

# War in cities: Why the protection of the natural environment matters even when fighting in urban areas, and what can be done to ensure protection

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## Abstract

*Around 50 million people across the world are affected by urban warfare. When conflict occurs in cities, the natural environment has historically been relegated to an afterthought, but both the immediate and long-term environmental consequences of urban warfare are serious. This article looks at actions that can be taken to protect the natural environment – and through this, the*

† The authors would like to thank Vanessa Murphy and Laurent Gisel for their very helpful feedback on earlier drafts. Any errors are the authors' alone. This paper reflects the authors' views and not any institutional position/s.

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*population – against the effects of urban warfare when fighting in urban areas. It is intended to be a part of the conversation about what parties to armed conflict can and should do to give effect to their legal obligations under international humanitarian law and international law more broadly, with a specific focus on the natural environment when fighting in urban areas.*

**Keywords:** war in cities, urban warfare, natural environment, essential infrastructure, IHL.

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## Introduction

Urban warfare<sup>1</sup> is not a new phenomenon. It has long presented us with devastating humanitarian consequences, including high numbers of civilian deaths and injuries, and the destruction of civilian livelihoods, homes and critical infrastructure. Today more than 50 million people across the world are affected by urban warfare,<sup>2</sup> and the consequences are extensive and varied. When war occurs in cities, the natural environment has historically been relegated to an afterthought, but both the immediate and long-term environmental consequences of urban warfare are too serious not to be taken into consideration before the end of hostilities. These consequences impact the delivery of essential services to civilians, their health, their ability to carry out their livelihoods and their ability to exercise freedom of movement. These effects continue to be felt after active hostilities have ended.<sup>3</sup>

This article begins by identifying the different ways in which hostilities waged within or on the outskirts of cities may impact the natural environment. It then sets out the relevant international humanitarian law (IHL), as well as other international legal frameworks which provide protection for the natural environment against the effects of urban warfare. The article goes on to look at actions that can be taken to protect the natural environment in urban areas, and through this, the population, against the effects of urban warfare. It is intended to be a part of the conversation about what parties to armed conflict can and should do to give effect to their legal obligations under IHL, and international law more broadly, with a specific focus on the protection of the natural environment when fighting occurs in urban areas.

- 1 The term “urban warfare” is understood to refer to “hostilities in an urban setting (which can take many forms, including ground troop/force manoeuvres and fighting, indirect fire, aerial bombardment, and/or asymmetric warfare), and other military operations affecting urban setting (such as a siege or some other form of encirclement, or damage to infrastructure in countryside that affects delivery of services in an urban setting)”: ICRC, *Present and Engaged: How the ICRC Responds to Armed Conflict and Violence in Cities*, Geneva, 2022, p. 17.
- 2 ICRC, *Waging War in Cities: A Deadly Choice*, Geneva, 2020; United Nations (UN), “Urban Warfare Devastates 50 Million People Worldwide, Speakers Tell Security Council, Calling for Effective Tools to End Impunity, Improve Humanitarian Response”, 25 January 2022, available at: <https://press.un.org/en/2022/sc14775.doc.htm>.
- 3 ICRC, above note 1, p. 17.

By way of an introductory point, it is noted that there is variation in terminology used in legal instruments on the protection of the environment in armed conflicts. Some instruments either do not define environment at all or include definitions that are for the purposes of a specific text only.<sup>4</sup> For the purposes of considering the impact of urban warfare on the environment, and in line with the view of the International Committee of the Red Cross (ICRC), the “natural environment” – the term generally used in IHL and in particular in Additional Protocol I to the Geneva Conventions (AP I)<sup>5</sup> – is understood in this article to constitute “the natural world together with the system of inextricable interrelations between living organisms and their inanimate environment, in the widest sense possible”. This includes “everything that exists or occurs naturally” and natural elements that “may be the product of human intervention”, including, *inter alia*, agricultural areas, drinking water and livestock.<sup>6</sup>

## Impact of urban warfare on the natural environment

The world continues to urbanize, with about 68% of the global population expected to live in the planet’s rapidly expanding urban areas in 2050.<sup>7</sup> This trend, together with the international community’s concern about degradation of the natural environment and climate change, has led to an increased attention in recent years on the interdependency between urban areas (which have been found to be more affected by climate change than more rural areas<sup>8</sup>) and the natural environment (which, particularly thorough providing safe water and clean air, is a known determinant of human health<sup>9</sup>). Armed conflicts today continue to cause

- 4 See, e.g., Marja Lehto, *Second Report on Protection of the Environment in Relation to Armed Conflicts*, UN Doc. A/CN.4/728, 27 March 2019, para. 186; ICRC, *Guidelines on the Protection of the Natural Environment in Armed Conflict*, Geneva, 2020 (ICRC Guidelines), p. 15; Program on Humanitarian Policy and Conflict Research at Harvard University, *HPCR Manual on International Law Applicable to Air and Missile Warfare*, Cambridge University Press, Cambridge, 2013, Rule 87, para. 6. See also Philippe Sands and Jacqueline Peel with Adriana Fabra and Ruth MacKenzie, *Principles of International Environmental Law*, 4th ed., Cambridge University Press, Cambridge, 2018, p. 14.
- 5 See e.g. Protocol Additional (I) to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts, 1125 UNTS 3, 8 June 1977 (entered into force 7 December 1978) (AP I), Article 35.
- 6 ICRC Guidelines, above note 4, para. 16 and references therein.
- 7 UN Habitat, *World Cities Report 2022: Envisaging the Future of Cities*, Nairobi, 2022, p. 4; UN, Department of Economic and Social Affairs, Population Division, *World Urbanization Prospects 2018: Highlights*, UN Doc. ST/ESA/SER.A/421, 2019.
- 8 Geneva Environment Network, “Update: Cities and the Environment”, 13 January 2023, available at: [www.genevaenvironmentnetwork.org/resources/updates/cities-and-the-environment/#scroll-nav\\_4](http://www.genevaenvironmentnetwork.org/resources/updates/cities-and-the-environment/#scroll-nav_4); Anne D. Guerry *et al.*, *Urban Nature and Biodiversity for Cities*, Global Platform for Sustainable Cities Policy Brief, World Bank, Washington, DC, 2021, p. 4; Hans-Otto Pörtner *et al.* (eds), “Summary for Policy Makers”, in Hans-Otto Pörtner *et al.* (eds), *Climate Change 2022: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge and New York, 2022, p. 11, para. B.1.5, available at: [www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC\\_AR6\\_WGII\\_SummaryForPolicymakers.pdf](http://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf).
- 9 Article 36, *Health and Harm: Protecting Civilians and Protecting Health*, August 2020, p. 9, available at: <https://article36.org/wp-content/uploads/2020/08/A36-protecting-health.pdf>.

degradation and destruction of the natural environment. The harm caused to the natural environment by armed conflict may be direct or indirect: the natural environment may be directly targeted, suffer incidental damage – including as a result of damage being caused to the built environment – or be impacted by the indirect effects of armed conflicts, such as the collapse of governance or infrastructure. Harm caused to the natural environment during urban warfare may, in turn, affect the well-being and health of local populations, sometimes long after the conflict has ended.<sup>10</sup>

When it comes to biodiversity, a variety of species live within city boundaries.<sup>11</sup> Urban nature and biodiversity provide a multitude of services to people which are commonly referred to as “ecosystem services”. These ecosystem services have provisioning (e.g. they provide city residents with food – such as inhabitants growing food<sup>12</sup> – and clean water – such as watersheds located in urban areas<sup>13</sup>), regulating (e.g., they can provide flood control to a city or filter the air), cultural (e.g. recreation, such as parks and forests) and supportive (e.g. nutrient cycling) characters.<sup>14</sup> To function properly, cities need healthy ecosystems and rich biodiversity. Nature and biodiversity outside of cities also provide crucial services to those residing within cities – for instance, providing resources such as water and food.<sup>15</sup>

Cities are not all the same. There will be great variety in the impacts of urban warfare on the natural environment in and outside of cities depending on each city’s location, and on natural and man-made features and key purposes, including industries. One common feature, however, is that cities by their nature contain buildings, whose destruction results in rubble, and within those buildings, potentially toxic or hazardous substances may be present. This is particularly the case where residential areas overlap with industrial, commercial or energy infrastructure. Further, cities are critically dependent on water and sanitation infrastructure to ensure proper health. The consequences of damage caused to water infrastructure, including the water source itself, are more severe in urban contexts than in rural areas because of the “complexity of water infrastructure, its

10 ICRC Guidelines, above note 4, paras 1–2.

11 See, further, A. D. Guerry *et al.*, above note 8.

12 Daniel. R. Richards and Benjamin. S. Thompson, “Urban Ecosystems: A New Frontier for Payments for Ecosystem Services”, *People and Nature*, Vol. 1, No. 2, 2019.

13 For instance, the New York City Watershed provides approximately 1.3 billion gallons of clean drinking water to roughly 9 million people every day, and the Omerli Watershed, outside of Istanbul, provides drinking water to Istanbul: Erik Gomez-Baggethun *et al.*, “Urban Ecosystem Services”, in Thomas Elmqvist *et al.* (eds), *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities*, Springer, Dordrecht, 2013.

