Wartime GHG Emissions as Widespread, Long-Term and Severe Damage to the Environment

Romina Pezzot*
Geneva Graduate Institute, Geneva, Switzerland
romina.pezzot@graduateinstitute.ch

The environment is the physical setting in which armed conflicts occur, rendering it particularly susceptible to both direct and indirect damage. Consequently, there is a constant tension between the environment and armed conflicts to such an extent, that it has been argued that the history of wartime activities is also a history of environmental damage.[1] The law of armed conflict (LOAC) acknowledges such an existing tension, and seeks to strike a balance between the military necessity of those actively participating in hostilities and the humanitarian and environmental considerations regarding those affected by hostilities. This balance is also present at the threshold of environmental damage that is considered unacceptable and, consequently, prohibited.

Widespread, long-term, and severe damage to the environment is the maximum threshold established in Articles 35(3) and 55 of Additional Protocol I (AP I, whose antecedent is the Environmental Modification [ENMOD] Convention) and Rule 45 of the International Committee of the Red Cross International Humanitarian Law (ICRC IHL) Customary Study. This threshold is based on the cumulative characteristics of the damage: geographical extent, durability, and severity. Since destruction and damage are inherent to armed conflicts and some damage is unavoidable, the threshold for environmental harm is intentionally set high to ensure that only the most serious environmental harm is prohibited. To prevent it, parties to armed conflicts shall take constant care to protect the environment. Interestingly, protecting the environment against widespread, long-term, and severe damage is not limited to specific sources of damage or to certain areas or

* PhD researcher in international law at the Geneva Graduate Institute. Her current research focuses on the intersection between international environmental law, climate change law, international humanitarian law and the law on the use of force. She holds a law degree from the University of Buenos Aires and a master's degree in international law from the Geneva Graduate Institute. The author thanks to the Editors as well as to John Hursh and Karem Cardenas Ynfanzon for their valuable comments to the previous version.

1 Silja Vöneky and Rüdiger Wolfrum, 'Environment, Protection in Armed Conflict' in: Rüdiger Wolfrum (ed.), *MPEPIL* (online edn, Oxford University Press 2016), para. 26.

DOI 10.17104/0044-2348-2026-3-811

components of the environment that may be affected during armed conflicts. This raises the question of whether greenhouse gas (GHG) emissions from Parties to armed conflicts can be considered widespread, long-term, and severe environmental damage, particularly to the climate system.[2] The Russia-Ukraine war illustrates how this armed conflict has affected the climate system, resulting in the emission of 311 million tonnes of CO2 equivalent (tCO2e) since 2022 – a figure comparable to France's annual emissions.[3] The answer to this question lies in the scope of the triad 'widespread, long-term and severe' damage and whether the effects of wartime GHG emissions fall within it. It is argued here that they do.

The triad of 'widespread, long-term and severe' damage is not defined in AP I. Bothe concludes, and I agree with him, that it would be highly dangerous to rely too heavily on the negotiation history of AP I (and the ENMOD Convention) for interpreting those terms, since they belong to a period of development of LOAC and of environmental awareness that is now gone or completely different.[4] The 2022 ICRC Guidelines on the protection of the environment in armed conflict are an appropriate reference because they provide an updated interpretation of those terms. Starting with 'widespread' – referring to the geographical extent of damage – the Guidelines interpret it as covering both direct and foreseeable indirect damage beyond the immediate area of warfare.[5] GHG emissions are transboundary in nature, as they do not remain within the territory where they were emitted. On the contrary, once released, they enter and accumulate in the atmosphere, which is part of the Earth's climate system, which is inherently global and part of the shared global commons. For that reason, given that GHGs transcend the territorial limits of the belligerent parties and extend across the global climate system, they may be regarded as a form of widespread environmental harm.

Regarding the second criterion – which concerns the duration of damage – the ICRC Guidelines interpret 'long-term' as referring to effects that last for years and extend beyond a single season, including ongoing indirect impacts.[6]

2 About the influence of concerns over warfare's climate impacts on the drafting history of AP I and the UN climate change regime, see Mario Pasquale Amoroso's contribution in this volume.

