151.

monitoring and evaluation of air, water, and soil, as we have seen in the case of the 1991 Gulf War.¹⁰²

On the facts, however, while there is inescapable evidence of real risk,¹⁰³ and destructive impacts¹⁰⁴ of hundreds of 2,000-pound bombs dropped on Gaza,¹⁰⁵ which has made the area unliveable,¹⁰⁶ taking advantage of the uncertainty and imprecision in the exact meaning of the phrase 'widespread, long-term and severe damage' to the natural environment is a misconception and speculative behaviour given that it could be invoked to manipulate the obligation to protect the natural environment in armed conflicts and that destruction of the environment may not be used as a weapon. Yet again, this is a situation of pure risk, and it is submitted that this is where the principle of 'humanity' would come into play to hinder inflicting unnecessary suffering, injury and destruction.¹⁰⁷ On the assumption that the law is either uncertain or dubious, the *Martens Clause* is illustrative enough to obviate this terminological confusion in the furtherance of civilian protection and human security as the overriding objective of IHL.¹⁰⁸ Thus, in cases of uncertainty and ambiguity of the relevant laws or cases not covered by IHL treaties, states are required to respect a minimum standard as established by the principle of 'humanity' and the 'public conscience'.¹⁰⁹ Note in this regard that courts have referred to the principle of humanity, as Cassese has submitted, to serve the purpose of circumscribing the discretionary power of belligerents in the face of loose international rules.¹¹⁰ The principle of humanity would remain applicable as the core principle protecting the environment due to the ambiguous and perhaps disputed nature of the 'widespread, long-term and severe damage' to the natural environment. Concisely, the principle of humanity protects the natural environment, as reflected in the *Martens Clause*, and reaffirmed by the Draft Principles on Protection of the Environment in relation to Armed Conflicts (2022).¹¹¹ Principle 12 of the Draft provides that 'in cases not covered by international agreements, the environment remains under the protection and authority of the principles of international law derived from established custom, from the principles of humanity and from the dictates of public conscience'.¹¹²

It bears reiterating that the 'widespread, long-term and severe damage' to the natural environment constitutes serious violations of the laws and customs of war and thus can be

¹⁰² See UN Environment Programme (UNEP), *Protecting the Environment during Armed Conflict: An Inventory and Analysis of International Law* (Nairobi, 2009). For a much more extended discussion, see K. Hulme, 'Armed Conflict, Wanton Ecological Devastation and Scorched Earth Policies: How the 1990-91 Gulf Conflict Revealed the Inadequacies of the Current Laws to Ensure Effective Protection and Preservation of the Natural Environment', 2 *Journal of Armed Conflict Law* (1997) 45-81; A. Roberts 'The Laws of War in the 1990-91 Gulf Conflict', 18 *International Security* (1994) 134-181, at 164-168.

¹⁰³ Ahmed, Gayle and Mousa (2024), *supra* note 35.

¹⁰⁴ Forensic Architecture, *supra* note 15.

¹⁰⁵ See 'UN Special Committee finds Israel's warfare methods in Gaza consistent with genocide, including use of starvation as weapon of war', Office of the United Nations High Commissioner for Human Rights—Press Releases, 14 November 2024, available at www.ohchr.org/en/press-releases/2024/11/un-special-committee-finds-israels-warfare-methods-gaza-consistent-genocide; T. Qiblawi et al, 'Not Seen Since Vietnam': Israel Dropped Hundreds of 2,000-Pound Bombs on Gaza, Analysis Shows', CNN, 22 December 2023, available online at <https://edition.cnn.com/gaza-israel-big-bombs>.

¹⁰⁶ Humanity and Inclusion, 'The Impact of Explosive Weapons in Gaza—The People Behind the Numbers', Factsheet November 2023, 9 November 2023, available online at <https://reliefweb.int/report/occupied-palestinian-territory/factsheet-november-2023-impact-explosive-weapons-gaza-people-behind-numbers>.

¹⁰⁷ ICRC Guidelines, *supra* note 74, at 79-80.

