

1996

Deliberate Environmental Modification Through the Use of Chemical and Biological Weapons: "Greening" the International Laws of Armed Conflict to Establish an Environmentally Protective Regime

Ensign Florencio J. Yuzon

Follow this and additional works at: <http://digitalcommons.wcl.american.edu/auilr>



Part of the [International Law Commons](#)

Recommended Citation

Yuzon, Ensign Florencio J. "Deliberate Environmental Modification Through the Use of Chemical and Biological Weapons: "Greening" the International Laws of Armed Conflict to Establish an Environmentally Protective Regime." American University International Law Review 11, no. 5 (1996): 793-846.

This Article is brought to you for free and open access by the Washington College of Law Journals & Law Reviews at Digital Commons @ American University Washington College of Law. It has been accepted for inclusion in American University International Law Review by an authorized administrator of Digital Commons @ American University Washington College of Law. For more information, please contact fbrown@wcl.american.edu.

DELIBERATE ENVIRONMENTAL MODIFICATION THROUGH THE USE OF CHEMICAL AND BIOLOGICAL WEAPONS: "GREENING" THE INTERNATIONAL LAWS OF ARMED CONFLICT TO ESTABLISH AN ENVIRONMENTALLY PROTECTIVE REGIME

Ensign Florencio J. Yuzon*

Mother Nature sets her own rules, and does not easily take sides in the quarrels between humans.¹

When two elephants fight, it's always the grass that gets hurt.²

* Judge Advocate General's Corps, United States Naval Reserve. Currently assigned to Naval Reserve Readiness Command; Region Nine; Naval Air Station Memphis; Millington, Tennessee. B.A., *magna cum laude*, Case Western Reserve University, 1993; M.A., *summa cum laude*, Case Western Reserve University School of Graduate Studies, 1993; J.D., Case Western Reserve University School of Law, 1996. The author wishes to thank Professors Hiram E. Chodosh, Christine A. Corcos, and Wendy E. Wagner; Dennis H. Bower, Esq.; James D. DeRosa, Esq.; Christopher D. Knopf, Esq.; and especially Lauren M. Moran for their encouragement, guidance, and support. The opinions expressed are those of the author and do not represent the views of the United States Department of Defense, the United States Department of the Navy, or any other governmental agency.

1. E. F. Roots, *International Agreements to Prohibit or Control Modification of the Environment for Military Purposes: An Historical Overview and Comments on Current Issues*, in VERIFICATION RESEARCH UNIT, ARMS CONTROL AND DISARMAMENT DIVISION, EXTERNAL AFFAIRS AND INTERNATIONAL TRADE CANADA, *VERIFYING OBLIGATIONS RESPECTING ARMS CONTROL AND THE ENVIRONMENT: A POST GULF WAR ASSESSMENT* 13, 23 (H. Bruno Schiefer ed., 1992) [hereinafter *VERIFYING OBLIGATIONS*].

2. Dr. Ranee Khooshie Lal Panjabi, *From Stockholm to Rio: A Comparison of the Declaratory Principles of International Environmental Law*, 21 DENV. J. INT'L L.

INTRODUCTION

The Persian Gulf War stands as a prime example of deliberate environmental modification for military purposes.³ In January 1991, the first news reports suggested that prior to the conflict, Iraqi ground forces ignited 150 oil installations.⁴ Subsequently, by war's end, Iraqi forces set fire to 732 wells.⁵ Moreover, on January 24, 1991, Saudi Arabian sources reported that 1.5 million barrels of crude oil had been dumped into the Persian Gulf.⁶

The effects of the purposeful torching of oil wells in Kuwait represent the State's most pressing environmental concerns. One report suggested that the fires released numerous toxins, including the emission of sulphur dioxide and hydrogen sulphide from the burning oil fields.⁷ Furthermore, the damage to marine life has been overwhelming. Toxic hydrocarbons and sediments affected seagrass beds, which provide nursery grounds for commercial shrimp.⁸ The ensuing oil slick devastated the coral reef communities, disrupting the sensitive ecological system.⁹ Finally, blue-green algae, which provides nutrients to fish and crusta-

& POL'Y 215, 259 (1993).

3. See Maj. Walter G. Sharp, Sr., *The Effective Deterrence of Environmental Damage During Armed Conflict: A Case Analysis of the Persian Gulf War*, 137 MIL. L. REV. 1, 3 (1992) (discussing the ramifications of Saddam Hussein's strategy including the call for a Fifth Geneva Convention).

4. U.N. DEP'T OF PUBLIC INFORMATION, KUWAIT: REPORT TO THE SECRETARY-GENERAL ON THE SCOPE AND NATURE OF DAMAGE INFLICTED ON THE KUWAITI INFRASTRUCTURE DURING THE IRAQI OCCUPATION at 27, U.N. Doc. DPI/1157 (1991) [hereinafter KUWAIT REPORT].

5. See Mark Caggiano, *The Legitimacy of Environmental Destruction in Modern Warfare: Customary Substance over Conventional Form*, 20 B.C. ENVTL. AFF. L. REV. 479, 480 (1993) (stating Director of the Oil Publication Bulletin, Richard Golob's estimate of the number of oil wells that Iraqi soldiers ignited).

6. David C. Morrison, *War on the Environment*, NAT'L. J., March 2, 1991, at 536.

7. KUWAIT REPORT, *supra* note 4, at 27.

8. *Id.*

9. *Id.*

ceans, suffered the deleterious effects of Iraq's deliberate environmental modification.¹⁰

The use of the environment as a target in times of armed conflict is not a new phenomenon. As early as 146 B.C., Roman troops razed the city of Carthage and salted the surrounding earth to sterilize the soil.¹¹ Strategists researched other means of denying territory to the enemy during World War II, including a strategy of saturation bombing utilizing Anthrax spores that would have killed an estimated fifty percent of the populations and contaminated the terrain enough to force evacuation.¹²

The ability to use the environment as an instrument of war increases with technological capability.¹³ Thus, armed forces only recently acquired the ability, with the sophistication of armaments, to control atmospheric, tectonic, and biotic factors of the environment for military purposes.¹⁴

In terms of atmospheric manipulations, one commentator suggested that altering the upper atmosphere and affecting its electrical properties would allow for the disruption of enemy communications.¹⁵ Moreover, it is an imminent possibility to be able to open a temporary hole in the ozone layer through controlled releases of a bromide compound over a specified area of enemy territory thereby permitting levels of ultraviolet radiation to penetrate and injure enemy forces.¹⁶

Operation Ranch Hand offers strikingly real evidence of the potential for deliberate modification of the land and vegetation. The United States instituted Operation Ranch Hand during the Vietnam War for the purpose of destroying vegetation used by the enemy as cover and as a source of sustenance.¹⁷ Appraisers estimated that the chemical-based incendiary weapons, such as Agent Orange, have caused destruction of eight percent of the region's croplands, fourteen percent of its forests,

10. *Id.* The blue-green algae covers much of the mud flats which provide feeding grounds for numerous species of wading birds. As a result of the oil slick, it is estimated that the fauna of worms and crustaceans will be killed, thus further disrupting the fragile ecosystem. *Id.*

11. Morrison, *supra* note 6, at 536.

12. *Id.*

13. Arthur H. Westing, *Environmental Warfare*, 15 ENVTL. L. 645, 646 (1985).

14. *Id.*

15. *Id.* at 648.

16. *Id.*

17. Morrison, *supra* note 6, at 536.

and half of its swamp areas.¹⁸ Furthermore, the introduction of microorganisms into the region threatened the balance of the ecosystem.¹⁹

The foregoing illustrates the realistic potential to use the environment as a target of military operations. In many of the examples, the introduction of chemical and biological toxins into the ecosystem instigated the deliberate environmental modification. Given this foreboding premonition, is it possible to contain or diminish the option of purposeful environmental destruction through the use of biological and chemical weaponry? Furthermore, does international law provide any framework for determining the legality of such military operations?

This Article examines the current norms and standards that exist in international law to confront these issues.²⁰ To understand the complexity of the problem, this Article first addresses the general principles surrounding state responsibility for environmental damage by surveying the various legal regimes established under international environmental law. The subsequent sections scrutinize the current laws of armed conflict and analyze whether they provide adequate environmental protection and curtail the use of weaponry based on chemical and biological toxins. This Article also examines the legality of the means and methods of using biological and chemical agents in times of war against the envi-

18. *Id.* See HERBICIDES IN WAR: THE LONG-TERM ECOLOGICAL AND HUMAN CONSEQUENCES (Arthur H. Westing ed., 1984) (providing a technical appraisal of the effects of herbicides on the ecologies of terrestrial plants and animals, soil, and coastal, aquatic and marine life).

19. Westing, *supra* note 13, at 655.

20. This Article does not examine nuclear armaments. For related conventions, see, e.g., South Pacific Nuclear Zone Treaty, Aug. 6, 1985, art. 3, 24 I.L.M. 1442, 1444 (refusing to encourage or assist in the possession or manufacture of nuclear weapons); Treaty on the Prohibition of the Employment of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof, Feb. 11, 1971, art. 1, 23 U.S.T. 701, 955 U.N.T.S. 115 (acknowledging our responsibility to preserve the Earth's seabed and according protection from nuclear weapons); Treaty on the Proliferation of Nuclear Weapons, opened for signature July 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161 (prompting atomic research for peaceful purposes); Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, opened for signature, Jan. 27, 1967, art. 4, 18 U.S.T. 2410, 610, U.N.T.S. 205 (vowing not to place into orbit any vessels containing nuclear weapons); Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space, and Under Water, Aug. 5, 1963, art. 1, 14 U.S.T. 1313, 480 U.N.T.S. 43 (proclaiming to agree to cease all testing of weapons, including nuclear weapons); The Antarctic Treaty, Dec. 12, 1959, arts. 1, 5, 12 U.S.T. 794, 402 U.N.T.S. 71 (committing the use of the continent of Antarctica to peaceful purposes).

ronment by focusing on established sources of law, including a discussion of the Chemical Weapons Convention, which is currently facing ratification in the domestic fora of member States. Finally, alternative protective regimes are proffered. This Article concludes that the established corpus of laws, at best, provides only limited coverage for environmental protection in times of purposeful modification, and therefore, a reaffirmation and reworking of this set of principles is necessary.

I. INTERNATIONAL ENVIRONMENTAL LAW

Man is both creature and molder of his environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social, and spiritual growth. In the long and tortuous evolution of the human race on this planet a stage has been reached when through rapid acceleration of science and technology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale.²¹

In large measure, the Declaration of the United Nations Conference on the Human Environment (Stockholm Conference)²² represents the birth of international environmental law. In its form and substance, the conference established a working-paradigm for global recognition of environmental issues, and instituted the United Nations Environment Program (UNEP).²³ Moreover, the Conference issued twenty-six non-binding principles within its Declaration, focusing on environmental protection.²⁴

Despite its lack of authority, the Stockholm Declaration is significant for its recognition of state responsibility for environmental damage.²⁵ Principle 21 dictates that States may conduct activities within their borders, such as "exploit[ing] their own resources," but that they have the further duty to prevent their actions from damaging other States.²⁶

21. Stockholm Declaration on the Human Environment adopted by the United Nations Conference on the Human Environment, June 16, 1972, Section I of the Report of the United Nations Conference on the Environment, U.N. Doc. A/CONF.48/14 and Corr. 1 (1972), *reprinted in* 11 I.L.M. 1416 [hereinafter Stockholm Declaration].

22. *Id.*

23. *Id.*

24. *Id.*

25. *Id.*

26. Principle 21 States that:

State responsibility for environmental destruction, as Principle 21 dictates, constitutes customary international law.²⁷ As a result, following the Stockholm Conference, some States sought to implement the principles of its Declaration while recognizing the need to elaborate on measures to conserve natural resources considered necessary to humanity.²⁸

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Stockholm Declaration, *supra* note 21, princ. 21.

27. See, e.g., Lynn Berat, *Defending the Right to a Healthy Environment: Toward a Crime of Geocide in International Law*, 11 B.U. INT'L L.J. 327, 329-40 (1993) (discussing the evolution of international common law and recognizing the responsibility of States to protect the environment); Caggiano, *supra* note 5, at 479 (explaining that the Stockholm Declaration addresses the duties and responsibilities of nations in wartime to protect the environment); Anthony Leibler, *Deliberate Wartime Environmental Damage: New Challenges for International Law*, 23 CAL. W. INT'L L.J. 67, 70 (1992) (highlighting Principle 21 as the defining source for determining whether a State is responsible for an environmentally injurious act). Furthermore, prior to its explicit delineation in the Stockholm Declaration, litigators relied on the notion of state responsibility in litigation concerning environmental despoilment. Trail Smelter Case (United States v. Canada), 3 R. Int'l Arb Awards 1905 (1938 & 1941) *reprinted in* 33 AM. J. INT'L L. 182 (1939) (initial opinion) and 35 AM. J. INT'L L. 684 (1941) (final decision). The case relates to injuries suffered by farmers resulting from emissions of sulphur dioxide from a smelting plant in British Columbia. *Id.* The Arbitral Tribunal concluded that "no state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties of another person therein, when the case is of serious consequence and the injury is established by clear and convincing evidence." *Id.* at 716.

Custom is an important source of international law. Statute of the ICJ, Art. 38 (b), 59 Stat. 1055 (1945), T.S. No. 993 at 25 (stating that "international custom, as evidence of a general practice accepted as law," is deemed a source of international law of which the ICJ shall apply). Often times, there exists a gradual transformation of treaty law into customary law evidenced by municipal enactments passed by States as standards of conduct. If other States find such codifications acceptable, the municipal statutes tend to be interpreted as giving rise to generally accepted usages. Moreover, it is possible that further refinements of this established custom may undergo subsequent development by way of multilateral treaties. Georg Schwarzenberger, *International Law as Applied by International Courts and Tribunals*, v. 2, *The Law of Armed Conflict*, at 15 (1968). See Jonathan I. Charney, *International Agreements and the Development of Customary International Law*, 61 WASH. L. REV. 971 (1986) (analyzing the evolution of treaty agreements into international customary law).

