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Environmental Warfare and the Persian Gulf War: Possible Remedies to Combat Intentional Destruction of the Environment

The environment has always been both a military target and a casualty of war
—Bernard Nietschmann¹

I. Introduction

On August 2, 1990, Iraqi troops crossed the southern border of Iraq and entered Kuwait, engaging in what President Bush later called, “a blatant use of military aggression.”² The invasion was the result of a two-week long impasse in talks between the two countries concerning border, oil, and debt disputes.³ While the leaders of the world were condemning the Iraqi President, Saddam Hussein, and passing provisions for economic sanctions, Iraqi soldiers were quickly invading the Kuwaiti oilfields.⁴ Little did the world know that Hussein would target not only the Kuwaiti resistance and the international forces which would eventually challenge him; he would also target the environment of the Gulf region.

During the course of the war, Hussein threatened, and then on several occasions, utilized deliberate environmental destruction as a tool of war.⁵ Iraqi troops intentionally turned Kuwaiti oil wells into raging infernos that would number over 500 by the time the Coali-

1. Bernard Nietschmann, *quoted in Morrison, War on the Environment*, 23 NAT'L J., March 2, 1991, at 536 [hereinafter Morrison].

2. *Invading Iraqis Seize Kuwait and It's Oil*, N.Y. Times, Aug. 3, 1990, at A1, col. 6.

3. *Iraq Army Invades Capitol of Kuwait in Fierce Fighting*, N.Y. Times, Aug. 2, 1990, at A1, col. 6 [hereinafter *Iraq Army Invades*]. Iraq had been demanding that Kuwait, which draws much of its oil from fields that straddle the disputed border, pay back billions of dollars in compensation for the revenues that Baghdad said had resulted from Kuwait's actions in forcing down the price of oil. Only a few hours after the collapse of talks, Iraqi armor, led by more than 350 main battle tanks, began racing across the eighty miles of desert towards Kuwait City.

4. *Invading Iraqis Seize Kuwait and It's Oil*, *supra* note 2, at col. 6. Twelve hours after the invasion began, the Iraqis were reported to be in control of the airport, the central bank, and all key government buildings.

5. Toukan, *The Gulf War and the Environment: The Need For a Treaty Prohibiting Ecological Destruction as a Weapon of War*, noted in THE FLETCHER FORUM 95 (Summer 1991) [hereinafter Toukan].

tion troops would cross the border to retake Kuwait.⁶ The release of oil into the Persian Gulf was another form of Iraq's deliberate assault on the environment, necessitating an international effort to clean up two to three⁷ million barrels of oil, which endangered wildlife, water desalination plants, and industrial facilities in Kuwait, Saudi Arabia, Bahrain, Qatar, the United Arab Emirates, and Oman.⁸ In the process of committing these abominable acts of environmental terrorism, Iraq violated several treaties and international laws regarding both the environment and the conduct of war.

This Comment will examine the legal ramifications of Iraq's actions during the Persian Gulf War in regards to its intentional destruction of the environment as an element of warfare. Sections II and III will begin with an examination of the history of the use of the environment in international conflict, and will then briefly review the different methods by which the environment may be utilized and manipulated as a tool for military action. This Comment will continue with Section IV's discussion of the specific use of environmental warfare in the Persian Gulf War, including the supposed tactical reasons for such use and the damaging effects it had on the region. The treaties and conventions regarding the use of the environment in war will then be examined. Sections V, VI, and VIII will conclude by evaluating the effectiveness of these instruments as used to determine remedial measures with regard to Iraq's punishment and the prevention of the purposeful abuse of the environment in future conflicts.

II. The Use of the Environment as a Weapon

A. History

Environmental warfare refers to the manipulation of the environment for hostile military purposes.⁹ Throughout history, the environment has been a repeated victim of military strategy, often to frustrate advancing troops or to cause widespread damage to an enemy, in order to force the opposition into submission. The first recorded use of environmental warfare was in the Persian-Scythian War of 512 B.C., in which the Scythians, as they retreated, practiced a self-inflicted scorched earth policy in an effort to hinder the Persian advance.¹⁰ In the Peloponnesian War of 431-404 B.C., the

6. *Id.* at 98.