¹⁰⁸ *Ibid.* For an extensive discussion, see R. Ticehurst, 'The Martens Clause and the Laws of Armed Conflict', 37 *International Review of the Red Cross* (1997) 125-134; Meron, *supra* note 43, at 78-89.

¹⁰⁹ Judgment, *Kupreškić et al. (IT-95-16-T)*, Trial Chamber, 14 January 2000, § 525.

¹¹⁰ A. Cassese, 'The Martens Clause: Half a Loaf or Simply Pie in the Sky?' 11 *European Journal of International Law* (2000) 187-216, at 208.

¹¹¹ International Law Commission (ILC), 'Draft Principles on Protection of the Environment in relation to Armed Conflicts', UN Doc. A/77/10, *Yearbook of International Law Commission* (2022) Vol. II (2).

¹¹² *Ibid.*, Principle 12.

considered war crimes under Article 8(2)(b)(iv) of the 1998 Rome Statute.¹¹³ There is no question whatsoever that IHL is a system of protection endeavouring to minimize harm and suffering during armed conflicts. Against this backdrop, the uncertain and almost disputed nature of the prohibition of 'widespread, long-term and severe damage' to the natural environment would not hamper the ICC's power and jurisdiction to conduct investigations effectively into disproportionate and intentional attacks and explosions that could produce damage to the natural environment not only for decades but also for several months in so far as that the health or survival of the Palestinian population is concerned.¹¹⁴

7. TERRAFORMING WARFARE, ENVIRONMENTAL DESTRUCTION, AND THE QUESTION OF ACCOUNTABILITY

We take as our framework for the accountability analysis the war crime created in Article 8(2)(b)(iv) of the 1998 Rome Statute, namely:

Intentionally launching an attack in the knowledge that such attack will cause incidental loss of life or injury to civilians or damage to civilian objects or 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.

The war crime created in the above provision has its basis in IHL as discussed elsewhere in this contribution, and in particular Articles 51(5)(b) and 85(3)(b), as well as Articles 35(3) and 55(1) of API. Regarding collateral damage, it should be noted that there is a textual difference between API and Article 8 of the Rome Statute, in that the words 'clearly' and 'overall' were added to the definition of the war crime in Article 8 of the Rome Statute. The war crime of damage to the environment in Article 8 is a combination of the elements contained in Articles 35(3) and 55 of API ('widespread, long-term and severe'), with the proportionality principle. In addition to the two components now contained in Article 8 of the Rome Statute, it should also be noted that '[d]amage to or destruction of the natural environment not justified by military necessity and carried out wantonly' is prohibited under customary international law.¹¹⁵

Before we consider the meaning of 'widespread, long-term and severe damage' to the environment for purposes of individual criminal liability, it is also important to consider proportionality in this context. It is an objective test and the relevant individual (for instance, the commander giving orders to attack) must 'be able reasonably to foresee, before launching the attack on a target, its military utility, the likely civilian casualties and whether the latter would be excessive'.¹¹⁶ The excessiveness must be in relation to the 'concrete and direct

¹¹³ For a discussion thereof, see J. de Hemptinne, 'Concluding Observations on the Influence of International Environmental Law over International Criminal Law', 20 *Journal of International Criminal Justice* (2022) 1287–1298; M. Gillett, 'Environmental Damage and International Criminal Law', in S. Jodoin and M.-C. Cordonier Segger (eds), *Sustainable Development, International Criminal Justice, and Treaty Implementation* (Cambridge University Press, 2013) 73–99.

¹¹⁴ On this issue, see R. Goodman, M.W. Meier, and T. Bridgeman, 'Expert Guidance: Law of Armed Conflict in the Israel-Hamas War', *Just Security*, available at www.justsecurity.org/89489/expert-guidance-law-of-armed-conflict-in-the-israel-hamas-war; M.N. Schmitt, 'Attacking Hamas—Part II: The Rules', *Articles of War*, 7 December 2023, available online at <https://lieber.westpoint.edu/attacking-hamas-part-ii-rules>; B.L. Cox, 'In Defence of Doctrinal Assessments: Proportionality and the 31 October Attack on the Jabalia Refugee Camp', *EJIL: Talk!*, 10 November 2023, available online at www.ejiltalk.org/in-defence-of-doctrinal-assessments-proportionality-and-the-31-october-attack-on-the-jabalia-refugee-camp; M. Lattimer, 'Assessing Israel's Approach to Proportionality in the Conduct of Hostilities in Gaza', *Lawfare*, 16 November 2023, available online at www.lawfaremedia.org/article/assessing-israel-s-approach-to-proportionality-in-the-conduct-of-hostilities-in-gaza.