28. ALEXANDRE KISS & DINAH SHELTON, *INTERNATIONAL ENVIRONMENTAL LAW* 46 (1991).

Given this generalized push, the United Nations promulgated the World Charter for Nature in 1982.²⁹

The Preamble of the Charter expresses several fundamental concepts: (1) "mankind is a part of nature and life depends on the uninterrupted functioning of natural systems to ensure the supply of energy and nutrients;" and (2) "civilization is rooted in nature, which has shaped human culture . . . and living in harmony with nature gives man the best opportunities for the development of his creativity."³⁰ Yet, implicit in this, is the recognition that "man can alter nature and exhaust natural resources by his action or its consequences and, therefore, must fully recognize the urgency of maintaining the stability and quality of nature and of conserving natural resources."³¹ Furthermore, "nature shall be respected and its essential processes shall not be impaired."³² This intimates a continuation of the Stockholm Declaration's espoused principle that humanity must respect the environment and take responsibility for state action that impairs its flourishing.³³

Similar to the Stockholm Declaration, the principles of the World Charter are not codified into binding legal authority.³⁴ Nevertheless, it is indicative of prevailing notions and the direction that international environmental law is taking.³⁵

The 1989 Declaration of the Hague on the Environment issued a mandate similar to that of its predecessors.³⁶ The Declaration, adopted by twenty-four States, supported the right to a healthy environment.³⁷ According to Paragraph 5, "remedies to be sought involve not only the fundamental duty to preserve the ecosystem but also the right to live in dignity in a viable global environment."³⁸ The scope of this particular Declaration included a proposal for the fashioning of an international

29. *World Charter for Nature*, U.N. GAOR 37th Sess., Agenda Item 21 at 7, U.N. Doc. A/Res/37/7, reprinted in, 22 I.L.M. 455 (1983) [hereinafter *World Charter for Nature*].

30. *Id.* annex.

31. *Id.*

32. *Id.*

33. See Stockholm Declaration, *supra* note 21, § I (creating a set of goals for nations to follow to preserve the environment).

34. *Id.* at § II.

35. See *infra* notes 52-53 and accompanying text (indicating that U.N. declarations and resolutions are not binding).

36. Declaration of the Hague on the Environment, Mar. 11, 1989, 28 I.L.M. 1308.

37. *Id.*

38. *Id.*

organization within the United Nations framework, in order to curtail state activities causing pollution.³⁹

The most significant recent event concerning international environmental law occurred with the promulgation of the Rio Declaration on Environment and Development in 1992.⁴⁰ Many of its twenty seven Principles restate notions found in its predecessors and attempt to build upon them. According to Principle 1, "human beings are the center of concerns for sustainable development, . . . [and] are entitled to a healthy and productive life in harmony with nature."⁴¹ Furthermore, Principle 2 embodies the notion of state responsibility, which it carried over from the Stockholm Declaration.⁴² The notion of state responsibility, as found in the Rio Declaration, allows for the recognition of state liability for activities that harm the environment.⁴³ According to Principle 13, "states shall . . . cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction."⁴⁴

The International Law Commission (ILC) in its "Draft Articles on State Responsibility" further develops many of the principles concerning state responsibility, as embodied in the conventional sources of international environmental law discussed in this section.⁴⁵ For purposes of

39. The International Court of Justice would have authority to mandate compliance with such agreements and settle international environmental disputes. *Id.* In many ways, however, it is difficult to assert that such a remedy is viable. This difficulty is mainly due to the failure of States to submit to the jurisdiction of the ICJ in most matters. See Berat, *supra* note 27, at 334-36 (noting the improbability that the ICJ will have jurisdiction in environmental disputes to divert the on-going environmental assault).

40. United Nations Conference on Environment and Development: Rio Declaration on Environment and Development, June 14, 1992, 31 I.L.M. 874 [hereinafter Rio Declaration].

41. *Id.* princ. 1.

42. Principle 2 states that:

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Id. princ. 2.

43. *Id.* princs. 13-15.

44. *Id.* princ. 13.

45. THE INTERNATIONAL LAW COMMISSION'S DRAFT ARTICLES ON STATE RE-

this section, the set of thirty-five principles, which constitute the Draft Articles, relates to the responsibility of States for internationally wrongful acts.⁴⁶

In summary, this brief history of international environmental law illustrates the existence of humanity's right to be secure in a habitable environment. Moreover, as the Stockholm Declaration and its progeny have indicated, States must take responsibility for their actions and activities that cause destruction to the natural environment.⁴⁷ Despite the non-binding status of the particular declarations, there is, nevertheless, evidence that the right to a habitable environment and state responsibility have become fixed principles within customary international law.⁴⁸

A. APPLICATION OF INTERNATIONAL ENVIRONMENTAL LAW TO MODERN WARFARE

International environmental law has an impact on modern warfare. According to the Stockholm Declaration "[m]an and his environment must be spared the effects of nuclear weapons and all other means of

SPONSIBILITY (Shabtai Rosenne ed., 1991) [hereinafter ILC DRAFT ARTICLES].

46. *Id.* at 169. A more in-depth discussion of the ILC Draft Articles is available *infra*, Section IA, in relation to the application of the principle of state responsibility to modern warfare.

47. See Stockholm Declaration, *supra* note 21, art. 21 (stating in Principle 2 that "states have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction").

48. See, e.g., Berat, *supra* note 27, at 338-40 (discussing the right to a healthy environment as deserving the status of *jus cogens*); Caggiano, *supra* note 5, at 500-03 (noting the world community's recognition of state responsibility to protect the environment from the effects of war); Leibler, *supra* note 27, at 70 (asserting that state responsibility for environmental damage has become a customary norm in international law).

Specific examples of state responsibility can be found in conventional sources. See, e.g., 1982 United Nations Convention on the Law of the Sea, U.N. Doc A.CONF.62/122, reprinted in UNITED NATIONS, OFFICIAL TEXT OF THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA WITH ANNEXES AND INDEX, U.N. Sales No. E.83.V.5 (1983) (mandating in Article 235(1) that "states are responsible for the fulfillment of their international obligations concerning the protection and preservation of the marine environment"); Convention on Long-Range Transboundary Air Pollution, Nov. 13, 1979, T.I.A.S. No. 10541, reprinted in 18 I.L.M. 1442 (dictating that States have the responsibility to limit air pollution); Vienna Convention for the Protection of the Ozone Layer, opened for signature Mar. 27, 1985, reprinted in 26 I.L.M. 1516 (recommending that States should take appropriate measure to protect the ozone layer).

mass destruction. States must strive to reach prompt agreement, in the relevant international organs, on the elimination and complete destruction of such weapons."⁴⁹ Both the World Charter for Nature and the Rio Declaration take positions similar to the Stockholm Declaration. As a general principle, the World Charter for Nature dictates that "nature shall be secured against degradation caused by warfare or other hostile activities."⁵⁰ Furthermore, the Rio Declaration indicates that international law should guide States to protect the environment in wartime and that States will, when necessary, reevaluate this framework.⁵¹ Although these principles are not binding on States,⁵² the widespread approval of these resolutions indicates that state responsibility applies in modern warfare.⁵³

ILC Draft Articles on State Responsibility provide additional evidence of States' accountability for their environmental destruction.⁵⁴ As a general principle, the ILC Draft Articles proclaim that "every internationally wrongful act of a State entails the international responsibility of that State."⁵⁵ Moreover, the elements necessary to constitute an "internation-

49. Stockholm Declaration, *supra* note 21, princ. 26.

50. *World Charter for Nature*, *supra* note 29, General Princs.

51. Rio Declaration, *supra* note 40, princ. 24 (stating that "[w]arfare is inherently destructive of sustainable development" and that "[s]tates shall therefore respect international law providing for the protection of the environment in times of armed conflict and cooperate in its further development, as necessary.").

52. Leibler, *supra* note 27, at 70 (expressing that the United Nation's Declarations are not legally binding); Caggiano, *supra* note 5, at 502 (indicating that the General Assembly Resolutions are merely recommendations and not *per se* legal restrictions); see U.N. CHARTER art. 14 reprinted in 1970 U.N.Y.B. 1001, 1003, U.N. Sales No. E.72.I.1 (providing that the "General Assembly may recommend measures for peaceful adjustment of any situation").

53. See Caggiano, *supra* note 5, at 503 (holding States accountable for the effects of modern warfare); Leibler, *supra* note 27, at 75 (concluding that state responsibility for environmental damage applies at wartime).

54. ILC DRAFT ARTICLES, *supra* note 45.

55. *Id.* art. 1. Commentary to the Draft principles affirms that the principles of international responsibility of States is based on state practice and judicial decisions. *Id.* In particular, the ILC cites as authority such cases as *S.S. Wimbledon* (France, G.B., Jap., It. v. Germany), 1923 P.C.I.J., (ser. A) No. 1, at 15 (holding Germany internationally responsible to uphold treaty obligations); *Case Concerning the Factory at Chorzow* (Germany v. Poland), 1927 P.C.I.J., (ser. A) No. 17, at 29 (finding that a state is internationally responsible not to breach a convention); *Corfu Channel Case* (United Kingdom v. Albania), 1949 I.C.J. 23 (concluding that Albania is responsible under international law for explosions in Albanian waters damaging U.K. vessels and killing U.K. seamen).

ally wrongful act" include "conduct consisting of an act or omission . . . attributable to the State under international law" that "constitutes a breach of an international obligation of the State."⁵⁶

The ILC Draft Articles extend further by explicitly delineating international crimes and international delicts.⁵⁷ In particular, Article 19 characterizes an international crime, as a "breach by a State of an international obligation so essential for the protection of fundamental interests of the international community," which may result from a breach of the obligation of "*safeguarding and preserv[ing] . . . the human environment*, such as those prohibiting massive pollution of the atmosphere or of the seas."⁵⁸

The ILC Draft Articles elaborate on the customary principles espoused by the Stockholm Declaration and its progeny. At least one commentator criticized the ILC Draft Articles, however, for not effectively deterring environmental damage in times of war.⁵⁹ One critic argued that state responsibility under the ILC Draft Articles merely imposes a threat of post-war financial obligations that States virtually overlook in order to fulfill legitimate military objectives.⁶⁰ In other words, the benefits of effectively meeting military objectives and conducting operations during armed conflicts outweighs the economic costs involved in protecting the environment.

Assuming international law addresses State responsibility for environmental destruction, the issue arises whether state responsibility realistically applies to deliberate environmental modification. In many instances, the law affords military commanders wide latitude in targeting and operations, much to the detriment of the environment. As a result, this Article examines other regimes for environmental protection.

56. ILC DRAFT ARTICLES, *supra* note 45, at 49.

57. See *id.* at 179 (stating in Paragraph I that "[a]n act of a State which constitutes a breach of an international obligation is an internationally wrongful act, regardless of the subject-matter of the obligation breached"). Furthermore, "[a]n internationally wrongful act which results from the breach by a State of an international obligation so essential for the protection of fundamental interests of the international community that its breach is recognized as a crime by that community as a whole constitutes an international crime." *Id.*

58. *Id.* at 179-80.

59. Leibler, *supra* note 27, at 77 (indicating that the general principle of state responsibility will not play a primary deterrent role during war, but rather, will serve its function in the context of post-war reparations).

60. *Id.*

B. INTERNATIONAL ENVIRONMENTAL LAW IN ACTION:
PREVENTING HOSTILE ENVIRONMENTAL MODIFICATION

The U.S. use of incendiary weapons in Vietnam and reports of U.S. attempts to manipulate weather in Indo-China to hamper land movement in North Vietnam provided the catalyst for the promulgation of the 1977 United Nations Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (En-Mod).⁶¹ Furthermore, the principles of state responsibility that the Stockholm Declaration and its progeny espoused provide a theoretical basis for the creation of En-Mod.⁶² This section examines the scope of the Convention and questions whether En-Mod itself is enough to curtail deliberate environmental damage. To advance that inquiry, this section examines the terms and prohibitions under the convention, as well as its ultimate utility in altering state actions and behavior in times of war.

Prior to framing En-Mod, various States studied and examined the plausible scope of the Convention.⁶³ One particular analysis reviewed

61. Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, May 18, 1977, 31 U.S.T. 333, 1108 U.N.T.S. 152, *reprinted in* 16 I.L.M. 88 [hereinafter En-Mod], *also reprinted in* DOCUMENTS ON THE LAW OF WAR 377-85 (Adam Roberts & Richard Guelff eds., 2d ed. 1989) [hereinafter DOCUMENTS]. According to E. F. Roots, further background of En-Mod is based on non-military concerns including technological modification, including cloud seeding by both the United States and Canada. Roots, *supra* note 1, at 13.

62. *Cf.* Leibler, *supra* note 27, at 82 (outlining the obligations En-Mod places on States not to engage in military or other activities hostile to the environment); Roots, *supra* note 1, at 17 (discussing the 1972 U.N. Stockholm Conference's position stating that domestic actions should not adversely affect other State's environments).

63. *See* DOCUMENTS, *supra* note 61, at 377 (citing the Nixon-Brezhnev Summit in Moscow on July 3, 1974 where the United States and U.S.S.R. agreed to consider the dangers of environmental warfare); Roots, *supra* note 1, at 18-20 (explaining Canada's response in the negotiations to formulate an environmental modification regime was to establish a scientific group to examine and assess the plausibility and reality of the potential hostile uses of the environment). This assessment included establishing which categories of deliberate environmental modification might be useful for military purposes, and what methods could become potential instruments of warfare in the near future. *Id.* at 18-19. *See also* WARFARE IN A FRAGILE WORLD: MILITARY IMPACT ON THE HUMAN ENVIRONMENT, STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE (1980) (citing Ernő Mészáros, *Techniques for Manipulating the Atmosphere*, in ENVIRONMENTAL WARFARE: A TECHNICAL, LEGAL AND POLICY APPRAISAL 13 (Arthur H. Westing ed., 1984) and Hallan C. Noltimier, *Techniques for Manipulating the Geosphere*, in ENVIRONMENTAL WARFARE: A TECHNICAL, LEGAL AND POLICY APPRAISAL, at 25 (examining the effects of warfare on temperate, tropical, desert, and arctic regions, islands, and the ocean).

five main categories of potential environmental modification targets,⁶⁴ including the environmental effects of nuclear warfare; deliberate modification of the weather for purposes of causing events such as drought, forest fires, and climatological changes;⁶⁵ modification of ecosystems including forest destruction and soil contamination;⁶⁶ modification of geophysical processes such as earthquakes and volcanic eruptions;⁶⁷ and modification of ocean conditions, such as alterations affecting currents and causing persistent fog.⁶⁸

Given these possibilities and concerns, Article I of the agreement enunciates the central obligation of each state to not "engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party."⁶⁹ Furthermore, Article II defines "environmental modification techniques" as "any technique for changing-through the deliberate manipulation of natural process-the dy-

64. See Roots, *supra* note 1, at 18 (discussing the five-category analysis of potential environmental targets).

65. *Id.* at 29-30 (examining the growing practice of artificially-induced weather modification). This practice has led to the possibility of localized "rain-making," which in principle could be used to enhance rainfall or snowfall in selected areas in order to increase the chance of avalanches and major floods in enemy territory. *Id.* Moreover, there may come a time when the use of toxic chemicals in order to form acid precipitation or destroy the stratospheric ozone layer will alter atmospheric chemistry. *Id.*

66. *Id.* This category includes scorched earth actions such as the intentional destruction of forests and farm lands in Finland and Norway during the Second World War, and deliberate defoliation of forests during the Vietnam War. *Id.* In addition, another important aspect of this subject is the possibility of biological warfare introducing human-influenced biological threats or nuisances into the ecological system of targeted States. *Id.* Examples of biological warfare include introducing bee parasites to destroy bee populations in areas where they are essential to pollinate vital crops, and creating "red tide" toxic algae that causes damage to coastal regions. *Id.* at 26-27, 31.