14 UN Environment Programme (UNEP), “Cities: Biodiversity and Ecosystems”, available at: [www.unep.org/explore-topics/resource-efficiency/what-we-do/cities/biodiversity-and-ecosystems](http://www.unep.org/explore-topics/resource-efficiency/what-we-do/cities/biodiversity-and-ecosystems). See also Food and Agriculture Organisation, “Background: Ecosystem Services and Biodiversity”, available at: [www.fao.org/ecosystem-services-biodiversity/background/en/](http://www.fao.org/ecosystem-services-biodiversity/background/en/). For more on ecosystem services and warfare, see Robert A. Francis and Krishna Krishnamurthy, “Human Conflict and Ecosystem Services: Finding the Environmental Price of Warfare”, *International Affairs*, Vol. 90, No. 4, 2014.

15 A. D. Guerry *et al.*, above note 8.

interconnectedness with other infrastructure and the density of the population depending on it”.<sup>16</sup>

There are different ways in which hostilities waged within or on the outskirts of cities may impact the natural environment. (Even though this section will focus on environmental impacts occurring within cities, it is important to note that such impacts may extend beyond cities – for instance, toxic substances released by explosive weapons used in populated areas can seep into the soil, subsoil and watercourses and continue spreading away from the populated area, poisoning flora and fauna.<sup>17</sup>) First, the natural environment may be directly damaged by the immediate conduct of hostilities, for instance with vegetation being destroyed by bombardments.<sup>18</sup> Second, weapons including explosives used during hostilities in urban environments contain toxic chemicals constituents harmful to humans and the natural environment. Leaks from unexploded ordnance or heavy metals from munitions may leave toxic or other hazardous remnants of war.<sup>19</sup> These substances can seep into the soil, subsoil and watercourses and contaminate the flora and fauna, including by spreading away from urban areas.<sup>20</sup> This can have a severe impact on the health of local populations and on ecosystems.<sup>21</sup>

Third, hostilities in urban environments generate considerable amounts of debris and rubble that may contain hazardous substances. For instance, it has been estimated that 55 million tons of conflict debris was generated in Iraq during the 2014–17 period of the ISIL conflict, along with 15 million tons in Aleppo and 5.3 million in Homs in Syria.<sup>22</sup> Such large amounts of debris have caused repeated

- 16 Mara Tignino and Oeykue Irmakkesen Westendorff, *The Geneva List of Principles on the Protection of Water Infrastructure*, Brill, Leiden, 2020; ICRC, *Urban Services during Protracted Armed Conflict: A Call for a Better Approach to Assisting Affected People*, Geneva, 2015.
- 17 ICRC, *Explosive Weapons with Wide Area Effects: A Deadly Choice in Populated Areas*, Geneva, January 2022 (ICRC EWIPA Report), p. 59.
- 18 Michael J. Lawrence, Holly L. J. Stemberger, Aaron J. Zoldero, Daniel P. Struthers and Steven J. Cooke, “The Effects of Modern War and Military Activities on Biodiversity and the Environment”, *Environmental Reviews*, Vol. 23, No. 4, 2015.
- 19 Terminology used in International Law Commission (ILC), *Principles on Protection of the Environment in Relation to Armed Conflicts*, UNGA Res. 77/104, 7 December 2022 (PERAC Principles), Principle 26. These may consist of explosive remnants of war but also of other hazardous material and objects: *ibid.*, commentary on Principle 26, para. 2.
- 20 ICRC EWIPA Report, above note 17, p. 59; Geneva International Centre for Humanitarian Demining, “‘Do No Harm’ and Mine Action: Protecting the Environment while Removing the Remnants of Conflict”, 2014, available at: [www.gichd.org/publications-resources/publications/do-no-harm-and-mine-action-protecting-the-environment-while-removing-the-remnants-of-conflict/](http://www.gichd.org/publications-resources/publications/do-no-harm-and-mine-action-protecting-the-environment-while-removing-the-remnants-of-conflict/).
- 21 Aneaka Kellay, “Pollution Politics: Power, accountability and toxic remnants of war”, Toxic Remnants of War Project, Conflict and Environment Observatory (CEOBS), 24 November 2014, available at: <https://ceobs.org/pollution-politics-power-accountability-and-toxic-remnants-of-war/#easy-footnote-bottom-12-373>; PAX, *Amidst the Debris: A Desktop Study on the Environmental and Public Health Impact of Syria’s Conflict*, 2015, p. 57, available at: <https://paxforpeace.nl/wp-content/uploads/sites/2/import/import/pax-report-amidst-the-debris-syria-web.pdf>; M. J. Lawrence *et al.*, above note 18.
- 22 UNEP, “Environmental Legacy of Explosive Weapons in Populated Areas”, 5 November 2021, available at: [www.unep.org/news-and-stories/story/environmental-legacy-explosive-weapons-populated-areas](http://www.unep.org/news-and-stories/story/environmental-legacy-explosive-weapons-populated-areas); UNEP, *Technical Note: Environmental Issues in Areas Retaken from ISIL, Mosul, Iraq*, 2017, p. 2, available at: [www.unep.org/resources/publication/environmental-issues-areas-retaken-isil-mosul-iraq-technical-note](http://www.unep.org/resources/publication/environmental-issues-areas-retaken-isil-mosul-iraq-technical-note).

concerns for the natural environment and the health of local populations.<sup>23</sup> The issue of asbestos in the Ukrainian built environment has also been recently flagged as creating “millions of tons of highly hazardous, asbestos-contaminated rubble”.<sup>24</sup> Demolition waste may be contaminated by toxic substances from weapons residues (see above), harmful household chemicals, medical waste and building materials (such as asbestos), thereby posing a risk to the natural environment and civilian health.<sup>25</sup> Fires caused by bombardment can also release polynuclear aromatic hydrocarbons, highly toxic chlorinated compounds, dioxins or furans.<sup>26</sup> Post-conflict management of toxic debris and rubble may also cause major environmental problems.<sup>27</sup>

Fourth, “facilities containing pollutants such as toxic chemicals, biological agents and radiological substances are often located on the outskirts or in the vicinity of major urban centres”.<sup>28</sup> When industrial infrastructure is impacted during armed conflict, facilities containing pollutants risk being incidentally damaged or not being properly managed due to the hostilities.<sup>29</sup> When such facilities are damaged, pollutants risk being released, contaminating the air, water and soil and thereby affecting the natural environment and civilian health.<sup>30</sup> These hazardous materials can also cause significant secondary explosions or large fires that further spread contaminants.<sup>31</sup> In 1999, during the Kosovo armed conflict, the NATO coalition air strikes damaged oil refineries and depots in Pančevo, a town of around 80,000 inhabitants located near Belgrade next to the Danube River. This resulted in widespread environmental damage and serious consequences for the civilian population in the affected area and downstream, who inhaled poisoned air and had toxic water and soil to

23 See e.g. UN Security Council, *Protection of Civilians in Armed Conflict: Report of the Secretary-General*, UN Doc. S/2019/373, 7 May 2019, para. 50; PAX, above note 21, p. 40; UNEP, *Environmental Assessment of the Gaza Strip following the escalation of hostilities in December 2008–January 2009*, 2009, pp. 27–29; Roos Boer and Wim Zwijnenburg, “Exploring the Links between Environmental Harm and the Use of Explosive Weapons in Populated Areas”, *INEW*, available at: [www.inew.org/exploring-the-links-between-environmental-harm-and-the-use-of-explosive-weapons/](http://www.inew.org/exploring-the-links-between-environmental-harm-and-the-use-of-explosive-weapons/). See also Okechukwu Ibeanu, *Adverse Effects of the Illicit Movement and Dumping of Toxic and Dangerous Products and Wastes on the Enjoyment of Human Rights: Report of the Special Rapporteur*, UN Doc. A/HRC/5/5, 5 May 2007, para. 21.

24 Olivia Nielsen and Dave Hodgkin, “Rebuilding Ukraine: The Imminent Risks from Asbestos”, *PreventionWeb*, 7 June 2022, available at: [www.preventionweb.net/blog/rebuilding-ukraine-imminent-risks-asbestos](http://www.preventionweb.net/blog/rebuilding-ukraine-imminent-risks-asbestos).

25 A. Kellay, above note 21; see also e.g. UNEP, *Lebanon: Post-Conflict Environmental Assessment*, 2007, p. 89.

26 A. Kellay, above note 21; UNEP, above note 23, pp. 27–29

27 See e.g. UNEP, above note 25, p. 88

28 ICRC EWIPA Report, above note 17, p. 60.

29 Doug Weir, “Collateral Damage Estimates of the Acceptability of Attacks on Industrial Sites”, *CEOBS*, 2015, available at: <https://ceobs.org/collateral-damage-estimates-and-the-acceptability-of-attacks-on-industrial-sites/>; UNEP, above note 23, pp. 27–29.

30 UNEP, “Environmental Legacy”, above note 22; UN Security Council, *Protection of Civilians in Armed Conflict: Report of the Secretary-General*, UN Doc. S/2019/373, 7 May 2019, para. 50; UN Security Council, *Protection of Civilians in Armed Conflict: Report of the Secretary-General*, UN Doc. S/2022/381, 10 May 2022, para. 30.