¹¹⁵ K. Dörmann, *Elements of War Crimes under the Rome Statute of the International Criminal Court* (Cambridge University Press, 2003), 167.

¹¹⁶ *Ibid.*, at 171.

overall military advantage anticipated'.¹¹⁷ Whether 'a definitive military advantage would result from an attack must be judged in the context of the military advantage anticipated from the specific military operation of which the attack is a part, considered as a whole, and not only from isolated or particular parts of that operation.' Thus, it is 'not necessary that the contribution made by the object to the Party attacked be related to the advantage anticipated by the attacker from the destruction, capture or neutralization of the object'.¹¹⁸ Several states have made declarations along these lines. For instance, the Canadian military manual contains the following:

- 1) The military advantage at the time of the attack is that advantage anticipated from the military campaign or operation of which the attack is part, considered as a whole, and not only from isolated or particular parts of that campaign or operation.
- 2) A concrete and direct military advantage exists if the commander has an honest and reasonable expectation that the attack will make a relevant contribution to the success of the overall operation. Military advantage may include a variety of considerations, including the security of the attacking forces.¹¹⁹

The test for the military value of an object, therefore, seems to be holistic rather than isolated. But this does not mean that the humanitarian considerations can be excluded from any given individual attack; foreseeable civilian harm must always form part of the equation.¹²⁰

The war crime is perpetrated when the attack is intentionally launched in the knowledge that such an 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. Before we get to the mental element of this war crime, it is again important to note the proportionality element, which is linked to the environmental harm element. Dörmann quotes from the Final Report to the Prosecutor of the ICTY by the Committee Established to Review the NATO Bombing Campaign to illustrate the interplay between the environmental norm and the element of proportionality:

in order to satisfy the requirement of proportionality, attacks against military targets which are known or can reasonably be assumed to cause grave environmental harm may need to confer a very substantial military advantage in order to be considered legitimate ...¹²¹

One must pause and ask whether the destruction of entire urban areas, together with systematic destruction of environmental infrastructure—terraforming warfare — carries the 'very substantial military advantage' for purposes of proportionality. The proposition seems highly unlikely.

This brings us to the mental element. Article 8(2)(b)(iv) of the Rome Statute mandates that the accused must deliberately initiate an attack with the awareness that such an attack will inflict 'widespread, long-term, and severe damage' to the natural environment, which would be disproportionate in relation to the concrete and direct overall military advantage

¹¹⁷ *Ibid.*

¹¹⁸ W.A. Solf, 'Article 52' in M. Bothe, K.J. Partsch and W.A. Solf (eds), *New Rules for Victims of Armed Conflicts: Commentary on the Two 1977 Protocols Additional to the Geneva Convention of 1949* (Martinus Nijhoff, 1982) 324.

¹¹⁹ Office of the Judge Advocate, The Law of Armed Conflict at the Operational and Tactical Level, 4-4, available online at www.fidh.org/fileadmin/_migrated/content_uploads/Canadian_LOAC_Manual_2001_English.pdf.

¹²⁰ Dörmann, *supra* note no 115, at 173.