67. *Id.* at 25. Although this modification may seem more like science fiction than reality, theoretically, States can use both earthquakes and tsunamis for military purposes. Despite the fact that most earthquakes occur in localized, well-defined locations, there are a number of "trouble spots" around the world where military tensions are high that are also prone to earthquakes. Thus the temptation for States to use earthquakes for military purposes exists. *Id.*

68. *Id.* at 32. A vital military strategy may utilize changes in ocean currents and marine conditions, given the distinct changes in oceanic characteristics such as global warming, changes in precipitation, and river runoff. The continuity and strength of the Gulf Stream in the North Atlantic Ocean, and in the ice conditions and drift patterns in the waters near Greenland and north of Russia, are foreseeable military targets. *Id.*

69. En-Mod, *supra* note 61, art. 1.

namics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space."⁷⁰

Semantically, the Articles imply that the modification must be large-scale.⁷¹ A Geneva Conference of the Committee on Disarmament Understanding (CCD Understanding) opined that examples of large-scale modification included: "earthquakes; tsunamis; an upset in the ecological balance of a region; changes in weather patterns (clouds, precipitation, cyclones of various types, and tornadic storms); changes in climate patterns; changes in ocean currents; changes in the states of the ozone layer; and changes in the state of the ionosphere."⁷²

The En-Mod Convention defines the quantum of damage necessary to fall within its scope as "widespread, long-lasting, or severe effects."⁷³ The disjunctive phrasing of the effect is important, meaning the presence of any one of these elements will suffice.⁷⁴ The problem, however, centers on the interpretation of each of the elements, since the Convention itself does not define them.⁷⁵ Another CCD Understanding accompanying Article I does, however, provide the following:

- (a) "Widespread": encompassing an area on the scale of several hundred square kilometers;
- (b) "Long-lasting": lasting for a period of months, or approximately a season;
- (c) "Severe": involving serious or significant disruption or harm to human life, natural and economic resources or other assets.

It is further understood that the interpretation set forth above is intended exclusively for this Convention and is not intended to prejudice the inter-

70. *Id.* art. 2.

71. Leibler, *supra* note 27, at 82-83.

72. See Understanding I of the Conference of the Committee of Disarmament, reprinted in DOCUMENTS, *supra* note 61, at 377 [hereinafter Understanding I] and Understanding II of the Conference of the Committee on Disarmament, reprinted in DOCUMENTS, *supra* note 61, at 378 [hereinafter Understanding II] (discussing the types of environmental modification techniques within the scope of En-Mod); see also *supra* notes 61-64 and accompanying text (discussing the potential environmental modification techniques that these targets pose).

73. En-Mod, *supra* note 61, art. 1. See Leibler, *supra* note 27, at 82 (detailing the elements of Article 1).

74. Stephanie N. Simonds, Note, *Conventional Warfare and Environmental Protection: A Proposal for International Legal Reform*, 29 STAN. J. INT'L L. 165, 186 (1992); Leibler, *supra* note 27, at 82-83.

75. See Leibler, *supra* note 27, at 83 (expressing that Article 1 of En-Mod does not indicate how severe or how widespread the damage must be).

pretation of the same or similar terms if used in connection with any other international agreement.⁷⁶

All of the signatories to the En-Mod Convention have not necessarily adopted this interpretation. For example, Turkey stated that "the terms . . . contained in the Convention need to be more clearly defined. So long as this clarification is not made [Turkey] will be compelled to interpret itself the terms in question and consequently it reserves the right to do so as and when required."⁷⁷ The central obligation of the En-Mod is also unclear regarding the phrase "as the means of destruction, damage or injury" because the phrase raises serious questions regarding an offending State's intention to cause the damage.⁷⁸ On the one hand, one interpretation of the phrase would allow a State to fully escape responsibility by asserting a lack of intention in causing any of the environmental damage.⁷⁹ On the other hand, if a State admits to intentionally causing a portion of the environmental damage, the State could also be liable for the excess amount of damage unforeseen or unintended.⁸⁰ Nevertheless, at least one commentator suggests that the international community should hold States responsible for any damage whether or not intentional.⁸¹ Moreover, even if States could establish a defined threshold or quantum of damage, critics have identified an exacerbating problem: the subjective aspect of determining when a breach of duty actually occurs.⁸² In other words, it is unclear who will judge the degree of severity or the degree to which the environmental modification was a deliberate act for hostile purposes. Moreover, it is unclear whether the party who makes the judgment will judge the acts separately, in terms of single military operations or campaigns, or whether it will weigh cumulative effects. As a result, the vague terminology of En-Mod undermines its value because it does not provide clear standards by which to judge state actions in wartime.

Furthermore, En-Mod has failed to actively alter state behavior in times of armed conflict. Only after the modification occurs will the

76. See Understanding I, *supra* note 72, at 377-78 (defining the terms "widespread," "long-lasting," and "severe").

77. Leibler, *supra* note 27, at 83.

78. *Id.*

79. *Id.*

80. *Id.*

81. *Id.*

82. E. F. Roots, *The Enmod Convention and Related International Agreements: The Changed Setting in Which They Must Operate*, in *VERIFYING OBLIGATIONS*, *supra* note 1, at 203.

governing body determine whether a State breached the Convention; therefore, there is some question as to whether the Convention acts to prevent deliberate environmental modification.⁸³ Moreover, the Convention prohibits only the use of the techniques, not research.⁸⁴ Thus, a State may continually develop methods to modify the environment for military purposes.⁸⁵ Finally, the question remains as to whom the Convention applies.⁸⁶ For example, upon accession to En-Mod, Kuwait stated that the Convention only binds it toward signatory States, and that Kuwait's obligations under En-Mod end with respect to a hostile State that does not abide by the Convention's prohibitions.⁸⁷

Finally, the extent of responsibility for breaches of En-Mod merits consideration. The terms of the Convention do not provide any obligation for remedial measures, such as reparation or monetary compensation.⁸⁸ Instead, Article 5(2) requires the United Nations Secretary-General to convene a Consultative Committee of Experts at the request of any State.⁸⁹ Yet, critics argue that the Consultative Committee lacks any substantive authority.⁹⁰ As a result, these critics view the lack of enforcement for breaches of En-Mod as compounding the ineffectiveness of the Convention.⁹¹

The ambiguity in language, divergence in interpretations, and the lack of enforcement measures resulted in few States ratifying En-Mod.⁹²

83. *Id.*

84. Simonds, *supra* note 74, at 186-87.

85. *Id.* at 186-87. Moreover, Party States may arguably use environmental techniques against Non-party States, and perhaps against a State's own population without violating the terms of En-Mod. *Id.*

86. *See id.* at 187 (stating that environmental modification techniques may be used against non-party States and perhaps a state's own population).

87. En-Mod, *supra* note 61, Reservations.

88. *See* Leibler, *supra* note 27, at 84 (discussing the responsibility of States under the En-Mod Convention); *see also* Simonds, *supra* note 74, at 187 (explaining how En-Mod Convention's investigatory body is powerless and how a complaining State must sue an offending State before the Convention takes action).

89. En-Mod, *supra* note 61, art. 5(2).

90. *See* Simonds, *supra* note 74, at 187 (stating that the Consultative Committee of Experts is relatively powerless); Leibler, *supra* note 27, at 84 (indicating that the committee is not authorized to draw legal conclusions, vote on matters of substance, or impose liability).

91. Leibler, *supra* note 27, at 84.

92. Simonds, *supra* note 74, at 187. As of June 1994, only 68 States have ratified En-Mod. UNITED STATES DEPARTMENT OF STATE, TREATIES IN FORCE: A LIST OF TREATIES AND OTHER INTERNATIONAL AGREEMENTS OF THE UNITED STATES IN FORCE ON JANUARY 1, 1994 (1994).

Despite the concerns and criticisms of the Convention, its form and substance remain intact after several review conferences.⁹³ The following sections determine whether States can more efficiently curtail environmental modification and the use of the environment as a weapon of war by using other limiting principles and organs.

II. CUSTOMARY PRINCIPLES OF THE LAW OF ARMED CONFLICT

The codification of norms and standards concerning armed conflict reinforces the customary principles of international law that States recognize.⁹⁴ These customary principles have played a key role in the development of the conventional sources that comprise the international laws of armed conflict.⁹⁵ Thus, examining these customs and their relevant *limitations* on the waging of war is of great importance.⁹⁶ The Martens Clause, which first appeared in the Preamble to the 1899 Hague Convention II, has expressly enunciated the significance of custom governing the use of force. This provision states in part that "the high contracting parties think it right to declare that . . . populations and belligerents remain under protection and empire of the principles of international law, as they result from the usages established between civilized nations, from the laws of humanity and the requirements of public conscience."⁹⁷ Later codifications of law adopted similar language, evidencing the relevance of this passage.⁹⁸ Most importantly, in

93. DOCUMENTS, *supra* note 61, at 378. The first review conference was held in September 1984 in Geneva where no amendments were made by any state party. *U.S. Urges No Change in Environment Arms Treaty*, Reuters, Sept. 15, 1992, available in LEXIS, INTLAW Library, INT-NEWS File. Moreover, in 1992, the State parties favorably reviewed the content and form of the En-Mod Convention. *Id.* According to U.S. delegate Michael Moodie, "[a]mendments are likely to do more harm than good, whether they amend the treaty directly or have the functional effect of an amendment through attempted reinterpretation." *Id.*

94. DOCUMENTS, *supra* note 61, at 4.

95. See Simonds, *supra* note 74, at 168-70 (explaining how the four customary law principles of proportionality, humanity, discrimination, and military necessity regulate wartime conduct not addressed in treaties); Caggiano, *supra* note 5, at 498-500 (describing how the customary Law of War forbids the use of some tactics and weapons, even if they are needed to win a war).

96. See *supra* note 27 and accompanying text (discussing what constitutes customary international law).

97. DOCUMENTS, *supra* note 61, at 4.

98. *Id.* See Hague Convention No. IV Respecting the Laws and Customs of War

times of armed conflict, combatants do not have an unlimited right to adopt any means necessary to injure the enemy.⁹⁹ The customary principles of proportionality and discrimination adopt this fundamental principle and form its foundation.

A. PROPORTIONALITY AND DISCRIMINATION

Proportionality, on the one hand, requires that the use of force be relative to the objective sought.¹⁰⁰ In other words, the means the combatants employ in armed conflict must be balanced against the overall strategic end or pursued objective. Discrimination, on the other hand, incorporates "care in the selection of methods, of weaponry, and of targets."¹⁰¹ Under this doctrine, strategy must distinguish those targets that are legitimate military objectives from those that are civilian targets.¹⁰² As a result, the principle of discrimination forbids the wanton

on Land, Oct. 18, 1907, pmbl., *reprinted in* DOCUMENTS, *supra* note 61, at 44 [hereinafter 1907 Hague Convention IV] (providing the text of the 1907 Hague Convention IV). The 1907 Hague Convention provides for almost identical language in its Preamble. *Id.* Furthermore, each of the four 1949 Geneva Conventions borrows similar terminology from the Marten's Clause and asserts that even if a party denounces the Convention, this:

shall in no way impair the obligations which the Parties to the conflict shall remain bound to fulfil by virtue of the principles of the law of nations, as they result from the usages established among civilized peoples, from the laws of humanity and the dictates of the public conscience.

1949 Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field of August 12, 1949, art. 63, *reprinted in* DOCUMENTS, *supra* note 61, at 171, 192; 1949 Geneva Convention II for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of the Armed Forces at Sea, art. 62, *reprinted in* DOCUMENTS, *supra* note 61, at 194, 213; 1949 Geneva Convention III Relative to the Treatment of Prisoners of War, art. 142, *reprinted in* DOCUMENTS, *supra* note 61, at 216, 270; 1949 Geneva Convention IV Relative to the Protection of Civilian Persons in Time of War, art. 158, *reprinted in* DOCUMENTS, *supra* note 61, at 272, 325.

99. DOCUMENTS, *supra* note 61, at 5.

100. See Caggiano, *supra* note 5, at 495 (explaining how the military means used must be in proportion to the overall objective); Capt. William A. Wilcox, Jr., *Environmental Protection in Combat*, 17 S. ILL. U. L.J. 299, 303 (1993) (defining proportionality as a balancing test with military objectives on the one hand, and unnecessary suffering on the other).

101. DOCUMENTS, *supra* note 61, at 5.

102. Caggiano, *supra* note 5, at 495.

attack of civilians.¹⁰³ Arguably, this principle forbids acts or threats if their primary purpose is to terrorize civilian populations.¹⁰⁴

Customary principles governing armed conflict, furthermore, transcend the doctrines of proportionality and discrimination by amalgamating the two to establish further sources of standards in times of war.¹⁰⁵ Three notions underlie these doctrines: (1) the principle of military necessity; (2) the principle of humanity; and (3) the principle of chivalry.¹⁰⁶ The definitions of these three notions are as follows:

1. Only that degree and kind of force, not otherwise prohibited by the law of armed conflict, required for the partial or complete submission of the enemy with a minimum expenditure of time, life, and physical resources may be applied.
2. The employment of any kind of degree of force not required for the purpose of the partial or complete submission of the enemy with a minimum expenditure of time, life, and physical resources is prohibited.
3. Dishonorable (treacherous) means, dishonorable expedients, and dishonorable conduct during armed conflict are forbidden.¹⁰⁷

B. THE DOCTRINE OF MILITARY NECESSITY

Military necessity provides that "a combatant is justified in applying any force necessary to secure complete submission of the enemy as soon as possible-as long as the means are not prohibited by the provisions of the law of war."¹⁰⁸ This generalization can be parsed into four primary elements:

1. That the use of force is capable of being and is in fact regulated by the user;
2. That the use of force is necessary to achieve as quickly as possible the partial or complete submission of the adversary;
3. That the force is no greater in effect on the enemy's personnel or property than needed to achieve his prompt submission; and
4. That the force used is not otherwise prohibited.¹⁰⁹

103. Andrew D. McClintock, Comment, *The Law of War: Coalition Attacks on Iraqi Chemical and Biological Weapon Storage and Production Facilities*, 7 EMORY INT'L L. REV. 633, 646 (1993).

104. *Id.* at 646-47.

105. DOCUMENTS, *supra* note 61, at 5.

106. *Id.*

107. *Id.*

108. Wilcox, *supra* note 100, at 302.

109. McClintock, *supra* note 103, at 641.

Commentators suggest that the doctrine of military necessity provides a loophole or excuse for the justification of suspending the laws of war.¹¹⁰ As this Article illustrates, this principle of military necessity, found in codifications governing the waging of war, has allowed substantive exceptions to their prohibitions by providing combatants with a means to suspend the laws of armed conflict.