31 ICRC EWIPA Report, above note 17, p. 60.

contend with.<sup>32</sup> In 2017, shelling hit a building which stored over 7,000 kilograms of chlorine gas in Ukraine.<sup>33</sup> While no storage container was damaged, experts stated that the rupture of just one 900-kilogram container would kill anyone within 200 metres and result in severe health consequences for those within 2.4 kilometres.<sup>34</sup>

Fifth, the destruction of electrical infrastructure can also have severe consequences. During the conflict in Serbia, 150 tons of pyralene transformer oils were released from a damaged station in Belgrade and leaked through a canal system, reaching local streams and rivers.<sup>35</sup> It is estimated that only one litre of the pyralene – a polychlorinated biphenyl, exposure to which can have severe adverse health effects – can pollute a billion litres of water.<sup>36</sup> Damage to electrical infrastructure can also disrupt sewage or wastewater treatment systems relying on electricity, harming the quality of the water and soil by polluting them with untreated wastewater.<sup>37</sup> Wastewater and sewage spills may have serious environmental consequences, leading to the contamination or interruption of safe drinking water supply and/or to the loss of safe disposal and treatment of sewage and other urban wastewater.<sup>38</sup> Furthermore, contamination of underground water systems may in turn contaminate natural water sources in other locations – with effects spreading beyond cities.

Sixth, armed conflicts in urban environments may also disrupt solid waste management services. For instance, during the armed conflict in Syria, the system of waste management was severely disrupted. This led to an accumulation of municipal waste and to an increase in uncontrolled dumping and burning, creating “immediate and long-term health and environmental risks”.<sup>39</sup>

Finally, indirect environmental impacts of armed conflicts on cities can result from population movements. Armed conflicts may lead to urban population growth, with people being driven away from their homes in rural areas and toward the city. People may be forced to flee the city following damage to or destruction of urban structures or services, and cities may also become a refuge for people fleeing from fighting.<sup>40</sup> Such population movements may have

32 “Serbian Town Bombed by NATO Fears Effects of Toxic Chemicals”, *New York Times*, 14 July 1999, available at: [www.nytimes.com/1999/07/14/world/serbian-town-bombed-by-nato-fears-effects-of-toxic-chemicals.html](http://www.nytimes.com/1999/07/14/world/serbian-town-bombed-by-nato-fears-effects-of-toxic-chemicals.html); UNEP, *The Kosovo Conflict: Consequences for the Environment and Human Settlements*, 31 December 1999, available at: [www.unep.org/resources/assessment/kosovo-conflict-consequences-environment-and-human-settlements](http://www.unep.org/resources/assessment/kosovo-conflict-consequences-environment-and-human-settlements).

33 Office of the UN High Commissioner for Human Rights, “Chemical Disaster Fear in Eastern Ukraine Prompts UN Expert to Raise Alarm”, 10 March 2017, available at: [www.ohchr.org/en/press-releases/2017/03/chemical-disaster-fear-eastern-ukraine-prompts-un-expert-raise-alarm?LangID=E&NewsID=21344](http://www.ohchr.org/en/press-releases/2017/03/chemical-disaster-fear-eastern-ukraine-prompts-un-expert-raise-alarm?LangID=E&NewsID=21344).

34 *Ibid.*

35 Regional Environmental Center for Central and Eastern Europe, *Assessment of the Environmental Impact of Military Activities during the Yugoslavia Conflict*, 30 June 1999, p. 13.

36 *Ibid.*

37 One example of this is in Gaza: see UNEP, above note 23, p. 39; PAX, above note 21, p. 29.

38 UNEP, above note 25, 2007, pp. 91, 117.

39 PAX, above note 21, p. 29; UNEP, above note 23, pp. 44–45.

40 Peter Maurer, “Wars in Cities: Protection of Civilians in Urban Settings”, speech given to the ICRC, UN Security Council Open Debate, 25 January 2022, available at: [www.icrc.org/en/document/wars-cities-protection-civilians-urban-settings](http://www.icrc.org/en/document/wars-cities-protection-civilians-urban-settings).

negative environmental impacts, which may be more severe if people travel through or move to particularly fragile natural environments. Displacement in urban contexts can “exacerbate pre-existing problems”, including waste management,<sup>41</sup> which may, in turn, have consequences for the natural environment. For instance, it was reported that the population of Abidjan, in Côte d’Ivoire, doubled during the decade of internal conflict following the military coup in 1999.<sup>42</sup> In parallel, however, investment in critical infrastructure – notably, water and wastewater management facilities – did not catch up because of the conflict, which led to major environmental issues in the city.<sup>43</sup> The impact of population movements in a city may also depend on the parts of the city that the newcomers settle in. For example, in the city of Maiduguri in Nigeria, in the inner areas of the city the increasing population affected primarily the urban poor, whereas in the outskirts of the city “the presence of [a large group of] displaced persons was leading to environmental degradation”.<sup>44</sup> While in Maiduguri people fled an armed conflict from rural areas to the city,<sup>45</sup> fleeing urban warfare from one city to another similarly causes pressure following population growth, and movement within the city puts strain on certain neighbourhoods.<sup>46</sup>

Additionally, the impacts of displacement from cities are strongly felt on the natural environment outside cities as displacement causes communities to deplete and damage resources in areas that are ill-equipped to house large numbers of people. The breakdown of environmental governance within cities, another possible indirect impact of armed conflict, may also result in a lesser capacity to address the environmental harm arising from the hostilities and to ensure the continued management and conservation of the urban environment.<sup>47</sup>

## The legal framework

The examples shared above demonstrate how environmental destruction or contamination in urban areas, and the collapse of urban environmental systems, can quickly have far-reaching impacts for civilians. This is notably because of the population density and interconnectedness of services in urban areas. In this part of the article, we will look at the specific protections under IHL for the natural environment, the protection of the natural environment as a civilian object, the

41 ICRC, *Displaced in Cities: Experiencing and Responding to Urban Internal Displacement Outside Camps*, Geneva, 2020, p. 29.

42 UNEP, *Côte d’Ivoire: Post-Conflict Environmental Assessment*, 2015, pp. 8, 9.

43 *Ibid.*

44 ICRC, above note 41, p. 29.

45 *Ibid.*, p. 20.

46 *Ibid.*, p. 29.

47 For instance, UNEP has reported on how the functioning of the key Palestinian institutions dealing with environmental issues in the Gaza Strip was hampered due to the escalation of hostilities in December 2008 and January 2009, notably due to direct physical damages suffered and “the mobility of staff from all institutions [being] restricted through the period, limiting their ability to effectively respond to urgent environmental problems that arose during the hostilities”: UNEP, above note 23, p. 68. See also UNEP, *Technical Note*, above note 22, pp. 19–20.

rules on the means and methods of warfare and what they mean for the protection of the natural environment, and other relevant provisions in international law.

In recent years, increased attention has been paid to the environmental impact of the conduct of hostilities. This increased attention is visible in the achievement of the International Law Commission (ILC) Principles on Protection of the Environment in Relation to Armed Conflicts (PERAC Principles).<sup>48</sup> The PERAC Principles codify existing law, including aspects of international environmental law, and also contain progressive developments in line with the mandate of the ILC.<sup>49</sup> In complement to the work of the ILC and focused more narrowly on the relevant rules of IHL, the ICRC also released its updated *Guidelines on the Protection of the Natural Environment in Armed Conflict* (ICRC Guidelines) to provide clarity as to how the existing rules of IHL protect the natural environment, guidance as to their interpretation, and support for their dissemination.<sup>50</sup> The focus here will be on those rules which have particular relevance in urban settings. This will inform the discussion later in the article about what practical measures States and parties to armed conflict can take to protect the natural environment in urban settings.

## Specific protection of the natural environment

IHL includes specific provisions that protect the natural environment in armed conflict. These provisions were adopted as a reaction to environmental damage in armed conflicts in the 1970s, in particular the Vietnam War, and were first codified in AP I. Most prominently, in AP I, the specific protection of the natural environment is encapsulated in two articles: Article 35(3) and Article 55. Article 35(3) protects the natural environment from methods or means of warfare which are intended, or may be expected, to cause “widespread, long-term and severe damage” to the natural environment itself. Article 55 prohibits use of such means and methods of warfare “which are intended or may be expected to cause [widespread, long-term and severe] damage to the natural environment and thereby to prejudice the health or survival of the population”. In addition, Article 55 prohibits reprisals against the natural environment.<sup>51</sup> These obligations are reflected in both the ICRC Guidelines and the PERAC Principles.<sup>52</sup> Moreover,

48 PERAC Principles, above note 19. The Draft Principles on Protection of the Environment in Relation to Armed Conflicts were adopted by the ILC at its 73rd Session in 2022, and submitted to the UN General Assembly as a part of the Commission’s report covering the work of that session: UN Doc. A/77/10, 2022, p. 92, para. 58. The Commission’s report “takes note” of the principles and “encourages their widest possible dissemination”.

49 See ILC, *Protection of the Environment in Relation to Armed Conflicts: Comments and Observations Received from Governments, International Organizations and Others*, UN Doc. A/CN.4/749, 17 January 2022.