¹²¹ ICTY, *Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign*, § 22, quoted in Dörmann, *supra* note 115, at 175–176.

anticipated. The ICRC Commentary on Article 85 of API notes that the relevant grave breach is committed if the alleged perpetrator 'knew with certainty that the described results would ensue, and this would not cover recklessness'.¹²² This is an appropriate standard for criminal liability, but not always easy to determine in situations where the consequences of environmental damages and destruction are not immediately clear. Indeed, what may seem like obvious destructive actions at the surface level may nevertheless lead to different conclusions in terms of potential criminal liability. Dannenbaum and Dill observed that some 'strikingly divergent evaluations of Israel's conduct in Gaza hinge on what intent is attributed to Israel or its officials'.¹²³ Contested facts, especially in an ongoing conflict like the situation in Gaza, could be the reason for the divergent judgments regarding the legal consequences of ostensibly destructive and harmful actions. However, as Dannenbaum and Dill note, at least some of the divergent judgments stem from 'doctrinal confusion' about the conceptualization of intent in conflict situations. This is certainly true of potential war crimes under Article 8(2)(b)(iv) of the Rome Statute. Infrastructural and environmental destruction can be carried out for various purposes, but evaluating such actions within a war crimes framework requires not only an assessment of the facts but also an examination of intent. To illustrate: Nadia Hardman, a researcher at Human Rights Watch, noted a pattern of actions in the north of Gaza where the IDF was clearing territory for 'buffer zones' and 'security corridors'. Hardman writes: 'People can argue whether the campaign of bombing is reckless destruction or part of the hostilities, but taking control of an area and intentionally destroying it looks far more systematic'.¹²⁴

It was already pointed out that recklessness is insufficient to establish liability for the war crime under Article 8(2)(b)(iv) of the Rome Statute. Acting with knowledge, that is, indirect (or oblique) intent, is sufficient for this war crime. The difficulty here is that the criminal liability under Article 8(2)(b)(iv) is not premised on mere prohibited conduct (regardless of consequences) but rather on the *consequence of conduct*. The intent element is defined in relation to the consequences, namely attacks which will cause *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*. The knowledge requirement is also reflected in the ICC Elements of Crimes, which states that the perpetrator 'knew that the attack would cause ... widespread, long-term and severe damage to the natural environment and that such ... damage would be of such an extent as to be clearly excessive in relation to the concrete and direct overall military advantage anticipated'.

The requirement that a proscribed attack should be 'excessive' in relation to the concrete and direct overall military advantage anticipated constitutes a significant but not insurmountable obstacle to the application of Article 8(2)(b)(iv). Importantly, the intention and thoughts behind the environmental damage must be the 'knowledge' that the environmental damage is disproportionate to the 'overall military advantage anticipated'. Turning to the responsibility and prosecution of environmental destruction during conflicts, it is important to note that the *travaux préparatoires* of the Rome Statute provide further clarity on the 'knowledge' criterion, which must be assessed for the accused to be convicted of the crime of environmental destruction during an international armed conflict. On the facts, 'the Court must first determine that, taking account of the relevant circumstances of, and information available to, the accused at the time, the accused had the requisite knowledge and

¹²² Quoted in Dörmann, *supra* note 115, at 176.

¹²³ See generally T. Dannenbaum and J. Dill, 'International law in Gaza: Belligerent Intent and Provisional Measures', 118 *American Journal of International Law* (2025) 659–683.

¹²⁴ See P. Beaumont, M.A. Tantesh, and K. Ahmed, 'Everything Is Gone': How Israeli Forces Destroyed Jabaliya Refugee Camp', *The Guardian*, 18 December 2024, available online at www.theguardian.com/global-development/2024/dec/18/jabaliya-refugee-camp-gaza-destruction-idf?CMP=share_btn_url.

intent to commit the crime.¹²⁵ Thus, before an armed attack is allowed, excessive damage to civilian objects resulting from the attack must be outweighed by the direct military advantage which accrues to the attacker. Therefore, prosecution of the commander of the attack will depend on detailed knowledge of the alleged perpetrator based on his 'foreseeable' perceptions at the time, and the knowledge of what 'widespread, long-term and severe damage' means.¹²⁶ In other words, will the attack cause such a level of damage, and will the damage probably be disproportionate to the anticipated advantage of the military operation? After all, it is often difficult to establish this criterion for the purposes of prosecution.¹²⁷ It is uncertain whether a commander in armed conflict can reasonably foresee an attack causing 'widespread, long-term and severe damage'.¹²⁸ However, it is worth noting that proportionality is inherently contextual and resists simple calculation. The ICTY in *Kupreškić* stressed the 'reasonable commander' standard,¹²⁹ which evaluates whether a reasonable military commander, given the context, would foresee excessive civilian harm.¹³⁰ It emphasizes that decisions should not rely solely on a commander's judgment but on whether a reasonable, well-informed commander could have anticipated such harm to civilians or civilian objects.¹³¹

