Journal of Military and Strategic Studies

VOLUME 24, ISSUE 3

Journal of Military and Strategic Studies 2025 Award of Excellence[1]

From Seeds to Suffering: Herbicides, Environmental Degradation and Slow Violence

Alexandra Pacheco Hardwicke*

[1] Awarded second prize.

* Alexandra Pacheco Hardwicke, Strategic Studies graduate student at the Centre for Military, Security and Strategic Studies at the University of Calgary.

ISSN : 1488-559X

Contemporary definitions of security are often tied to a state's defence of sovereign interests by use of force and military means.[2] The concept of environmental security represents the effort to bring environmental concerns to the "high table of priority issues where security has traditionally had a seat."[3] Environmental security has multiple and diverse meanings, often invoked to refer to how national and human security may be threatened by changes in the environment or how the environment itself can be rendered insecure. [4] Explicit requests for the inclusion of environmental concerns within considerations of security have gained prominence following the end of the Cold War and the resulting search for an orienting security paradigm.[5] Proposed conceptions of environmental security range from regarding environmental stressors as an added threat "within the conflictual status framework" to positioning environmental change at the heart of cooperative models of global security.[6] Environmental security is frequently conceptualized outside the context of warfare, typically linked to ecological degradation, climate change, and resource scarcity as factors that contribute to and multiply the threat of violent conflict. Traditional scholarship tends to center on environmental devastation as a precursor to war, often overlooking the environmental security challenges that arise during and following the conflict.

Warfare almost always results in the destruction of the environment, yet the devastation extends far beyond the immediate physical consequences of battle. Environmental devastation is not only acknowledged as a by-product of war and militarism but has been "implemented as a military strategy since ancient times."[7] Historically, natural environments have played an integral role in human conflict, from land disputes to armed conflict and terrorism. Starving the enemy through attacking livestock, contaminating water resources, and scorched earth tactics are a few of the many ways in which the environment has been weaponized in past conflicts. Further, some of

[2] Geoffrey D. Dabelko and David Dabelko, "Environmental Security: Issues of Conflict and Redefinition," *Environmental Change and Security Project* Report 1, no. 1 (1995): p. 3-13.
[3] Dabelko and Dabelko, " Environmental Security," p. 4.
[4] Peter Hough, *Environmental Security: An Introduction*, 2nd ed. 2021, (London: Routledge, 2021): p. 5.
[5] Richard H. Ullman, "Redefining Security," *International Security* 8, no. 1 (1983): p. 129–153, https://doi.org/10.2307/2538489; Barry Buzan, *People, States and Fear: An Agenda for International Security Studies in the Post–Cold War Era* (London: Harvester Wheatsheaf, 1991).
[6] Dabelko and Dabelko, *Environmental Security*, p. 4.
[7] Bronwyn Leebaw, "Scorched Earth: Environmental War Crimes and International Justice," *Perspectives on Politics* 12, no. 4 (2014): p. 770–788.

these tactics have even facilitated the advancement of sophisticated military programs.[8] In a more direct manner, the environment itself has been intentionally employed as an instrument of destruction.[9] For instance, the Huang He River was diverted to disrupt the advancement of Japanese troops, resulting in high civilian casualties and the degradation of surrounding natural landscapes.[10] The deployment of tactical herbicide Agent Orange during the Vietnam War, the detonation of Kuwaiti oil well by retreating Iraqi forces during the 1990-91 Gulf War, the use of scorched earth tactics in Bakhmut Ukraine by Russian troops, or the use of white phosphorus munitions in Gaza by Israeli troops represent merely a small fraction of contemporary examples of the deliberate destruction of the environment during times of armed conflict.[11]

Often, the impacts of war last beyond the end of the conflict itself. Wartime environmental devastation diminishes regional biodiversity and facilitates disease, starvation, and long-term impacts and repercussions for agricultural systems.[12] These consequences are commonly acknowledged by security and military scholars and practitioners, yet the imperatives of war are "routinely invoked to justify the abrogation of [the] laws" that are intended to prevent and protect against excessive environmental harm.[13] Whilst environmental damage is regarded as an unavoidable byproduct of conflict, some acts of environmental destruction are not necessary to achieve military objectives. The breadth and influence of international norms and laws governing warfare have significantly grown in recent years; however, the impacts of war on the environment, human populations and ecosystems in impacted regions remain at the periphery of contemporary debates within the field of environmental security. Human rights and environmental scholars tend to prioritize efforts to "prevent and punish a subset of egregious crimes against humanity," with the environmental standard of war

[8] Mark Wheelis, Lajos Rózsa, and Malcolm Dando, *Deadly Cultures: Biological Weapons since 1945* (London: Harvard University Press, 2006).
[9] Achim Maas et al., eds., *Global Environmental Change: New Drivers for Resistance, Crime and Terrorism?*, 1st ed. (Baden-Baden: Nomos, 2013): p. 203.
[10] Neil Burgess, "Benchmarks: Diverting the Huang He River, Largest Act of Environmental Warfare in History," *Earth Magazine*, 2009, https://www.earthmagazine.org/article/june-9-1938-huang-he-diversion-largest-act-environmental-warfare-history/.
[11] Mass et al., *Global Environmental Change,* p. 203.
[12] Leebaw, *Scorched Earth,* p.770.
[13] Leebaw, *Scorched Earth*, p.770.

considered a subordinate priority.[14] In a legal context, there are few provisions in the Laws of Armed Conflict (LOAC) that use the term *environment*, such provisions "apply in very exceptional circumstances" in which few states are bound.[15]

This article investigates the following question: *How can environmental security be conceptualized in the context of war? Further, what role does the concept of "slow violence" play in understanding the long-term environmental impacts of war?* Environmental security, particularly in the context of armed conflict, is an evolving field. The incorporation of slow violence may provide a critical framework to analyze post-war impacts and long-term ecological harm in ways traditional security studies have overlooked. Bridging these two concepts creates a space to explore the complexities of the intentional weaponization of environmental degradation used during armed conflict beyond immediate and visible destruction. This paper aims to address a critical gap in the existing environmental security literature by exploring how environmental security may be conceptualized within the context of armed conflict, specifically investigating the role of slow violence in the long-term environmental consequences of war. Current conceptualizations of environmental security have primarily focused on immediate ecological threats, principally the national security implications of climate change. Nevertheless, the objective of this paper is to understand if and how 'slow violence' may broaden the scope of environmental security studies, allowing for a more comprehensive examination of the intentional weaponized degradation of land and ecosystems during conflict.

Methodology

This paper adopts a multi-disciplinary approach to analyzing the intersection of environmental degradation, armed conflict, and security, focusing on the intentional weaponization of the environment. It brings together security studies, political ecology, history, and various scientific studies regarding the contamination of land. This paper is structured into two key sections. The first section will conduct an extensive literature review to explore the early debates and conceptual development of traditional understandings of environmental security. Central to this discussion is examining how

[14] Leebaw, *Scorched Earth*, p. 771.
[15] Adam Roberts, "The law of war and environmental damage." *The Environmental Consequences of War,* Cambridge (2000): p. 47–86.

environmental security intersects with traditional security studies, particularly in relation to the conceptualization and discourse surrounding land and the environment. Further, this section will conduct a conceptual analysis to deconstruct and examine both environmental security and slow violence. The aim is to re-contextualize environmental security in the context of intentional and weaponized environmental destruction in armed conflict, extending beyond immediate and visible acts of destruction. A key component is the integration of Rob Nixon's concept of *slow violence*, which highlights the prolonged, often invisible nature of environmental harm. This section aims to critically assess how the intentional weaponization of land and environmental degradation poses a unique challenge to traditional understandings of environmental and even human security.

The second section will conduct a comparative case study to investigate two instances of intentional environmental harm caused by chemical warfare: the deployment of Agent Orange in Vietnam and the use of chemical weapons and herbicides in Palestine. A most different system design will be used to facilitate a comparative analysis regarding the nature of each conflict, focusing on the patterns of deployment of chemical agents, their potentially enduring social, economic, and health implications for people, as well as their long-term effects on the land itself. These cases were selected based on their deliberate uses of toxic substances and herbicides to achieve military or political objectives, resulting in long-term, multigenerational environmental and human health consequences. This paper aims to investigate whether each case demonstrates the four key tenets of slow violence. The first tenet, *time*, suggests that slow violence is a gradual process where the 'violence' is not immediate nor is spectacular. The second, *invisible in nature*, asserts that in comparison to other forms of violence, it is not detectable to the eye whereby the lasting impacts cannot necessarily be determined upon impact. The third, *delayed impact*, seeks to connect the past and the present as a form of generational violence. The final tenets, *attritional and exponential*, assess the intention of the violence to weaken and destroy the target over time.

Literature Review

Conceptual Development of Environmental Security & Slow Violence

(i)The Evolution of Environmental Security

In the simplest terms, insecurity is the risk of something bad happening to a thing or place that is valued. As such, security can apply to various things that are valued; the 'referent object' refers to the many different forms of risk. Broadly, the environment has often been regarded as a referent object of security, whereby environmental change has been seen as a security risk.[16] Environmental security is often considered a *new* non-traditional security issue that has deepened and broadened the concept of security. It serves to deepen the field as it considers not only the security of states, but the security of the environment and its various nested subsystems.[17] It broadens security by considering risks other than war, particularly the risks brought forth by environmental change, that could potentially pose an existential threat to people and what they value.[18] Environmental security is often viewed as a critical security project, whereby the environment is both a referent object to be protected and a potential source of risk. This duality raises key questions about who or what is be secured, from which threat, and by what means. Interpretations frequently diverge based on the entity being secured, the perceived sources of risk, and proposed responses.

Environmental security emerged as a critical concept within security studies due to four interrelated developments beginning in the early 1960s.[19] The starting point of these developments was the growth of environmental consciousness in *developed* countries. A series of events stimulated and sustained the emerging environmental movement at this time. Of critical influence was the nuclear strikes on Hiroshima and Nagasaki in 1945, the two military atrocities that effectively ended World War II.[20] Additionally, the emergence of environmental security is largely attributed to the publication of Rachel Carson's book *Silent Spring* (1962), which illustrated the detrimental impacts of the pesticide DDT on animals and the food chain. Her central assertion, "in

[16] Jon Barnett, "Environmental Security," in *The Routledge Handbook of New Security* Studies (Routledge, 2016): p. 230.
[17] Barnett, *Environmental Security*, p. 230.
[18] Barnett, *Environmental Security*, p. 230.
[19] Barnett, *Environmental Security*, p. 230.
[20] Benjamin Kohlmann, What is it like to be a rat? Early cold war glimpse of the post-human. *Textual Practice, 28*(4), (2014): p. 655-675.

nature, nothing exists alone," underscored the profound interconnectedness of all life on Earth.[21] This insight remains a foundational contribution to the conceptual development of environmental security, shaping early understandings of ecological interdependence and shared vulnerability. Carson's observations on the poisoning of the land and sea compelled her to write the scientific novel that alerted the American population, whose understanding of chemical exposure was rather limited.[22] In Carson's prologue, *A Fable for Tomorrow*, prophesises humanity's fate if mankind continues with its project of destruction in the countryside:

> A grim spectre has crept upon us almost unnoticed, and this imagined tragedy may easily become a stark reality we shall all know. What has already silenced the voices of spring in countless towns in America? This book is an attempt to explain.[23]

Some Scholars have suggested that this novel "resembles a twisted fairy-tale" more than an educational warning, with its "Cold War themes of death, disease, and destruction" seeping through ecosystems while continuing a dialectic lesson on the devastation of pesticides.[24] Greg Garrard, an ecocritical scholar, argues that Carson's depiction of poisons as phantoms and shadows represents a "morally significant inversion of the world of appearances," the disturbing reality that an entity so potent yet invisible is not only external, but man-made.[25] The juxtaposition of Cold War themes and Carson's depiction of "a spring without voices" resonated with a world coming to terms with the aftermath of WWII and the fear of an atomic age.[26] Moreover, her characterization of pesticides as "biocides" highlights the unprecedented scale of self-harm caused by human innovation, which manifested as "substances of incredible potential for destruction."[27] Her work foretold that the scale of widespread government-led practices, like manufactured chemical pesticides and herbicides, would only increase

---

[21] Rachel Carson, *Silent Spring*, (Boston: Houghton Mifflin, 1962): p. 52.
[22] Ursula K. Heise, *Sense of Place and Sense of Planet: The Environmental Imagination of the Global*. (New York: Oxford University Press, 2008): p. 160
[23] Carson, *Silent Spring*, p. 22.
[24] Thomas Holton, *A literary exploration of the second "Ecological Conscience," 1960s-1970s.* (England: University of Bedfordshire, 2017): p. 9.
[25] Greg Garrard, *The Oxford Handbook to Ecocriticism.* (New York: Oxford University Press, 2014): p. 157-8.
[26] Carson, *Silent Spring*, p. 22.
[27] Carson, *Silent Spring*, p. 25.

until something tragic would happen, claiming "a Who's Who of pesticides is therefore of concern to us all."[28]

The second major development for environmental security emerged in the 1970s, when scholars began to critically assess orthodox security paradigms, emphasizing their inadequacy in addressing environmental risks that pose significant threats to national and international security.[29] This is often cited as the initial critical use of the concept of environmental security. Among the first critical scholars were Richard Falk, Harold and Margaret Sprout. Richard Falk, an international legal scholar and political theorist, is known for his critical perspective on modernity and challenges to the dominant realist paradigms embedded in international relations. One of his most influential contributions to environmental thought is his 1971 book *This Endangered Plant: Prospects and Proposals for Human Survival.* In this work, Falk offers a critique of traditional conceptions of security, which were primarily state-centric and concerned with military threats.[30] He argued that traditional approaches are rigid and ill-equipped to confront emerging global challenges, particularly those related to environmental degradation, resource scarcity, and ecological imbalances.[31] Central to this approach is "the need for limits" that requires a profound and urgent transformation of political society that identifies "the limits of our planetary existence and plan to live within those limits."[32]

Harold and Margaret Sprout, scholars of political ecology and international relations, developed a distinctive approach that emphasized the central role of the environment in shaping state behaviour and international outcomes. Their landmark publication, *Towards a Politics of Planet Earth*, is considered a foundational text in environmental thinking within the context of a post-WWII international political regime "preoccupied with the high politics" of state security, power and prestige following the destruction and uncertainty that came with the nuclear age.[33] The Sprouts challenged the prevailing realist and state-centric paradigms, instead advocating for what they called an

[28] Carson, *Silent Spring*, p. 32.
[29] Barnett, *Environmental Security*, p. 231.
[30] Barnett, *Environmental Security*, p. 231.
[31] Richard A. Falk, *This Endangered Planet: Prospects and Proposals for Human Survival.* (New York: Penguin Random House, 1972): p 3.
[32] Falk, *This Endangered Planet*, p. 2.
[33] Harold Sprout and Margaret Sprout, *Towards a Politics of the Planet Earth*. (New York: Van Nostrand Reinhold Company, 1971): p. x.