7. *International Maritime Organization Launches Gulf Oil Pollution Disaster Fund*, Int'l Env. Rep. Current Report (BNA), vol. 14, No. 5, at 127 (March 13, 1991). Original estimates reached as high as 10 million barrels of oil spilled into the Gulf. *Id.*

8. *Id.* at 97.

9. ENVIRONMENTAL WARFARE: A TECHNICAL, LEGAL AND POLICY APPRAISAL 3 (A. Westing ed. 1984). [hereinafter Westing].

10. STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE, WARFARE IN A FRAGILE

Spartans annually destroyed the Athenian grain crop in their conquest of Athens.¹¹ In the Third Punic War of 149-146 B.C., the Romans, after conquering Carthage, razed the city and salted the fields around it, to forever sterilize the area's soil.¹²

The Mongolian incursions into Mesopotamia in 1213 to 1224 A.D. brought about the massive annihilation of all unappropriated crops and livestock. During those campaigns, the Mongols, under Genghis Khan, deliberately destroyed the major irrigation works of the Tigris River, upon which the agriculture of the indigenous civilization of Mesopotamia (now Iraq) depended.¹³

During the Franco-Dutch War of 1672 to 1678, dikes and dams in the Netherlands were cut and broken by the Dutch, in order to create large scale flooding and to impede the advance of the French forces. The so-called "Holland water line" resulted.¹⁴ Another country to utilize the environment in defense of French advances was Russia during the Napoleonic Wars of 1796-1815. As the French advanced through Russia in the summer of 1812, the Russians practiced a self-inflicted scorched earth policy to impede Napoleon's progress.¹⁵

The use of the environment as an implement of war is also not uncommon to the United States (U.S.). In the U.S.-Navaho Wars of 1860 to 1864, the United States deliberately destroyed sheep and other livestock, as well as fruit orchards and other crops of the Navaho, as part of its successful strategy of subjugation.¹⁶ Also, during the United States Civil War, the Union army practiced a scorched earth policy in an attempt to starve the rebellious states. In particular, a special vehemence was shown in Virginia, where the agriculturally rich 700,000 hectare Shenandoah Valley was systematically devastated between September and October 1864.¹⁷ Furthermore, in Georgia, the Confederate granary, 4 million hectares were laid to waste.¹⁸

From 1937 to 1945, during the Second Sino-Japanese War the Chinese dynamited the Huayuankow dike of the Yellow River, in an effort to stop the advance of the Japanese. The ensuing flood waters ravaged major portions of the Honan, Anhwei, and Kiangsu provinces, destroying crops and topsoil of several million hectares, drown-

WORLD: MILITARY IMPACT ON THE HUMAN ENVIRONMENT 14 (1980) [hereinafter SIPRI].

11. *Id.*

12. *Id.* See also Morrison, *supra* note 1.

13. See SIPRI, *supra* note 10, at 15.

14. *Id.* See also Westing, *supra* note 9, at 6.

15. See SIPRI, *supra* note 10, at 15.

16. *Id.* at 16.

17. *Id.* See also Morrison, *supra* note 1.

18. See SIPRI, *supra* note 10, at 12.

ing several thousand people, and leaving millions homeless.¹⁹

Destruction of dams was a common tactic in World War II. The British in May 1943, demolished two major dams in the Ruhr Valley, destroying or damaging 125 factories, twenty-five bridges, and power-stations; flooding coal mines; disrupting railway lines; and killing 1,294 Germans.²⁰

Probably the most extensive use of the environment as a tool of warfare occurred during the Second Indochina War of 1961 to 1975, also known as the Viet Nam Conflict. During this war, the United States utilized a strategy which included massive rural bombing, chemical and mechanical deforestation, large scale crop destruction, and intentional disruption of natural and human ecologies.²¹

The use of environmental warfare is not an idea new to Iraq. Indeed, Iraq had employed the environment as a weapon on a smaller scale during its eight-year war with Iran. During the war with Iran, Iraq shifted the courses of rivers and ignited dammed-up marsh areas to create barriers against Iranian troops.²²

B. *Different Methods of Environmental Warfare*

The uses of the environment for military purposes are limitless. While some methods have actually been employed, others have yet to be developed or are in the process of being developed. The most expedient military manipulations of the environment are those in which a relatively modest expenditure of triggering energy leads to the release of a substantially greater amount of directed destructive energy.²³

Future environmental warfare could involve atmospheric modifi-

19. *Id.* See also Westing, *supra* note 9, at 6.