For our purposes, the ambiguity of the military margin of appreciation, which allows for flexibility in the conduct of operations by military commanders who must assess the necessity of targeting a specific object, has created grounds for controversy on the scope of environmental crimes under the Rome Statute.¹³² This is likely to be sufficient to justify military operations that will lead to environmental damage. This is simply because the three modifiers of damage — 'widespread, long-term and severe' — and the term 'natural environment' are not explicitly defined in the Rome Statute.¹³³

What is clear, however, is that IHL confers protection to the natural environment, which is a civilian object in character. That being so, one may refer to Article 51(5)(b) of API, according to which any attack that is expected to cause excessive loss of civilian life, injury to civilians, and/or damage to civilian objects is prohibited. Fundamentally, these kinds of operations are evidently against the principle of distinction between civilian objects and military objectives.

Concerns about the threats to ecology, wildlife, and human health or survival of the population from pollution caused by armed conflict have forced the UN Environment Assembly to adopt the Resolution on Pollution Mitigation and Control in Areas Affected by Armed

¹²⁵ United Nations Diplomatic Conference of Plenipotentiaries on the Establishment of an International Criminal Court—Official Records, Vol. III, Rome, 15 June–17 July 1998, *Report of the Preparatory Committee on the Establishment of an International Criminal Court*, Doc. A/CONF.183/2, 14 April 1998, Section B(b) to 'War Crimes', Option 3, at 16.

¹²⁶ For a discussion of this issue, see J. van den Boogaard, *Proportionality in International Humanitarian Law Refocusing the Balance in Practice* (Cambridge University Press, 2023) 226–252.

¹²⁷ See Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign against the Federal Republic of Yugoslavia (2000), ICTY Committee Report, § 23.

¹²⁸ See R. Gilman, 'Expanding Environmental Justice after War: The Need for Universal Jurisdiction over Environmental War Crimes', 22 *Colorado Journal of International Environmental Law and Policy* (2011) 447–471, at 455; S. Freeland, *Addressing the Intentional Destruction of the Environment during Warfare under the Rome Statute of the International Criminal Court* (Intersentia, 2015) 210; Schmitt, *supra* note 89, at 35.

¹²⁹ For a discussion thereof, see I. Henderson and K. Reece, 'Proportionality Under International Humanitarian Law: The "Reasonable Military Commander" Standard and Reverberating Effects', 51 *Vanderbilt Journal of Transnational Law* (2018) 835–855.

¹³⁰ *Kupreškić et al.*, *supra* note 109, § 524.

¹³¹ See F. Kalshoven and L. Zegveld, *Constraints on the Waging of War: An Introduction to International Humanitarian Law* (Cambridge University Press, 2011) 115.

¹³² For a much more extensive discussion, see S. Redse Johansen, *The Military Commander's Necessity: The Law of Armed Conflict and Its Limits* (Cambridge University Press, 2019) 64–89.

¹³³ See K. Dörmann, 'War Crimes under the Rome Statute of the International Criminal Court, with a Special Focus on the Elements of Crimes', 7 *Max Planck Yearbook of United Nations Law* (2003) 341–407, at 384–387; J.C. Lawrence and K.J. Heller, 'The First Ecocentric Environmental War Crime: The Limits of Article 8(2)(B)(IV) of the Rome Statute', 20 *Georgetown Environmental Law Review* (2007) 61–96, at 94–95; M.A. Drumb, 'Waging War against the World: The Need to Move from War Crimes to Environmental Crimes', 22 *Fordham International Law Journal* (1998) 122–153, at 127–128.