"ecological perspective" on world politics.[34] The ecological perspective is a distinct way of comprehending international politics as a "system of relationships among interdependent, earth-related communities" that share an "increasingly crowded planet…[with] finite and exhaustible quantities of basic essentials" required for human existence.[35] They called for a reconceptualization of politics to include planetary considerations, emphasizing the interconnectedness of environmental systems and the global implications of environmental degradation.[36] Their analysis anticipated many of the central concerns of contemporary environmental security, particularly the need to integrate environmental awareness into the strategic and ethical dimensions of international politics. These ideas of environmental interdependence and common security have remained central to discourses on environmental security and formed the foundational principles underlying numerous international agreements geared towards sustainable development.

It was not until 1982 that the potential link between environmental change and conflict gained serious academic consideration, notably through Richard H. Ullman's seminal article, *Redefining Security*. In this work, Ullman argued that non-military threats could pose a significant risk to national and global security, and as such, the idea of a 'threat' to the state must be re-evaluated.[37] He argued that when weighing security trade-offs, it is essential to understand that security "may be defined not merely as a goal but as a consequence."[38] Moreover, security is determined by the threats that challenge it. He challenged the state-centric definition of national security dominant during the Cold War, proposing instead a broader conceptualization that introduced the notion that beyond military threats arising from outside a state's borders, threats from within are equally as capable to undermine state stability and security.[39] Ullman proposed a comprehensive definition of security that fundamentally shifted scholarly approaches to security:

[34] Sprout & Sprout, *Towards a Politics of Planet Earth*, p. 13.
[35] Sprout & Sprout, *Towards a Politics of Planet Earth*, p. 14.
[36] Sprout & Sprout, *Towards a Politics of Planet Earth*, p. 14.
[37] Richard H. Ullman, "Redefining Security." *International Security* 8, no.1 (1983): p. 131.
[38] Ullman, *Redefining Security*, p. 133.
[39] Ullman, *Redefining Security*, p. 133.

> A threat to national security is an action or sequence of events that (1) threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state, or (2) threatens significantly to narrow the range of policy choices available to the government of a state or to private, nongovernmental entities within the state.[40]

These threats range from internal rebellions and blockades to raw material shortages and natural disasters such as epidemics, catastrophic floods, and droughts. Further, he suggested that the degradation of the quality of life in its most extreme form, could lead to conflict within a state that potentially poses a threat to the state, both militarily and non-militarily.[41]

These foundational arguments establishing the linkages between the environment and security were often a peripheral concern for security institutions in the West preoccupied with the "hard power" required to win the Cold War.[42] For the United States and its allies, security was equated with national security from the military and ideological threat posed by the Soviet Union whereby the principal strategy of protection was to build and maintain military superiority.[43] However, in 1973 the Organization of Petroleum Exporting Countries ("OPEC") restricted oil exports resulting in the near quadrupling of the price of oil on world markets. This demonstrated that the industrial capacity that supported the military superiority of the West was vulnerable to the supply of energy. This shift in strategic landscape is the third key development in the emergence of environmental security. Gearóid Tuathail, suggests that the end of the Cold War created a 'vertigo' for security policy and studies, shifting the focus of traditional state-centric security and incorporating other methods of investigation.[44] This vertigo effect, accompanied by the growing environmental consciousness in developed countries, the call for common security, and the preparations for the United Nations Conference on Environment and Development (UNCED) Rio Conference in 1992, facilitated an

[40] Ullman, *Redefining Security*, p. 133.
[41] Ullman, *Redefining Security*, p. 135.
[42] Barnett, *Environmental Security*, p. 232.
[43] Barnett, *Environmental Security*, p. 232.
[44] Gearóid Ó. Tuathail, and Gerard Toal, *Critical geopolitics: The politics of writing global space*. Vol. 6. (University of Minnesota Press, 1996).

intellectual space for environmental security to enter mainstream security thinking as a 'new' issue.[45]

The fourth major development in the evolution of environmental security was the growing recognition that changes in the environment threatens not only ecosystems, but human well-being, livelihoods, and existence. Contemporarily, it is well understood that environmental change, particularly global warming, poses an increasingly real threat to human security by "undermining access to basic environmental assets."[46] Further, scholars began connecting environmental change with the violations of civil and political rights (i.e. access to means of subsistence and health) and the restriction of people's access to economic and social opportunities.[47] Anseeuw and Taylor posit that the struggles over land and resources are some of the defining features of movements around the world to overcome hunger, discrimination, and political repression.[48] The increasing demand for food, feed, fuels and other commodities combined with the growing global population and shrinking resources has intensified due to the physical impacts of climate change.[49] As this line of reasoning continues to evolve, environmental security is a central concern in development studies, fostering greater collaboration among security, development, and environmental research.

(ii) Interpretations and Contributions of Environmental Security

Environmental security has emerged as an increasingly relevant concept since the early 1990s. However, its meaning is ambiguous, by virtue of the flexible and often politicized interpretations of environment and security. The broad meaning of environment is the "external conditions that surround an entity," and more accurately, it is defined as the living organisms and the physical and chemical components that make up the total Earth system.[50] The concept of security is also a vague, all-encompassing

[45] Simon Dalby, "Ecopolitical Discourse: 'Environmental Security' and Political Geography." *Progress in Human Geography* 16, no.4 (1992): p. 503.
[46] Barnett, *Environmental Security,* p. 233.
[47] Richard Matthew, Jon Barnett, and Karen O'Brien, *Global Environmental Change and Human Security*. (Cambridge, MA: MIT Press, 2009).
[48] Taylor Anseeuw, & Mike Taylor, "Factors Shaping the Global Land Rush." In Alexander Reid Ross (ed.), *Grabbing Back: Essays Against the Global Land Rush*. (Oakland, CA: AK Press, 2014): p. 476.
[49] Anseeuw & Taylor, *Factors Shaping the Global Land Rush*, p. 476.
[50] Barnett, *Environmental Security,* p. 234.

concept, often understood as an "assurance people have that they will continue to enjoy those things that are most important to their survival."[51] The inherent ambiguity of these terms has led to a proliferation of various interpretations and definitions within the field of environmental security.

Within the literature, distinct approaches to environmental security can be identified, each differing primarily in terms of the entity to be secured and what is perceived as the source of risk. First, environmental security is understood as addressing the impacts of human activity on the natural environment. This interpretation, often referred to as ecological security, emphasizes the need to safeguard ecosystems and ecological processes, identifying human behaviour as the principal threat to ecological integrity.[52] Simon Dalby extends the concept of ecological security through the notion of 'Anthropocene security,' which frames human activity as a transformative force within the biosphere already affecting significant and irreversible changes. [53] These conceptualizations of security differ radically from mainstream security discourse and policy, and to date, have exerted limited influence.[54]

The second approach focuses on common security. The causes and consequences of many environmental problems transcend national borders. Issues such as ozone depletion, rising sea levels, and climate change are inherently global in nature, resulting from the cumulative emissions of greenhouse gases by multiple countries over time.[55] However, the global scale of these challenges does not imply that all states bear equal responsibility, nor that all countries or communities face the same level of risk.[56] This positioning underscores stark inequalities, revealing how certain populations, typically poor and vulnerable communities in the Global South, are subjected to the brunt of environmental harm while those responsible for the exploitation of both people and land are often shielded from its consequences.[57] Even where environmental problems are commonly experienced, the divergence of national interests and the primacy of state

[51] Marvin Soroos, *The Endangered Atmosphere: Preserving a Global Commons*. (Columbia: University of South Carolina Press, 1997): p. 236.
[52] Simon Dalby, *Security and Environmental Change*. (Cambridge: Polity Press, 2009): p. 171.
[53] Dalby, *Security and Environmental Change,* p. 172.
[54] Barnett, *Environmental Security,* p. 234.
[55] Barnett, *Environmental Security,* p. 234.
[56] Aaron Saad, *Worlds at Stake: Climate Politics, Ideology, and Justice*. (Halifax: Fernwood Publishing, 2022): p. 32
[57] Saad, *Worlds at Stake*, p. 32.

sovereignty complicate collective action. As a result, multilateral agreements have often failed to significantly halt environmental degradation.[58]

The relationship between environmental change and violent conflict has been a central and long-standing concern within the field of environmental security. Yet, fundamental questions remain unresolved, including whether environmental change contributes to violent conflict, and if so, to what extent and through what mechanisms. Early writings on the relationship between environmental change and violence borrowed from international relations theory, placing sustained emphasis on resource scarcity and conflict between states. According to Peter Gleick, environmental degradation is closely linked to the dynamics of violent conflict.[59] He posits that natural resources can function as both strategic targets and tools in conflict, and ultimately, disparities in access to these resources may serve as a potential driver of instability and conflict.[60] Further, he gestures towards the possibility of war between countries with shared resources, particularly the manifestation of a water war in the Middle East.[61] Along with Richard Ullman, early contributions from John Meyers also questioned the possibility of interstate war caused by resource and environmental vulnerabilities:

> If a nation's environmental foundations are depleted, its economy will steadily decline, its social fabric deteriorate, and its political structure becomes destabilized. The outcome is all too likely to become conflict, whether conflict in the form of disorder and insurrection within the nation, or tensions and hostilities with other nations.[62]

Other scholars contend that environmental change is not a direct trigger of conflict; rather, it often functions as an exacerbating factor that intensifies existing social, political, or economic tensions. Homer-Dixon's *Environment, Scarcity, and Violence* asserts that the scarcity of renewable resources, or what he calls environmental scarcity, may contribute to the increase in civil violence, including insurgencies and ethnic clashes.[63] He integrates

---

[58] Barnett, *Environmental Security,* p. 235.
[59] Peter H. Gleick, 'Environment and Security: The Clear Connections'. *Bulletin of Atomic Scientists* 47, no.3 (1991): p. 17.
[60] Gleick, *Environment and Security*, p. 20.
[61] Gleick, *Environment and Security*, p. 21.
[62] John M. Meyer, *Political Nature: Environmentalism and the Interpretations of Western Thought* (Cambridge, MA: MIT Press, 2001): pp 251; Ullman, *Redefining Security*, p. 130.
[63] Thomas Homer-Dixon, *Environment, Scarcity, and Violence*. (London: Princeton University Press, 1999): p. 177.

physical variables (supply of natural resources, population size, and resource-consumption per capita) and social factors (market dynamics and socio-economic structures) in a single model that engages the importance of thresholds and interactivity within complex environmental systems.[64] For Homer-Dixon, the "metaphors of stability, equilibrium, and balance" are not capable of capturing the complex interdependent system like those of environmental change.[65] Rather, "metaphors of anarchy, flux, and constant turmoil' are more adequate as societies must prepare to supply greater social and technical ingenuity to adapt to heightened levels of scarcity in a way that is not linear nor equal.[66]

In recent years, there has been a growing body of research aimed at quantifying the relationship between climate change and violent conflict, prompting substantial debate over the validity of methods and evidence applied in such studies.[67] As Adger et al. note, there is no comprehensive theory that can explain the causal pathways linking climate variability to conflict.[68] Emerging scholarship suggests that climate change and environmental degradation are unlikely to be direct causes of violence, but rather function as 'threat multipliers,' factors that heighten the risk of conflict under specific socio-political and economic conditions.[69] Shehnoor Khurram posits that as the physical consequences of global warming and climate change become more severe, the "social and political aspects of adaptation" may evolve into reactionary and repressive responses from both state and non-state actors.[70] Her analysis is grounded in the case of Boko Haram's operations in northern Nigeria and Chad, where the militant Islamist group has exploited climate-induced water scarcity in the Lake Chad region by asserting control over a significant portion of this critical resource.[71]

---

[64] Homer-Dixon, *Environment, Scarcity, and Violence,* p. 40.
[65] Homer-Dixon, *Environment, Scarcity, and Violence,* p. 41.
[66] Homer-Dixon, *Environment, Scarcity, and Violence,* p. 41-2.
[67] Neil Adger, Juan M. Pulhin, Jon Barnett, Geoffry D. Dabelko, Grete K. Hovelsrud, Marc Levy, Ursula Oswald Spring, and Coleen H. Vogel (eds.), *Human Security.* (Cambridge: Cambridge University Press, 2014): p. 755.
[68] Adger et al., *Human Security*, p. 756.
[69] Shehnoor Khurram, "Boko Haram in the Capitalocene: assemblages of climate change and militant Islamism in Nigeria." In Irma King Allen et al (eds.), *Political Ecologies of the Far Right: Fanning the Flames*. (Manchester University Press: Manchester, 2024): p. 24.
[70] Khurram, *Boko Haram in the Capitalocene*, p. 32.
[71] Khurram, *Boko Haram in the Capitalocene*, p. 48.