20. Westing, *Environmental Warfare*, 15 ENVTL. L. 644, 652 (1985) [hereinafter *Environmental Warfare*]. British Air Force authorities would later summarize the operation as "maximum effect with minimal effort," *Id.*, See also P. BRICKHILL, *THE DAM BUSTERS* 9, 11 (1951).

21. See SIPRI, *supra* note 10, at 22. During the Viet Nam conflict, the United States (U.S.) had a division of "anti-forest rangers" to eliminate tracts of forestland used by Viet Cong troops, with a lethal combination of napalm and a chemical defoliant, Agent Orange. D. DAY, *THE ENVIRONMENTAL WARS* 238 (1989). Agent Orange was successful in destroying 8% of the region's croplands, 14% of its forests, and one half of its mangrove swamps. See Morrison, *supra* note 1, at 537.

22. *Environmental Weapons Used Before*, L.A. Times, Jan. 29, 1991, at A6, col. 3 [hereinafter *Environmental Weapons*]. Most of Iraq's military received its training from the Soviet Union. Such tactics used in the Gulf by the Iraqis have appeared in Soviet military texts since 1986. In 1989 methods of environmental warfare were described most clearly in *Defense Against Weapons of Mass Destruction*, a 399 page, Russian-language textbook written by Gen. V. V. Myasnikov. The author wrote that it is possible to "make use of destructive forces occurring in nature for military purposes." *Id.* He said the weapons open to military use include "flooding and pollution to disrupt navigation and disable irrigation and other hydrostructures and create obstructions in rivers, canals and other bodies." *Id.* See also MYASNIKOV, *DEFENSE AGAINST WEAPONS OF MASS DESTRUCTION* (1989).

23. See WESTING, *supra* note 9, at 3.

cations, including fog and cloud dispersion or generation, hailstone production, release of materials which might alter the electrical properties of the atmosphere, generation and direction of destructive storms, rain or snow making, and control of lightning and climate modifications.²⁴

It could also involve modification of the oceans, which would include changes in the physical, chemical, or electrical parameters of the seas and oceans, the addition of radioactive materials into seas and oceans, the destruction of oil wells on the sea bed,²⁵ or the generation of large tidal waves.²⁶

Other options of futuristic environmental warfare might entail the manipulation of the land masses and associated water systems. Such methods would include the stimulation of earthquakes and volcanoes,²⁷ the generation of avalanches and landslides,²⁸ large scale burning or destruction of vegetation, river diversion, destruction of dams on rivers, or the destruction of nuclear industry.²⁹

One final option might be the use of animals in environmental warfare. This was the case in the First and Second World Wars where weapons such as the "pigeon guided missile,"³⁰ napalm bats,³¹

24. J. GOLDBLAT, AGREEMENTS FOR ARMS CONTROL: A CRITICAL SURVEY 52 (1982). Techniques could be developed in the future making it possible to alter the electrical properties of the ionosphere in such a way as to disrupt enemy communication. *Environmental Warfare*, *supra* note 20, at 648. It is an imminent possibility that technology will be developed that will allow one to open a temporary "window" in the ozone layer above enemy territory for the purpose of permitting an injurious level of ultra violet radiation to penetrate to the ground. *Id.* Also, various levels of control could be exercised over winds (to create hurricanes), over clouds (to create or dissolve fog, to generate cloud-to-ground lightning) or over precipitation (to create monsoons), bringing direct or indirect damage to an enemy. *Id.* at 649.

25. SIPRI, *supra*. note 10, at 167. A massive oil spill of the sort that might result from the sinking of an oil tanker could have a dramatic local ecological impact, particularly if it occurred along the coast or in some other biotically rich area, and all the more so if the area were partially isolated from the main body of the ocean.