Conflict or Terrorism.¹³⁴ The Resolution addresses the loss of environmental governance, as well as the coping strategies that communities affected by pollution are often forced into due to armed conflicts. As mentioned by the Resolution, 'the long-term socio-economic consequences of the degradation of the environment and natural resources resulting from pollution caused by armed conflict or terrorism, which include, *inter alia*, the loss of biodiversity, the loss of crops or livestock, and the lack of access to clean water and agricultural land, the negative and sometimes irreversible impacts on ecosystem services and their impact on sustainable recovery, [contribute] to further forced displacement related to environmental factors.'¹³⁵

Furthermore, pollution resulting from the IDF's air strikes on the Gaza Strip has an indirect impact on ecology, wildlife, and human health or survival of the population, posing risks for the local population in vulnerable situations, in violation of the environmental norms of IHL.¹³⁶ Article 55(1) of API is the key instrument of IHL in this regard, prohibiting operations that are intended or may be expected to cause damage to the natural environment and human health.¹³⁷ As we have seen in the example of the 1991 Gulf War,¹³⁸ air, soil, and maritime pollution from oil spillages and fires had profound environmental consequences derived from the destruction of energy resources as part of the natural environment.¹³⁹

As reaffirmed in the Rio Declaration on Environment and Development, 'human beings are at the centre of concerns for sustainable development [and] they are entitled to a healthy and productive life in harmony with nature'.¹⁴⁰ This is, in fact, indicative of the obligation to protect human life and health by limiting the impact of armed conflict as the primary objective of IHL. Having said this, the principle of precautions in attack, which is enunciated in Article 57(2)(a) of API, requires the perpetrator to consider all options when making targeting decisions, including verifying the target, the timing of the strike (for instance, considering whether to attack at a time when there might be fewer civilians around), the weapons used, and warnings and evacuations for the civilian population in the area.¹⁴¹ Crucially for our purposes, the customary nature of the obligation to take all feasible precautions in order to avoid, and in any event to minimize, incidental loss of civilian life, injury to civilians and damage to civilian objects is supported by reported state practice.¹⁴²

A rational balance must be struck between military necessity and proportionality. The harmful and excessive effects of an attack on the natural environment must be outweighed by achieving the legitimate military advantages.¹⁴³ This would certainly be the case in assessing excessive harm to the natural environment as well. We are, however, in thorough

¹³⁴ See UN Environment Assembly of the UN Environment Programme (UNEP), Resolution 3/1 on 'Pollution Mitigation and Control in Areas Affected by Armed Conflict or Terrorism', UN Doc. UNEP/EA.3/Res.1, 30 January 2018.

¹³⁵ Relatedly, see UN Environment Assembly of the UN Environment Programme (UNEP), Resolution 2/15 on 'Protection of the Environment in Areas Affected by Armed Conflict', UN Doc. UNEP/EA.2/Res.15, 4 August 2016.

¹³⁶ See generally UNEP, *Environmental Impact of the Conflict in Gaza*, *supra* note 15.

¹³⁷ For more details, see P.-M. Dupuy and J.E. Vinuales, *International Environmental Law* (Cambridge University Press, 2018) 413–417.

¹³⁸ See Roberts, *supra* note 80, at 222–277; Roberts, *supra* note 102, at 164–168; Hulme, *supra* note 102, at 45–81.

¹³⁹ See International Law and Policy Institute (ILPI), *Protection of the Natural Environment in Armed Conflict: An Empirical Study* (Oslo: 2014) 14; UN Environment Programme (UNEP), *Desk Study on the Environment in Iraq* (Nairobi, 2003) 56–57.

¹⁴⁰ Rio Declaration on Environment and Development, Annex I of the Report of the United Nations Conference on Environment and Development, UN Doc. A/CONF.151/26, Vol. I, Rio de Janeiro, 3–14 June 1992, Principle 1, available online at www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_CONF.151_26_Vol.I_Declaration.pdf.

¹⁴¹ See J.-M. Henckaerts and D. Constantin, 'Protection of the Natural Environment', in A. Clapham and P. Gaeta (eds), *The Oxford Handbook of International Law in Armed Conflict* (Oxford University Press, 2014) 472; S. Oeter, 'Methods and Means of Combat', in D. Fleck (ed.), *The Handbook of International Humanitarian Law* (Oxford University Press, 2013) 119–236, at 214–215.