Other scholars have taken existing theories of national security and then factor in environmental threats. As Barnett suggests, environmental change can weaken states in subtle ways that undermine national security.[72] In many countries, natural resources and land-based services are essential to economic growth and employment. Income and employment in primary sectors such as agriculture, forestry, fishing, and mining are heavily dependent on favourable climates.[73] In many cases, the erosion of the natural capital base, that is, the stock of natural resources such as soil, water, forests, and biodiversity, has far-reaching consequences across ecological, economic, and social domains. This degradation can undermine a state's ability to engage in global markets due to declining agricultural productivity and disrupted supply chains. Simultaneously, it exacerbates public health risks by increasing exposure to pollutants, reducing access to potable water, and increasing food insecurity.[74]

Linking environmental change to security necessitates examining the role of one of the most prominent security institutions, the military. Armed conflict has historically been a significant driver of environmental degradation.[75] Examples of the direct environmental impacts of war include the atomic bombings in Japan, chemical defoliants in Vietnam, depleted uranium munitions in Kuwait and Kosovo, and the deliberate draining of marshes in southeastern Iraq.[76] Even in times of peace, militaries are debatably the "single largest institutional source of environmental degradation in the world" as they are both major consumers of resources and major polluters.[77] The discourse surrounding "greening defense" and the development of an "environmentally literate military" emerged in response to the belief that the armed forces have a constructive role in environmental protection and recovery, particularly following the aftermath of the Cold War.[78] An environmentally literate military is one that operates and exhibits "correct environmental behaviour while executing their activities" and possesses

[72] John Barnett, "Environmental Security." In Alan Collins (ed.), *Contemporary Security Studies*. (Oxford: Oxford University Press, 2016): p. 237.
[73] Barnett, *Environmental Security*, p. 238.
[74] Barnett, *Environmental Security*, p. 238.
[75] Maas et al., *Global Environmental Change,* p. 203.
[76] Maas et al., eds., *Global Environmental Change,* pp 203.
[77] Barnett, *Environmental Security*, p. 240.
[78] H.A.P. Smit and I. Henrico, "Greening militaries: the military-environment conundrum." In *Proceedings of the Joint Biennial Conference of the Society of South African Geographers and the Southern African Association of Geomorphologists* (South Africa: Rhodes University, 2021): p. 51.

a "degree of knowledge of the military environment and how to engage with it in an environmentally sustainable way."[79] In *The Greening of the U.S Military*, Robert Durant suggests that the pursuit of environmentally sustainable military practices, although semi-successful in the case of the US military, ultimately reflects a deeper tension between traditional conceptions of national security and environmental security.[80]

The most influential interpretations of environmental security are those that continue to fit comfortably within the orthodox security paradigm. Dominant among these are frameworks that portray environmental change as a potential catalyst for conflict or as a threat multiplier that heightens tensions within and between states. Likewise, narratives that frame environmental degradation, particularly resource scarcity, as a direct threat to national security have been accepted by both policymakers and, in some cases, the military. Consequently, environmental security continues to primarily be understood as a potential risk posed to the nation-state, rather than to ecosystems, transnational communities, and the individuals most immediately affected by environmental harm. While recent discourse has increasingly gestured towards the language of human security and well-being, a deeper recognition of the relational interdependence between people and ecological systems remains relatively absent. This reveals a paradox: although the conceptual terrain of security has broadened, it has not been meaningfully deepened.[81] The emphasis remains on short-term, visible, and measurable threats, often to the exclusion of more protracted, invisible, and systemic forms of risk. In this context, the theoretical framing of slow violence offers a compelling lens to reimagine environmental security, not merely as a response to immediate crises, but as a means of addressing the enduring, uneven, and often unseen violence that accumulates over time.

(iii) Slow Violence: Temporality, Invisibility, & Generational Harm

Violence is customarily perceived as an immediate, explosive, and spectacular event or action that captures attention through its "instant sensational visibility."[82]

[79] Smit & Henrico, *Greening Militaries*, p. 51.
[80] Robert F. Durant, *The Greening of the US Military: Environmental Policy, National Security, and Organizational Change*. (Georgetown University Press, 2007): p. 31.
[81] Barnett, *Environmental Security*, p. 244.
[82] Rob Nixon, *Slow Violence and the Environmentalism of the Poor.* (Harvard University Press, 2011): p..2.

However, this framing is fundamentally unable to account for more insidious forms of destruction, the kind that accumulates in silence across generations. Rob Nixon, a postcolonial and environmental humanities scholar, coined the term *slow violence*, in an attempt to capture the 'violence' against the environment that occurs beyond what our eyes can see. As Nixon contends in *Slow Violence: The Environmentalism of the Poor*, slow violence is:

> A violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all… A different kind of violence…that is neither spectacular nor instantaneous, but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal spaces.[83]

Slow violence rests upon four central tenets that define its conceptual basis. The first time is a critical component, if "the past of slow violence is never the past, so the post is never the post." [84] Nixon's formulation of violence draws from Johan Galtung's theorizing of structural violence, which, rather than involving direct action between the subject and object of violence, "shows up as unequal power and consequently as unequal life chances."[85] Moreover, his concept of cultural violence incorporates a range of cultural means that "can be used to justify or legitimize direct or structural violence," whereby the causal flow from cultural via structural to direct violence can be identified.[86] Differing from Galtung, Nixon places more emphasis on the temporal dimensions of violence, referring to the distance between the action and the inflicted harm. As such, violence cannot be limited to events that are newsworthy, time and body, rather, it is necessary to "account for the temporal dispersion of how slow violence affects the way we perceive and respond" to different social afflictions.[87]

Harm is spatially and temporally dispersed from the initial event[s] and their full effect. This does not preclude the possibility that the original event of impact might be spectacular or visibly catastrophic. Rather, what distinguishes slow violence is that the

---

[83] Nixon, *Slow Violence*, p. 2.
[84] Nixon, *Slow Violence*, p. 8.
[85] Johan Galtung, "Violence, Peace, and Peace Research." *Journal of Peace Research*, 6, no. 3 (1969): p. 171.
[86] Johan Galtung, "Cultural Violence." *Journal of Peace Research*, 27, no. 3 (1990): p. 291.
[87] Nixon, *Slow Violence*, p. 3.

aftermath has devastating consequences which unfold gradually, often evading immediate recognition or understanding of its long-term impacts, thus failing to provoke an urgent response.[88] This leads into the second and third dimensions of slow violence: invisibility and delayed destruction. Slow violence connects the past and the present, acting to connect spaces and occurrences that may "appear to be separate and distinct" due to its nature of invisibility.[89] Unlike conventional understandings of violence, its damage accumulates over time and is often described as generational in its impact. Phenomena such as climate change, the thawing of the cryosphere, acidifying oceans, toxic drift and the radioactive aftermaths of war all exemplify elusive forms of violence. As Nixon observes, such forms of violence "present formidable representational obstacles that hinder…efforts to mobilize and act decisively."[90] This is further complicated when the idea of 'intentional' slow violence is brought into the equation. The final tenant is that slow violence is both attritional and exponential as it "acts as a major threat multiplier" fuelling long-term, proliferating conflicts "in situations where conditions for sustaining life become increasingly degrading."[91] Further, as an attritional violence, it:

> Overspill[s] clear boundaries in time and space [that is] marked above all by displacements – temporal, geographical, rhetorical, and technological displacements that simplify violence and underestimate in advance and retrospect, the human and environmental costs. Such displacements smooth the way for amnesia, as places are rendered irretrievable to those who once inhabited them.[92]

In the context of armed conflict, violence between people and the physical environment materializes in ways that are often immediately felt and experienced in war. Beyond having immediate effects that can cause changes in an instant, new methods of warfare have "unleashed changes that have led to a slow process of violence."[93] In essence, wars have created degrees of mediation that have led to the "onslaught of violence against the environment and people" that occurs over a longer span of space

[88] Nixon, *Slow Violence*, p. 5.
[89] Albert L. Park, "The Reshaping of Landscapes: Systems of Mediation, War, and Slow Violence." *The Journal of Asian Studies*, 77, no. 2 (2018): p. 367.
[90] Nixon, *Slow Violence*, p. 2.
[91] Nixon, *Slow Violence*, p. 3.
[92] Nixon, *Slow Violence*, p. 7.
[93] Park, *The Reshaping of Landscapes*, p. 367.

and time.[94] Slow violence begins from a process of valuation. The needs of war alter the value of "concepts, practices, and things."[95] Parts of nature, like forests, waterways, and potable soil, acquire value through their ability to potentially aid in achieving military victories.[96] As war reshapes human societies and ecological systems, it engenders a process of valuation where alternative values of nature and culture emerge.[97]

This transformation is especially significant in the context of the new landscapes forged through armed conflict, whereby environmental and cultural shifts are inextricably linked to the violence and devastation brought about by warfare.[98] This collision of landscapes triggers a process of slow violence where a creeping attack against the natural order has induced a decline in the diversity of an ecosystem and the "rhythm of [individuals]…everyday lives have been ruptured, unsettled, and transformed" over a temporal frame.[99] The chemical violence created by modern warfare has been "driven inward, somatized into cellular dramas of mutation" in both people and ecosystems that remain widely "unobserved, undiagnosed, and untreated."[100] Places like the Marshall Islands, which had been subjected to approximately sixty-seven American atmospheric nuclear 'tests' between 1948 and 1957, serve as a clear-cut example of slow violence. In 1956, the Atomic Energy Commission declared the Marshall Islands "by far the most contaminated place in the world," a condition that would later compromise independence in the long-term.[101] Well into the 1980s, the island's republic was still governed by an "irradicated past" with inhabitable lands and women delivering "jellyfish babies" into the world – headless, eyeless, limbless human infants who would live for only a few hours.[102]

---

[94] Park, *The Reshaping of Landscapes*, p. 367.
[95] Park, *The Reshaping of Landscapes*, p. 368.
[96] Park, *The Reshaping of Landscapes*, p. 368.
[97] David Fedman, "Wartime Forestry and the Low Temperature Lifestyle in Late Colonial Korea, 1937 – 1945." *The Journal of Asian Studies* 77, no.2 (2018): p.33.
[98] Nixon, *Slow Violence*, p. 17.
[99] Park, *The Reshaping of Landscapes*, p. 368.
[100] Nixon, *Slow Violence*, p. 6.
[101] Stephanie Cooke, In *Mortal Hands: A Cautionary History of the Nuclear Age*. (New York: Bloomsbury Publishing USA, 2009): p. 168.
[102] Nixon, *Slow Violence*, p. 7.

Eliana Cusato posits that a fundamental insight of slow violence is the recognition that not everyone is equally impacted by environmental degradation and natural resource depletion.[103] Additionally, those most vulnerable to slow violence are often those who already have limited access to resources, primarily "the poor, women, and rural populations," who are disproportionately impacted by the devastation of warfare.[104] Furthermore, Nixon challenges the normative understandings of what constitutes a war casualty. The term, war casualty "asserts itself less through arguments than through visceral photographs, often revolving around the toll on human life.[105] Images of lifeless bodies, bloodied civilians, and soldiers strung about account for only the immediate and visually arresting fatalities. However, this process of visualization does not sufficiently address the casualty, "whose belatedness and dispersal" make them resistant to dramatic packaging.[106] With respect to chemical warfare, the representational bias against slow violence has a damaging impact on what or who is considered a casualty.[107] Further, he questions how we interpret casualties once the war is over:

> After official victory has been declared, how do we track the persistence of unofficial hostilities in the cellular domain, the untidy, attritional lethality that moves through the tissue, blood, and bones of combatants alike, moving through…the living body of the land itself.[108]

Yet, in the face of such profound destruction, the rhetoric of military necessity is routinely invoked to justify the violation of international and domestic legal frameworks intended to prevent the intentional destruction of the environment.[109]

This paradox underscores the tension between the strategic imperatives of warfare and the ethical, legal, and ecological responsibilities to protect the natural world. Scholarly debates about the meaning and value of nature in a security context have been central in struggles over how to justify political authority, define responsibility, and

[103] Eliana Cusato, *The Ecology of War and Peace: Marginalising Slow and Structural Violence in International Law.* (Cambridge University Press, 2021): p. 21.
[104] Cusato, *The Ecology of War and Peace,* p. 22.
[105] Nixon, *Slow Violence*, p. 200.
[106] Nixon, *Slow Violence*, p. 200.
[107] Nixon, *Slow Violence*, p. 13.
[108] Nixon, *Slow Violence*, p. 200.
[109] Leebaw, *Scorched Earth*, p. 770.

frame ideas about agency.[110] The ways of evaluating the meaning of nature in the context of norms governing warfare, as well as the logic used in deploying tactics that intentionally weaponize nature, have become implicit in rationalizing wartime abuses.[111] There is a need to "tell the slow-moving stories of the long dying" as their suffering is often overlooked and forgotten.[112] If war leaves in its wake contaminated lands behind repair and "mangled genetic codes," any war will be pyrrhic as "death by indirection becomes the ultimate form of unfriendly fire."[113]

Comparative Case Study

Herbicidal Warfare in Vietnam: Case of Agent Orange

(i) Background and Context

There is a broad consensus among scholars that the origins of the Vietnam conflict derived from the interaction of two major phenomena of the post-WWII era: decolonization and the Cold War. The surge of nationalist movements among colonized subjects, coupled with the weakening of European imperial powers following WWII, "combined to destroy a colonial system that had been an established feature of world politics for centuries." [114] This fundamental shift proceeded with difficulty, and for Vietnam, it led to war. After France fell to Nazi Germany in 1940, Japan seized the opportunity to extend its imperial ambitions by imposing a protectorate over French Indochina, effectively undermining French colonial authority.[115] In March 1945, as the war neared its end, the Japanese overthrew the French puppet government and established a collaborative Vietnamese government under Bao Dai, further fuelling Vietnamese nationalist aspirations.[116] The collapse of the French system resulted in "a vacuum of authority," particularly in rural areas, which enabled the Viet Minh to establish control of six northern provinces. [117] A devastating famine further eroded

[110] Leebaw, *Scorched Earth*, p. 771; Meyer, *Political Nature, 2001.*
[111] Leebaw, *Scorched Earth*, p. 770.
[112] Nixon, *Slow Violence*, p. 232.
[113] Nixon, *Slow Violence*, p. 232.
[114] George C. Herring, The Cold War and Vietnam. *OAH Magazine History*, 18, no. 5 (2004): p. 18.
[115] Herring, *The Cold War and Vietnam,* p. 18.
[116] Mitchell K. Hall, *The Vietnam War.* Third Edition. (Routledge, 2018): p. 5.
[117] Hall, *The Vietnam War*, p. 5.

government authority, and when the Japanese suddenly surrendered in August, the Viet Minh called for a general uprising to create an independent state. During the August Revolution in 1945, Vietnamese nationalists led by Ho Chi Minh were met with little opposition in seizing power throughout much of the northern and central provinces.[118] On 2 September before a crowd of half a million people in Hanoi, Ho Chi Minh called for formal recognition of the newly proclaimed Democratic Republic of Vietnam ("DRV").[119]

Although the Viet Minh had made significant gains, it faced challenges with legitimacy. Competition from other nationalist organizations and the Cao Gai and Hoa Hoa religious sects limited their ability to solidify their influence in Cochin China.[120] Further, the allies had designated China and Great Britain to accept Japanese surrender in northern and southern Indochina, and to occupy the region until "stable government had been restored."[121] The arrival of the French, combined with the Vietnamese government's recognition of French claims, undermined Viet Minh authority.[122] In late September, British troops arrived in Saigon to support French forces in their mission to drive the armed Viet Minh out of the city. Military attacks and reprisals took place on both sides, and the broadly based Committee of the South "opened a guerrilla war against the French in the South."[123] At the very time that the Vietnamese nationalists were engaged in a devastating anticolonial war with France, the Cold War between the U.S and the Soviet Union was "evolving into an ideological power struggle with global dimensions."[124] The conjuncture of these historical trends is often cited as the explanation behind the internationalization of the war in Vietnam.