26. See J. GOLDBLAT, *supra* note 24, at 52; See also *Environmental Warfare*, *supra* note 20, at 654. Manipulation of the oceans could include chemical manipulations that are meant to disrupt acoustic (sonar) or electromagnetic properties of the attacked oceans, or to create tsunamis. *Id.* An atomic bomb under the ocean, could also create huge tidal waves which might devastate the coastal cities of a hostile power, *Hurricanes, Earthquakes, Volcanoes Could be Weapons of War*, Reuters North European Service (Sept. 16, 1984) (LEXIS, Nexis library, Int'l file) [hereinafter *Hurricanes*].

27. A nuclear bomb dropped into an active volcano could result in an explosion, igniting a volcanic eruption which may blot out the sun and cause chaos for miles around. See *Hurricanes*, *supra* note 26.

28. *Id.* In addition, relatively small nuclear explosions could be used to create earth vibrations that would cause clay soils to temporarily liquify, thus producing landslides of the sort that devastated Anchorage, Alaska in a 1964 earthquake.

29. See J. GOLDBLAT, *supra* note 24, at 52. The land could also be manipulated by the application of chemical poisons and herbicides, and the introduction of exotic living organisms. *Environmental Warfare*, *supra* note 20, at 655.

30. See D. DAY, *supra* note 21, at 124.

31. *Id.* at 127. Napalm was sutured underneath the bats' skin and the bats would be dropped over Japan. The bats would then hide in attics of houses and buildings and chew through the suture, causing unexpected explosions.

and explosive dogs³² were the subjects of experimentation.

III. Environmental Warfare and the Persian Gulf War

A. *Iraq's Methods of Environmental Warfare*

As the Coalition troops began the intense air war against Iraq in January 1991, Saddam Hussein planned his defense. The first victims of this environmental defense were Kuwaiti oil wells, refineries, and storage tanks.³³ The burning of these facilities was a defensive tactic, in which Hussein hoped that the dense black smoke from the blazes would confound United States ground and air forces.³⁴ Senate Energy Committee Chairman, Senator J. Bennett Johnston, stated: "The idea is that all that heat and light would foul up our night vision and maybe even obscure with a black cloud the bombing efforts."³⁵

By February 1991, the Pentagon reported that over 590 Kuwaiti wells and facilities were on fire, and scientists stated that the result would be an episode of pollution that is unprecedented in history.³⁶ While experts predicted that the smokescreen could significantly sidetrack the ground war and temporarily hinder the air war by obscuring targets, the damage to the environment far exceeded any contributions such actions in fact had to Iraq's defense.³⁷

Saddam Hussein's environmental warfare also took the form of intentional oil spills. On January 22, 1991, two Iraqi tankers in the northern Gulf began to release oil into international waters.³⁸ Three other intentional spills followed: the first in the Khafji area, the second at the Sea Island Terminal at Mina Al Ahmadi in Kuwait, and

32. *Id.* at 129. Russians during World War I equipped dogs with explosives, and they in turn, would crawl under tanks, causing explosions.

33. See Toukan, *supra* note 5, at 95, 97; See also, *Oil as a Weapon of Combat*, Gannett News Service (Jan. 22, 1991) (NEXIS, Nexis library, Int'l file). Saddam Hussein had previously warned the West that he was prepared to blow up oil-filled trenches along the Kuwait-Saudi Arabia border and oil-laden tankers sitting in the Kuwaiti harbor. *Id.* Saddam also had warned the West that he would destroy Kuwait and its oilfields in the face of a ground assault. Schwartz, *Blasting Down to the Wire*, NEWSWEEK, Mar. 4, 1991, at 38.

34. *Oil as a Weapon of Combat*, *supra* note 33.

35. *Id.* Johnston went on to say that:

It is a very simple task to simply blow them [oil facilities] up or simply ignite them as he's [Hussein's] done. If those fires have to be stopped and there's a whole series of them going on at the same time, it will be a huge task to get in there because of the heat.

Id.