50 ICRC Guidelines, above note 4, paras 9–13 (updated in 2020 from the earlier 1994 articulation).

51 AP I, Arts 35(3), 55. See also PERAC Principles, above note 19, Principles 13, 15; ICRC Guidelines, above note 4, Rules 2, 4; Jean-Marie Henckaerts and Louise Doswald-Beck (eds), *Customary International Humanitarian Law*, Vol. 1: *Rules*, Cambridge University Press, Cambridge, 2005 (ICRC Customary Law Study), Rule 45, available at: <https://ihl-databases.icrc.org/en/customary-ihl/v1>.

52 PERAC Principles, above note 19, Principle 13; ICRC Guidelines, above note 4, Rules 2–3.

specific provisions for protecting the natural environment in armed conflict have crystallized into customary IHL. As identified by Rules 44 and 45 of the ICRC Customary Law Study, methods and means of warfare must be employed with due regard to the protection and preservation of the natural environment,<sup>53</sup> and it is prohibited to use means or methods of warfare intended or expected to cause widespread, long-term and severe damage to the natural environment.<sup>54</sup>

The cumulative conditions of “widespread, long-term and severe damage” in the case of AP I and customary law<sup>55</sup> are worth examining in light of the specificities of urban contexts to determine whether they could be met by environmental damage caused by urban warfare. In the view of the ICRC, as set out in its Guidelines, “widespread” should be understood to refer to an area of “several hundred square kilometres”,<sup>56</sup> “long-term” covers damage with impacts lasting in the range of years (possibly a scale of ten to thirty years),<sup>57</sup> and “severe” should be understood to cover disruption or damage to an ecosystem or harm to the health or survival of the population on a large scale.<sup>58</sup> Analysis of these terms should today take into account not only direct effects but also “cumulative and indirect (or reverberating) effects” and, for example, the persistence of substances in the natural environment.<sup>59</sup>

For example, as explained above, the interconnectedness of water systems can spread any damage to the natural environment in an urban environment over a wide area. As the examples given above show, such pollution of water systems can, *inter alia*, be caused by damage to oil refineries or to vessels docked in ports and which contain poisonous substances, or by damage to wastewater purification systems or to power plants running these systems. The interconnectedness of water systems, and the very nature of water flows, will then spread the damage to a wide area, potentially outside of the city, even if the

53 ICRC Customary Law Study, above note 51, Rule 4; ICRC Guidelines, above note 4, Rule 1.

54 ICRC Customary Law Study, above note 51, Rule 45; ICRC Guidelines, above note 4, Rule 2.

55 While the provisions of AP I are applicable in international armed conflict only, it has been considered that the prohibition against causing widespread, long-term and severe damage to the natural environment arguably also applies in non-international armed conflicts following the customary nature of these provisions. See ICRC Customary Law Study, above note 51, Rule 45 (first sentence), p. 151; ICRC Guidelines, above note 4, Rule 2 and para. 47. It should be noted that some States are persistent objectors to the customary nature of this rule.

56 ICRC Guidelines, above note 4, Rule 2, paras 56–60.

57 Yves Sandoz, Christophe Swinarski and Bruno Zimmermann (eds), *Commentary on the Additional Protocols*, ICRC, Geneva, 1987 (ICRC Commentary on the APs), pp. 415–416, para. 1452; ICRC Guidelines, above note 4, Rule 2, paras 61–66.

58 As with “widespread”, the term “severe” is not discussed in the *travaux préparatoires* of AP I. The term “severe” is used in the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, 1108 UNTS 151, 18 May 1977 (ENMOD Convention). The ENMOD Convention prohibits the “use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party” (Art. I). Environmental modification refers to the deliberate manipulation of natural processes such as causing earthquakes, tsunamis, an upset in the ecological balance of a region, or changes in weather patterns (Art. II and Understanding Relating to Art. II). Although this is not directly transferable, the reference to “upset in the ecological balance” does give some indication as to what would be encapsulated by “severe”. See also ICRC Guidelines, above note 4, Rule 2, paras 67–72.

59 ICRC Guidelines, above note 4, paras 62–66.

immediate damage itself may have occurred in a relatively restricted area. Furthermore, such damage can be long-term, as it can contaminate the soil and natural water sources. The clean-up process may be difficult, if not impossible, complicated possibly by the prolonged armed conflict. Finally, as the examples presented above show, the consequences of environmental damage in the context of urban warfare can be severe, damaging the health of, and possibly even killing, members of the population coming into contact with the pollution. In the case of water systems, the interconnectedness of urban infrastructure means that the impact of the damage to an ecosystem on which the water system relies for a source of water could be more severe than in more rural areas. As the interconnectedness of urban infrastructure is foreseeable to some degree, this must be taken into account.

Having discussed the conditions of damage to the natural environment under IHL in an urban context, it is to be recognized that fulfilling these conditions in the city context *stricto sensu*, in particular with regard to “widespread” damage that is required to be “several hundred square kilometres” in area, can be difficult. It has been argued that the rules of IHL are inadequate because the “widespread” requirement would exceed “the actual territories of the absolute majority of the cities in the world”.<sup>60</sup> While recognizing that this is likely to be true in many cases, this view does not take into account the interconnectedness described above, and the fact that damage could spread beyond city boundaries and therefore fulfil this condition. Given this, there could be circumstances where damage to the natural environment caused by urban fighting is widespread, long-term and severe.

## The civilian character of the natural environment

In addition to specific rules designed to protect it, the natural environment is protected by virtue of its civilian character.<sup>61</sup> It is generally recognized today that, by default, the natural environment is civilian in character,<sup>62</sup> and all parts of the natural environment are civilian objects, unless they have become military objectives.<sup>63</sup> Thus the principles of IHL relevant to civilian objects protect all parts of the natural environment unless they become military objectives

60 Nikoloz Mosidze, “Urban Natural Environment: Yet Another Vulnerable Victim of Wars in Cities”, *International Law Blog*, 26 June 2023, available at: <https://internationallaw.blog/2023/06/26/urban-natural-environment-yet-another-vulnerable-victim-of-wars-in-cities/>.

61 It is to be noted that over time, there have been differing views on whether the natural environment should be seen as a civilian object. For discussion, see Cordula Droege and Marie-Louise Tougas, “The Protection of the Natural Environment in Armed Conflict – Existing Rules and Need for Further Legal Protection”, in Rosemary Rayfure (ed.), *War and the Environment: New Approaches to Protecting the Environment in Armed Conflict*, Brill, Leiden, 2014, pp. 15–17.

62 ICRC Guidelines, above note 4, para. 18 fn. 32–35; PERAC Principles, above note 19, Principle 13. For discussion on diverging views on the civilian character of the natural environment, see ICRC Guidelines, above note 4, fn. 32.

63 ICRC Guidelines, above note 4, para. 21.

according to the ordinary rules.<sup>64</sup> The principle of distinction<sup>65</sup> means that attacks directed at any part of the natural environment are prohibited, unless and for such time as that part becomes a military objective.<sup>66</sup> In addition, indiscriminate attacks – meaning attacks that “are not directed at a specific military objective”, that “employ a method or means of combat which cannot be directed at a specific military objective” or that “employ a method or means of combat the effects of which cannot be limited as required” by IHL and therefore do not conform the principle of distinction – are prohibited.<sup>67</sup> Furthermore, when attacks against military objectives are expected to cause incidental damage to the natural environment, the additional core principles of IHL,<sup>68</sup> the principles of proportionality<sup>69</sup> and precaution (both in attack and against the effects of attacks),<sup>70</sup> are to be complied with.<sup>71</sup>

The principle of proportionality means that launching attacks against a military objective that “may be expected to cause incidental damage to the natural environment which would be excessive in relation to the concrete and

64 PERAC Principles, above note 19, Principles 13–14; ICRC Guidelines, above note 4, Rules 5–9. See also International Court of Justice (ICJ), *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 8 July 1996, *ICJ Reports 1996* (Nuclear Weapons Advisory Opinion), p. 226, para. 30; C. Droège and M.-L. Tougas, above note 61, pp. 13–14.

65 On the principle of distinction with regard to international armed conflicts, see AP I, Arts 48, 52. With regard to non-international armed conflicts, the principle is not explicitly included in Additional Protocol II. It can, however, be found in other conventions and is considered by the ICRC to form a rule of customary IHL. See two protocols of the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (and Protocols), 1341 UNTS 137, 10 October 1980 (amended 21 December 2001) (CCW): Protocol (II) on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices, 3 May 1996 (entered into force 3 December 1998), Art. 3(7); and Protocol (III) on Prohibitions or Restrictions on the Use of Incendiary Weapons, 10 October 1980 (entered into force 2 December 1983) (CCW Protocol III), Art. 2(1). See also ICRC Customary Law Study, above note 51, Rule 1.

66 PERAC Principles, above note 19, Principle 13(3); ICRC Guidelines, above note 4, Rule 5 (see also Rule 6 prohibiting indiscriminate attacks); C. Droège and M.-L. Tougas, above note 61, p. 17.