C. UNNECESSARY SUFFERING: THE PRINCIPLES OF HUMANITY AND CHIVALRY

The principles of humanity and chivalry gave rise to the concept of unnecessary suffering.¹¹¹ In general, unnecessary suffering means that military forces must take all necessary steps to avoid "inflicting superfluous suffering, injury or destruction that harm 'not actually necessary for the accomplishment of legitimate military purposes.'"¹¹² Thus, this precept requires acceptance of the enemy's surrender; demands that combatants not attack civilian objects; and forbids the use of armaments that cause effects more deleterious than necessary.¹¹³

Relevant Conventions include the customary principles governing the law of armed conflict, underscoring their significance. In many instances, these precepts limit the rule's applicability to environmental protection, in terms of human concerns, rather than for environmental concerns, and provide substantive loopholes for combatants to wage environmental destruction.¹¹⁴

110. See INGRID D. DE LUPIS, *THE LAW OF WAR* 332-33 (1987) (explaining that military necessity transforms acts that would normally be war crimes into legitimate acts); McClintock, *supra* note 103, at 641-45 (discussing how the doctrine of military necessity provides a justification for the use of force not prohibited by international law, if such force is needed to secure military ends with the least amount of human and economic injury).

111. See Wilcox, *supra* note 100, at 303 (explaining how the principles of chivalry and humanity prohibit use of dishonorable means or force not needed for military purposes).

112. McClintock, *supra* note 103, at 645.

113. *Id.* at 645-46.

114. See Leibler, *supra* note 27, at 98-105 (stating that the inclusion of the customary principles into the relevant conventions is to the environment's detriment); Simonds, *supra* note 74, at 168-70 (positing that States may be able to justify environmental damage by grounding their actions in terms of customary principle such as military necessity).

III. ENVIRONMENTAL PROTECTION AND THE LAW OF WAR

The collective set of conventions and agreements comprising the laws of armed conflict incorporates many of the customary sources of international law concerning the waging of war. The corpus of law in war, or *jus in bello*, generally governs the conduct of hostilities.¹¹⁵ This set contains a dichotomy of standards: the sections of "Hague" and "Geneva" international humanitarian laws. The "Hague," on the one hand, seeks to set limits on the means and methods of warfare by restricting weapon types and usage, as well as monitoring the tactics and the employment of general operational methods.¹¹⁶ On the other hand, "Geneva" law focuses on the protection of combatants and non-combatants.¹¹⁷

The following section introduces the relevant provisions of the international laws of armed conflict and the scope of protection afforded to the environment. These provisions provide a framework for analyzing the legality of deliberate environmental modification through the use of biological and chemical toxins.¹¹⁸ The provisions offer a limited scope of protection in many of the specific instances that this section illustrates (that is, the protection of property; objects indispensable to the survival of the civilian population; and works and installations containing dangerous forces). The laws of armed conflict are subject to divergent interpretations of substantive language, and subject to exceptions as in legitimate targeting through military necessity. The main purposes behind the established conventions are to protect *human* life, and ameliorate *human* suffering. As a result, the conventions are devices that provide only collateral or indirect protection to the environment.¹¹⁹

115. HILARE MCCOUBREY & NIGEL D. WHITE, *INTERNATIONAL LAW AND ARMED CONFLICT* 189 (1992).

116. *Id.*

117. *Id.*

118. See discussion *infra* Section VI.C. (proposing that the legality of chemical and biological weapons use rests partly on conventional sources which provide a scope of protection for the environment); Leibler, *supra* note 27, at 96-117 (considering the conventional sources of the Laws of Armed Conflict as a basis for understanding deliberate environmental damage in times of war).

119. Cf. GLEN PLANT, *ENVIRONMENTAL PROTECTION AND THE LAW OF WAR* 246-47 (1992) (noting the need "to update existing Geneva and Hague Law to improve the protection afforded to the environment...").

A. PROTECTING THE ENVIRONMENT THROUGH THE PROTECTION OF PROPERTY

1. The 1907 Hague Convention

Convention IV Respecting the Laws and Customs of War on Land (Convention IV) adopted in 1907 provides a degree of protection to the environment. Yet, this Convention affords only a limited scope of protection. Moreover, in many respects the protection afforded to the environment is merely incidental to humanitarian concerns.

The most relevant sections of Convention IV are Article 23(a), which prohibits the use of poisonous weapons; Article 23(b), which prevents the unnecessary suffering of civilians and combatants; and Article 23(g), which provides limited preservation of property.¹²⁰ Though offering a degree of protection to the environment, reliance on these provisions is dubious. For example, Article 23(g) forbids the destruction of the enemy's property "unless such destruction or seizure be imperatively demanded by the necessities of war."¹²¹ This provision fails to provide adequate protection for several reasons. First, it is difficult to rely on this provision because its application to a modern military context is unclear. At least one commentator has suggested that historically the Convention directs use of specific armaments, such as the poison weapons Article 23(a) proscribes, more toward combatants instead of directly toward the environment.¹²² As a result, this provision intimates an approach to protecting the environment that is only incidental to ameliorating human casualties. By inference, then, so long as military forces avoid the threat of destroying human life, targeting the environment may be legitimate.

Second, there is difficulty in ascertaining the scope of the protection afforded under Article 23(g), which protects "property" of the enemy

120. Caggiano, *supra* note 5, at 486; 1907 Hague Convention IV, *supra* note 98, art. 23. The particular provisions provide:

[I]t is . . . forbidden —

(a) to employ poison or poisoned weapons;
(b) to kill or wound treacherously individuals belonging to the hostile nation or army;

. . .

(g) to destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war.

Id.

121. 1907 Hague Convention IV, *supra* note 98, art. 23(g).

122. Caggiano, *supra* note 5, at 86-87.

state. One commentator construed property, in its plain meaning, to mean land and the immediate airspace.¹²³ Yet, this definition does not necessarily provide coverage for the destruction of the upper atmosphere or outer space.¹²⁴

Finally, Article 23(g) gives way to the doctrine of military necessity. For example, in the Second World War, the German General Lothar Rendulic adopted a scorched earth policy in Norway in order to evade advancing Russian troops.¹²⁵ General Rendulic ordered the evacuation of all inhabitants in the province of Finmark, and destroyed all villages and surrounding facilities.¹²⁶ The Nuremberg Military Tribunal charged General Rendulic with wanton destruction of property, but later acquitted him on the basis that military necessity justified his actions in light of the military situation as he perceived it at the time.¹²⁷

2. The Fourth Geneva Convention of 1949

The Fourth Geneva Convention concerning the protection of civilians provides a similar scope of protection of property as its Hague counterpart.¹²⁸ According to Article 53, "[a]ny destruction by the Occupying

123. See Simonds, *supra* note 74, at 171 (describing how international law defines property as land and airspace, but makes no rule regarding outer space).

124. See Westing, *supra* note 13, at 647-50 (discussing how the significance of this proposition is based on the possibility of atmospheric modification, whereby combatants may attempt to control weather patterns and other atmospheric factors such as ultraviolet protection over enemy territory by tampering with their physical properties).

125. Robert E. Jordan III, in *LAW AND RESPONSIBILITY IN WARFARE: THE VIETNAM EXPERIENCE* 54, 57 (Peter D. Trooboff ed., 1975).

126. *Id.*

127. See *United States v. List*, XI Trials of War Criminals Before the Nuremberg Military Tribunals 757, 1295-97 (1946-49) (stating that although, in retrospect, General Rendulic may have erred in his assessment of military necessity, he was not guilty of a criminal act because the doctrine of military necessity may be justified by one's reasonable assessment of the situation).

128. Geneva Convention Relative to the Protection of Civilian Persons in Time of War, Aug. 12, 1949, art. 53, 75 U.N.T.S. 31-83 (1950), *reprinted in* DOCUMENTS, *supra* note 61, at 290 [hereinafter Civilian Protection Convention]. After World War II, much of the turmoil surrounding the war confirmed the need to fashion a new set of guidelines because former codifications failed to provide adequate protection. *Id.* In many ways, the former codifications failed to provide clear and sufficient terms; in those areas where relative clarity existed, violations nonetheless continued. *Id.* In 1949, a diplomatic conference in Geneva approved four conventions whose central purpose was the protection of victims of war. *Id.* The four Geneva Conventions deal with the Amelioration of the Condition of the Wounded and Sick in Armed Forces in

Power of real or personal property belonging individually or collectively to private persons, or to the State, or to other public authorities, . . . is prohibited, except where such destruction is rendered absolutely necessary by military operations."¹²⁹ Furthermore, Article 33 of the Convention prohibits the pillage of property and outlaws reprisals against protected individuals and their property.¹³⁰

The deficiencies of this Convention are similar to those found in the 1907 Hague Convention with its inclusion of similar language on the doctrine of military necessity, which effectively provides an adequate justification for the suspension of the prohibitions in Article 53. A further limitation on the scope of the prohibition, the inclusion of the qualifying phrase "occupying power," exacerbates the defect. The plain meaning of this phrase limits the prohibition of Article 53 to those instances when a state is actually within or "occupying" another state. As one commentator has noted, the prohibition does not provide coverage for instances of aerial bombing because arguably, the enemy force is not "occupying" the target state.¹³¹

B. PROTOCOL I TO THE 1949 GENEVA CONVENTIONS

Despite its central focus on the protection of victims of armed conflict, the 1977 Geneva Protocol I Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I) provides a modern approach to protecting the environment.¹³² The Protocol's provisions restricting war-

the Field, the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea, the Treatment of Prisoners of War, and the Protection of Civilian Persons in Time of War. *Id.* The Fourth Convention pertaining to the protection of civilians is relevant to this Article.

129. Civilian Protection Convention, *supra* note 128, art. 53.

130. *Id.* art. 33.

131. Leibler, *supra* note 27, at 106.

132. Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts, June 8, 1977 reprinted in DOCUMENTS, *supra* note 61, at 389 [hereinafter Protocol I]; DOCUMENTS, *supra* note 61, at 387. Following the adoption of the four Geneva Conventions in 1949, developments in the character and modes of warfare led to the realization that the international laws of armed conflict required further adaptation. *Id.* By the late 1960s, efforts to reaffirm and develop a new set of rules made headway under the auspices of the International Committee of the Red Cross (ICRC). *Id.* By 1977, the strides made by the ICRC and various conferences led to the adoption of two Protocols to the 1949 Geneva Conventions: (1) relating to the protection of victims of

fare provide: (1) protection of objects indispensable to the survival of the civilian population;¹³³ (2) protection of works and installations containing dangerous forces;¹³⁴ and (3) general protection of the natural environment.¹³⁵

1. Protection of Objects Indispensable to the Survival of the Civilian Population

In its provision of protection to "objects indispensable to the survival of the civilian population," Article 54 of Protocol I states that belligerents "may not attack, destroy, remove or render useless" those indispensable objects.¹³⁶ Article 54 explicitly enumerates a list of targets that are protected, including "foodstuffs, agricultural areas, crops, livestock, [and] drinking water installations."¹³⁷

To the extent that belligerents follow these prohibitions, some degree of environmental protection results. Article 5, however, qualifies these prohibitions.¹³⁸ First, the language of the Article protects only those objects that are indispensable to "the survival of the *civilian population*." This qualification is significant because, by inference, belligerents may legitimately destroy those objects or facets of the natural environment that are not necessary for the survival of the civilian population.¹³⁹

international armed conflict; and (2) relating to the protection of victims of non-international armed conflicts. *Id.*

133. Protocol I, *supra* note 132, art. 54.

134. *Id.* art. 56.

135. *Id.* arts. 35(3) and (55).

136. *Id.* art. 54(2).

137. *Id.*

138. Protocol I, *supra* note 132, arts. 54(3) and 54(5). Articles 54(3) and 54(5) provide in part that:

54(3) The prohibitions . . . shall not apply to such of the objects covered by it as are used by an adverse Party:

(a) as sustenance solely for the members of its armed forces; or

(b) if not as sustenance, then in direct support of military action, provided however, that in no event shall actions against these objects be taken which may be expected to leave the civilian population with such inadequate food or water as to cause its starvation or force its movement . . .

54(5) In recognition of the vital requirements of any Party to the conflict in the defence of its national territory against invasion, derogation from the prohibitions . . . may be made by a Party to the conflict within such territory under its own control where required by imperative military necessity.

Id.

139. See Leibler, *supra* note 27, at 107 (arguing that objects indispensable to the

Such legitimate purposes may include the destruction of the environment to prevent its use as cover, or to hinder an advancing enemy force.¹⁴⁰

Paragraph 3 offers another exception. Those objects such as crops and livestock that enemy forces use may be lawfully destroyed, so long as the objects are solely for the use of members of the enemy armed forces or "in direct support of military action."¹⁴¹

The inclusion of the military necessity doctrine presents a third limiting factor. Paragraph 5 effectively permits a party under threat of conflict within its own territory to devastate its own environment out of the exigency of external invasion. Similar to military necessity, there is no bright-line test to determine the quantum of necessity to justify the destruction of the environment.¹⁴² Arguably, a party may conduct environmental destruction within its own territory under an apparent or imminent threat, absent actual invasion.

The narrow interpretation of Article 54's substantive language limits the scope of environmental protection. This is further exacerbated by the inclusion of the military necessity doctrine.

2. Protection of Works and Installations Containing Dangerous Forces

Article 56 provides protection to "[w]orks or installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations."¹⁴³ Moreover, the Article specifically provides that such objects "shall not be made the object of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population."¹⁴⁴

The protection afforded to these specified installations leaves little room for divergent interpretation. Paragraph 2 provides various scenarios in which military forces may attack these objects. Accordingly, the special protection shall cease:

sustenance of armed forces would be outside the scope of Article 54); Simonds, *supra* note 74, at 175-76 (interpreting Article 54 to allow destruction of civilian objects for purposes other than their survival).

140. Leibler, *supra* note 27, at 107.

141. Protocol I, *supra* note 132, art. 54(3).

142. See discussion *supra* Section II.B. (asserting that the doctrine of military necessity is often used to justify exceptions to the laws of armed conflict).

143. Protocol I, *supra* note 132, art. 56.

144. *Id.*

- (a) For a dam or dyke only if it is used for other than its normal function and in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support;
- (b) For a nuclear generating station only if it provides electric power in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support;
- (c) For other military objectives located at or in the vicinity of these works or installations only if they are used in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support.¹⁴⁵

The minimum threshold the Article requires in order for the installations to be legitimate targets can be parsed from these provisions. First, the installations must be used in regular, significant, and direct support of military operations. Second, the method of attack must be the only feasible means of terminating that support. Moreover, it is clear from the language that in the case of dams and dykes, an additional element must be met: the enemy forces must use the installations for purposes other than their normal functions.