36. *War Scars Gulf's Fragile Environment*, Gannett News Service (Feb. 27, 1991) (LEXIS, Nexis library, Int'l file). Some sources estimated the total wells, tanks and refineries ignited by Iraqi troops to be between 600 and 700. *The Spoils of War: A Report on the Eco-Disaster in the Persian Gulf*, L.A. Times, June 23, 1991, (Magazine), at 16 [hereinafter *The Spoils of War*].

37. See Schwartz, *supra* note 33, at 38.

38. See Toukan, *supra* note 5, at 96.

the third from the Iraqi offshore terminal at Mina Al Bakr.³⁹ Estimates of the amount of the oil released exceeded three million barrels of crude oil.⁴⁰ This is about ten times the amount of oil spilled into Alaskan waters during the Exxon-Valdez accident. It equals the largest unintentional oil spill in history, which was the Ixtoc spill in the Gulf of Mexico in 1979.⁴¹ Saudi spokesmen stated that the spill was about nine miles long and had flowed for three days.⁴²

The main reason for the intentional spilling of oil into the Gulf was its military value. Iraq believed that such a huge oil slick might present problems to Coalition troops, should they attempt to land on the Kuwaiti coast.⁴³ Furthermore, the ignition of the oil slicks could have created a wall of fire effectively forcing allied naval vessels to operate further offshore.⁴⁴ However, due to the evaporation and dispersion of the oil, as well as the insufficient quantities of oil actually released, the three million barrels spilled failed to serve any military purpose, and only damaged an already fragile Persian Gulf ecosystem.⁴⁵

Another reason for the intentional spill could have been to clog Saudi desalinization plants which fed water to eastern Arabia, and served as the main supply for more than 700,000 coalition troops.⁴⁶ It is hypothesized that the Iraqis used research and exercises from the 1980s to plan the deliberate, large-scale release of crude oil that occurred in the Persian Gulf.⁴⁷

39. *Id.* After the spill on January 25, 1991, President Bush stated, "Saddam Hussein continues to amaze the world. Now he resorts to enormous environmental damage. No military advantage to him whatsoever. He clearly is outraging the world." *War in Gulf; U.S. Says Iraq Pumps Kuwaiti Oil into Gulf*, N.Y. Times, Jan. 26, 1991, at A1, col. 6 [hereinafter *War in Gulf*].

40. News Conference with Worldwatch Institute (Mar. 1, 1991). According to the Saudi Arabian Meteorology and Environmental Protection Administration, at least 3.3 million barrels of oil were spilled into the Gulf Waters. A barrel of oil is equal to forty-two gallons, which would make the spill to be in excess of 130 million gallons of oil. *See also* Toukan *supra* note 5, at 97. (The final estimate of the amount of oil spilled into the Gulf is between 2 and 3 million barrels.) *Id.*

41. Toukan, *supra* note 5, at 97. President Bush and other officials said the flow of oil could be a dozen times greater than the Exxon Valdez disaster which dumped 258,000 barrels of crude into Prince William Sound in 1989. *United States Tries to Contain Oil Spill*, The Reuters Library Report (Jan. 26, 1991) (LEXIS, Nexis library, Int'l file) [hereinafter *Oil Spill*].

42. *See Oil Spill, supra* note 41, at 2.

43. *War in Gulf, supra* note 39, at col. 6; *See also* Toukan, *supra* note 5, at 97.

44. *See* Toukan, *supra* note 5, at 97.

45. *Id.*

46. *See* Morrison, *supra* note 1, at 536. There is also a threat to the desalination plants that turn Persian Gulf seawater into drinking water for the civilian population and allied troops in eastern Saudi Arabia. Several plants have been forced to close for brief periods because of earlier, smaller spills in the gulf. *War in Gulf, supra* note 39, col.6.