67 AP I, Art. 51(4); ICRC Customary Law Study, above note 51, Rules 11–12.

68 It is to be noted that as the principles of precaution and proportionality are discussed here, what is meant by them are the specific definitions found in IHL. These terms are also found in international environmental law. As Stefanik has noted, while precaution in IHL and international environmental law have shared elements, in particular the aim of protecting entities from excessive damage, they also differ significantly. In international environmental law, the precautionary principle essentially means abstaining from causing “significant harm to the environment” even in cases in which there is no scientific certainty of such harm occurring. Similarly, proportionality in international environmental law means that responses taken to prevent harm to the environment should be proportionate to the perceived risk. Kirsten Stefanik, “The Environment and Armed Conflict: Employing General Principles to Protect the Environment”, in Carsten Stahn, Jens Iverson and Jennifer S. Easterday (eds), *Environmental Protection and Transitions from Conflict to Peace*, Oxford University Press, Oxford, 2017, pp. 106, 113.

69 AP I, Art. 51(1)(b). For analysis and practice on the principle of proportionality as customary law, see ICRC Customary Law Study, above note 51, Rule 14 and related practice.

70 AP I, Arts 57, 58. For analysis and practice on the principle of precaution as customary law, see ICRC Customary Law Study, above note 51, Rules 15–24 and related practice.

71 See also Karen Hulme, “Taking Care to Protect the Environment against Damage: A Meaningless Obligation?”, *International Review of the Red Cross*, Vol. 92, No. 879, 2010, p. 678.

direct military advantage anticipated is prohibited”.<sup>72</sup> In addition to the principle of proportionality, in line with the protection of civilians and civilian objects, parties to an armed conflict must take constant care in the conduct of military operations “to spare the civilian population, civilians and civilian objects” from the effects of attacks and must therefore take all feasible precautions “in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects”,<sup>73</sup> including to the natural environment.<sup>74</sup> The precautions are not limited to the attacking party, but the parties to the conflict must also take “all feasible precautions” to protect all parts of the natural environment that are civilian object under their control.<sup>75</sup> The ICRC Guidelines note that the feasible precautions “in given circumstances will therefore be highly fact specific” and

may vary depending on factors such as the military advantage sought by the operation, whether it is time sensitive, the terrain (whether man-made or natural), the situation and capabilities of the parties to the conflict, the resources, methods and means available, and the type, likelihood and severity of the expected incidental civilian harm, including harm to the natural environment.<sup>76</sup>

The ICRC Guidelines further note that with regard to this latter aspect, elements to be taken into account when assessing the feasibility of a precaution include “the area expected to be affected and the scope of those effects, the fragility or vulnerability of the natural environment in that area, the expected severity of the damage and the expected duration of damage”.<sup>77</sup>

The principles of proportionality and precaution are particularly relevant in densely populated areas. However, when fighting in populated areas, taking the natural environment into account when applying these principles is perhaps a less obvious consideration for those planning and making decisions on military operations, and for military targeteers. In urban areas, military and civilian objects are often “intermingled” and civilian objects may be damaged despite not being directly targeted.<sup>78</sup> Where such damage is excessive in relation to the military advantage anticipated, such an attack would be unlawful. Military targeting

72 ICRC Customary Law Study, above note 51, Rule 43(C); ICRC Guidelines, above note 4, Rule 7; C. Droege and M.-L. Tougas, above note 61, p. 19. See also Louise Doswald-Beck (ed.), *San Remo Manual on International Law Applicable to Armed Conflicts at Sea*, 12 June 1994, para. 13(c); ICRC Guidelines, above note 4, Rule 7, para. 115. See also Nuclear Weapons Advisory Opinion, above note 64, where the ICJ confirmed that “environmental considerations” are part of the assessment that States must take into account when they consider “what is necessary and proportionate in the pursuit of legitimate military objectives”.

73 AP I, Art. 57; ICRC Customary Law Study, above note 51, Rule 15; ICRC Guidelines, above note 4, Rules 8, 9.

74 ICRC Guidelines, above note 4, Rules 8, 9.

75 See AP I, Art. 58(c) regarding “civilian objects”; and ICRC Guidelines, above note 4, Rule 9 for greater detail regarding the natural environment.

76 ICRC Guidelines, above note 4, para. 129.

77 *Ibid.*, Rule 8, para. 129. See also ICRC Guidelines, above note 4, Rule 9, para. 143 regarding choosing the option of least impact.

78 ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts: Recommitting to Protection in Armed Conflict on the 70th Anniversary of the Geneva Conventions*, Geneva, 2019, p. 16.

considerations have long included many types of civilian objects in “collateral damage assessments”. The natural environment must also be a part of these assessments, including when fighting in cities, and adequate precautions are to be taken to minimize such damage. Incidental civilian harm can be excessive because of damage to the natural environment alone, or as a combination of damage to the natural environment and harm caused to other civilian objects or civilians,<sup>79</sup> including the indirect effects on humans of environmental damage as shown above. What is to be noted is that damage to the natural environment does not necessarily appear immediately and may be indirect rather than direct, and that “foreseeable reverberating effects of the attack” must be taken into account.<sup>80</sup> In the urban context, urban services are “increasingly complex systems” which are “dependent upon each other”:<sup>81</sup> for example, explosive weapons may cause damage to electricity networks, and the resulting disruption to those networks may cause disruptions in the handling of wastewater and sewage which may continue for many months.<sup>82</sup> Such disruptions in urban services may then “seriously harm the quality of water and soil”.<sup>83</sup> This harm is foreseeable.

The importance of the protection afforded to the natural environment by virtue of its civilian character cannot be downplayed. Hulme has argued that this protection “has done more to protect [the natural environment] than any environmentally specific rule of [IHL]”,<sup>84</sup> such as those discussed above. This is also true in the urban context. The ICRC report *Explosive Weapons with Wide Area Effects: A Deadly Choice in Populated Areas* and the ICRC Commentary on the Additional Protocols highlight the importance of the principles of IHL in densely populated urban areas.<sup>85</sup> The natural environment in cities is everywhere (including under the cities, such as when they are built on top of aquifers), is closely linked with urban life, and is often located close to military objectives. Hence, it is important to comply with the protection provided to the natural environment as a civilian object in urban areas.

## Protection stemming from other IHL rules and restrictions on weapons

In addition to the specific and general provisions discussed above, the natural environment is also protected through the restrictions on certain means and methods of warfare. This has, to some extent, been discussed already above regarding means and methods of warfare that would cause widespread, long-term

79 ICRC Guidelines, above note 4, Rule 7, para. 115.

80 C. Droege and M.-L. Tougas, above note 61, pp. 19–20.

81 Mark Zeitoun and Michael Talhami, “The Impact of Explosive Weapons on Urban Services: Direct and Reverberating Effects across Space and Time”, *International Review of the Red Cross*, Vol. 98, No. 1, 2016, p. 56.

82 For a detailed description of the “upstream” and “downstream” impacts of explosive attacks on urban services across space and time and the implications for proportionality, see *ibid.*, pp. 56–57.

83 C. Droege and M.-L. Tougas, above note 61, p. 20.

84 K. Hulme, above note 71, p. 678.

85 ICRC Commentary on the APs, above note 57, p. 679, para. 2190; ICRC EWIPA Report, above note 17, p. 102.

and severe damage to the natural environment. However, there are two additional elements provided by the prohibitions and restrictions on the use of certain specific weapons and on methods of warfare. The first relates to the weapons themselves and the damage they may cause to the environment. The second relates to the protection of specific objects, the destruction of which would have severe environmental consequences impacting the civilian population.

First, States party to AP I are obliged to carry out a legal review of whether the employment of new weapons, means or methods of warfare would, in some or all circumstances, be prohibited by the provisions of the Protocol or “by any other rule of international law applicable” to the party.<sup>86</sup> As has been noted by the ICRC, “[p]opulated areas constitute an environment that may render indiscriminate certain methods or means of combat [such as explosive weapons with wide-area impacts] that can be lawfully employed in other circumstances, in open battlefields, for instance”.<sup>87</sup> The ICRC Guidelines note that questions to be considered in relation to the natural environment when assessing the legality of weapons could include the conducting and examination of “adequate scientific studies on the effects of the weapon on the natural environment”; taking into account the “type and extent of damage ... expected to be directly or indirectly caused to the natural environment”, as well as the expected duration of the damage and whether it is “practically/economically possible to reverse the damage”; considering “the direct and indirect impact of the environmental damage on the civilian population”; and taking into account whether “the weapon [is] specifically designed to destroy or damage the natural environment, or to cause environmental modification”.<sup>88</sup> Such considerations then need to be taken with regard to the specific characteristics of urban warfare and the protection of the natural environment in urban areas. This provision therefore sets an obligation for States party to AP I to evaluate whether a specific weapon can be lawfully used in the context of urban warfare, taking into account the obligations in relation to the protection of the natural environment in armed conflicts stemming both from treaty law and from customary law.

Such a review can identify, in two categories, weapons of concern when it comes to the environment. First, it can identify weapons that are prohibited because (among, in many cases, other factors) they contain harmful substances.<sup>89</sup> These weapons and their remnants can release toxic chemicals or other harmful materials, leading to environmental contamination and soil and water degradation. They include poison or poisoned weapons, biological weapons and chemical weapons. They cause untold long-term damage to the natural environment and consequently suffering for the civilian population. These weapons are prohibited from being used anywhere, including in urban areas. Although they are not urban- or environment-specific, these prohibitions have the effect of protecting the environment when armed conflicts occur in cities.