George Herring proposed that, from an American perspective, what was unique about decolonization in Vietnam was that the nationalist movement had been led by Communists, and this would ultimately have enormous implications.[125] At first, the US responded to Vietnamese efforts inconsistently. President Franklin Roosevelt was initially opposed to France's reassertion of control after the, opting for a trusteeship

[118] Hall, *The Vietnam War*, p. 5.
[119] Hall, *The Vietnam War*, p. 5.
[120] Hall, *The Vietnam War*, p. 5.
[121] Hall, *The Vietnam War*, p. 6.
[122] Hall, The Vietnam *War*, p. 5.
[123] Hall, *The Vietnam War*, p. 18.
[124] Herring, *The Cold War and Vietnam*, p. 18.
[125] Herring, *The Cold War and Vietnam*, p. 18.

followed by independence.[126] Throughout 1945, the Viet Minh provided intelligence to the American Office of Strategic Services ("OSS") in exchange for weapons and training. Ho wanted US support for his political aims, but Washington remained distant.[127] Until 1949, US officials had regarded the struggle in Indochina in Cold War terms. Ho Chi Minh had been a vocal communist operative for many years. When Mao Tse-tung's Communist revolution had seized power in China in August 1949, they offered sanctuary and military assistance to the Viet Minh, heightening U.S. concerns.[128] Ultimately, President Harry Truman and other American officials became more concerned regarding Ho's communist beliefs and began the project of restoring French control as an ally against the Soviet Union.[129]

Between mid-1954 and the end of 1960, the US increased its efforts to squash communist influence in Vietnam. At first, American officials wanted to establish a viable and permanently separate non-communist state in the South.[130] In the process of 'nation-building,' the US increased aid to Prime Minister Ngo Dinh Diem, funded economic development initiatives, and urged social and political reform.[131] While Diem was depicted as a "miracle man" in the American press and favoured by American politicians, his popularity in Vietnam was minimal.[132] His rule became increasingly dictatorial and centred around his own family. At the same time, he alienated ethnic minorities by settling a large, predominantly Catholic population in the Central highlands.[133] Further, his land reform program was not nearly as effective as the Viet Minh's, and "potential improvements disappeared amid official corruption and incompetence."[134] To solidify his power, Diem deployed armed forces to "uproot and eradicate" the Viet Minh remnants in the South by launching a 'Denounce the Communists' campaign in 1954.[135] Ho had initially hoped to avoid armed conflict, but Southern communists, supported in Hanoi's

[126] Hall, *The Vietnam War*, p. 6.
[127] Hall, *The Vietnam War*, p. 6.
[128] Herring, *The Cold War and Vietnam*, p. 18.
[129] Hall, *The Vietnam War*, p. 6.
[130] Hall, *The Vietnam War*, p. 15.
[131] Hall, *The Vietnam War*, p. 15.
[132] Hall, *The Vietnam War*, p. 15.
[133] Hall, *The Vietnam War*, p. 15.
[134] Hall, *The Vietnam War*, p. 15.
[135] Hall, *The Vietnam War*, p. 16.

Political Buro, advocated for military action against Diem.[136] Fighting between the Saigon Army of the Republic of Vietnam ("ARVN") and southern communist insurgents, later called 'Viet Cong', broke out in 1957 when Diem deployed troops into communist strongholds.[137]

Following an alleged rigged election in 1959, Diem implemented a series of controversial counterinsurgency measures that further alienated the peasant populations in the South. Among these was the Agroville Program, a resettlement initiative aimed at isolating rural communities from Viet Cong influence by forcibly relocating them into fortified villages.[138] While intended to deny insurges of access to food, shelter, and local support, the program led to widespread resentment. In December 1960, communists joined other disaffected groups forming the National Liberation Front ("NLF"), and with its broad supporter base, they emphasized national independence over social revolution.[139] Hanoi directed the NLF and was committed to reunifying the country, with force if necessary.[140] Under President John Kennedy, American commitment to Diem increased as his popular support declined, with a clear understanding of the conflict as communist aggression.[141] Kennedy shifted his emphasis towards counterinsurgency. U.S. Army Special Forces (Green Berets) trained the ARVN in guerrilla warfare, while the CIA worked on creating a local defence program, the Civilian Irregular Defense Groups (CIDGs).[142] The US counterinsurgency plan was based on the "oil spot technique," where forces would begin operations in a central location (a main city or town) and radiate outwards, halting insurgent resistance as it progressed and using police force to eliminate residual resistance.[143]

With the assassination of both Diem and Kennedy in 1963, the situation in Vietnam rapidly deteriorated. Kennedy had left President Lyndon Johnson a US military force in Vietnam of 16,000 and a commitment to growing the war without yet committing combat

[136] Hall, *The Vietnam War*, p. 16.
[137] Hall, *The Vietnam War*, p. 16.
[138] Hall, *The Vietnam War*, p. 16.
[139] Hall, *The Vietnam War*, p. 17.
[140] Hall, *The Vietnam War*, p. 17.
[141] Hall, *The Vietnam War*, pp 17.
[142] Marc Opper, The Vietnam War, 1960–1975. In *People's Wars in China, Malaya, and Vietnam.* (University of Michigan Press, 2019): p. 219.
[143] Opper, *The Vietnam War, 1960-1975*, p. 220.

troops.[144] The Johnson administration went to "great lengths to keep the war limited," escalating military commitments gradually to minimize the danger of confronting major Communist powers.[145] Historians have extensively documented the lavish and often excessive use of firepower in Vietnam, documenting that the U.S. military "preferred to expend treasure rather than blood."[146] For most of the war, it was believed that firepower was the best way to "save American lives" and combat insurgency in Vietnam.[147] As Herring argued,

> The military in general pressed for a quick, hard-hitting bombing campaign against major North Vietnamese targets, although the navy and air force differed sharply on the focus and major objectives of the bombing.[148]

Following the North Vietnamese attack on the Maddox in the Gulf of Tonkin in August 1964, the pressure for military escalation increased. Under the Johnson administration, US forces were on the ground in Vietnam by 1965, where they tracked down NLF main force units, while the ARVN and local militias tracked down the NLF's smaller local forces.[149] The issue was that even when the ARVN forces captured a village or hamlet, it did little to "change the underlying political problem that animated the insurgency."[150] The NLF's military strategy throughout the Vietnam War was designed to capture and control rural areas while using its main forces to engage with conventional forces. The NLF adopted guerrilla warfare tactics whereby their forces were highly mobile and operated in a way that enabled them to swiftly concentrate their forces and overwhelm their opponent.[151] As the conflict continued and the military strength of the NLF increased, it deployed main units, highly mobile guerrilla units that operated without being tied to a particular area.[152] The decentralization of forces, paired with the

[144] Hall, *The Vietnam War*, p. 20.
[145] Herring, *The Cold War and Vietnam*, p. 19.
[146] James McAllister, "Who Lost Vietnam? Soldiers, Civilians, and U.S. Military Strategy." *International Security 35*, no. 3 (2010): p. 101.
[147] McAllister, *Who Lost Vietnam?*, p. 101.
[148] George Herring, *LBJ and Vietnam: A different kind of war.* (Austin: University of Texas Press, 1994): p. 43.
[149] Opper, *The Vietnam War, 1960-1975*, p. 220.
[150] Opper, *The Vietnam War, 1960-1975*, p. 220.
[151] Opper, *The Vietnam War, 1960-1975*, p. 221.
[152] Opper, *The Vietnam War, 1960-1975*, p. 221.

strategic use of the jungle, was one of the most effective means of contesting territory and achieving military gains.

The Vietnam War ended on April 30, 1975, when the North Vietnamese forces captured Saigon. This event marked the fall of South Vietnam and the unification of the country under communist rule, officially becoming the Socialist Republic of Vietnam. This is largely attributed to the Paris Peace Accords in 1973, where the United States and North Vietnam signed an agreement that led to the withdrawal of American troops.[153] After the U.S. withdrawal, South Vietnam's government struggled to maintain control against the advancing ARVN, and eventually, the South Vietnamese government surrendered.[154] The war's end was a significant moment in the Cold War, resulting in the unification of Vietnam under a communist regime. However, the casualties of the war cumulated long after its official end.

(ii) Herbicides in Vietnam

During the War in Vietnam, the US military apparatus carried out a massive herbicidal programme that was in effect for about a decade. Although the US was neither the first nor only nation to employ chemical anti-plant agents as weapons of war, the "magnitude of this programme was without precedent."[155] Between the years 1961 and 1971, herbicide mixtures were deployed by the United States and the ARVN to "defoliate forests and mangroves…clear perimeters of military installations" and destroy "unfriendly crops." [156] Although the deployment of herbicides may appear rather straightforward, in the early 1960's, there was no clear method in how these compounds were to be used or what their exact purpose was.[157] Some military officials saw herbicides as a limited, defensive weapon with the ablility to slow down the Viet Cong but not much more.[158] They could possibly prevent Viet Cong from ambushing by clearing the borders

[153] David L. Prentice, Choosing "the Long Road": Henry Kissinger, Melvin Laird, Vietnamization, and the War over Nixon's Vietnam Strategy. *Diplomatic History*, 40, no. 3 (2016): p. 447.
[154] Prentice, *Choosing "the Long Road"*, p. 447.
[155] Arthur H. Westing, *Herbicides in war: the long-term ecological and human consequences.* (London: Taylor & Francis, 1984): p. 5.
[156] Jeanne Mager Stellman, Steven D. Stellman, Richard Christian, Tracy Weber, and Carrie Tomasallo. "The extent and patterns of usage of Agent Orange and other herbicides in Vietnam." *Nature* 422, no. 6933 (2003): p.681.
[157] Peter Sills. *Toxic war: the story of agent orange*. (Vanderbilt University Press, 2014): p. 19.
[158] Sills. *Toxic war,* p. 19.

of military bases and transportation routes (roads, rivers, etc.) of vegetation and possibly exposing enemy hideouts. One military official claimed,

> I can't stress too strongly my belief then and my belief now that this wasn't a high-priority project. It was just one more thing. No one really felt that this was going to win the war.[159]

For others, by preventing the Viet Cong from moving unseen and destroying their food supply, these chemicals would leave the enemy vulnerable and incapable of fighting an extended guerrilla war.[160] Beyond defence, they could be used offensively to "effortlessly establish lines of fire, makeshift camps, and artillery placements."[161] For the most part, it aimed at the forests of South Viet Nam and, to a lesser extent, crops and agricultural lands.[162] Using a variety of chemical defoliants, the US expended a volume of over 72 million litres (91 million kilograms), containing approximately 55 million kilograms of active herbicidal ingredients.[163]

Between 1957 and 1967, the US Army Chemical Corps was tasked with the development and refinement of tactical herbicides and their delivery systems for potential military application in Southeast Asia.[164] During this period, the Corps evaluated a wide range of chemical formulations for use in counterinsurgency operations, investigating herbicides that were already in use or under development for domestic agricultural purposes.[165] Thus, prior to their deployment, there was "an extremely voluminous amount of research data, demonstration, and use experience" that had been accumulated on the chemical components of the herbicides, rangingfrom "toxicity in animals, to environmental fate."[166] The major agents that were used were colour-coded 'Orange', 'White', and 'Blue'. Agent Orange and White consisted of mixtures of plant-hormone-mimicking compounds that kill by interfering with the

[159] Sills. *Toxic war,* p. 19.
[160] Sills. *Toxic war,* p. 20.
[161] Sills. *Toxic war,* p. 20.
[162] Westing, *Herbicides in war,* p. 5.
[163] Westing, *Herbicides in war,* p. 5.
[164] Alvin L. Young, *The history, use, disposition and environmental fate of Agent Orange*. New York: Springer, 2009: p. 2.
[165] Young, *The history, use, disposition and environmental fate of Agent Orange*, p. 2.
[166] Young, *The history, use, disposition and environmental fate of Agent Orange,* p. 3.

normal metabolism of targeted plants.[167] Agent Blue consisted of a desiccating compound that kills by preventing a plant from retaining moisture, and is particularly good at destroying rice. Of the agents used, Agent Orange made up sixty-one per cent of the total volume expended over the years and proved later to be the most harmful.[168] In the development of Agent Orange, the US Chemical Corps combined a 1 to 1 mixture of 2,4,5-T (2,4,5-trichlorophenoxyacetic) and 2,4-D (2,4-dichlorophenoxyacetin), resulting in a dangerously potent, dioxin-laden chemical contaminant, .[169]

Were D and T safe to use? When this question was brought to a committee of over a dozen scientists from the military, industry and the US Department of Agriculture (USDA) in 1961. The committee asserted they had not received any complaint of injury to people, livestock, wildlife, or soils.[170] However, in 1963, the USDA was confronted with reports that verified 2,4-D and 2,4,5-T were toxic to humans.[171] A year earlier, Lt. Col. Charles Kraul, head of the Army Environmental Hygiene Agency (AEHA), advised an Air Force unit stationed on U.S. soil that only one herbicide, neither D nor T, had been proven safe to use in drinking water.[172] Other AEHA scientists had testified that they could not offer reassurance that the chemical compounds were safe for combat, stating, "we had no information that it was harmful, but we didn't have any information that it was safe."[173] The AEHA had decided to print a small pamphlet formalizing its findings on D and T among other compounds, but the US Chemical Corps warned that it "could have international implications, since the Communists are charging that the US is poisoning people in South Vietnam with the herbicide…[used] there."[174] Nonetheless, the AEHA remained unmoved and refused to list D and T as nontoxic.