¹⁴² *Ibid.*, at 55.

¹⁴³ See generally Y. Dinstein, 'Legitimate Military Objectives under the Current Jus in Bello', *78 International Law Studies* (2002) 139–172.

agreement with Gillett that counterattacks and acts of reprisal against the natural environment cannot be considered permissible military advantage, simply because they would undermine the relevant prohibitions set out under IHL.¹⁴⁴ This would suggest that any harm to the civilians and civilian objects must be balanced against military advantage within the meaning of Article 51(5)(b) of API, which prohibits any attacks that are expected to cause excessive loss of civilian life, injury to civilians, and/or damage to civilian objects. It is worth noting here that the term 'excessive' in API calls for a rational balance to be struck between military advantage and potential harm to the civilian population.¹⁴⁵

It should be uncontroversial that the only legitimate military aim is to weaken the military capacity of the enemy while taking into consideration that civilians and civilian objects must be protected against attacks, as the primary aim of IHL. In principle, necessity is inadmissible if the purpose for which the measure was taken (for instance, environmental destruction) was itself contrary to IHL. Again, belligerents have the obligation to protect the natural environment from 'widespread, long-term and severe damage' if the incidental harm is disproportionate. This is the exact purpose of the principle of proportionality, which aims to balance military and humanitarian considerations during armed conflicts.¹⁴⁶ Military commanders must consider any factors affecting incidental loss or damage, such as the proximity of civilians or civilian objects, in particular the natural environment, in the vicinity of the target or other protected objects, or the possible release of environmentally harmful materials as a result of the attack.¹⁴⁷ In doing so, military commanders may have to accept a higher level of risk to their own forces in order to avoid or minimize collateral damage to the enemy's civilian population and civilian objects.¹⁴⁸ Thus, parties to the conflict must use only those methods and means of warfare that do not cause such undue damage to civilians and civilian objects, such as the natural environment, even if the attack is considered lawful under the extant IHL considerations. To turn the entirety of the Gaza Strip into a military objective by an expansive categorization of military targets strongly suggests an abuse of settled IHL rules and principles.¹⁴⁹

In terms of knowledge of unlawfulness and intent, what we are advocating for here is not a lowering of the legal standard (we are not reading recklessness into the war crime elements), but rather a proper—and realistic—construction of knowledge of consequence. This knowledge element is informed by a humanitarianism that includes proper environmental considerations, norms, and standards.

In the context of a terraforming war (such as in Gaza), it is hardly necessary to lower the legal standard for individual or state liability. Evidence presented by South Africa in its genocide case against Israel points to clear knowledge of the annihilatory consequences intended by Israeli military and civilian officials. Indeed, when IDF generals stated in November 2023 on Israeli television that Gaza will become a 'fallow land', a 'scorched earth', 'unliveable, and

¹⁴⁴ M. Gillett, 'Criminalizing Reprisals against the Natural Environment', 105 *International Review of the Red Cross* (2023) 1463–1496, at 1492.

¹⁴⁵ See C.J. Greenwood, 'Current Issues in the Law of Armed Conflict: Weapons, Targets and International Criminal Liability', 1 *Singapore Journal of International and Comparative Law* (1997) 441–467, at 461–462; Henckaerts and Doswald-Beck, *supra* note 6, Rule 1, at 14.

¹⁴⁶ A.P.V. Rogers, 'Zero-Casualty Warfare', 82 *International Review of the Red Cross* (2000) 165–181, at 176. For a much more extensive discussion, see A. Cohen and D. Zlotogorski, *Proportionality in International Humanitarian Law: Consequences, Precautions, and Procedures* (Oxford University Press, 2021) 3–10 (discussing the applicability of proportionality and the interrelationship between proportionality and the principle of distinction, and military necessity).

¹⁴⁷ *Ibid.*

¹⁴⁸ British Minister of Defence, British Defence Doctrine (JWP 0-01) (Joint Warfare Publication, 1996), discussed and cited by Rogers, *supra* note 146, at 178.