The optimistic stance of Article 56 is not without criticism. First, the language limits the scope of its coverage to those types of installations the Article enumerates. As a result, oil wells and pumping stations, as well as chemical and biological weapons production facilities, are exempt from protection. The significance of this oversight is evident from the intentional destruction of these types of installations in the Gulf War by Iraqi and Coalition Forces.¹⁴⁶ Furthermore, at least one commentator has suggested that Article 56 has not yet gained acceptance as customary international law.¹⁴⁷

145. *Id.* art. 56(2).

146. See McClintock, *supra* note 103, at 636 (providing examples from the Persian Gulf War of aerial attacks on chemical and biological weapons producing facilities). Destruction of these volatile facilities likely produced grave effects for the surrounding environment, including the unintentional release of noxious agents. *Id.* at 637-38. Furthermore, as the author points out, other potential targets such as nuclear and agricultural/industrial chemical facilities present the same types of dangers as targeted biochemical weapons factories. *Id.*

147. Leibler, *supra* note 27, at 108-09. The author points out that in order to be incorporated into customary practice, there must be evidence of "constant and uniform" practice by States in abiding by these prohibitions. *Id.* Furthermore, support for this proposition is found in the fact that many States have had reservations to the adoption of Protocol I, thus frustrating an argument to the contrary. *Id.*

As a result, Article 56 provides limited protection to the natural environment. Given the narrow interpretation of the provision's language, and the implicit inclusion of the military necessity principle, combatants have wide latitude in targeting objectives which may adversely affect the environment.

3. General Protection of the Natural Environment

Protocol I, unlike its predecessors, makes explicit mention of environmental protection in substance. Article 35(3) states that "it is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment."¹⁴⁸ Similarly, Article 55 states that:

[C]are shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage. This protection includes a prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population.¹⁴⁹

To understand the significance of these provisions, this section discusses their importance relative to the context in which they are placed. Article 35 is placed within the scope of the permissible methods and means of warfare. In its most basic sense, this Article adopts the notion that the methods and means available to combatants are not unlimited.¹⁵⁰ Further adoption of customary principles governing the waging of war is evident from the language of paragraph 2, which prohibits "superfluous injury or unnecessary suffering."¹⁵¹ Article 35(3), placed within the context of these basic rules, supports an interpretation of general protection of the environment, unlike Article 55 which is placed within the framework of protecting the environment out of civilian needs.

Article 55 is placed within the ambit of civilian objects.¹⁵² The scope of the Article applies to the general protection of civilian objects defined in Article 52.¹⁵³ Furthermore, Article 55 adds the qualifying

148. Protocol I, *supra* note 132, art. 35(3).

149. *Id.* art. 55.

150. *Id.* art. 35(1).

151. *Id.* art. 35(2).

152. *Id.* ch. III.

153. Protocol I, *supra* note 132, art. 52. Paragraphs 2 and 3 dictate that:

language from its counterpart that prohibits destruction of the environment where "prejudice [to] the health or survival of the population" occurs.¹⁵⁴

Given this dichotomy of environmental protection, that is, one dealing with general protection, and the other concerning the indiscriminate effects of environmental destruction on human populations, it is apparent that Protocol I serves as a cornerstone of international cognizance for the need to protect the environment. Furthermore, unlike its preceding counterparts, Protocol I does not include language of military necessity, thus precluding arguments of proportionality relative to military objectives.

The inclusion of explicit articles that govern the protection of the environment is not free of frailties, however. An examination of the terms used in the relevant provisions reveals an ambiguity that is not easily ameliorated. The text of Protocol I fails to define "widespread," "long-term," or "severe." One may want to apply similar interpretations of these identical elements that the En-Mod Convention uses, but as the Conference of the Committee for Disarmament in its Understanding has dictated, such interpretations apply solely to En-Mod.¹⁵⁵ One commentator suggested that an interpretation of the terms could be as follows:

- (1) Widespread: encompassing at least an entire region of several hundred square kilometers;
- (2) Long-term: lasting at least several decades;
- (3) Severe: causing death, ill-health or loss of sustenance to thousands of people, at least at present or in the future.¹⁵⁶

(2) Attacks shall be limited strictly to military objectives. In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offer a definite military advantage.

(3) In case of doubt whether an object which is normally dedicated to civilian purposes, such as a place of worship, a house or other dwelling or a school, is being used to make an effective contribution to military action, it shall be presumed not to be so used.

Id.

154. *Id.* art. 55.

155. See discussion *supra* Section I.B. (providing En-Mod's interpretations of "widespread," "long-term," and "severe," but explaining that "En-Mod's interpretations are not meant to be used in connection with any other international agreements").

156. Leibler, *supra* note 27, at 111.

Such attempts to characterize the terms, however, are unavailing. The interpretation does not allow for general application, and a broader interpretation is not representative of an international consensus.¹⁵⁷ The difficulty in interpreting these terms is exacerbated because Protocol I does not embody customary international law as indicated by the numerous reservations that States have suggested upon signing the Convention. Therefore, given the variance in interpretations and reservations, the ambiguity of the language of Articles 35(3) and 55 remains unreconciled.

Another difficulty readily apparent from these provisions concerns the threshold of materiality of military operations a party must transcend to fit within the scope of prohibited activity. An examination of both Articles 35(3) and 55 reveals a conjunctive nature of the elements. Therefore, in order for a material breach of these articles to occur, all three elements, "widespread," "long-term," and "severe," must be present.

Furthermore, in terms of proscribing the use of biological and chemical weapons, commentators suggested that:

[Articles 35 and 55] will not impose any significant limitation on combatants waging conventional warfare. [They are] primarily directed at high level policy decision makers and would affect such unconventional means of warfare as the massive use of herbicides or chemical agents which could produce widespread, long-term, and severe damage to the natural environment.¹⁵⁸

Such a statement, however, is a fallacy because the drafters did not intend the Protocol to apply to chemical, biological, and nuclear warfare.¹⁵⁹

Protocol I has further insufficiencies. In many ways, the language of the relevant Articles is *ex post facto*. Any claims of violations of Arti-

157. *Id.* For example, at accession to another protocol of the 1949 Geneva Conventions, France indicated that it was not acceding to Protocol I because of "the lack of consensus among the signatory states of Protocol I as to the exact meaning of the obligations" DOCUMENTS, *supra* note 61, at 464-65. Cf. George H. Aldrich, *Prospects for United States Ratification of Additional Protocol I to the 1949 Geneva Conventions*, 85 AM. J. INT'L L. 1, 14 (1991) (theorizing that Articles 35 and 55 of Protocol I, as it applies to non-nuclear warfare, will be quickly accepted as customary law).

158. Simonds, *supra* note 74, at 175 (citing Michael Boothe et al., *New Rules for Victims of Armed Conflicts* 348 (1982)).

159. INTERNATIONAL COMMITTEE OF THE RED CROSS, DRAFT ADDITIONAL PROTOCOLS TO THE GENEVA CONVENTIONS OF AUGUST 12, 1949: COMMENTARY 2 (1973).

cles 35(3) and 55 would arise only after the allegedly violative act has occurred. Arguably, the language is flawed in that it does not provide for preventive measures to curtail environmental damage. Moreover, Protocol I, although sweeping in its coverage, has not risen to the level of general acceptance by states needed to constitute a customary principle. Major signatories to Protocol I, including the United States, expressed reservations to its provisions, and in many cases, these states have failed to ratify the Convention.¹⁶⁰ In order for the provisions to apply to those States that are not parties to the document, therefore, further evidence of adoption of the provisions into customary international law is necessary.

C. ADDITIONAL PROTECTION: THE INHUMANE WEAPONS CONVENTION

The 1981 United Nations Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects (Inhumane Weapons Convention) is an extension of the spirit of the Geneva Conventions and the 1977 Protocols because it focuses on the protection of civilian life. Its Preamble reiterates Article 35(3) of Protocol I, thus providing further evidence of environmental concern in times of armed conflict.¹⁶¹ The scope of this particular convention is different from its predecessors, in that it covers specified modes of conventional warfare within its component protocols.¹⁶²

Of particular interest is Protocol III of the Inhumane Weapons Convention, which prohibits the use of incendiary weapons. The focus of these provisions, however, relates to the protection of human life, rather than explicit protection for the natural environment. As a result, protection of the environment is merely incidental. For example, Article 2(4) provides that "[i]t is prohibited to make forests or other kinds of plant cover the object of attack by incendiary weapons except when such

160. Protocol I, *supra* note 132, Reservations. See Aldrich, *supra* note 157, at 14 (commenting that the environmental provisions of Protocol I are "clearly new law[s]" and that they do not yet embody customary international law).

161. Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, pmbl., 35 U.N. GAOR, 35th Sess., U.N. Doc. A/CONF 95/15, Oct. 27, 1980, 19 I.L.M. 1523, 1524-25 [hereinafter Inhumane Weapons Convention].

162. There are three Protocols to the Inhumane Weapons Convention on: (1) Non-Detectable Fragments; (2) Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices; and (3) Prohibitions on the Use of Incendiary Weapons. *Id.*

natural elements are used to cover, conceal or camouflage combatants or other military objectives, or are themselves military objectives.”¹⁶³

The language evidences various deficiencies that have plagued prior codifications of the laws of armed conflict. For example, military necessity qualifies the prohibition on the use of incendiary weapons.¹⁶⁴ Moreover, the definitions of “incendiary weapon” itself are limited. According to Article I, “‘incendiary weapon’ means any weapon or munitions which is primarily designed to set fire to objects or to cause burn injury to persons through the action of flame, heat, or a combination thereof, produced by a chemical reaction of a substance delivered on the target.”¹⁶⁵ Article 1(b)(ii), however, limits the definition of an incendiary weapon.¹⁶⁶ Accordingly, this limitation implies that there are certain weapons with incendiary effects that this Protocol allows, so long as their ultimate effects are not directed toward human targets. Article 2(3) further supports an interpretation excusing environmental despoilment, allowing the destruction of any military objective “separated from the concentration of civilians.”¹⁶⁷ Moreover, military necessity allows proportional destruction in order to meet targeted objectives, thus allowing a degree of destruction to the environment.¹⁶⁸

D. SUMMARY

The preceding sections illustrate the extent to which the international laws of armed conflict apply to environmental protection. In many instances, ambiguity in language and problems of interpretation provide

163. Inhumane Weapons Convention, *supra* note 161; Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons, art. 2(4), 19 I.L.M. 1534, 1535 (1981) [hereinafter Protocol on Incendiary Weapons].

164. See Simonds, *supra* note 74, at 178 (discussing the military necessity exception for the use of incendiary weapons).

165. Protocol on Incendiary Weapons, *supra* note 163, art. 1.

166. *Id.* art. 1(b)(ii). The limitation on what is considered an incendiary weapon is:

(ii) Munitions designed to combine penetration, blast or fragmentation effects with an additional incendiary effect, such as armor-piercing projectiles, fragmentation shell, explosive bombs and similar combined-effects munitions in which incendiary effect is not specifically designed to cause burn injury to persons, but to be used against military objective, such as armored vehicles, aircraft and installations or facilities.

Id.

167. *Id.* art. 2(3).

168. *Id.* art. 2(4).

loopholes combatants may use to justify destruction of the environment. Most of the provisions provide only collateral protection, that is, the existing protection is related only to the preservation of human life and the amelioration of human suffering. Moreover, the concern of protecting the environment in times of armed conflict has not sufficiently risen to a collective conscience required to embody customary international law. As a result, the relevant principles in the preceding conventions, when compared to En-Mod, provide only additional *limited* restraints on deliberate environmental modification through the use of chemical and biological toxins. The following sections examine whether the laws of war concerning the specific employment of those types of armaments provide any supplementary restrictions on environmental damage.

IV. THE LAW OF WAR AND THE USE OF CHEMICAL AND BIOLOGICAL WEAPONS

Due to the indiscriminate effects of chemical and biological weapons (CBWs) upon their victims, States historically have regulated their use in times of armed conflict.¹⁶⁹ Prior to their use in the trenches of Western Europe during World War I, the world community considered the use of weapons emitting toxic gas unlawful.¹⁷⁰ States have historically resorted to using these means of mass destruction, however, to the detriment of the environment. As a result, this section examines each form of weapon and the legality of its use, within the confines of conventional and customary sources of international law, in order to understand whether deliberate environmental modification can be curtailed.¹⁷¹ Moreover, implicit in this inquiry is whether the relevant conventions actually apply to the protection of the environment, or whether environmental protection is merely incidental to preventing unnecessary *human* suffering.

169. MCCOUBREY & WHITE, *supra* note 115, at 189.

170. *Id.* at 245.

171. See Roots, *supra* notes 1 and 64-68 and accompanying text (discussing various examples of environmental modification based on the introduction of chemical and biological weapons). States, when conducting environmental modification, may attempt to introduce these weapons into their strategy in order to achieve the desired results. For example, herbicides and napalm are forms of chemical weapons that were used as defoliants in Vietnam. Moreover, it has been suggested that there exists the possibility of using biological toxins to alter the environment in enemy territory. *Id.*

A. THE EVOLUTION OF THE PROSCRIPTION OF CBWs IN TIMES OF ARMED CONFLICT

The 1868 Declaration of St. Petersburg to the Effect of Prohibiting the Use of Certain Projectiles in Wartime recognized the custom of preserving humanity in times of armed conflict. As a result, the signatories to this regulation engaged to mutually "renounce, in case of war among themselves, the employment by their military or naval troops of any projectile of a weight below 400 grams, which is either explosive or charged with fulminating or inflammable substances."¹⁷² The International Declaration concerning the Laws and Customs of War, concluded in Brussels six years later, provided a similar position.¹⁷³

The Hague Convention of 1899 made first mention of the specific prohibition of weapons having the sole object of diffusing asphyxiating gases.¹⁷⁴ In addition to recalling the customary principle that the means of warfare used by combatants is not unlimited, the Convention in Article XXIII stated that:

In addition to the prohibitions provided by special conventions, it is especially forbidden:

(a) To employ poison or poisoned weapons;

(b) To kill or wound treacherously individuals belonging to the hostile nation or army;

...

(e) To employ arms, projectiles, or material calculated to cause unnecessary suffering;

172. Declaration of St. Petersburg of 1868 to the Effect of Prohibiting the Use of Certain Projectiles in Wartime, Dec. 11, 1868, *partially reprinted in* STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE, CBW AND THE LAW OF WAR 151 (1973) [hereinafter CBW AND THE LAW OF WAR].

173. International Declaration Concerning the Law and Customs of War, Aug. 27, 1894, *partially reprinted in* CBW AND THE LAW OF WAR, *supra* note 172, at 151-52. In pertinent part, Article XII provides that "the laws of war do not recognize in belligerents an unlimited power in the adoption of means of injuring the enemy." *Id.* Furthermore, Article XIII of the Declaration provides:

According to this principle are especially forbidden:

(a) Employment of poison or poisoned weapons;

...