The operation conducted by the US Air Force, codenamed 'Operation Ranch Hand,' dispersed over ninety-five percent of all herbicides used in 'Operation Trail Dust,' the overall programme.[175] Other branches of the US Armed Forces and ARVN sprayed

[167] Westing, *Herbicides in war,* p. 5.
[168] Young, *The history, use, disposition and environmental fate of Agent Orange,* p. 3.
[169] Young, *The history, use, disposition and environmental fate of Agent Orange,* p. 3.
[170] Sills. *Toxic war,* p. 42.
[171] Sills. *Toxic war,* p. 42.
[172] Sills. *Toxic war,* p. 42.
[173] Sills. *Toxic war,* p. 42.
[174] Sills. *Toxic war,* p. 42.
[175] Stellaman et al., *The extent and patterns of usage of Agent Orange*, p. 681.

smaller quantities of herbicides, generally using hand sprayers, spray trucks (Buffalo turbines), planes and boats.[176] By 1971, tactical herbicides had "defoliated approximately five million acres of forest…to expose communist guerrilla fighters" loyal to the NLF.[177] While military objectives of the U.S. and ARVN claimed they would only attack "unfriendly crops," Operation Ranch Hand targeted not only specific weeds but entire ecosystems, whereby rendering the entire forest a 'weed.'[178] The tactical success of herbicides in the Vietnam War remains largely debated, as it is difficult to declare the precise statistical success of the defoliation and crop destruction of Operation Ranch Hand, particularly in terms of achieving the intended military aim. In 1963, on the advice of the Joint Chiefs of Staff, then Secretary of Defence Robert McNamara claimed that the operation had destroyed "over 700,000 pounds of rice, or roughly enough to feed 1,000 Viet Cong for one year," and as such "militarily and technically, the results were excellent."[179] What was absent from this statement was the fact that the sprays were not the sole cause of the food shortages, nor were they able to effectively hit targets due to unpredictable winds and the inability to accurately discern between unfriendly and friendly crops. In his memoir, *Dispatches*, US Vietnam veteran Michael Herr remarks that "some people just wanted to blow it all to hell, animal, vegetable, and mineral," further claiming that "a lot of people knew that the country could never be won, only destroyed, and they locked into that with breathtaking concentration."[180]

(iii) Slow Violence in Vietnam

The US military's logic behind the use of tactical herbicides was straightforward. They claimed the use of herbicides "improved vertical and lateral vision in forested terrain," limiting the enemy's capacity to "resupply its forces and to attack soldiers, convoys, and bases."[181] At that point in time, several scholars and military officials praised the use of herbicides, arguing that the defoliation in Vietnam had reduced casualty rates, revealed enemy ambush positioning, and sufficiently destroyed the NLF's

[176] Stellaman et al., *The extent and patterns of usage of Agent Orange*, p. 682.
[177] David Zierler, *The Invention of Ecocide: Agent Orange, Vietnam, and the Scientists Who Changed the Way We Think About the Environment*. (University of Georgia Press, 2011) p. 2.
[178] Zierler, *The invention of ecocide,* p. 2.
[179] Sills. *Toxic war,* p. 43.
[180] Michael Herr, *Dispatches.* Vol. 23. (Pan Macmillan, 2014) p. 59.
[181] Zierler, *The invention of ecocide,* p. 2.

resource base.[182] Compared to most weapons of war, some further argued that "herbicides score pretty high on the scale of humanness" due to their "low civilian casualty rate."[183] However, the ecological and human health legacy of Agent Orange continues to be a critical issue in contemporary conversations of herbicide use in war. Decades after the end of the war in Vietnam, scientific testing in heavily sprayed regions still detects hazardous levels of dioxin contamination in "soils and sediments at the bottom of drainage canals, where it attaches to organic matter and ascends food chains" and is ultimately absorbed by human bodies.[184] Health specialists have traced various illnesses back to Agent Orange, including cancer, diabetes, nerve damage, stillborn and birth defects in Vietnamese civilians as well as US, Australian, and Vietnamese war veterans.[185] Yamashita & Trinh establish that even three decades after the war, individuals from resource-poor backgrounds, particularly women, who live in areas heavily contaminated continue to live with the legacy of the war in ways that are invisible and often unrecognized.[186]

The environmental and biological persistence of dioxin is largely dependent on its location and surrounding conditions. In human biological systems, dioxin has a half-life ranging from 11 to 15 years, though for some individuals it may persist for up to 20 years, depending on factors such as age, body fat composition, and metabolic rate.[187] In environmental contexts, the half-life of dioxin is highly variable. When it is exposed to sunlight on a solid surface or vegetation, photodegradation can reduce its persistence, with half-lives ranging from one to three years contingent on local conditions such as temperature, humidity, and sun exposure.[188] However, dioxin that is buried in soil, embedded in sediment, or trapped in aquatic environments may be shielded from light

[182] Ferd E. Anderson, Is the Use of Herbicides in Limited War Justified?. *Essay published by the US Army War College. Carlisle Barracks, PA: Defense Technical Information Center*,1970.
[183] Anderson, *Is the Use of Herbicides in Limited War Justified,* 1970.
[184] Yamashita, Nobuaki and Trong-Anh Trinh, Long-Term Effects of Vietnam War: Agent Orange and the Health of Vietnamese People After 30 Years. *Asian Economic Journal* 36, no.2 (2022): p. 181.
[185] Zierler, *The invention of ecocide,* p. 6.
[186] Yamashita & Trinh, *Long-Term Effects of Vietnam War*, p. 200.
[187] Kiem N. Truong, and Khuong V. Dinh. "Agent Orange: Haft-century effects on the Vietnamese wildlife have been ignored." *Environmental Science & Technology* 55, no. 22 (2021).
[188] Truong & Dinh, *Agent Orange*, 2021.

and oxygen which significantly slows its breakdown.[189] Particularly in riverbeds or lake sediments, dioxin can remain chemically stable for over 100 years.[190]

In the 1980s, environmental science studies revealed that alarming concentrations of dioxin remained in soil and sediment samples collected in high-impact areas of Vietnam. These findings indicated that environmental degradation in these regions was not only severe but persistent, due to soil erosion and surface runoff from highly contaminated zones.[191] One of the most significantly contaminated areas identified was the Bien Hoa Air Base, a former U.S. military installation where large volumes of herbicides were stored and handled.[192] Soil and sediment samples collected from the site in 1999 showed some of the highest dioxin concentrations ever recorded. Wayne Dwernychuk et al. analyzed soil and food samples from A Luoi Valley, another area subjected to extensive spraying.[193] Further investigations revealed high levels of dioxin in animal fat and soil samples taken from villages located near US Army bases known to store herbicides between 1963 and 1966.[194] Similarly, breast milk and soil samples collected in 2002 to 2003 had high concentrations of dioxin, reinforcing the evidence that dioxin residue from herbicide spraying remains biologically active and harmful decades after its initial deployment.[195]

Further, elevated dioxin levels have been detected in the adipose tissues of residents living in regions that were directly sprayed. Quinh etal., hypothesized that these concentrations were a result of secondary contamination brought on by monsoonal rains and high erosion rates and transported dioxin-laden soil from defoliated hillside

[189] Truong & Dinh, *Agent Orange*, 2021.
[190] Truong & Dinh, *Agent Orange*, 2021.
[191] Kenneth Ray Olson, and Lois Wright Morton, "Long-term fate of Agent Orange and dioxin TCDD contaminated soils and sediments in Vietnam hotspots." *Open Journal of Soil Science* 9, no. 01 (2019): p 1.
[192] Olson & Morton, *Long-term fate of Agent Orange*, p. 1.
[193] Wayne L. Dwernychuk, Hoang Dinh Cau, Christopher T. Hatfield, Thomas G. Boivin, Tran Manh Hung, Phung Tri Dung, and Nguyen Dinh Thai. "Dioxin reservoirs in southern Viet Nam—a legacy of Agent Orange." *Chemosphere* 47, no. 2 (2002): p. 118.
[194] Dwernychuk et al., *Dioxin reservoirs in southern Viet Nam,* p. 118.
[195] Dang Duc Nhu, Teruhiko Kido, Rie Naganuma, Nobuhiro Sawano, Kenji Tawara, Muneko Nishijo, Hideaki Nakagawa, Nguyen Ngoc Hung, and Le Thi Hong Thom. "A GIS study of dioxin contamination in a Vietnamese region sprayed with herbicide." *Environmental health and preventive medicine* 14, no. 6 (2009): p. 355.

into downstream environments like wetland rice paddies, lakes, and river systems.[196] This process not only redistributed the toxin across the landscape but also facilitated its biomagnification through aquatic and terrestrial food chains, intensifying long-term ecological and human health impacts.[197] More recently, scientists have been making important advances confirming that the chemical has long-lasting and transgenerational consequences.[198] As dioxin reprograms epigenetic controls, the effects do not necessarily appear after initial chemical exposure. Charles Schmidt hypothesized that, as the half-life of dioxin in soils and sediments lasts decades, and it is able to compound easily in animals like ducks and fish, both staples in the Vietnamese diet.[199] Further, dioxin accumulates in the fat stores of individuals who consume contaminated food, eventually reaching levels at which it builds up faster than the body can eliminate it, leading to neurological damage and liver and kidney disease.[200] Pregnant women and young children are reportedly the most vulnerable.

In 2004, the Vietnam Association for Victims of Agent Orange ("VAVA") and other plaintiffs, including Vietnamese nationals who had been exposed to Agent Orange during the war, filed a lawsuit in the Southern District of New York.[201] The lawsuit accused U.S chemical companies (i.e. Dow Chemical and Monsanto) of aiding in the manufacturing of Agent Orange and violating international law, including allegations of genocide, war crimes, crimes against humanity, and torture.[202] The plaintiffs argued that the spraying of Agent Orange caused devastating environmental destruction that rendered the land unsuitable for agricultural use and was linked to birth defects, cancers, and other health issues.[203] However, despite these claims being proven true, the case was dismissed based on the ruling that there was "no basis for any of the claims…under domestic law of any nation or state or any form of international law," primarily due to the doctrine of sovereign immunity, which protected the US from lawsuits related to

[196] Hoang Tri Quinh, "Effects of geographical conditions, soil movement and other variables on the distribution of 2, 3, 7, 8-TCDD levels in adipose tissues from Viet Nam: preliminary observations." *Chemosphere* 18, no. 1-6 (1989): p. 970.
[197] Quinh, E*ffects of geographical conditions soil movement and other variables*, p. 971.
[198] Charles Schmidt, The Fog of Agent Orange. *Scientific American* 314, no. 6 (2016): p. 73.
[199] Schmidt, *The Fog of Agent Orange*, p. 74.
[200] Schmidt, *The Fog of Agent Orange*, p. 73.
[201] Roberts, *The Agent Orange Case,* p. 379.
[202] Roberts, *The Agent Orange Case,* p. 380.
[203] Roberts, *The Agent Orange Case,* p. 380.

wartime actions.[204] Although there have been some successful efforts to 're-green' rural areas that sustained repeated herbicide attacks by both the US forces and the ARVN, no person or government has been held legally accountable for the slow violence in heavily impacted regions of Vietnam.

Tactical Herbicides: The Case of Palestine

(i) Background & Context

The history of Palestine and Israel is rooted in a complex interplay of ancient ties to the land, colonial legacies, and nationalism long before the establishment of the modern-day Israel. For centuries, Palestine, as known under the British Mandate, "formed no independent geographical and political units."[205] As part of the Fertile Crescent stretching from the Mediterranean to the Persian Gulf, and from the Mountains of Taurus and Zagros in the north to the Arabian desert in the south, "Palestine has always been a land of passage."[206] As such, it has historically been a prominent location of cultural encounter and exchange. Known to be part of greater Syria, Palestine has very few natural landmarks, and aside from the Mediterranean Sea, no natural borders.[207] As Gudrun Krämer contends, the Jordan Valley and the Sinai Peninsula offer geographical markers of Palestine, but neither of them offered any *natural* protection to the inhabitants of the area against hostile incursions. Its borders were largely man-made and hence variable, often determined less by the local populations than by powerful neighbours…In political terms, Palestine, in part or in whole, was usually a province within a great empire; only rarely, and even then, only for short periods, did it form an independent political unit.[208]

The ongoing conflict in Gaza is not a recent phenomenon. While there are many contributing factors and events, the historical roots of the Israeli-Palestinian conflict can largely be traced to two significant developments: the emergence of Zionism and the

[204] Roberts, *The Agent Orange Case,* p. 380.
[205] Gudrun Krämer, *A history of Palestine: From the Ottoman conquest to the founding of the state of Israel*. (Princeton University Press, 2008): p. 1.
[206] Krämer, *A history of Palestine,* p. 1.
[207] Krämer, *A history of Palestine,* p. 1.
[208] Krämer, *A history of Palestine,* p. 2.

influence of colonialism. The Zionist movement primarily manifested in the second half of the nineteenth century in Central and Eastern Europe and was formed "as a national revival movement, prompted by the growing pressure on Jews in those regions to assimilate totally or risk continuing persecution."[209] Although political Zionism is a homegrown European movement, the historic displacement of Jewish populations in Europe and Russia pushed many to emigrate to different countries, most notably the Ottoman Empire. Under Ottoman rule, which began in 1516 and lasted for about four centuries, present-day Palestine was subdivided and absorbed by neighbouring administrative units.[210] The colonization of Palestine began during the final phases of Ottoman rule and "flourished under the British Mandate."[211] Colonial intentions were felt in the post-WWI division of the Arab Levant into areas influenced by British and French hegemony, as outlined by the 1916 Sèvres-Picot agreement.[212] In 1917, the Balfour Declaration was issued by the British government, which committed the British Empire to "the establishment in Palestine of a national home for the Jewish people."[213] This agreement marked the "first substantial triumph for political Zionism" as it had political backing by a critical world power.[214] In 1922, Palestine was formally declared a British Mandate by the League of Nations, and as such, the Balfour Declaration was translated into official policy.[215]