3 Initiative on GHG Accounting of War, 'Climate Damage Caused by Russia's War in Ukraine (24 February 2022- 23 February 2026)', <https://en.ecoaction.org.ua/wp-content/uploads/2026/02/Climate-Damage-Caused-by-War-48-months_ENs.pdf>, last access 6 July 2026.

4 Michael Bothe, 'The Protection of the Environment in Times of Armed Conflict', GYIL 34 (1991), 54-62 (56-58).

5 ICRC, 'Guidelines on the Protection of the Natural Environment in Armed Conflict' (2022), 33-34.

6 ICRC (n. 5), 67-71.

 DOI 10.17104/0044-2348-2026-3-811

This criterion is also met since once released, GHGs do not simply dissipate; they accumulate in the atmosphere over time, causing and aggravating climate change. The average lifetime of GHGs in the atmosphere depends on their type. According to scientific studies, carbon dioxide remains in the environment for hundreds of thousands of years, while methane stays around a decade, nitrous oxide about 110 years, and chlorofluorocarbons range from about 52 to 93 years.[7] Consequently, GHG emissions cause long-term and direct damage to the climate system.

Lastly, the 'severe' criterion – which refers to the intensity of the harm – is interpreted by the ICRC Guidelines as denoting serious harm, such as large-scale ecosystem disruption or significant threats to human health or survival.[8] As for GHG emissions (including those from armed conflicts), science has confirmed that they cause severe damage to the climate system because they contribute to climate change, which in turn disrupts biological diversity and causes and aggravates desertification and land degradation[9] as well as sea level rise and ocean acidification.[10] Additionally, the effects of climate change (caused by GHG emissions) threaten several human rights, particularly the right to life.[11]

With all that in mind, it is difficult not to consider wartime GHG emissions as widespread, long-term, and severe damage to the climate system. Given that parties to armed conflicts shall take constant care to prevent damage to the environment from reaching that threshold (Article 55(1) AP I), they must adopt all feasible measures to prevent or mitigate GHG emissions from their military operations (Article 57 AP I and Rule 15 ICRC IHL Customary Study). NATO'AJEPP-4 is a good example of the implementation of this obligation, since environmental risk management is integrated into the overall planning for military activities, including impacts on the climate system.[12] This does not mean that parties must immediately stop emitting GHGs, since that would not be realistic and would ignore military necessity, the other half of the balancing test. On the contrary, they must adopt feasible measures to prevent or mitigate

7 NASA, 'Major Greenhouse Gas Sources, Lifespans, and Possible Added Heat', 22 June 2023, <https://science.nasa.gov/resource/graphic-major-greenhouse-gas-sources-lifespans-and-possible-added-heat/>, last access 6 July 2026.

8 ICRC (n. 5), 61-66.

9 ICJ, *Obligations of States in respect of climate change*, Advisory Opinion of 23 July 2025, paras 325-335.

10 IPCC, 'Special Report on the Ocean and Cryosphere in a Changing Climate' (2019).

11 UN Human Rights Committee, General Comment No. 36: Article 6: Right to Life of 3 September 2019, CCPR/C/GC/36, para. 62.

12 North Atlantic Treaty Organization, 'AJEPP-4: Joint NATO doctrine for environmental protection during NATO-led military activities (Edition B, Version 1)' (2018), 15-16.

GHG emissions,[13] since the 'take care' obligation is a due diligence obligation applicable in all circumstances during armed conflicts.[14]

It is evident that armed conflicts have an environmental cost, particularly for the Earth's climate system. Therefore, they can no longer disregard their negative impact on the climate system, nor can the climate system remain a casualty of armed conflicts.

13 This is the position followed by ITLOS when concluding that GHG emissions are a form of marine pollution contrary to Article 194.1 of UNCLOS, and that States Parties shall take all necessary measures to reduce and control existing marine pollution and, eventually, to prevent such pollution from occurring. ITLOS, *Request for an Advisory Opinion Submitted by The Commission of Small Island States on Climate Change and International Law*, Advisory Opinion of 21 May 2024, case no. 31, paras 198-199.

14 Karem Hulme, 'Taking Care to Protect the Environment Against Damage', Int'l Rev. of the Red Cross 92 (2010), 675-691 (676-680).

 DOI 10.17104/0044-2348-2026-3-811