(e) The employment of arms, projectiles or material calculated to cause superfluous injury, as well as the use of projectiles prohibited by the Declaration of St. Petersburg of 1868.

Id.

174. See MCCOUBREY & WHITE, *supra* note 115, at 245 (discussing the prohibition of asphyxiating gases included in 1899 Hague Convention).

...

Declare as follows:

The Contracting Powers agree to abstain from the use of projectiles the object of which is the diffusion of asphyxiating or deleterious gases¹⁷⁵

The 1907 Hague Convention incorporated almost identical language.¹⁷⁶

These prohibitions did not deter the use of gas warfare in World War I.¹⁷⁷ Following the war, outrage concerning the use of poisonous weapons ensued.¹⁷⁸ As a result, the Treaty of Versailles sought to reaffirm the unlawfulness of gas warfare by including in Article 171 the notion that "[t]he use of asphyxiating, poisonous or other gases and all analogous liquids, materials or devices being prohibited, their manufacture and importation are strictly forbidden in Germany."¹⁷⁹

B. THE GENEVA GAS PROTOCOL

The 1925 Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare (Gas Protocol), concluded in Geneva, stands as the first major codification that curtailed the use of biological weapons.¹⁸⁰ Its provisions reiterated the prohibition on the use of

175. First International Peace Conference, The Hague, 1899 Acts, July 29, 1899, reprinted in CBW AND THE LAW OF WAR, *supra* note 172, at 152.

176. See Second International Peace Conference, The Hague, 1907 Acts, Oct. 18, 1907, reprinted in CBW AND THE LAW OF WAR, *supra* note 172, at 153 (providing restrictions on States for armed conflict).

177. MCCOUBREY & WHITE, *supra* note 115, at 245. According to one commentator, the resort to such armaments was a means to remedy the infantry stalemate that had developed in Western Europe. *Id.*

178. *Id.*

179. Treaty of Peace with Germany at Versailles, June 28, 1819, reprinted in CBW AND THE LAW OF WAR, *supra* note 172, at 153.

180. Maj. Bernard Schafer, *The Relationships Between International Laws of Armed Conflict and Environmental Protection: The Need to Reevaluate What Types of Conduct Are Permissible during Hostilities*, 19 CAL. W. INT'L L.J. 287, 303 (1989). The terms "bacteriological" and "biological" are interchangeable when discussing this type of armament. One source defines these weapons as "living organisms, whatever their nature, or ineffective material derived from them, which are intended to cause disease or death in man, animals, or plants, and which depend for their effects on their ability to multiply in the person, animal, or plant attacked." Howard S. Levie, *Nuclear, Chemical, and Biological Weapons*, in INTERNATIONAL LAW STUDIES 1991: THE LAW

poisonous weapons as its predecessors had done. The Gas Protocol, however, added the additional limitation "[t]hat the High Contracting Parties . . . agree to extend this prohibition to the use of bacteriological methods of warfare and agree to be bound as between themselves according to the terms of this declaration."¹⁸¹

Despite its seemingly broad coverage, this general prohibition on the use of bacteriological weapons in times of armed conflict is subject to several deficiencies. First, the Gas Protocol's terms allow considerable room for varying interpretations. States have argued as to whether tear-gas and other normally non-lethal gases, as well as herbicides and similar agents, fall within the scope of the prohibition.¹⁸² In 1975, in connection with the ratification of the Gas Protocol by the United States, the U.S. government asserted that the scope of the Protocol did not extend to riot-control agents and chemical herbicides.¹⁸³

A second deficiency in the Gas Protocol concerns the number of States that have become parties subject to reservation. Generally, the overriding reservation was that the Protocol would only be binding on a State, so long as other States respected the prescribed prohibitions.¹⁸⁴ Given this reservation, the Gas Protocol is not a

OF NAVAL OPERATIONS 331, 342 (Horace B. Robertson, Jr. ed., 1992).

181. Geneva Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, June 17, 1925, reprinted in DOCUMENTS, *supra* note 61, at 140 [hereinafter the Geneva Gas Protocol].

182. DOCUMENTS, *supra* note 61, at 137. The British government issued a memorandum in 1930 regarding tear-gas, bringing attention to this ambiguity. *Id.* According to its interpretation of the language, Britain took the position that tear-gas was properly within the scope of the Gas Protocol. *Id.* France iterated a similar position. *Id.* at 137-38. The United States, however, did not share this view. *Id.* at 138. The United States based its position on an argument that it would be inconsistent to prohibit the use of tear gas in times of international conflict, when the use of such "weapon" was allowed in domestic law enforcement. *Id.* Interestingly, in 1970, the British government announced a reinterpretation of the Protocol concerning tear-gas, and this time changed its position holding that tear-gas was not significantly harmful to man "in other than wholly exceptional circumstances." *Id.*

183. See *id.* at 138 (describing U.S. optimism to include riot control agents and chemical herbicides within the scope of the 1975 Gas Protocol).

184. *Id.* at 145. For example, France, with whom many States sided, proclaimed that:

(1) The said Protocol is only binding on the Government of the French Republic as regards States which have signed or ratified it or which may accede to it.

per se restriction on the use of biological weapons as it purports to be. Rather, its function lies in its ability to deter the *first use* of the weapon.

Given the large number of States currently bound by the 1925 Geneva Gas Protocol, the prohibitions on the use of biological weapons could be a source of customary international law.¹⁸⁵ States have met such a position, however, with considerable dissent.¹⁸⁶ Much of this debate has centered on the character of the reservations to the Protocol, as well as the variations in interpretation which have reduced its usefulness as a practical guide for customary international law, such as whether the Protocol covers non-lethal toxic weapons.¹⁸⁷ Yet, at the very least, the world community generally accepts the notion of prohibiting the first-strike use of these classifications of weapons.¹⁸⁸

Moreover, the spirit of the Gas Protocol has produced a legacy which seeks to limit the production and stockpiling of biological and similar toxic weapons.¹⁸⁹ The Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (Biological Weapons Convention) fashioned a formidable regime where States agreed never to develop, produce, or stockpile:

- (1) Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes;
- (2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.¹⁹⁰

(2) The Said Protocol shall *ipso facto* cease to be binding on the Government of the French Republic in regard to any enemy State whose armed forces or whose Allies fail to respect the prohibitions laid down in the Protocol.

Id. at 144.

The United States took a similar position. DOCUMENTS, *supra* note 61, at 145.

185. *Id.* at 138.

186. *Id.* at 139.

187. *Id.*

188. Schafer, *supra* note 180, at 303.

189. Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Feb. 25, 1972, 11 I.L.M. 309 (1973).

190. *Id.* art. I.

Furthermore, the Biological Weapons Convention provides for means by which member States shall dispose of currently stockpiled biological weapons.¹⁹¹

C. APPLICATION OF THE GAS PROTOCOL TO
THE PROTECTION OF THE ENVIRONMENT

Considerable debate surrounds the scope of application of the Gas Protocol and the Biological Weapons Convention. The focus of the debate rests on whether the provisions apply only to the use of biological weapons against human beings or whether it also prohibits attacks on animals and plants.¹⁹² The norms and standards imposed by the laws of war dictate a baseline approach to the use of CBWs against the environment.¹⁹³ Though these rules of war are not related to the Gas Protocol, they nevertheless may provide some guidance to the legitimate targeting of the environment, regardless of the mode of weaponry employed.¹⁹⁴ In order to advance the inquiry, this section examines two independent factors: the legitimacy of environmental targets; and the legitimacy of the use of biological weapons against those specified targets.¹⁹⁵

In terms of legitimacy of targeting, belligerents in enemy territory may destroy vegetation which hampers their operations or threatens their security.¹⁹⁶ Yet, this general rule may have limited exceptions. Belligerents may not destroy indispensable products, such as foodstuffs if the civilian population suffers from their destruction.¹⁹⁷ There are, however, cases in which belligerents may justifiably destroy these targets, such as when the enemy uses the products for the furtherance of

191. See *id.* arts. III-IV (requiring States to eliminate stockpiles of biological weapons).

192. See CBW AND THE LAW OF WAR, *supra* note 172, at 67 (discussing debate over the scope of protection offered by international agreements).

193. See discussion *supra* Section III (discussing the Law of War as it relates to environmental protection).

194. CBW AND THE LAW OF WAR, *supra* note 172, at 68. The international community regards this practice as a form of economic warfare; this concept is related to the destruction and the definition of legitimate bombing targets. *Id.*

195. *Id.*

196. *Id.*

197. See discussion *supra* Section II.B.1. (discussing the relevance of the doctrine of military necessity).

military operations. One such example is the "scorched earth" strategy.¹⁹⁸

Various forms of "crops" are viewed as legitimate targets. For example, Article 53 of the Hague Regulations refers to war munitions, which "may be seized, even if they belong to private individuals."¹⁹⁹ War munitions include "industrial crops," such as rubber, timber, and cotton.²⁰⁰ If destruction of these products is legitimate in the industrial/raw material stage, then the destruction of these products in their natural environment can also be justified.²⁰¹

This same argument applies to economic crops considered not as sustenance for the population of the enemy country, but as goods intended for monetary exchange, such as sugar and coffee. Applying logic similar to the above case, the seizure and destruction of these products in their finished stage would be legitimate. Therefore, eventual destruction of these goods in the growing stage arguably would also be permitted.²⁰²

Given this reexamination of the legitimacy of environmental targets in armed conflict, the next threshold inquiry addresses whether biological weapons are permissible armaments in warfare.²⁰³ The language of the Gas Protocol may provide some insight. Though the scope of coverage of chemical weapons is slight, the use of the generalized phrase "*bacteriological methods of warfare*" suggests little room for any restrictive interpretation. In other words, the Protocol prohibits the use of biological weapons, regardless of whether the target is human or plant. The United Nations General Assembly has repeatedly adopted resolutions calling for strict observance of the Gas Protocol principles.²⁰⁴ The most

198. See discussion *supra* Section II.A.1. (discussing the legal terms of proportionality and discrimination in the context of the law of war).

199. 1907 Hague Convention IV, *supra* note 98, art. 53.

200. CBW AND THE LAW OF WAR, *supra* note 172, at 68.

201. *Id.* at 69.

202. *Id.*

203. Section II examines the legitimacy of the environment as a target in wartime. The purpose of this brief exposition is merely to remind the reader that the environment can be the subject of armed conflict.

204. G.A. Res. 2162B (XXI), U.N. GAOR, 21st Sess., Supp. No. 16, at 10, U.N. Doc. A/6316 (1966), reprinted in CBW AND THE LAW OF WAR, *supra* note 172, at 166. For example, Resolution 2162B (XXI) adopted on December 5, 1966 called for:

(1) Strict observance by all States of the principles and objectives of the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare . . . and condemns all actions contrary to these objectives.

significant of these is Resolution 2603A (XXIV), adopted on December 16, 1969, which evidences an intent to include protection for the environment.²⁰⁵ Moreover, the position of member States buttresses this notion. For example, according to the Polish delegate to the Gas Protocol, "[b]acteriological warfare can also be waged against the vegetable world, and not only may corn, fruit and vegetables suffer, but also vineyards, orchards, and fields."²⁰⁶

The provisions of the Gas Protocol, and the Biological Weapons Convention apparently curtailed the potential for using these forms of weapons to modify the environment deliberately.²⁰⁷ These prohibitions have not deterred States from resorting to these types of weapons.²⁰⁸ Continued research relating to recombinant DNA leading to the formation of "supergerms," and the conversion of harmless micro-organisms to lethal toxins capable of mass production at low costs in clandestine facilities has renewed concerns of a return to usage of biological weapons.²⁰⁹

Id. See CBW AND THE LAW OF WAR, *supra* note 172, at 166-68 (reiterating similar positions in a myriad of resolutions: 2454A, 2662, and 2827A).

205. G.A. Res. 2603A, U.N. GAOR, 24th Sess., Supp. No. 30, at 16, U.N. Doc. A/7630 (1969), *reprinted in*, CBW AND THE LAW OF WAR, *supra* note 172, at 167. Resolution 2603A states in pertinent part:

Considering that chemical and biological methods of warfare have always been viewed with horror and have been justly condemned by the international community,

Considering that these methods of warfare are inherently reprehensible because their effects are often uncontrollable and unpredictable and may be injurious without distinction to combatants and non-combatants . . .

Declares as contrary to international law:

(a) Any chemical agents of warfare—chemical substances, whether gaseous, liquid or solid—which might be employed because of their direct toxic effects on man, animals or plants;

(b) Any biological agents of warfare—living organisms, whatever their nature, or infective material derived from them—which are intended to cause disease or death in man, animals or plants, and which depend for their effects to multiply in the person, animal or plant attacked.

Id.

206. CBW AND THE LAW OF WAR, *supra* note 172, at 71.

207. See Schafer, *supra* note 180, at 303-04 (discussing the efforts the Gas Protocol and Biological Weapons Convention made to ban biological weapons in warfare).

208. See *id.* at 303 (indicating that no custom concerning refraining the possible use of biological weapons exists); RICHARD FALK, REVITALIZING INTERNATIONAL LAW 129 (1989) (stating that there exists indications of renewed reliance on the possibility of utilizing biological weaponry).

209. FALK, *supra* note 208, at 129. Moreover, evidence shows that the United

At least one commentator offered further criticisms of the established regime.²¹⁰ First, peaceful applications of biological toxins can no longer be reliably distinguished from potential military applications.²¹¹ Moreover, the secrecy of research in this area obscures the distinction between innocent research and more sinister intentions.²¹² As a result, these problems with the regime make verification and compliance with the provisions of the Biological Weapons Convention difficult.²¹³

In summary, the preceding examination of the limitation of the use of biological weapons indicates that protection of the environment may exist. Fortunately, States have never used biological weapons on a wide-scale level in armed conflict.²¹⁴ Nevertheless, the importance lies in recognizing the plausibility of using such armaments for deliberate environmental modification purposes,²¹⁵ especially because States have not

States has renewed support for research in the biological warfare area, including experimentation and development of biological agents possessing a medical purpose as well as military purposes. *Id.* Professor Falk has indicated that government-supported research budgets have increased since 1980, reaching \$100 million in 1983. *Id.* at 130. As justification for these measures, the author has suggested that much of the activity was in response to possible Russian research and development, evidenced by the Sverdlovsk explosion in 1979 in which the apparent release of anthrax spores into the atmosphere caused casualties. *Id.* See *The State, Society, and the Evolution of Warfare in the Middle East: The Rise of Strategic Deterrence?*, WASH. Q., Autumn 1995, at 53 (examining reliance on chemical and biological weapons by Middle Eastern States); *U.N. Official Wants More on Iran Biological Weapons*, ORLANDO SENTINEL, Sept. 17, 1995, at A18 (reporting the deficiency of data released on the extent of Iraq's biological weapon development that the United Nations requested in order to disarm the country); James Hackett, *Lethal Germs in the Arsenal*, WASH. TIMES, Sept. 19, 1995, at A14 (commenting on the need to use threats of nuclear weapons retaliation on those countries willing to use chemical or biological weapons).