<sup>86</sup> AP I, Art. 36.

<sup>87</sup> ICRC EWIPA Report, above note 17, pp. 88–89.

<sup>88</sup> ICRC Guidelines, above note 4, para. 334.

<sup>89</sup> C. Droege and M.-L. Tougas, above note 61, p. 31.

The second category comprises weapons that are restricted for use in urban areas because (again, among, in many cases, other factors) of the harm they cause to the civilian population and the environment in urban areas. Incendiary weapons (prohibited when air-delivered and within “a concentration of civilians”)<sup>90</sup> are one such example; explosive weapons with wide impact areas are another. While the latter may not be prohibited under a specific convention, their use is regulated by the rules of IHL prohibiting indiscriminate attacks,<sup>91</sup> area bombardment<sup>92</sup> and disproportionate attacks,<sup>93</sup> as well as the obligation to take precautions discussed above. The ICRC and the International Red Cross and Red Crescent Movement (the Movement) have made a call to States and all parties to armed conflicts “to avoid using explosive weapons with a wide impact area in populated areas owing to the significant likelihood of indiscriminate effects”, stating that such weapons “should not be used in populated areas unless sufficient mitigation measures can be taken to reduce the weapons’ wide area effects and the consequent risk of civilian harm”.<sup>94</sup> These weapons are also the subject of the Political Declaration on the Use of Explosive Weapons in Populated Areas.<sup>95</sup> Such legal and policy restrictions protect the natural environment against the toxic substances or other hazardous materials that explosives weapons could release if used in urban areas, contaminating the air, water and/or soil.

Nuclear weapons should also be mentioned here. The ICRC takes the view that “it is extremely doubtful that nuclear weapons could ever be used in accordance with the principles and rules of IHL”.<sup>96</sup> It is clear that their use in urban areas would be illegal, because of the catastrophic consequences for the people and the long-term viability of the natural environment in the urban area. Directing nuclear weapons against cities would “violate the principle of distinction”, and the use of nuclear weapons “against military objectives located in or near populated areas would violate the prohibitions of indiscriminate and disproportionate attacks”.<sup>97</sup> Furthermore, nuclear weapons “can cause significant, long-term, widespread environmental damage, due to the dispersion and the impact of dust, soot and radioactive particles on the atmosphere, soil, water, plants and animals”.<sup>98</sup>

90 Protocol for the Prohibition of the Use of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, 17 June 1925 (entered into force 8 February 1928); Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, 10 April 1972 (entered into force 26 March 1975); CCW Protocol III, above note 65; Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, 13 January 1993 (entered into force 29 April 1997).

91 AP I, Art. 51(4); ICRC Customary Law Study, above note 51, Rules 11, 12.

92 AP I, Art. 51(5)(a); ICRC Customary Law Study, above note 51, Rule 13.

93 AP I, Art. 51(5)(b); ICRC Customary Law Study, above note 51, Rule 14.

94 ICRC, “Explosive Weapons in Populated Areas Factsheet”, June 2023, available at: [www.icrc.org/en/document/explosive-weapons-populated-areas-factsheet](http://www.icrc.org/en/document/explosive-weapons-populated-areas-factsheet). See also ICRC EWIPA Report, above note 17, p. 60.

95 Political Declaration on Strengthening the Protection of Civilians from the Humanitarian Consequences Arising from the Use of Explosive Weapons in Populated Areas, 18 November 2022, available at: [www.dfa.ie/our-role-policies/international-priorities/peace-and-security/ewipa-consultations](http://www.dfa.ie/our-role-policies/international-priorities/peace-and-security/ewipa-consultations).

96 ICRC, “The ICRC’s Legal and Policy Position on Nuclear Weapons”, *International Review of the Red Cross*, Vol. 104, No. 919, 2022, p. 1481.

97 *Ibid.*

98 *Ibid.*, p. 1496.

Further, certain objects especially relevant in urban warfare are specifically protected; among others, it is prohibited to attack works and installations containing dangerous forces – i.e., dams, dykes and nuclear power plants – when such attacks “may cause the release of dangerous forces” and “consequent severe losses among the civilian population”. Also, military objects located close to such works and installations shall not be attacked.<sup>99</sup> It is clear that an attack against these objects in an urban context would cause significant destruction and damage to civilians and civilian objects, including the natural environment in cities and beyond. The devastating impact of the destruction of the Nova Kakhovka dam for the people of the region and their natural environment, and the concern of the international community regarding the protracted fighting near Zaporizhzhia, Europe’s largest nuclear power plant, are two recent examples. Although these installations are not based in large urban areas themselves, attacks against them have significant consequences for the surrounding urban areas. Further, the consequences of the peacetime accidents at the Chernobyl and Fukushima nuclear power plants, although not the result of urban warfare, give us an idea of the human and environmental concerns involved if nuclear power plants were to be damaged during urban fighting. As a result of these accidents, the whole city of Pripyat, the town of close to 50,000 people that was built to house the workers of Chernobyl and their families some 2–3 kilometres from the Chernobyl plant, and an area covering a radius of 40 kilometres around Fukushima were rendered, at least temporarily, uninhabitable. The accidents caused severe consequences to the natural environment, including reduction in diversity of ecosystems and richness of species.<sup>100</sup>

Taken together, the limits on means and methods of warfare discussed here provide important layers of protection for the natural environment including in urban warfare. The article will return later to the question of what States can do practically in response to these obligations in relation to urban warfare.

## Obligations under other fields of international law

While this article mainly concentrates on IHL, other fields of international law may also be relevant. International human rights law<sup>101</sup> includes, *inter alia*, the right to a

99 AP I, Art. 56. It should be noted that the prohibition in AP I is subject to restrictions listed in Art. 56(2); Protocol Additional (II) to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of Non-International Armed Conflicts, 1125 UNTS 609, 8 June 1977 (entered into force 7 December 1978) (AP II), Art. 15; ICRC Customary Law Study, above note 51, Rule 42 and related practice; ICRC Guidelines, above note 4, Rule 11.

100 Jessica E. Laine, “War in Europe: Health Implications of Environmental Nuclear Disaster amidst War”, *European Journal of Epidemiology*, Vol. 37, No. 3, 2022, p. 222; Bundesamt für Strahlenschutz, “Umweltfolgen des Unfalls von Fukushima: Die radiologische Situation in Japan”, available at: <https://tinyurl.com/yc62ch84>.

101 ICRC Guidelines, above note 4, para. 40. On the application of human rights in armed conflict, see also ICJ, *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory*, Advisory Opinion, *ICJ Reports 2004*, p. 136, para. 136; ICJ, *Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda)*, Judgment, *ICJ Reports 2005*, p. 168, para. 178; Cordula Droegge, “Elective Affinities? Human Rights and Humanitarian Law”, *International Review of the Red Cross*, Vol. 90, No. 871, 2008.

healthy environment<sup>102</sup> and indeed can “complement the protection afforded by IHL”.<sup>103</sup> Furthermore, as was discussed above, one particularly relevant question with regard to the natural environment in urban warfare is the displacement of persons, as population movements resulting from urban warfare may have significant impact on the natural environment. This impact is recognized, for example, in the African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa, which obliges State Parties to “[t]ake necessary measures to safeguard against environmental degradation in areas where internally displaced persons are located, either within the jurisdiction of the State Parties, or in areas under their effective control”.<sup>104</sup>

The other relevant area is international criminal law. The Rome Statute of the International Criminal Court (ICC) features a specific war crime against damage to the natural environment in international armed conflict.<sup>105</sup> Crimes that are committed by means of, or that result in, the destruction of the natural environment were identified by the ICC Office of the Prosecutor, in 2016, as one element to which particular consideration should be given in case selection.<sup>106</sup> As a result of the Rome Statute, States have adopted war crimes legislation in their domestic frameworks related to the environment at the national level.<sup>107</sup> Breaches of international law in relation to damage to the natural environment have also been dealt with in the United Nations (UN). Perhaps most notably, in 1991 the UN Security Council noted, in Resolution 687, that Iraq was “liable under international law for any direct loss, damage – including environmental damage and the depletion of natural resources – or injury to foreign Governments, nationals and corporations as a result of its unlawful invasion and occupation of Kuwait”.<sup>108</sup> This has resulted in several awards in relation to damage to the natural environment by the UN Compensation Commission (UNCC).<sup>109</sup>

102 See Inter-American Court of Human Rights, *The Environment and Human Rights*, Advisory Opinion OC-23/17 requested by the Republic of Colombia, 15 November 2017, paras 56–59. See also ICRC Guidelines, above note 4, para. 37.

103 ICRC Guidelines, above note 4, para. 40. For more discussion on human rights and the environment in armed conflict, see ICRC Guidelines, above note 4, paras 37–40.

104 African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa, 23 October 2009 (entered into force 6 December 2012).

105 With regard to environmental damage specifically, see Rome Statute of the International Criminal Court, UN Doc. A/CONF.183/9, 17 July 1998 (entered into force 1 July 2002), Art. 8(2)(b)(iv). In addition, a range of other offences against the environment could fall within various crimes under Article 8(2) of the Rome Statute.