Throughout the 1920s and 1930s, the British Mandate was regarded as a double standard whereby granting "Zionist protection and facilitated Jewish immigration, institution building, the formation of paramilitary groups, and the acquisition of lands" while they "excluded and brutally suppressed Palestinians and their demands for self-determination."[216] Palestinian revolts eventually culminated in the Great Arab Revolution (1936-1939), and with the pressure from Palestinians on the British administration as well as the looming threat of WWII, the White Paper of 1939, readjusted

[209] Ilan Pappé, *The ethnic cleansing of Palestine.* (Oneworld Publications, 2007): p. 71.
[210] Krämer, *A history of Palestine,* p. 16.
[211] Tariq Dana, and Ali Jarbawi, A Century of Settler Colonialism in Palestine: Zionism's Entangled Project. *The Brown Journal of World Affairs* 24, no. 1 (2017): p. 203.
[212] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 202.
[213] BBC News."Key Documents | the Balfour Declaration." *BBC News,* 2001.
[214] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 202.
[215] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 203.
[216] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 203.

to limit land ownership and immigration of Jewish settlers and grant Palestinians independence within a 10-year period.[217] Armed Zionist groups rejected the White Paper and waged various attacks through the 1940s on both the British authorities and Palestinian civilians and land. Due to the British administration's inability to control the situation and its desire to end its mandate, the UN passed Resolution 181 (Partition Plan) in November 1947.[218] This plan proposed the creation of two separate states in Mandatory Palestine. Despite Palestinians making up much of the population, with the Jewish population only accounting for one-third, the plan allocated 53 per cent of the land to a Jewish state and forty-seven per cent to a Palestinian state.[219] The Jewish Agency accepted the plan with some reservations, while Palestinians rejected it, arguing it "depriv[ed] the majority of the people of Palestine of their territory and transfer[ed] it to the exclusive use of a minority in the country."[220]

Tensions between Palestinians and Zionists escalated, leading to a war in 1948, with the latter determined to establish their state over a majority of Palestinian land and "embarking on systemic polices of extermination and violent dispossession of Palestinian inhabitants." [221] The war was asymmetric as "Zionist terror groups" were highly organized and equipped with advanced weapons and trained fighters, and the Palestinian resistance was disorganized and lightly armed.[222] At this time, the Israeli military campaigning undertook a series of systemic, planned, and organized terror campaigns conducted to displace the Palestinian population in major urban and rural areas.[223] According to Israeli historian Ilan Pappe:

> On 10 March 1948, a group of eleven men, veteran Zionist leaders together with young military Jewish officers, put the final touches to a plan for the ethnic cleansing of Palestine. That same evening, military orders were dispatched to the

[217] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 203.
[218] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 203.
[219] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 203.
[220] United Nations. (1947*). Report of Sub-Committee 2 of the Ad Hoc Committee on the Palestinian Question*. New York: United Nations, 1947.
[221] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 203.
[222] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 204.
[223] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 204.

> units on the ground to prepare for the systemic expulsion of the Palestinians from vast areas of the country.[224]

The military campaigns during the 1948 war led to the widespread destruction of Palestinian society. Over 770,000 Palestinians were expelled from their homeland and became refugees in neighbouring countries and in the greater diaspora.[225] Hundreds of Palestinian villages and cities were destroyed, and approximately twenty per cent of the 150,000 Palestinians who remained became internally displaced.[226] When British forces withdrew from Palestine on 14 May 1948, five Arab armies joined the fight against Israeli forces, they were decisively defeated.[227] The 1948 defeat of the Palestinians and Arab forces resulted in the occupation of approximately seventy-seven percent of Mandatory Palestine.[228] With this, the State of Israel was born.

1948 was a seminal year in the modern history of Palestine as it hosted two diametrically contrasing realities and narratives, the Palestinian catastrophe (commemorated annually as *Nakba*) and the establishment of the State of Israel (celebrated annually as the day of independence).[229] The twenty-year period between the establishment of the Israeli state and the major Arab-Israeli wars (1948-1967) saw concentrated efforts to consolidate and expand the power of the Israeli state. This was evident in a wide range of practices that were primarily aimed at promoting the Jewish character of the state and "ensuring superiority and deterrent capabilities at the regional level."[230] First, to consolidate power and influence, the Israeli authorities put forward a program of legal dispossession for Palestinian property to bring about a new land regime designed to "seize, retain, expropriate, reallocate and reclassify the Arab lands appropriated by the state."[231] Second, thousands of Palestinian refugees who were displaced from their homeland were denied the right to return and repossess their lands

---

[224] Pappé, *The ethnic cleansing of Palestine,* p. xi.
[225] Walid Khalidi, The Palestine Problem: An Overview. *Journal of Palestine Studies* 21, no. 1 (1991): p. 9.
[226] Khalidi, *The Palestine Problem*, p. 9.
[227] Khalidi, *The Palestine Problem*, p. 9.
[228] Khalidi, *The Palestine Problem*, p. 9.
[229] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 204.
[230] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 204.
[231] Geremy Forman, and Alexander Kedar. "From Arab land to 'Israel Lands': the legal dispossession of the Palestinians displaced by Israel in the wake of 1948". *Environment and Planning D: Society and Space* 22, no. 6 (2004): p. 810.

(1950 "Absentee Property Law"). While in 1950, Jewish people worldwide were granted the right to live in Israel and acquire citizenship ("The Law of Return" and "Citizenship Law").[232] Lastly, Palestinians were subjected to systemic institutional discrimination and exclusion from engaging in political decision-making. From around 1948 to 1966, Israel formed and consolidated a military government to perform a variety of roles aimed at monitoring, controlling and constraining Palestinian life to a point where they were rendered second-class citizens.[233]

Since 1967, a core element of Israel's colonial strategy has been the expropriation of land from Palestinian ownership and the construction of Jewish-only settlements. These settlements are heavily subsidized by the state and supported by pro-settlement organizations. While the right and left-wing Israeli governments have supported settlement expansion, their approaches have varied in tactics, timing, and intensity. From 1967 to 1977, the Labor Party, under the Allon Plan, promoted settlements to secure a 'Greater Israel' by annexing significant portions of the occupied territories.[234] After 1977, the right-wing Likud Party shifted the focus to ideological motivations, driven by a national Messianic agenda. Under Likud, settler movements, like Gush Emunim and Amanah, intensified and advanced their agenda of "settling anywhere and everywhere," pushing for the construction of settlements across the West Bank, East Jerusalem, and the Gaza Strip.[235] By the time the Oslo Accords were signed in 1993, the number of Jewish settlers in the occupied territories had reached around 250,000.[236]

Israel used the Oslo Accords to further deepen territorial fragmentation by breaking the West Bank into three distinct enclaves, effectively "cutting off spatial and social continuity" with the Gaza Strip and Jerusalem.[237] Area A (eighteen percent of the land, under Palestinian Authority ("PA") civil and security control); Area B (twenty percent, under PA civilian and Israeli military control); and Area C (sixty-two percent,

[232] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 205.
[233] Arnon Yehuda Degani, The decline and fall of the Israeli Military Government, 1948–1966: a case of settler-colonial consolidation?. *Settler Colonial Studies* 5, no. 1 (2015): p. 85.
[234] Nassar, Jamal Raji. *Intifada: Palestine at the crossroads*. Praeger, 1990.
[235] Newman, David. The evolution of a political landscape: Geographical and territorial implications of Jewish colonization in the West Bank. *Middle Eastern Studies* 21, no. 2 (1985): p. 198.
[236] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 210.
[237] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 211.

under full Israeli control).[238] Areas A and B were surrounded by Area C to effectively isolate the West Bank and assure complete control. Israeli settlements have expanded rapidly in Area C, encompassing about forty-two percent of West Bank territory, and were supported by military infrastructure, settler-only roads, surveillance technologies, and roadblocks.[239] The settler population has more than doubled since the Oslo Accords, and by 2015, there were around 588,000 settlers in the West Bank compared to 150,000 in 1993. The post Oslo years have been characterized by "the imposition of the severe closure regime," which places increasingly rigid restrictions on the movement of people and goods between Palestinian communities and the external world, enforcing a clear isolation of the people and the land.[240] Moreover, the rise of Hamas, a militant resistance group, has become a significant political force and opposition to Israeli control. Hamas has roots tracing back to the late 1970s when activists, primarily from the Muslim Brotherhood, established social institutions for Palestinians in areas under Israeli occupation.[241] Over time, Hamas has evolved into both a political and military force, challenging both Israeli authority and Palestinian leadership through increasingly deadly and violent confrontations.[242]

(ii) Weaponization of Land and Herbicides in the Gaza

Throughout the first five decades of the twentieth century, the citrus industry played a "major economic, social, and cultural role" in the lives of Arabs of the Ottoman Empire, and later Palestinians.[243] By 1900, citrus was the primary export, and by 1930 it composed seventy-seven per cent of the total value of exports from Palestine. The citrus industry was the primary source of livelihoods and sustenance for many Palestinian households and hundreds of villages, but beyond that, the *Jaffa* (oranges) represented a cultural and spiritual connection to the land and later became a representation of

[238] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 211.
[239] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 211.
[240] Dana & Jarbawi, *A Century of Settler Colonialism in Palestine,* p. 211.
[241] Liliana-Maria Tivadar, "The Gaza Strip and the Israel-Hamas Conflict: From 2008 until Nowadays." *Acta Musei Napocensis. Historica* 58, no. 58 (2021): p. 294.
[242] Tivadar, *The Gaza Strip and the Israel-Hamas Conflict,* p. 294-5.
[243] Mustafa Kabha, and Nahum Karlinsky, *The lost orchard: the Palestinian-Arab citrus industry, 1850-1950.* (Syracuse University Press, 2021): p. 1.

Palestinian resistance.[244] The industry itself was a vehicle of social mobility within Palestinian-Arab society preceding the Nakba. Until the 1960s, citrus remained an economic backbone for the region, employing more than 30 percent of workers in Gaza.[245]

Citriculture considerably declined in Gaza during the second half of the twentieth century. The decline was driven by a combination of factors, including land confiscations, restrictions on water access, as well as the challenges derived from the Israeli occupation and blockade. However, what is often underreported is how the campaign against the citrus industry was sustained during the Oslo and Madrid peace efforts.[246] Throughout the 1990s, Israeli bulldozers systematically destroyed orange groves, leaving chemical remnants behind, claiming it was a necessary action because "orange groves were used as a shelter for terrorists."[247] Israel occupied and illegally settled in Gaza between 1967 and 2005, after which it withdrew its settlers as part of a disengagement plan. During the occupation, Israeli bulldozing operations were essential in the decimation of Palestine's orange orchards, with many impoverished Gazan farmers unable to maintain the groves that were left.[248] Further, during military operations, such as *Operation Cast Lead* (2008-2009) and *Pilar of Defense* (2012), the Israeli forces used airstrikes, artillery and unconventional weapons like white phosphorus, which resulted in extensive damage to civilian infrastructure, including farms, orchards, and crops.[249] Some scholars have suggested that the destruction of agricultural resources, such as the targeting bombing and burning of crops, has significantly harmed the regeneration of the land and contaminated essential farmlands.[250]

Since 2014, Palestinian lands have been decimated by Israeli forces, and with the incorporation of aerial tactical herbicides, the reach of Israeli operations has "extended

[244] Kabha & Karlinsky, *The lost orchard,* p.1.
[245] Mohsen Mohammad Saleh, The Palestine Issue: Historical Background and Contemporary Developments (Revised and Updated Version 2022). *Al-Zaytouna Center for Studies and Consultations,* Vol. 2 (2022).
[246] Rob Goyanes, The *Ecological War on Gaza*. Jewish Currents, 2019.
[247] Goyanes, The *Ecological War on Gaza,* 2019.
[248] Goyanes, The *Ecological War on Gaza,* 2019.
[249] Ahlam Abuawad, Mark Griffiths, Graham Edwards, Adan Eftekhari, Mohammed El-Ebweini, Husam Al-Najar, Abeer Butmeh, Rasha Abu Dayyeh, Mohamed Al-Shewy, and Amira Aker, "From ecocide to genocide: a call to action for scientists globally to address the destruction in Gaza." *Available at SSRN 5021472* (2024): p. 8.
[250] Abuawad et al., *From ecocide to genocide*, p. 8.

into the realm of chemical warfare."[251] The intentional use of aerial crop-dusters to spray toxic herbicides and the "mobilization of wind" resulted in the destruction of agricultural lands hundreds of meters from initial target areas.[252] With bulldozers occupying the land and "toxic clouds in the air," Gaza has "transformed…into parched ground, cleared of vegetation, a colonial-made desert."[253] The desertification of Gaza has provided the Israeli military with a manufactured military advantage, "uninterrupted lines of sight and fire into Gaza."[254]

In collaboration with the Gaza-based Al Mezan Centre for Human Rights, the Tel Aviv-based Gisha Legal Center for Freedom of Movement and the Haifa-based Adalah Legal Center for Arab Minority Rights, Forensic Architecture (2019) conducted an in-depth investigation on the environmental ramifications of Israel's aerial herbicide spraying along the Gaza border. Through an analysis of first-hand videos, land samples, and testimonies from Palestinian farmers, the investigation revealed "each spray [left] behind a unique destructive signature," meaning that "no two aerial sprays [had] the same effect, nor can their damage be reasonably predicted."[255] The report documented that between 2014 and 2019, Israeli aerial forces sprayed herbicides over 20 times along the Israeli side of the border, reaching more than 300 meters into Gaza. In November 2016, the Israeli Minister of Defense confirmed the use of herbicides, justifying the practice as a form of "weed control" designed to remove potential cover for militant groups along the border, specifically to eliminate potential hiding spots for "terror elements" that could pose a threat to Israeli citizens living adjacent to the Gaza border.[256] In an interview, the Ministry of Defence alleged:

[251] Shourideh C. Molavi, *Environmental Warfare in Gaza: Colonial violence and new landscapes of resistance*. (Pluto Books, 2024): p. 2.
[252] Molavi, *Environmental Warfare in Gaza,* p. 2.
[253] Molavi, *Environmental Warfare in Gaza,* p. 2.
[254] Molavi, *Environmental Warfare in Gaza,* p. 4.
[255] Shourideh Molavi, "Herbicidal warfare in Gaza." *Forensic Architecture* (2019).
[256] Miriam Berger, Israeli spraying of herbicide near Gaza harming Palestinian crops. *The Guardian online* 19 (2019).