¹⁴⁹ N. Sultany, 'A Threshold Crossed: On Genocidal Intent and the Duty to Prevent Genocide in Palestine', *Journal of Genocide Research* (2024) 1–26, at 9; Report by UN Special Rapporteur Francesca Albanese, *supra* note 40, §§ 63–67.

without a future',¹⁵⁰ they expressed full knowledge of the nature of the military campaign that followed, a terraforming campaign of destruction, realized during the conflict and still ongoing at the time of writing.¹⁵¹ Statements like these may very well show genocidal intent as well as knowledge of unlawfulness for purposes of the environmental war crimes discussed above.¹⁵² Indeed, how can these statements not be understood as knowledge of unlawfulness, especially since the rhetoric was followed by acts of unjustified destruction?¹⁵³ And, to be clear, genocidal intent and intent to commit war crimes can coexist in a scenario where acts are perpetrated for more than one purpose.¹⁵⁴

8. CONCLUSION

Looking at the devastation in densely populated Gaza, one cannot help but think of the examples of terraforming in Amitav Ghosh's book; locations where landscapes, even whole ecosystems, were utterly changed. And it is not hyperbolic to think of the situation in Gaza in these terms; one only needs to read the many reports by NGOs, human rights groups, and international organizations to appreciate the fact that the destruction in Gaza is more than just superficial, incidental, or collateral. Human and environmental systems are falling apart, with global risks such as climate change exacerbating the situation.

In this contribution, we have considered the environmental impact of the war in Gaza. The environmental destruction is well-documented and clear. Less clear is the appropriate legal response to this. There are normative-doctrinal and factual-evidentiary issues precluding any definitive findings in a contribution like this. What we put forward is a realistic and plausible abstract assessment of the situation in Gaza, with relevance for similar 'terraforming' warfare situations currently or in future. As is evident from the OTP Draft Policy on Environmental Crimes, there are currently no ecocentric crimes (as such) in the Rome Statute, despite initiatives in academia and civil society proposing amendments to the Statute to include crimes like 'ecocide' within the substantive jurisdiction of the ICC. The lack of ecocentric crimes does not mean that anthropocentric crimes (including core international crimes like genocide, crimes against humanity, and war crimes) cannot be useful tools to hold to account those responsible for environmental harm and destruction. What we have shown is that the IHL and war crimes frameworks have their own difficulties and contested areas. But we have also shown that the humanitarian norm, which informs IHL and war crimes law, informs both state responsibility and individual criminal liability for the violation of primary rules, which includes the protection of the natural environment in times of war.

¹⁵⁰ ICJ, 'Application Instituting Proceedings and Request for the Indication of Provisional Measures' — Application of the Convention on the Prevention and Punishment of the Crime of Genocide in the Gaza Strip (*South Africa v Israel*), 29 December 2023, at 59–66.

¹⁵¹ Even a few months after the November 2023 statements by the IDF generals, the UN humanitarian relief agency's chief official remarked that Gaza has become 'uninhabitable'. See 'UN Relief Chief: The war in Gaza must end', OCHA, 5 January 2024, available online at <https://www.unocha.org/news/un-relief-chief-war-gaza-must-end>.

¹⁵² Compare: Judgment, *Kordic and Cerkez* (IT-95-14/2-T), Trial Chamber, 26 February 2001, §§ 346–347: '[T]he elements of the crime of wanton destruction not justified by military necessity charged under Article 3(b) of the Statute are satisfied where: (i) the destruction of property occurs on a large scale; (ii) the destruction is not justified by military necessity; and (iii) the perpetrator acted with the intent to destroy the property in question or in reckless disregard of the likelihood of its destruction.' To be clear, we don't argue for a recklessness standard for purposes of individual criminal liability under the Rome Statute, but that would at any rate have been redundant, given the clear intent expressed by the IDF generals as quoted above, an intent which was followed by conduct that matched the stated aim of making Gaza 'unliveable' and 'without a future'.

¹⁵³ Sultany, *supra* note 149, at 1–5.

¹⁵⁴ Judgment, *Krstic* (IT-98-33-T), Trial Chamber, 2 August 2001, § 599.

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