210. FALK, *supra* note 208, at 135 (acknowledging the weakness of the Biological Weapons Convention to enforce mechanisms preventing further biological weapons development).

211. See *id.* (suggesting that Article I of the Biological Weapons Convention, which limits the use of agents that have no justification for prophylactic, protective, or other protective purposes, creates a loophole capable of being reconciled with almost any path of research).

212. *Id.*

213. See *id.* at 135-36 (noting the reluctance of nations to disengage in non-military research in order to insure that biological weapons research will not continue).

214. See Schafer, *supra* note 180, at 304 (stating the potential environmental damage from chemical and biological warfare).

215. See *supra* notes 63-65 and accompanying text (analyzing the future military use of toxic chemicals to alter the weather conditions of enemy territory).

completely ceased the development of and possible reliance on these weapons.

D. THE CHEMICAL WEAPONS CONVENTION

Chemical weapons employment has spawned a debate as to the legality of their use.²¹⁶ The use of herbicides during the Vietnam War led to the determination that activities such as defoliation²¹⁷ of forests in times of armed conflict emerged as a viable issue in terms of deliberate environmental modification.²¹⁸ Accordingly, the following section examines whether the recently-proffered Chemical Weapons Convention provides adequate mechanisms to prevent intentional modification of the environment in times of armed conflict.

Initially, military operations used herbicides to defoliate jungle growths to gain better views of enemy movements, but later found additional uses. These uses include defoliating friendly base perimeters in order to prevent sneak attacks; defoliating lines of communication to prevent ambushes; defoliating enemy base areas to force enemy troop movements; and destroying crops in order to divest the enemy of sustenance.²¹⁹ The defense of using these chemical agents rests on the ground that neither the Gas Protocol nor customary international law prohibits employing herbicides.²²⁰ This basis leads to the conclusion that the use of herbicides does not violate any of the general norms of the laws of armed conflict if the environmental destruction has a valid

216. See Levie, *supra* note 180, at 334 (defining chemical warfare agents as "chemical substances, whether gaseous, liquid, or solid which might be employed because of their direct toxic effects on man, animals and plants").

217. See Howard S. Levie, in *LAW AND RESPONSIBILITY IN WARFARE: THE VIETNAM EXPERIENCE*, *supra* note 125, at 158 (considering defoliants as agricultural chemicals that poison or desiccate the leaves of plants, causing them to shed their leaves or die).

218. See Roots, *supra* note 1, at 27 (opining that such activities should be dealt with under the En-Mod Convention).

219. See Levie, *supra* note 217, at 158 (discussing the progressive use of herbicides as a weapon during the Vietnam War).

220. *Id.* at 159. The author suggests two basic arguments that have been proffered but discredited. The first argument is that because States widely use herbicides domestically to control weeds and other unwanted vegetation, the Gas Protocol could not have been meant to cover the use of these chemical agents. The argument is specious, especially when applied to international law. The second argument is that the Gas Protocol did not mean to cover herbicides because they were not developed until a later date. This argument has been discredited as insignificant due to the language of the Gas Protocol. *Id.*

military purpose and if the combatants identify the targeted crops for the use of enemy forces.²²¹ Alternatively, one author suggested that the laws should draw a distinction between defoliation and crop destruction.²²² In either case, the central issue involves a determination of whether States can control the effects of using herbicides that are either lethal or injurious to the health of combatants or the civilian population.²²³ Thus, if States can control the chemical agents as such, the agents shall be deemed lawful.²²⁴

The result of several decades of debate is the formation of a regime to control reliance on chemical weapons.²²⁵ In January 1989, 149

221. See *id.* at 160 (suggesting the use of alternative methods that reduce the environmental risks of herbicides).

222. Robert W. Tucker, in *LAW AND RESPONSIBILITY IN WARFARE: THE VIETNAM EXPERIENCE*, *supra* note 125, at 168.

223. See *id.* at 169 (stating that the controlled use of herbicides would allow for lawful application without fear of health hazards).

224. *Id.* Moreover, the United States has almost uniformly taken the position that no customary international law prohibits these weapons. Levie, *supra* note 180, at 340. For example, the *Law of Naval Warfare* stated that:

The United States is not a party to any treaty . . . that prohibits or restricts the use in warfare of poisonous or asphyxiating gases Although the use of such weapons frequently has been condemned by states, including the United States, it remains doubtful that, in the absence of a specific restriction established by a treaty, a state legally is prohibited at present from resorting to their use.

Id. With the ratification of the Geneva Gas Protocol, it would seem that such a position is no longer warranted. President Gerald Ford on April 8, 1975, however, signed Executive Order 11,850 which provides:

The United States renounces, as a matter of policy, first use of herbicides in war except use, under regulations applicable to their domestic use, for control of vegetation within U.S. bases and installations or around their immediate defensive perimeters, and first use of riot control agents in war except in defensive military modes to save lives such as:

(a) Use of riot control agents in riot control situation in areas under direct and distinct U.S. military control, to include controlling rioting prisoners of war.

(b) Use of riot control agents in situations in which civilians are used to mask or screen attacks and civilian casualties can be reduced or avoided.

(c) Use of riot control agents in rescue missions in remotely isolated areas, of downed aircrews and passengers, and escaping prisoners.

(d) Use of riot control agents in rear echelon areas outside the zone of immediate combat to protect convoys from civil disturbances, terrorists and paramilitary organizations.

Id. at 340-41.

225. See Marian Nash (Leich), *Chemical Weapons Convention*, 88 AM. J. INT'L L.

States convened at the Paris Conference on the Prohibition of Chemical Weapons. The States represented were parties to the original Gas Protocol and other interested States.²²⁶ The meeting culminated in the promulgation of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (Chemical Weapons Convention).²²⁷

The Preamble of the Chemical Weapons Convention seeks to reaffirm the principles of the Gas Protocol as well as the Biological Weapons Convention. Moreover, the Chemical Weapons Convention "[d]etermined for the sake of all mankind, to exclude completely the possibility of the use of chemical weapons." Article I declares that:

Each State Party . . . undertakes *never under any circumstances*:

- (a) To develop, produce, otherwise acquire, stockpile or retain chemical weapons, or transfer, directly or indirectly chemical weapons to anyone;
- (b) To use chemical weapons;
- (c) To engage in any military preparations to use chemical weapons;
- (d) To assist, encourage or induce, in any way, anyone to engage in any activity prohibited . . . under this Convention.²²⁸

The significance of the Chemical Weapons Convention is found in its definitions and criteria. For instance, it defines "chemical weapons," as among other things, "toxic chemicals and their precursors" and "munitions and devices, specifically designed to cause death or other harm"²²⁹ Further, the Chemical Weapons Convention defines a toxic chemical as "any chemical which through its chemical action on life process can cause death, temporary incapacitation or permanent harm to humans or animals."²³⁰

323, 323 (1994) (stating in U.S. President Clinton's letter of transmittal the tremendous international struggle involved in negotiating this treaty); DOCUMENTS, *supra* note 61, at 139 (stating that the first use of chemical weapons is a violation of customary international law).

226. See DOCUMENTS, *supra* note 61, at 137 (discussing State parties to the Paris Conference on the Prohibition of Chemical Weapons).

227. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and Their Destruction, *opened for signature* Jan. 13, 1993, U.N. GAOR, 47th Sess., Supp. No. 27, U.N. Doc. A/47/27, App. I (1992), reprinted in SHADOW AND SUBSTANCE: THE CHEMICAL WEAPONS CONVENTION 307 (Benoit Morel & Kyle Olson eds., 1993) [hereinafter Chemical Weapons Convention].

228. *Id.* art. I (emphasis added).

229. *Id.* art. II.

230. *Id.*

What is especially meaningful in the above criteria is an implicit interpretation that environmental damage falls within the scope of the Chemical Weapons Convention. The types of prohibited weapons are not only those designed to cause death, but also those which can cause "other harm," presumably including "harm" to the environment.²³¹ The fact that Article I explicitly prohibits the use of chemical weapons "under any circumstances" supports this conclusion.²³² Furthermore, the Preamble of the Chemical Weapons Convention recognizes that there exists "[a] prohibition, embodied in the pertinent agreements and relevant principles of international law, of the use of herbicides as a method of warfare."²³³

The problem, however, is whether a state will stop using chemical weapons with the ratification of the Chemical Weapons Convention. One argument suggests that the prohibition of the use of herbicides and other chemical agents has become a fixed principle in customary international law.²³⁴ Yet, the issue involves the validity of this position. As stated earlier, military operations have defended the use of herbicides in armed conflict on various grounds.²³⁵ Moreover, the fact that the Inhumane Weapons Convention provides various circumstances in which it deems the use of defoliants lawful in times of war suggests the Inhumane Weapons Convention does not completely prohibit the use of herbicides.²³⁶ Thus, the opposing positions concerning the legality of herbicides in times of warfare makes a fixed principle prohibiting the use of chemical weapons difficult to assess.²³⁷

Finally, the Chemical Weapons Convention is simply not in force.²³⁸

231. See *id.* (defining the munitions and devices prohibited from release due to their toxic chemical content).

232. Chemical Weapons Convention, *supra* note 227, art. I.

233. *Id.* pmbl.

234. Schafer, *supra* note 180, at 301-03.

235. See Sharp, *supra* note 3, at 55-56 (stating that the use of herbicides can be defended on the ground of military necessity).

236. See *supra* section III.C (discussing the Inhumane Weapons Convention and the purported loopholes that exist thereby allowing lawful use of herbicides in armed conflict).

237. See *supra* note 27 and accompanying text (discussing what constitutes a customary principle in international law).

238. See Chemical Weapons Convention, *supra* note 227, art. XXI (stating that: "[The] Convention shall enter into force 180 days after the date of the deposit of the 65th instrument of ratification, but in no case earlier than two years after its opening for signature"). As of January 1, 1995, 158 States had signed the Chemical Weapons Convention and only 16 had ratified it. REPORT RELATIVE TO CHEMICAL AND BIO-

Due to domestic debate and opposition, ratification of the Convention has proceeded slowly.²³⁹

E. SUMMARY

The preceding sections illustrate the current international regimes concerning the use of biological and chemical weapons in times of armed conflict. Thus far, on the one hand, it appears that States have curtailed the use of biological armaments. As a result, States are unlikely to resort to weapons of mass destruction for environmental modification purposes. Evidence exists, however, that some States have not ceased research and development of biological weapons. Therefore, it is useful to understand the weapons' potential for widespread environmental damage, and the relevant international laws of armed conflict governing their use.²⁴⁰

On the other hand, proscriptions on the use of chemical agents for environmental modification purposes are not entirely in place. States have expressed reservations to prior codifications of the laws of war allowing for the use of herbicides and other non-lethal chemical weapons. Although the newly-fashioned Chemical Weapons Convention may sharply curtail the weapons' application, until the Convention enters into

LOGICAL WEAPONS — MESSAGE FROM THE PRESIDENT, S. Doc. No. 31, 104th Cong., 1st Sess. 2821 (1995). On November 23, 1993, President William J. Clinton submitted the Convention to the United States Senate for its advice and consent to ratification. *Id.* On July 1, 1995 the Netherlands became the 30th State to ratify the Chemical Weapons Convention. *Netherlands Signs Treaty Banning Chemical Weapons*, AGENCY FRANCE PRESSE, July 1, 1995, available in LEXIS, News Library, CURNWS File.

239. See, e.g., Frank Gaffney Jr., *Chemical Weapons Treaty or Travesty?*, WASH. TIMES, Aug. 11, 1994, at A17 (arguing that the Chemical Weapons Convention should not be ratified since it is unlikely that it will curtail the proliferation of chemical weapons); Kathleen C. Bailey, *Why the Chemical Weapons Convention Should Not Be Ratified*, in RATIFYING THE CHEMICAL WEAPONS CONVENTION 52 (Brad Roberts ed., 1994) (stating that weak verification methods within the Convention do not ensure absolute compliance and thus reduction of chemical weapons); Baker Spring, *Chemical Weapons Convention: A Bad Treaty*, WASH. POST, Aug. 4, 1994, at A30; see also Barbara Crossette, *Chemical Treaty Appears on Hold in the Senate*, N.Y. TIMES, Sept. 10, 1995, at A12 (indicating that ambivalence exists in the United States Senate on passing the Chemical Weapons Convention); *Chem Weapons: Senate Won't Ratify Treaty in 1995*, GREENWIRE, Sept. 11, 1995, available in LEXIS, News Library, CURNWS File (articulating that it is unclear whether States will reach the 1995 target date of implementation).

240. See *supra* notes 65-67 and accompanying text (discussing the possible uses of biological toxins for deliberate environmental modification purposes).

force, it is uncertain whether conventional or customary sources of international law legally forbid the employment of chemical weapons for purposeful environmental modification. The following section addresses the problems that have plagued the international laws of armed conflict and offers various remedial measures given the limited protection afforded to the environment.

V. REMEDYING THE PROBLEM

As the preceding sections have illustrated, present codifications of the laws of war and relevant customary principles of international law provide limited environmental protection in times of armed conflict. Yet, those precepts provide many exceptions leading to the legitimate suspension of the laws of war. Due to ambiguity of terms and lack of enforcement, States' environmental destruction goes unprosecuted. In order to meet the right of a habitable environment for the use of humanity, new standards, norms, and enforcement vehicles need to be fashioned.

A. CRIMINALIZATION OF GEOCIDE

Customary law seems to have recognized the utilitarian value of a habitable environment. In the international forum, many environmental agreements provide for penal sanctions against those who violate their prohibitions.²⁴¹ Yet, one commentator advocates that a *per se* international crime of "geocide" is evolving.²⁴²

The language of "geocide" would have to expand upon the definition of genocide and borrow similar language from the Convention on Prevention and Punishment of Genocide of 1948.²⁴³ This would not only include the *mens rea* standard of criminal law, but also include knowledge with substantial certainty from tort law.²⁴⁴ As a result, this new language would deem destruction of any facet of the global ecological system a crime on an international level.

241. See, e.g., International Convention for the Prevention of Pollution From Ships, Nov. 2, 1973, 12 I.L.M. 1319; Convention for the Conservation of Antarctic Seals, June 1, 1972, 11 I.L.M. 251; Convention on International Trade in Endangered Species of Wild Flora and Fauna, March 3, 1973, 12 I.L.M. 1035; Convention on the Conservation of Migratory Species of Wild Animals, June 23, 1979, 19 I.L.M. 656.