> The [spraying of herbicides] is conducted only over the territory of the State of Israel. It is carried out by companies specialized in the field, in accordance with the [Plant Protection Law].[257]

The Ministry did not respond to follow-up questions for clarification regarding the burning of tires to assess the direction of the wind.[258]

Herbicide spraying was strategically carried out during key harvest periods, targeting both spring and summer crops. In collaboration with a private Israeli aviation firm, Chim-Nir, the army's destruction of vegetation along the eastern perimeter of Gaza was executed in a continuous manner, simultaneously using two aircraft equipped with a GPS system to enable precision targeting.[259] The Ministry of Defense later confirmed that the Israeli military used a combination of three herbicides: Glyphosate, Oxyfluorfen, and Diuron. Glyphosate, formulated as *Roundup*, is a commonly used herbicide that leaves behind detectable traces in soil, foodstuffs, air, water, and human waste.[260] Roundup is a flagship product of Monsanto, a corporation that played a key role in developing the herbicides and defoliants used in Vietnam. By analyzing various lead and soil samples, Forensic Architecture reported that harmful concentrations of the spray exceeded EU safety standards, with residue appearing in areas where farmers had reported damage.[261] Researchers further identified a "protracted and continuous loss of greenness along the border that has, over time, flattened it" with little to no estimated recovery time.[262] With the ongoing bombing, bulldozing, and herbicidal spraying, the land is steadily transforming into a "barren and scorched dead zone."[263]

(iii) Slow Violence in Palestine

[257] Goyanes, The *Ecological War on Gaza,* 2019.
[258] Goyanes, The *Ecological War on Gaza,* 2019.
[259] Molavi, *Herbicidal warfare in Gaza,* 2019.
[260] Molavi, *Herbicidal warfare in Gaza,* 2019.
[261] Molavi, *Herbicidal warfare in Gaza,* 2019.
[262] Molavi, *Herbicidal warfare in Gaza,* 2019.
[263] Molavi, *Environmental Warfare in Gaza,* p. 4.

For decades, Palestinian life has become "globally less visible and locally more precarious."[264] Palestinian national and political aspirations have been regionally and globally marginalized even as Israeli settlers, supported by right-wing governments, further expand their occupational control over the West Bank. This continual form of state violence "impedes, reroutes, and structures Palestinian life" in a manner that is framed and regulated through law.[265] As Zinaida Miller asserts, in Gaza, spectacular violence and slow violence are conjoined, working together to cause immediate and long-term destruction. On one hand, there is constant media coverage showing images of Gaza neighbourhoods reduced to rubble, the bodies of small children, and the general destruction of the land. On the other hand, quiet acts of violence continue to perpetuate suffering for both the land and Palestinians.[266] In 2023, Israeli Defense Minister Yoav Gallant issued a decree stating there would be "no electricity, no food, no water, no fuel" for Gazans, a statement that signifies the imposition of harsh conditions that could lead to prolonged suffering and death.[267]

Alongside these immediate violations of humanitarian law, the environmental devastation caused by years of Israeli military operations has rendered the land along the border of Gaza increasingly infertile. Repeated attacks, including herbicidal airstrikes and the ongoing use of white phosphorus as both a smokescreen and weapon, have poisoned critical agricultural infrastructure, contaminated water supplies, and degraded the soil, compounding the suffering of Gaza's population.[268] The environmental damage, while less visible, has long-term consequences for the region's ability to sustain its population, resulting in slower, quieter, and generational forms of violence as the land itself becomes increasingly uninhabitable. Palestinian, Nicki Kattoura writes,

> Slow violence is the defining condition of living as Palestinians: in between the sharp escalations of protracted conflict, the ongoing trauma of an existence under apartheid is typically not viewed as violence at all.[269]

---

[264] Zinaida Miller, In Gaza, Catastrophic Violence of War and Slow Violence of Oppression Collide. *Just Security*, 2023.
[265] Miller, *In Gaza Catastrophic Violence of War and Slow Violence,* 2023.
[266] Miller, *In Gaza Catastrophic Violence of War and Slow Violence,* 2023.
[267] Miller, *In Gaza Catastrophic Violence of War and Slow Violence*, 2023
[268] Miller, *In Gaza Catastrophic Violence of War and Slow Violence*, 2023
[269] Nikki Kattoura, Recognizing and resisting slow violence in Palestine. *Mondoweiss,* 2021.

The ongoing conflict alone has inflicted serious environmental damage, affecting air, water, land, and all those who depend on them. The increase in air contamination from chemical weapons and the heavy use of explosives has led to decreased productivity of agricultural lands and threatens the existence of natural ecosystems.[270] Further, continued land and soil degradation have devastated Gaza's agrarian society. The systemic destruction of farms and agricultural lands, along with the nearly seventeen years of blockade, which deprived the region of essential farming inputs, has significantly contributed to forced starvation.[271]

In May 2024, the United Nations Institute for Training and Research reported that roughly fifty-seven percent of cropland in Gaza has been sufficiently damaged. The hazardous materials used in Gaza have caused direct and immediate toxicity to flow and fauna (causing mortality, reducing growth, disease, and damage to organisms) and bioaccumulation through natural food webs, leading to concentrated amounts of these substances in people and nature alike.[272] Some materials are predicted to persist for a long time in the environment through soil, groundwater, seawater, and marine sediments, likely resulting in generational harms.[273] Soil samples taken from agricultural lands along the Eastern Gaza border have shown elevated levels of "nickel, chromium, copper, manganese and lead," all of which, in large quantities, are toxic and linked to various diseases, including liver and kidney failure, breast cancer, blue baby syndrome, and the deterioration of the nervous system.[274] While it is hard to determine the exact causes of the contamination, it is slow violence, nonetheless.

> This is slow violence - a violence that does not kill by bomb, rocket, or drone strike but through a depletion that does not seem to require urgent attention. However, it physically wears out and deteriorates a population, making occupation and trauma a defining condition of Palestinian existence.[275]

---

[270] Farah Al Hattab, Scorched-earth: making Gaza uninhabitable for generations to come. *Greenpeace,* 2024.
[271] Hattab, *Scorched-earth*, 2024.
[272] United Nations Environment Programme. *Environmental impact of the conflict in Gaza*. (Nairobi: United Nations Environment Programme, 2024): p. 40.
[273] United Nations Environment Programme. *Environmental impact of the conflict in Gaza*, p. 40.
[274] United Nations Environment Programme. *Environmental impact of the conflict in Gaza*, p. 40.
[275] Kattoura, *Recognizing and resisting slow violence in Palestine,* 2021.

While the case of Gaza is complex, the nature of the conflict goes beyond exponential and attritional. In the aftermath of explosions, herbicide spraying, and other forms of overt attack, it is the land itself that will bear the scars, silent yet enduring. The continual erosion of ecosystems over time mirrors the erosion of a people's future, where the cost of war is measured not just in the lives lost, but the slow death of the very earth beneath their feet.

Analysis & Conclusion

The cases of Agent Orange in Vietnam and the environmental destruction in Gaza are critical examples of slow violence, that is, a form of violence that is gradual, often invisible, yet generational and attritional in nature. As seen in Vietnam, the long-term effects of Agent Orange have led to the widespread contamination of land and water resources, with severe and generational consequences for rural populations, particularly women and young children. Similarly, the use of herbicide spraying along the Gaza border has resulted in the devastation of arable land, exacerbating the existing humanitarian crisis. The targeted destruction of agricultural resources, a critical means of survival in Gaza both economically and agriculturally, has worked to exacerbate the isolation of Palestinian communities. The environmental and human suffering perpetrated by the herbicides in Gaza, alongside the use of toxic and other chemical weapons, mirrors that of Agent Orange, where the deployment of herbicides resulted in irreversible damage to various ecosystems and inflicted decades of generational suffering for human populations. Although not for certain, as the land has endured various forms of chemical attacks, the long-term consequences of herbicide spraying in Gaza may include similar devastation, with permanent alterations to the land and its ecosystem that were once vital to the survival of local populations.

As the occupation in Palestine continues, thousands of Palestinians continue to face imminent threats to their life, whether that be through direct physical harm or generational harm. The environmental devastation in Gaza is often overlooked. However, it is a critical aspect of the enduring conflict. The relentless assault on Gaza has resulted in immense human suffering and has also inflicted severe and long-term damage

on the natural environment, "transforming the region into a toxic wasteland."[276] This kind of environmental devastation, often referred to as 'ecocide', is a deliberate strategy that exacerbates humanitarian crises and undermines the ability of a region to sustain its people, replacing life-giving resources with lasting harm. The concept of ecocide first gained prominence during the Vietnam War, as a response to the deployment of Agent Orange and other chemical defoliants. This pattern of utilizing environmental degradation as a weapon of war raises critical ethical and legal concerns.

Central to this discussion are the indiscriminate attacks on civilian and civilian objects, as well as the disproportionality of the attacks on military objectives. The relevant Law of Armed Conflict ("LOAC") provisions addressing the protection of the natural environment during armed conflict is primarily codified in Article 35(3) of the Additional Protocol I to the 1977 Geneva Convection ("AP I") which explicitly prohibits the "use [of] methods or means of warfare which are intended, or may be expected, to cause widespread, long-term, and severe damage to the natural environment.t"[277] Similarly, Article 55 of AP I emphasize that "care shall be taken in warfare to protect the natural environment against widespread methods or means of warfare" intended or expected to cause damage to the natural environment, as well as harm to the health or survival of affected civilian population.[278] These provisions are particularly important as they recognize the need to protect the natural environment, due to the "specific relationship of an area with human populations."[279] However, the application of these protocols addressing environmental devastation that is widespread, long-term, and severe relies on a very high threshold, making it difficult to distinguish proportionality and the excessive use of military force.[280] The Geneva Conventions protocols are often described as "toothless tigers" regarding the ability of LOAC to hold states accountable for acts of ecocide.[281]

---

[276] Noor Badri, Ecocide in Gaza: Israel's genocide in Gaza will create an unprecedented environmental health crisis. *UC Global Health Institute,* 2024.
[277] International Committee of the Red Cross. *Additional Protocol 1 to the Geneva Convention of 12 August 1949 and relating to the protection of victims of international armed conflict (Protocol 1), article. 35*(3), 1977.
[278] Joanna Jarose, A Sleeping Giant? The ENMOD Convention as a Limit on Intentional Environmental Harm in Armed Conflict and Beyond. *American Journal of International Law* 118, no. 3 (2024): p. 474.
[279] Jarose, *A Sleeping Giant,* p. 474.
[280] Jarose, *A Sleeping Giant,* p. 475.
[281] Jarose, *A Sleeping Giant,* p. 471.

Although these environmental protections were introduced in response to the environmental devastation produced by US actions in Vietnam, the threshold for violations continues to be "so high…that they actually authorize much of what was done in Vietnam."[282] Echoing the work of Rob Nixon, casualties of war go beyond those immediately impacted and physically impacted by conflict. It includes those that suffer from the delayed destruction of war, and in cases where the land itself is a target, the ecosystems and their nested subsystems become casualties as well.[283] When assessing the loss of entire ecosystems as a casualty, the way in which we understand the Laws of Armed Conflict must evolve if we are to sufficiently account for intentional environmental destruction. This requires decentering the analysis of environmental weaponization from its implication to human harm and considering the destruction of biodiversity and ecosystems in a way that addresses the interconnectedness of all life. In its current manifestation, the field of environmental security continues to emphasize the short-term, spectacular, and measurable threats of environmental harm, often excluding other forms of protracted, invisible, and attritional forms of violence and risk. As the field of environmental security continues to evolve, the inclusion of slow violence offers a critical lens that sufficiently addresses the enduring, uneven, and unseen violence that accumulates in nature and over time. The initial doctrine of environmental security was built upon Carson's claim that "in nature, nothing exists alone," which is to say that the intent behind the weaponization of the environment by states needs to be examined as a temporal tactic to cause generational harm.[284] The historical poisoning of communities is not simply a consequence of environmental warfare; it is the sole aim and must be studied as such.

[282] Leebaw, *Scorched Earth*, p. 778.
[283] Nixon, *Slow Violence*, p 8.
[284] Carson, *Silent Spring*, p. 52.

Bibliography

Abuawad, Ahlam, Mark Griffiths, Graham Edwards, Adan Eftekhari, Mohammed El-Ebweini, Husam Al-Najar, Abeer Butmeh, Rasha Abu Dayyeh, Mohamed Al-Shewy, and Amira Aker. "From ecocide to genocide: a call to action for scientists globally to address the destruction in Gaza." *Available at SSRN 5021472* (2024).

Adger, W. Neil, Juan M. Pulhin, Jon Barnett, Geoffrey D. Dabelko, Grete K. Hovelsrud, Marc Levy, Ursula Oswald Spring, and Coleen H. Vogel. "Human security." Cambridge University Press, 2014.

Anderson Jr, Ferd E. Is the Use of Herbicides in Limited War Justified?. *Essay published by the US Army War College. Carlisle Barracks, PA: Defense Technical Information Center*, 1970.

Anseeuw, Ward, & Taylor, Mike. "Factors Shaping the Global Land Rush." In Alexander Reid Ross (ed.*), Grabbing Back: Essays against the Global Land Grab*. Oakland, CA: AK Press, 2014.

Badri, Noor. Ecocide in Gaza: Israel's genocide in Gaza will create an unprecedented environmental health crisis. *UC Global Health Institute,* 2024. https://ucghi.universityofcalifornia.edu/news/ecocide-gaza-israels-genocide-gaza-will-create-unprecedented-environmental-health-crisis/

Barnett, Jon. "Environmental security." In *The Routledge Handbook of New Security Studies*, p. 123-131. Routledge, 2010.

----------. "Environmental Security." In Collins, Alan, ed. *Contemporary Security Studies*. Fourth edition. Oxford: Oxford University Press, 2016, p. 229-247.

BBC News."Key Documents | the Balfour Declaration." *BBC News*, 2001. http://news.bbc.co.uk/2/hi/in_depth/middle_east/israel_and_the_palestinians/key_documents/1682961.stm.

Berger, Miriam. Israeli spraying of herbicide near Gaza harming Palestinian crops.