106 ICC Office of the Prosecutor, *Policy Paper on Case Selection and Prioritisation*, 15 September 2016, para. 41.

107 See e.g. Criminal Code of Finland, Chap. 11, Section 5(8); Australian Criminal Code Act, 1995, Division 268; Belgian Criminal Code, 1867, Art. 136*quater*, §1, para. 22.

108 UNSC Res. 687, 3 April 1991, para. 16.

109 See UNCC, *Report and Recommendations Made by the Panel of Commissioners Concerning the First Instalment of “F4” Claims*, UN Doc. S/AC.26/2001/16, 22 June 2001; UNCC, *Report and Recommendations Made by the Panel of Commissioners Concerning the Second Instalment of “F4” Claims*, UN Doc. S/AC.26/2002/26, 3 October 2002; UNCC, *Report and Recommendations Made by the Panel of Commissioners Concerning the Third Instalment of “F4” Claims*, UN Doc. S/AC.26/2003/31, 18 December 2003; UNCC, *Report and Recommendations Made by the Panel of Commissioners Concerning Part One of the Fourth Instalment of “F4” Claims*, UN Doc. S/AC.26/2004/16, 9 December

Considering the number of conflicts fought in urban environments today and the increased attention to environmental matters, there is a likelihood that attention to international crimes relevant to the natural environment in the urban context will grow in the future.

## **Practical measures that States and parties to armed conflict can take to protect the natural environment in urban settings**

Having set out how urban warfare damages the natural environment in ways which impact both the environment and people living in urban areas, and the relevant legal frameworks, this article will now turn to the core question of what more can be done to comply with the rules and better protect urban populations. The PERAC Principles and the ICRC Guidelines include a range of practical recommendations for how parties to a conflict can better protect and enhance protection for the natural environment in armed conflict, whether that be before, during or after the conflict. The article will now consider how States (and other actors) might go about implementing these recommendations with the urban natural environment in mind. The following section seeks to draw out and highlight the elements particularly important for urban warfare. It first looks at military doctrine and suggests more concerted efforts by States to explicitly link the conduct of urban warfare to environmental protection. The article then looks at the possibility of establishing protected zones to reduce damage to areas of particular environmental importance or fragility in urban areas. Finally, the article focuses on weapons and explosives in urban areas and how these can be best managed in the interests of the natural environment.

### **Focus issue: Military doctrine**

The ICRC, addressing military commanders and planners, has made it clear that “planners [of urban warfare operations] need to be familiar with and must observe the rules providing protection to the environment under the [law of armed conflict] (including the principles of distinction, proportionality and precautions)”.<sup>110</sup> Further, it has stated that “doctrine to inform planning for urban warfare should include ... comprehensive guidance on analysing the natural and human environment and civilian infrastructure”<sup>111</sup> and that targeting doctrine should include tools such as a “post-strike battle damage assessment (BDA), including an assessment of the harm caused to civilians, civilian objects

2004; UNCC, *Report and Recommendations Made by the Panel of Commissioners Concerning Part Two of the Fourth Instalment of “F4” Claims*, UN Doc. S/AC.26/2004/17, 9 December 2004; UNCC, *Report and Recommendations Made by the Panel of Commissioners Concerning the Fifth Instalment of “F4” Claims*, UN Doc. S/AC.26/2005/10, 30 June 2005.

110 ICRC, *Reducing Civilian Harm in Urban Warfare: A Commander’s Handbook*, Geneva, 2023, p. 43.

111 *Ibid.*, p. 18.

(including infrastructure) and parts of the natural environment”.<sup>112</sup> While a number of militaries have both urban warfare and environmental policies/doctrines, we have not been able to find a clear example where military doctrine explicitly speaks to conducting urban warfare in such a way as to ensure the protection of the natural environment. That said, there is some military doctrine which demonstrates the need for militaries to be prepared for urban warfare and which also makes reference to the need to have regard to environmental considerations when making targeting decisions. NATO Joint Targeting Doctrine acknowledges the increasing urbanization of battlefields and notes that “NATO forces must be prepared to conduct a wide range of activities, often simultaneously, within a single area or multiple areas of operation, areas which are becoming increasingly urbanized”.<sup>113</sup> Under this doctrine, environmental considerations are one of the restrictions that might be placed on attacking an otherwise valid target.<sup>114</sup>

Another relevant example is the *Environmental Guidebook for Military Operations* (the Guidebook) jointly produced by the US, Sweden and Finland.<sup>115</sup> It includes an environmental toolbox with tangible information for planning and implementing environmental practices (including a field card and site-specific information) and a training module for commanders, environmental officers and soldiers.<sup>116</sup> The Guidebook underscores that “the integration of environmental considerations into all aspects of operational planning, training, and execution is essential for maintaining the health and well-being of the deployed troops and the local population”. This is particularly true in populated areas such as cities, even if the Guidebook does not address urban warfare in a distinct manner.<sup>117</sup> US doctrine also takes note that the urban environment includes the “natural terrain”;<sup>118</sup> however, it goes on in the same document to clearly identify the natural environment as either a resource for the military to use or the source of a threat given that the enemy could use it (e.g. for camouflage or as obstacles), rather than as something in need of protection. As such, it is clear that militaries could and should better ensure that doctrines around urban warfare explicitly reference measures to ensure the protection of the natural environment, and conversely that doctrine or other guidance documents on the protection of the natural environment highlight the specific challenges of protecting the natural environment during urban warfare.

<sup>112</sup> *Ibid.*, p. 20.

<sup>113</sup> NATO, *NATO Standard AJP-3.0: Allied Joint Doctrine for Joint Targeting*, Edition B, Version 1, November 2021, p. 1-1, available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1033306/AJP-3.9\\_EDB\\_V1\\_E.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033306/AJP-3.9_EDB_V1_E.pdf).

<sup>114</sup> *Ibid.*, pp. 1-8, 1-22.

<sup>115</sup> United States, Finland and Sweden, *Environmental Guidebook for Military Operations*, March 2008, available at: [https://ceobs.org/wp-content/uploads/2018/03/Guidebook\\_final\\_printing\\_version.pdf](https://ceobs.org/wp-content/uploads/2018/03/Guidebook_final_printing_version.pdf).

<sup>116</sup> See Finland, Sweden and United States, *Environment Toolbox for Deploying Forces*, extracts available at: <https://vdocuments.mx/developed-by-trilateral-cooperation-of-defence-environmental-experts-from-finland.html?page=2>.

<sup>117</sup> *Ibid.*, checklist phase 1.

<sup>118</sup> US Department of the Army, *Combined Arms Operations in Urban Terrain*, ATTP 3-06.11 (FM 3-06.11), 2011, p. xii, available at: <https://tinyurl.com/3n9ywx69>.

Militaries themselves acknowledge the increasing concern for the protection of the natural environment, including when fighting in cities. For instance, a 2020 report by the Defence Science and Technology Laboratory of the UK Ministry of Defence (MoD), in speaking about fighting in cities, observes that “the UK military may come under increasing pressure from otherwise disinterested actors to do the least possible damage to the environment during operations”<sup>119</sup> and that “there may be merit in employing environmental specialists to support operations in a similar manner to how legal and policy advisers are currently used”.<sup>120</sup> In making the recommendation that militaries pay greater regard to the protection of the natural environment when planning for, training for and conducting urban warfare, it is noted that protecting the environment in urban warfare can also have military benefits. That same UK MoD report notes the threat of urban warfare’s environmental degradation to the military personnel themselves, noting that, “for example, breathing apparatus may need to be routinely used in order to prevent contamination from toxic chemicals and biological waste, avoid the spread of disease and operate in urban areas with dangerous levels of air pollution”.<sup>121</sup>

## Focus issue: Protected areas in urban contexts

The concept of establishing protected zones to reduce damage to areas of particular environmental importance or fragility continues to garner attention. There have been several proposals to designate environmental areas as protected zones that have been well documented, starting from the proposal at the time of the Additional Protocols’ drafting.<sup>122</sup> Most recently, Principle 4 of the PERAC Principles provides that “States should designate, by agreement or otherwise, areas of major environmental and cultural importance as protected zones”. The ICRC Guidelines make a similar recommendation.<sup>123</sup> It might be commonly assumed that the establishment of protected zones would occur in more remote and rural areas, but areas within or close to an urban environment may also have important ecological value. Indeed, with increasing urbanization and urban sprawl, many areas of environmental importance or fragility are today surrounded by cities. For example, Nairobi National Park is an important area of natural beauty and biodiversity that is co-located with a dense urban population. A study by the International Union for Conservation of Nature looking specifically at the need for the protection of urban environmental areas notes a number of others, including Table Mountain National Park, which adjoins Cape

119 *Ibid.*, p. 34.

120 MoD Defence Science and Technology Laboratory, *Future Cities: Trends and Implications*, 2020, p. 33, available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/875528/Dstl\\_Future\\_Cities\\_Trends\\_\\_\\_Implications\\_OFFICIAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875528/Dstl_Future_Cities_Trends___Implications_OFFICIAL.pdf).

121 *Ibid.*, p. 35.

122 See, further, C. Droege and M.-L. Tougas, above note 61, pp. 43–45; but also, more simply, CEOBS, *An Overview of Area-Based Environmental Protection in Relation to Armed Conflict*, 8 October 2020, available at: <https://ceobs.org/conflicts-and-conservation-the-promise-and-perils-of-protected-zones/>.