242. See Berat, *supra* note 27, at 340-42 (stating that there is a moral imperative to create the crime of geocide to prevent the destruction of the environment).

243. *Id.* at 342.

244. *Id.* at 343.

Criminalizing deliberate environmental modification appears to be a viable alternative, in terms of diminishing state actions in times of armed conflict, as well as enforcing state responsibility. In many ways, the Gulf War provides an example of international concern over the environment's intentional modification.²⁴⁵ Following the War, in June 1991, the London Conference on Environmental Protection and the Law of War stated that Iraq be held liable for the destruction of the environment under the international laws of armed conflict, a reiteration of the United Nations Security Council Resolution 687.²⁴⁶

Given the international concern for environmental damage, on what bases should States criminalize environmental modification or deem it a method of geocide? One reason would be to deter conduct. By increas-

245. See Maj. Ariane L. DeSaussure, *The Role of the Law of Armed Conflict During the Persian Gulf War: An Overview*, 37 A.F. L. REV. 41, 68 (1994) (concluding that the Coalition's failure to punish Iraq for war crimes signaled to the international community that the law of armed conflict is unenforceable); James S. Robbins, *War Crimes: The Case of Iraq*, 18-FALL FLETCHER F. WORLD AFF. 45, 54 (1994) (claiming that ecocide, that is, crimes against the environment, reflects the tenors of time rather than traditional principles of the laws of war); Marc A. Ross, Comment, *Environmental Warfare and the Persian Gulf War: Possible Remedies to Combat Intentional Destruction of the Environment*, 10 DICK. J. INT'L L. 515, 539 (1992) (advocating that the Gulf War's experience should be an impetus for a convention outlawing ecological warfare); Sharp, *supra* note 4, at 66 (claiming that the massive and vindictive environmental destruction by Iraq during the Gulf War violated the laws of war; however, there is no identifiable forum to prosecute their crimes); Col. James P. Terry, *Operation Desert Storm: Stark Contrasts in Compliance with the Rule of Law*, 41 NAVAL L. REV. 83, 92 (1993) (noting that the extensive and international damage to the environment by Iraq represents the kind of wanton destruction that the laws of war are trying to proscribe); McClintock, *supra* note 103, at 686-90 (arguing that the most effective way to enforce the crime of geocide is through a convention, which can provide a forum for contracting parties to prevent and punish violators under international law); Wilcox, *supra* note 100, at 314 (suggesting that international sanctions should be sufficiently severe to deter environmental terrorism).

246. See PLANT, *supra* note 119, at 3-36 (stating that Iraq's action caused international outrage that led governments to consider creating international laws to protect the environment). Cf. Amb. Philippe Kirsh, *The London Conference on Environmental Protection and the Law of War*, in VERIFYING OBLIGATIONS, *supra* note 1, at 156. Security Council Resolution 687 states that:

Iraq, without prejudice to the debts and obligations of Iraq arising prior to 2 August 1990, which will be addressed through the normal mechanisms, is liable under international law for any direct loss, damage, including environmental damage and the depletion of natural resources . . . as a result of Iraq's unlawful invasion and occupation of Kuwait

Resolution 687, UN. Doc. S/RES/687 (1991).

ing the costs and penalties of environmental modification, States may comply.²⁴⁷ Moreover, by criminalizing deliberate environmental modification, there is the potential for providing an effective means of ensuring state responsibility.²⁴⁸ Any one of the following characteristics would qualify a geocide convention as belonging to the field of international criminal law: (1) explicit or implicit declaration of certain conduct as a crime under international law; (2) criminalization of the conduct under national law; (3) providing for the prosecution or extradition of the alleged perpetrator; (4) providing for punishment of the individual found guilty; (5) reference to an international criminal jurisdiction; and (6) exclusion of the defense of superior orders.²⁴⁹ Furthermore, by establishing a generalized crime of geocide, governing bodies may penalize not only the State, but also the individual actor.²⁵⁰

By establishing an international crime of environmental destruction, the quantum of proof that is necessary, or the threshold of damage that must occur, is relatively low compared to En-Mod and Protocol I where higher thresholds of damage must be met.²⁵¹ By introducing an element of intent to the crime, the deliberate nature of environmental modification would render the State culpable for its conduct. Therefore, any damage, regardless of the degree, whether widespread, long-term, or severe, would automatically render the perpetrator, either the State and/or its military, criminally liable.

At least one convention on geocide has been proposed in which deliberate environmental modification is a concern, the Proposed Convention of the Crime of Ecocide.²⁵² According to this Convention, ecocide includes intent to use biological and chemical weapons against the environment; the use of herbicides in order to defoliate and destroy forests, soil degradation; and the use of weather modification techniques.²⁵³

247. Stephen C. McCaffery, *Crimes Against the Environment*, in INTERNATIONAL CRIMINAL LAW, CRIMES 543 (M. Cherif Brassiouni ed., 1986).

248. See Berat, *supra* note 27, at 343-44 (recommending that persons subject to geocide liability include rulers, public officials, and private individuals as well as corporations).

249. M. Cherif Brassiouni, *Penal Characteristics of International Criminal Law*, 15 CASE W. RES. J. INT'L L. 27, 30 (1983).

250. Berat, *supra* note 27, at 344 (noting that private citizens should also be liable for geocide).

251. Cf. Simonds, *supra* note 74, at 210-15 (commenting that lowering the threshold of liability to a realistic level is one way of making States responsible for the destruction of the environment).

252. FALK, *supra* note 208, at 187.

253. *Id.* at 189 (proposing that the use of bombs in such quantity as to affect

Moreover, this Convention proposes that any person, including "responsible rulers, public officials, military commanders, or private individuals," may be charged with ecocide, conspiracy to commit ecocide, attempt to commit ecocide, or complicity.²⁵⁴ The Convention is silent on the necessary quantum of damage. Thus, it appears that any damage is sufficient to trigger the proposed convention's penalties.²⁵⁵

Establishment of an international crime of geocide and enforcement of a viable regime of environmental protection can diminish deliberate modification of the environment. Merely enforcing an approach, as found in the Proposed Convention of the Crime of Ecocide, can eliminate, in many respects, the problems of ambiguous language, divergent interpretation, existing loopholes, and limited enforcement. It remains to be seen, however, whether States would openly accept such an approach.²⁵⁶

B. ESTABLISHING A FIFTH GENEVA CONVENTION

As the preceding sections indicate, the international laws of armed conflict provide only collateral protection for the environment. The frailties of the relevant provisions suggest that protection of the environment is an incidental function of protecting human lives. Moreover, ambiguity in the language of environmentally centered conventions such as En-Mod, reveals limitations on the scope of the protection afforded. As a result, another remedy to ameliorate damage to the environment would be to establish a new corpus of laws of war designed to abolish the inherent problems in the current set.²⁵⁷

adversely the quality of soil, or the use of techniques to modify weather and climate as a hostile act against a foreign state, should be punishable under international law).

254. *Id.*

255. *See id.* at 190 (noting that contracting parties agreed to enact laws necessary to give effective penalties to persons charged with ecocide or acts enumerated in Article III and citing the Proposed Convention on the Crime of Ecocide, arts. VI and VII).

256. *Cf.* George H. Brauchler, Jr., Comment, *United States Environmental Policy and the United States Army in Western Europe*, 5 COLO. J. INT'L ENVTL. L. & POL'Y 479 (1994) (examining the applicability of the United States National Environmental Policy Act to actions by the U.S. armed forces abroad). "Any proposal that places greater restrictions on the freedom of the U.S. military to respond and act abroad must be evaluated in light of the impact of the additional burdens placed on the military's stated mission and goal." *Id.* at 489.

257. *See* PLANT, *supra* note 119, at 37-42 (clarifying what exists is a necessary part of deciding upon and advocating what needs to be done by way of international

The London Conference, convened in June 1991, sought to establish a "Fifth Geneva" Convention on the Protection of the Environment in Time of Armed Conflict and fashion a new framework.²⁵⁸ The general premise behind this new Convention was due to the deliberate environmental damage that occurred in the Persian Gulf War. This new framework would restate and consolidate the relevant rules of customary law concerning state responsibility by updating the current laws of war, as well as improving the language of the conventional sources of Geneva and Hague laws.²⁵⁹ Although the author did not define the term "environment," one commentator suggested that the new Convention would deal with "damage to the marine environment as a whole and marine wildlife and habitats in particular; pollution of the atmosphere, destructive climate modification, enhanced global warming and degradation of the ozone layer; and the destruction or degradation of terrestrial fauna and flora and their habitats."²⁶⁰

In order to eliminate differing quanta of damage necessary, several options have been considered:

Option (a): prohibiting the employment of methods or means of warfare which are intended, or may be expected, to cause *any* (except *de minimis*) damage to the environment;

Option (b): prohibiting it at least where the damage is widespread, long-lasting *or* severe;

Option (c): prohibiting it as under alternative (b), but adding a fourth alternative criterion, 'significant (or 'appreciable') and irreversible';

Option (d): choosing some midway position between alternative (b) and the existing excessively high threshold as it appears in Article 35(3) of Protocol I.²⁶¹

One commentator suggested that option (c) may be the best approach because the threshold of damage required is sufficient to encompass most damage, but high enough so as not to impose liability for any

law).

258. *Id.*; Kirsh, *supra* note 246, at 151.

259. Kirsh, *supra* note 246, at 151-52.

260. PLANT, *supra* note 119, at 41-42 (noting that the impetus behind this Convention is concerns that arose during the Gulf War).

261. *Id.* at 45; Protocol I, *supra* note 132, art. 35(3). Protocol I's standard requires widespread, long-term, and severe environmental damage. *See* discussion *supra* Section III.B.3 (discussing Protocol I's prohibition of methods that result in the destruction of the natural environment).

damage.²⁶² Assuming that option (c) is appropriate, the drafters must eliminate the ambiguity of these terms.²⁶³

A Fifth Geneva Convention must also clearly define the types of weapon it will ban. Since environmental modification may be brought about using several types of weaponry (conventional or of a type causing mass destruction, including biological and chemical weapons), a clear restriction on the use of these armaments is necessary because, as the laws of armed conflict have indicated, loopholes exist that also allow States to use these weapons.²⁶⁴

Another problem that the Fifth Geneva Convention must address is the notion of military necessity. The subjective nature of this principle has caused the suspension of the application of the current set of international laws of armed conflict.²⁶⁵ Providing military commanders with a more objective criteria in appraising what constitutes proper military targets may solve this problem.²⁶⁶ Yet, such a remedy is not likely, or imminent.²⁶⁷

262. PLANT, *supra* note 119, at 48 (defining "irreversibility" as "the loss of ecosystems, species or genetic material or the diversity thereof in a given area which could have a serious impact upon the ecology of the region or of the world as a whole").

263. *Id.* at 47 (suggesting that the definitions provided by the CCD Understanding to En-Mod be adopted for the purposes of uniformity). See discussion *supra* Section I.B (discussing how the various interpretations of the language causes States to fail to ratify the Convention resulting in non-compliance of the Convention).

264. Part III of the proposed Fifth Geneva Convention focuses on the use of some weapons which may be deemed excessively injurious to the environment. The use of these weapons was more circumscribed than in the present weapons convention. The Fifth Geneva Convention, however, does recognize that there are very limited purposes for defoliants and herbicides including small-scale use to assist in preparation of air-strips, harbors, and camps, as well as areas in which ambush is possible. *Id.* at 52.

265. Richard Falk, *The Environmental Law of War: An Introduction*, in ENVIRONMENTAL PROTECTION AND THE LAW OF WAR 78, 79, 92-94 (Glen Plant ed., 1992) (claiming that military necessity has been subjectively defined in wartime and has prevailed over customary international law).

266. Cf. Cmdr. Charles A. Allen, *Implementing Limitations on the Use of Force: The Doctrine of Proportionality and Necessity*, 86 AM. SOC'Y INT'L L. PROC. 39, 45 (1992) (stating that strategic planners are advised to select targets that cause the least danger to civilian lives and civilian objects).

267. *Id.* (doubting whether belligerents would refrain from attacking an important military target because they do not possess the weapons to avoid incurring collateral damage).

In summary, a Fifth Geneva Convention may be able to address some ambiguities contained in the current set of international laws of armed conflict; however, the Convention must be wary of the infirmities that have plagued its predecessors, such as ambiguity in terms, divergence in interpretations, and lack of enforcement. Only when the Convention explicitly defines the terms, prohibits specific methods employed, and provides objective criteria for military targets, can States eliminate destruction. Until States establish a new legal regime on warfare, however, environmental protection in times of armed conflict remains limited.

CONCLUSION

The international laws of armed conflict provide the environment with a degree of protection in times of modern warfare. Yet, as the Article has illustrated, that protection is, at best, limited. In many instances, military necessity and the preoccupation with ameliorating *human* suffering have outweighed environmental concerns. As technology evolves, and the means and methods of warfare become more advanced, States have found that the environment itself may be manipulated through the use of weapons of mass destruction, such as chemical and biological armaments, to achieve efficient military operations and desired outcomes. It is with this foreboding reality that States must reaffirm and reformulate current regimes to protect the environment.

A basic tenet behind international environmental law is the notion of state responsibility for environmental destruction. The Stockholm Declaration and its progeny have extended that principle to the waging of modern warfare, but with marginal success. Customary international law, the laws of war, and their corresponding weapons conventions diminish the importance of this responsibility and of ultimate liability. This Article has examined the problems in the current regimes and has proffered various remedial measures.

States must recognize the extensive ecological damage that deliberate environmental modification causes. The current corpus of laws, however, does not furnish a clear understanding of this potential. States must reconcile divergent interpretations and ambiguous terms in conventions such as En-Mod and Protocol I to provide States with clear guidelines for military operations.

States have diminished their reliance on biological toxins, and as a result, the use of such weapons for purposeful environmental modification may be unlikely. Yet, States cannot confidently assert a similar statement about chemical armaments. Differing opinions on the legality of their use reveals the possibility of resorting to those weapons for

environmental modification purposes. The Chemical Weapons Convention, however, may provide a remedy. Establishing an explicit proscription on the employment of chemical agents in armed conflict may establish a distinct customary principle of international law. Signatory States should ratify the Chemical Weapons Convention to prevent extensive environmental damage by purposeful modification and through the use of chemical weapons.

Finally, the adoption of the Fifth Geneva Convention on the Environment can support the curtailing of deliberate environmental modification and the strengthening of an environmentally protective regime. Such a Convention would ameliorate the infirmities of the current set of laws of armed conflict by pronouncing clear standards for military operations and defining quanta of proof of environmental damage. Moreover, the Convention should incorporate facets of the Proposed Convention of the Crime of Ecocide to provide definite criminal elements and ultimate criminal liability. Increasing the economic and penal costs can alter state action and behavior. These steps can ensure compliance with state responsibility for deliberate environmental modification in times of armed conflict.