The Guardian online 19 (2019). https://www.theguardian.com/world/2019/jul/19/israeli-spraying-of-herbicide-near-gaza-harming-palestinian-crops

Burgess, Neil. "Benchmarks: Diverting the Huang He River, Largest Act of

Environmental Warfare in History." *Earth Magazine*, 2009. https://www.earthmagazine.org/article/june-9-1938-huang-he-diversion-largest-act-environmental-warfare-history/.

Buzan, Barry. *People, States and Fear: An Agenda for International Security Studies in the Post-Cold War Era*. London: Harvester Wheatsheaf, 1991.

Carson, Rachel. *Silent Spring*. Boston: Houghton Mifflin, 1962.

Cooke, Stephanie. *In Mortal Hands: A Cautionary History of the Nuclear Age*. New York: Bloomsbury Publishing USA, 2009.

Cusato, Eliana. *The Ecology of War and Peace: Marginalising Slow and Structural Violence in International Law*. Cambridge University Press, 2021.

Dabelko, Geoffery D., and David D. Dabelko. Environmental Security: Issues of Conflict and Redefinition. *Environmental change and security project report*, 1, no.1 (1995): p. 3-13.

Dalby, Simon. "Ecopolitical Discourse: 'Environmental Security' and Political Geography." *Progress in Human geography* 16, no. 4 (1992): p. 503-522.

----------. *Security and Environmental Change*. Cambridge: Polity Press, 2009.

Dana, Tariq, and Ali Jarbawi. A Century of Settler Colonialism in Palestine: Zionism's Entangled Project. *The Brown Journal of World Affairs* 24, no. 1 (2017): p. 197–220. https://www.jstor.org/stable/27119089

Degani, Arnon Yehuda. The decline and fall of the Israeli Military Government, 1948-1966: a case of settler-colonial consolidation?. *Settler Colonial Studies* 5, no. 1 (2015): p. 84-99.

Durant, Robert F. *The greening of the US military: Environmental policy, national security, and organizational change*. Georgetown University Press, 2007.

Dwernychuk, L. Wayne, Hoang Dinh Cau, Christopher T. Hatfield, Thomas G. Boivin, Tran Manh Hung, Phung Tri Dung, and Nguyen Dinh Thai. "Dioxin reservoirs in southern Viet Nam—a legacy of Agent Orange." *Chemosphere* 47, no. 2 (2002): p. 117-137.

Falk, Richard A. *This endangered planet: prospects and proposals for human survival.* New York: Random House, 1972.

Fedman, David. Wartime Forestry and the "Low Temperature Lifestyle" in Late Colonial Korea, 1937–1945. *The Journal of Asian Studies*, 77, no. 2 (2018): p. 333–350.

Forman, Geremy, and Alexander Kedar. "From Arab land to 'Israel Lands': the legal dispossession of the Palestinians displaced by Israel in the wake of 1948". *Environment and Planning D: Society and Space* 22, no. 6 (2004): p. 809-830.

Galtung, Johan. Violence, Peace, and Peace Research. *Journal of Peace Research*, 6, no.3 (1969): p.167–191. http://www.jstor.org/stable/422690

----------. Cultural violence. *Journal of Peace Research*, 27, no. 3 (1990): p. 291-305.

Garrard, Greg. *The Oxford Handbook to Ecocriticism.* New York: Oxford University Press, 2014.

Gleick, Peter H. 'Environment and Security: The Clear Connections'. *Bulletin of Atomic Scientists* 47, no.3 (1991): p. 16-21.

Goyanes, Rob. *The Ecological War on Gaza*. Jewish Currents, 2019. https://jewishcurrents.org/the-ecological-war-on-gaza

Hall, Mitchell K. *The Vietnam War.* Third Edition. Routledge, 2018.

Hattab, Farah Al Scorched-earth: making Gaza uninhabitable for generations to come. *Greenpeace,* 2024. https://www.greenpeace.org/mena/en/gaza-scorched-earth/

Heise, Ursula K. *Sense of place and sense of planet: The environmental imagination of the global*. Oxford University Press, 2008.

Herr, Michael. *Dispatches*. Vol. 23. Pan Macmillan, 2014.

Herring, George C. *LBJ and Vietnam: A different kind of war*. Austin: University of Texas Press, 1994.

----------. The Cold War and Vietnam. *OAH Magazine of History*, 18, no. 5 (2004): p. 18–21. http://www.jstor.org/stable/25163717

Holton, Thomas. *A literary exploration of the second "Ecological Conscience", 1960s-1970s*. England: University of Bedfordshire, 2017.

Homer-Dixon, Thomas. *Environment, Scarcity, and Violence*. London: Princeton University Press, 1999. https://doi.org/10.2307/j.ctt7pgg0

Hough, Peter. *Environmental Security: An Introduction*. 2nd ed. London: Routledge, 2021.

International Committee of the Red Cross. *Additional Protocol 1 to the Geneva Convention of 12 August 1949 and relating to the protection of victims of international armed conflict (Protocol 1), article. 35*(3), 1977. https://www.ohchr.org/en/instruments-

mechanisms/instruments/protocol-additional-geneva-conventions-12-august-1949-and

Jarose, Joanna. "A Sleeping Giant? The ENMOD Convention as a Limit on Intentional Environmental Harm in Armed Conflict and Beyond." *American Journal of International Law* 118, no. 3 (2024): p. 468–511. doi:10.1017/ajil.2024.15

Kabha, Mustafa, and Nahum Karlinsky. *The lost orchard: the Palestinian-Arab citrus industry, 1850-1950*. Syracuse University Press, 2021.

Kattoura, Nikki. Recognizing and resisting slow violence in Palestine. *Mondoweiss,* 2021. https://mondoweiss.net/2021/06/recognizing-and-resisting-slow-violence-in-palestine/

Kohlmann, Benjamin. 2014. "What Is It Like to Be a Rat? Early Cold War Glimpses of the Post-Human." *Textual Practice* 28 (4): p. 655–75. doi:10.1080/0950236X.2013.858066.

Khalidi, Walid. "The Palestine Problem: An Overview." *Journal of Palestine Studies* 21, no. 1 (1991): p. 5-16. DOI: 10.2307/257362.

Khurram, Shehnoor. "Boko Haram in the Capitalocene: assemblages of climate change and militant Islamism in Nigeria." In Irma King Allen et al (eds.), *Political Ecologies of the Far Right: Fanning the Flames*. Manchester University Press: Manchester, (2024): p. 32-56.

Krämer, Gudrun. *A history of Palestine: From the Ottoman conquest to the founding of the state of Israel*. Princeton University Press, 2008.

Leebaw, Bronwyn. "Scorched Earth: Environmental War Crimes and International Justice." *Perspectives on Politics* 12, no. 4 (2014): p. 770–788.

Maas, Achim, Balázs Bodó, Chris Burnley, Ioana Comardicea, and Ralf Roffey, eds. *Global Environmental Change: New Drivers for Resistance, Crime and Terrorism?* 1st ed. Baden-Baden: Nomos, 2013.

Matthew, Richard, Jon Barnett, and Karen O'Brien. *Global Environmental Change and Human Security*. Cambridge, MA: MIT Press, 2009.

McAllister, James. "Who Lost Vietnam? Soldiers, Civilians, and U.S. Military Strategy." *International Security*, 35, no. 3 (2010): p. 95–123. https://doi.org/10.1162/ISEC_a_00024

Meyer, John M. *Political Nature: Environmentalism and the Interpretation of Western Thought*. Cambridge, MA: MIT Press, 2001.

Miller, Zinaida. In Gaza, Catastrophic Violence of War and Slow Violence of Oppression Collide. *Just Security*, 2023. https://www.justsecurity.org/89998/gaza-catastrophic-violence-slow-violence-collide/

Molavi, Shourideh. "Herbicidal warfare in Gaza." *Forensic Architecture* (2019). https://forensic-architecture.org/investigation/herbicidal-warfare-in-gaza

----------.. *Environmental Warfare in Gaza: Colonial violence and new landscapes of resistance*. Pluto Books, 2024.

Nassar, Jamal Raji. *Intifada: Palestine at the crossroads*. Praeger, 1990.

Newman, David. The evolution of a political landscape: Geographical and territorial implications of Jewish colonization in the West Bank. *Middle Eastern Studies* 21, no. 2 (1985): p. 192-205.

Nhu, Dang Duc, Teruhiko Kido, Rie Naganuma, Nobuhiro Sawano, Kenji Tawara, Muneko Nishijo, Hideaki Nakagawa, Nguyen Ngoc Hung, and Le Thi Hong Thom. "A GIS study of dioxin contamination in a Vietnamese region sprayed with herbicide." *Environmental health and preventive medicine* 14, no. 6 (2009): p. 353-360. https://doi.org/10.1007/s12199-009-0107-8

Nixon, Rob. *Slow Violence and the Environmentalism of the Poor*. Cambridge, MA: Harvard University Press, 2011.

Olson, Kenneth Ray, and Lois Wright Morton. "Long-term fate of Agent Orange and dioxin TCDD contaminated soils and sediments in Vietnam hotspots." *Open Journal of Soil Science* 9, no. 01 (2019).

Opper, Marc. The Vietnam War, 1960–1975. In *People's Wars in China, Malaya, and Vietnam.* University of Michigan Press, 2019: p. 205-234. http://www.jstor.org/stable/10.3998/mpub.11413902.13

Pappé, Ilan. *The ethnic cleansing of Palestine*. Oneworld Publications, 2007.

Park, Albert L. "The Reshaping of Landscapes: Systems of Mediation, War, and Slow Violence." *The Journal of Asian Studies*, 77, no. 2 (2018): p. 365–368. https://doi.org/10.1017/S0021911817001401

Prentice, David L. Choosing "the Long Road": Henry Kissinger, Melvin Laird, Vietnamization, and the War over Nixon's Vietnam Strategy. *Diplomatic History*, 40, no. 3 (2016): p. 445-474.

Quinh, Hoang Tri. "Effects of geographical conditions, soil movement and other variables on the distribution of 2, 3, 7, 8-TCDD levels in adipose tissues from Viet Nam: preliminary observations." *Chemosphere* 18, no. 1-6 (1989): p. 967-974.

Roberts, Adam. "The law of war and environmental damage." *The Environmental Consequences of War,* Cambridge (2000): p. 47–86. https://doi.org/10.1017/CBO9780511522321.006

-------- The Agent Orange Case: Vietnam Ass'n for Victims of Agent Orange/Dioxin v. Dow Chemical Co. *Proceedings of the Annual Meeting (American Society of International Law)*, *99*, (2005): p. 380–385. http://www.jstor.org/stable/25660031

Saad, Aaron. Worlds at Stake: Climate Politics, Ideology, and Justice. Halifax: Fernwood Publishing, 2022.

Saleh, Mohsen Mohammad. The Palestine Issue: Historical Background and Contemporary Developments (Revised and Updated Version 2022). *Al-Zaytouna Center for Studies and Consultations,* Vol. 2 (2022).

Schmidt, Charles. The Fog of Agent Orange. *Scientific American* 314, no. 6 (2016):p. 70-75.

Sills, Peter. *Toxic war: the story of agent orange*. Vanderbilt University Press, 2014.

Smit, H.A.P. and I. Henrico. "Greening militaries: the military-environment conundrum."In *Proceedings of the Joint Biennial Conference of the Society of South African Geographers and the Southern African Association of Geomorphologists. Society of South African Geographers and the Southern African Association of Geomorphologists,* 46. South Africa: Rhodes University, (2021).

Soroos, Marvin. *The Endangered Atmosphere: Preserving a Global Commons*. Columbia: University of South Carolina Press, 1997.

Sprout, Harold H., & Margaret T. Sprout. *Toward a politics of the planet earth.* New York: Van Nostrand Reinhold Company, 1971.

Stellman, Jeanne Mager, Steven D. Stellman, Richard Christian, Tracy Weber, and Carrie Tomasallo. "The extent and patterns of usage of Agent Orange and other herbicides in Vietnam." *Nature* 422, no. 6933 (2003): p. 681-687.

Tivadar, Liliana-Maria. "The Gaza Strip and the Israel-Hamas Conflict: From 2008 until

Nowadays." *Acta Musei Napocensis. Historica* 58, no. 58 (2021): p. 293-311.

Truong, Kiem N., and Khuong V. Dinh. "Agent Orange: Half-century effects on the Vietnamese wildlife have been ignored." *Environmental Science & Technology* 55, no. 22 (2021).

Tuathail, Gearóid Ó., and Gerard Toal. *Critical geopolitics: The politics of writing global space*. Vol. 6. University of Minnesota Press, 1996.

Ullman, Richard H. "Redefining Security." *International Security*, 8, no.1 (1983): p. 129–153. https://doi.org/10.2307/2538489

United Nations Environment Programme. *Environmental impact of the conflict in Gaza*. Nairobi: United Nations Environment Programme, 2024. https://wedocs.unep.org/bitstream/handle/20.500.11822/45739/environmental_impact_conflict_Gaza.pdf?sequence=3&isAllowed=y

United Nations Institute for Training and Research. *UNOSAT and FAO reveal substantial increase in damage to Gaza's cropland amid ongoing conflict*. UNITR, 2024. https://unitar.org/about/news-stories/press/unosat-and-fao-reveal-substantial-increase-damage-gazas-cropland-amid-ongoing-conflict

United Nations. (1947*). Report of Sub-Committee 2 of the Ad Hoc Committee on the Palestinian Question*. New York: United Nations, 1947. https://unispal.un.org/pdfs/AAC1432.pdf

Westing, Arthur H. *Herbicides in war: the long-term ecological and human consequences.*London: Taylor & Francis, 1984: p. 2-25.

Wheelis, Mark, Lajos Rózsa, and Malcolm Dando. *Deadly Cultures: Biological Weapons since 1945*. London: Harvard University Press, 2006.

Yamashita, Nobuaki and Trong-Anh Trinh. Long-Term Effects of Vietnam War: Agent Orange and the Health of Vietnamese People After 30 Years. *Asian Economic Journal* 36, no.2 (2022): p. 180-202. https://doi.org/10.1111/asej.12265

Young, Alvin L. *The history, use, disposition and environmental fate of Agent Orange*. New York: Springer, 2009.

Zierler, David. *The invention of ecocide: Agent Orange, Vietnam, and the scientists who changed the way we think about the environment*. University of Georgia Press, 2011.