123 ICRC Guidelines, above note 4, Recommendation 17.

Town in South Africa; Sanjay Gandhi National Park, which is increasingly encircled by Mumbai in India; and Tijuca National Park, which is surrounded by Rio De Janeiro in Brazil.<sup>124</sup> It is suggested that such areas would be appropriate for designation as protected zones under the environmental aspect of PERAC Principle 4 should the need arise.

### Focus issue: Clearing toxic remnants of war and debris in urban areas

Regardless of how meticulously the rules are followed, armed conflicts damage the natural environment. However, the impact of urban warfare on the natural environment can be minimized with “concrete, practical measures”<sup>125</sup> in the aftermath of hostilities to ensure the “continued habitability of the territory”.<sup>126</sup> The correct destruction of weapons after a conflict<sup>127</sup> is a particularly relevant consideration in urban areas and indeed a legal obligation under many instruments of international law, including the Protocol on Explosive Remnants of War under the Convention on Certain Conventional Weapons, the Anti-Personnel Mine Ban Convention and the Cluster Munitions Convention, as well as customary IHL.<sup>128</sup>

If unused and unexploded ordinance is not properly handled, the consequences in urban settings can be long-lasting. As was noted earlier in this article, weapon remnants contain toxic chemicals which can leak into the soil, subsoil and watercourses and have significant environmental and human health impacts. Particularly long-lasting impacts include the subsequent inability of responders to prioritize the repair of the key infrastructure required for the city to function until the remnants are removed, and the breakdown of the efficient functioning of the ecosystem.

Cardon *et al.* note the need to “mark and clear all unexploded remnants of war and solicit international support for humanitarian demining”.<sup>129</sup> Clearing of weapon remnants is needed to protect the environment, but is itself not an activity without environmental consequences. Standards must be applied to ensure that it is done without causing further environmental damage.<sup>130</sup> While such clearance will be important everywhere, including in rural areas to return

124 See, further, International Union for Conservation of Nature, *Urban Protected Areas: Profiles and Best Practice Guidelines*, Gland, 2014, available at: <https://portals.iucn.org/library/sites/library/files/documents/PAG-022.pdf>.

125 Christian Cardon, Thomas de Saint Maurice and Kelisiana Thynne, “Aftermath of Battles and Conflict: From Challenges to Solutions”, *Humanitarian Law and Policy Blog*, 13 September 2022, available at: <https://blogs.icrc.org/law-and-policy/2022/09/13/aftermath-battles-conflict-challenges-solutions/>.

126 Ramin Mahnad and Kelisiana Thynne, “Silenced Guns Do not Mend Lives: What Does the Law Say about Human Suffering at the End of Conflict?”, *Humanitarian Law and Policy Blog*, 21 July 2022, available at: <https://blogs.icrc.org/law-and-policy/2022/07/21/silenced-guns-lives-law-end-of-conflict/>.

127 C. Cardon, T. de Saint Maurice and K. Thynne, above note 125.

128 CCW, above note 65, Protocol (V) on Explosive Remnants of War, 28 November 2003 (entered into force 12 November 2006); Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction, 18 September 1997 (entered in force 1 March 1999), Art. 5; Convention on Cluster Munitions, 30 May 2008 (entered into force 1 August 2010), Art. 4; ICRC Customary Law Study, above note 51, Rule 83.

129 C. Cardon, T. de Saint Maurice and K. Thynne, above note 125.

130 See, further, ICRC Guidelines, above note 4, Rules 25, 26.

agricultural lands to productive use, it will be particularly important in the urban environment in order to allow for the safe movement of civilians and the correct functioning of civilian infrastructure. Even small projects can have significant impacts for civilian communities.<sup>131</sup>

Further, the issue of toxic remnants of war more broadly is of particular concern in urban areas. As detailed earlier in the article, the toxic and dangerous products found in building materials (including asbestos) and ash from burning toxic debris impact the natural environment.<sup>132</sup> An example of a specific remedial project to address this is in Iraq. The UN Environment Programme (UNEP) has worked with municipal authorities in Mosul since 2017 to clear the debris of the conflict, and in mid-2022 it announced the handover to the Mosul Municipality of a debris recycling centre.<sup>133</sup> The focus of this project is the “restabilization of the liberated areas in an environmentally sustainable manner”;<sup>134</sup> that is, the project does not just consider the future uses of the land for civilian purposes, but also considers environmental sustainability. Such projects have human and environmental benefits and should be a post-conflict focus.

Elsewhere in this issue of the *Review*, Obregón Gieseken and Murphy explore the practical measures that must be taken to protect the natural environment in times of armed conflict regardless of the location of the natural environment needing protection.<sup>135</sup> Although to date the protection of the natural environment does not appear to have been a major consideration during urban warfare, increasing urbanization and the resulting increasing prevalence of urban warfare – and the significant consequences, as detailed earlier in this article – mean that it should be. Indeed, in our view, it is important for States to ensure that military members – and especially planners – are aware of the scope of what the natural environment encompasses and the damage to the natural environment that attacks in urban areas can cause.

All of this is not to say that putting in place such measures will prevent all environmental harm caused by urban warfare. Many of these points will need consideration – not only during conflict, but also prior to conflict breaking out, and in the aftermath of conflict if preventative measures fail to provide adequate protection. Importantly, giving prior consideration to preventing environmental harm during urban warfare can have a positive impact. A particularly evident

131 For an example project, see “Back to School: Displaced by Conflict, Children from Ubari, Southern Libya, Return Home and to the Classroom”, *ReliefWeb*, 6 April 2018, available at: <https://reliefweb.int/report/libya/back-school-displaced-conflict-children-ubari-southern-libya-return-home-and-classroom>.

132 *Report of the Special Rapporteur on Toxics and Human Rights: Adverse Effects of the Illicit Movement and Dumping of Toxic and Dangerous Products and Wastes on the Enjoyment of Human Rights*, UN Doc. A/HRC/5/5, 5 May 2007.

133 UNEP, “Mosul’s Recovery Moves Towards a Circular Economy”, 28 July 2022, available at: [www.unep.org/news-and-stories/press-release/mosuls-recovery-moves-towards-circular-economy](http://www.unep.org/news-and-stories/press-release/mosuls-recovery-moves-towards-circular-economy).

134 *Ibid.*

135 Such practical measures were also explored by States in an expert meeting convened by the ICRC and Switzerland in 2023. See Switzerland and ICRC, *Chair’s Summary Report of State Expert Meeting on IHL: Protecting the Natural Environment in Armed Conflict*, 2023, available at: [www.icrc.org/en/document/chairs-summary-report-state-expert-meeting-ihl-protecting-natural-environment-armed](http://www.icrc.org/en/document/chairs-summary-report-state-expert-meeting-ihl-protecting-natural-environment-armed).

takeaway is how much action can be taken prior to the outbreak of hostilities. This prior planning is particularly important in urban areas, where dense populations are so reliant both on the interconnected infrastructure and on the natural environment that they do have.

## Conclusion

Addressing the humanitarian impact of urban warfare requires a huge range of considerations that go well beyond the points being made in this article about the natural environment.<sup>136</sup> Humanity is currently facing a collision of challenges: a change in global demographics that features, for the first time in history, more people living in urban than in rural areas; and a tipping-point chance to address the climate risks the planet is now facing. The humanitarian impacts of conflict-related damages to the natural environment – especially in and around populated areas and essential civilian infrastructure, and the environmental damage which results from widespread urban displacement – only exacerbate these intersecting challenges.

This article, having identified a range of environmental consequences of urban warfare, has laid out the legal frameworks for the protection of the natural environment which are of particular (although not necessarily unique) relevance in urban warfare, with a focus on the rules of IHL. These legal obligations give rise to a range of actions that States can take to ensure meaningful implementation. Being conscious of the risk of harm that urban warfare creates for the natural environment is the first step. Taking measures to ensure that doctrine, planning, training, protected zone designation, weapons reviews and clean-up measures all take on board this interplay and minimize environmental impacts must then follow. This interplay between the urban environment and the natural environment is something noted by the International Red Cross and Red Crescent Movement as it seeks to do more to prevent and respond to the humanitarian impacts of urban warfare. Indeed, environmental damage and the obligations protecting the natural environment are a part of the ambitious multi-year plan of action that the Movement adopted in June 2022 on war in cities.<sup>137</sup> Stahn *et al.* make the point that “the mandate to protect the environment during and after armed conflict is inherently linked to the needs of future generations”.<sup>138</sup> Given that around 70% of those future generations will live in cities, thinking about the conduct of urban warfare with the natural environment in mind is therefore of great importance.

136 See further the range of themes addressed in Council of Delegates of the International Red Cross and Red Crescent Movement, “Resolution 6: War in Cities”, 22–23 June 2022, available at: [https://rcrcconference.org/app/uploads/2022/06/CD22-R06-War-in-cities\\_22-June-2022\\_FINAL\\_EN.pdf](https://rcrcconference.org/app/uploads/2022/06/CD22-R06-War-in-cities_22-June-2022_FINAL_EN.pdf).

137 *Ibid.*

138 C. Stahn, J. Iverson and J. S. Easterday (eds), above note 68, p. 10.