47. *International Maritime Organization Launches Gulf Oil Pollution Disaster Fund*, 14 Int'l Env. Rep. (BNA), No. 5, at 127 (March 13, 1991). In 1988 the Regional Organization for Protection of the Marine Environment (ROPME), of which Iraq is a member, held a joint exercise which simulated a major tanker spill off Kuwait. The exercise included the simulated southward movement of a large slick. Some ROPME Member States said they believe

B. *The Effects of Iraq's Environmental Warfare*

The deleterious effects of Saddam Hussein's environmental warfare have been tremendous. The burning of Kuwait's oil wells and refineries will have two primary and related ecological consequences: atmospheric pollution and possible climatic changes.⁴⁸ It can take from weeks to months to bring each oil well under control. With some 500 wells burning, it was first thought that the entire process would take months, or even years.⁴⁹ During the period in which the wells burned, the sky in Kuwait became a dark quilt of smoke boiling up from the wells, while throwing off millions of tons of soot, poisons and pollutants.⁵⁰

The smoke has caused extensive damage to the environment, both in the Gulf Region and worldwide. As oil burns, sulphur dioxide, nitrogen oxide, carbon monoxide, carbon dioxide, and hydrogen sulfide are released into the atmosphere. When these chemicals combine with water, the result is acid rain.⁵¹ The main effects of acid rain are soil acidification, groundwater pollution, and damage to vegetation.⁵² Reports from governments world-wide, which have been

Iraq could have used the exercise data to plan a deliberate release or even that the exercise could have acted as an inspiration for "environmental warfare." *Id.*

48. See Toukan, *supra* note 5, at 97.

49. *Id.* at 98. Air pollution was estimated by the U.S. Environmental Protection Agency as roughly ten times that emitted by all U.S. industrial and power-generating plants combined. Kass & Gerrard, *The Gulf War*, N.Y. L.J. 4 (July 26, 1991). [hereinafter Kass & Gerrard]. While original estimates predicted that it would take months or years to "cap" all of the burning wells, such did not turn out to be the case. As the wells were burning, innovative technology was developed to fight these fires, and the last well was extinguished on November 6, 1991. *Regional Survey*, IBC Int'l Country Risk Guide, (November 1991) (LEXIS, Nexis Library, Int'l file) [hereinafter *Regional Survey*].

50. Cooke, *Hell on Earth*, *NEWSDAY*, July 30, 1991, at 55. Furthermore it was estimated that between 2.2 and 3 million barrels of oil per day were being burned, See News Conference with Worldwatch Institute, *supra* note 40, at 3. Some estimates said that as much as 5 million barrels of crude oil worth about \$87 million were going up in thick black smoke daily. According to estimates by Scientific American magazine, the blazing wells in Kuwait were spewing 50,000 tons of sulfur dioxide, 100,000 tons of soot, and more than 800,000 tons of carbon in the form of carbon dioxide per day. Cooke, *supra*, at 55. The amount of oil lost was about 6 million barrels per day and that is twice the country's maximum production capacity, and equal to about 10% of the world's daily consumption of oil. Leerhsen & Begley, *Hellfighters to the Rescue*, *NEWSWEEK*, Mar. 25, 1991, at 27 [hereinafter *Hellfighters*].

Fallout from the plume has blackened soil in Kuwait, dropped soot as far away as Thailand, and may be poisoning the soil in the Fertile Crescent where, ironically, 30% of Iraq's own food is grown. That same plume of smoke, if it had originated in New York City, would extend down to the Florida peninsula, and be several hundred miles wide. *Id.*

51. See Toukan, *supra* note 5, at 98. When large amounts of sulphur and nitrogen oxide in the atmosphere come in contact with water droplets, they will turn to nitric and sulphuric acid and will, in turn, fall to earth as acid rain.

52. *European Oil Industry Called on for Help in Extinguishing Kuwaiti Oil Field Fires*, 14 Int'l Env. Rep. Current Report (BNA), No. 6, at 161 (March 27, 1991). According to the World Meteorological Organization, the fires dumped more than 40,000 tons of sulfur dioxide, which forms the acid rain, into the atmosphere daily, equal to the combined emissions of France, Germany, and Great Britain. See *The Spoils of War*, *supra* note 36, at 16.

"Black Rain" already has fallen in Turkey and Iran, and a thick sooty haze has blanketed Bahrain, 220 miles south of Kuwait. "The soot fallout could last for months," said Walter Vreeland, a consultant to Bahrain's Environmental Protection Committee. Already people in

filed into the United Nations Environment Program information system, indicate that there is acid rain falling in a belt from Bulgaria to Pakistan as a result of the fires. Iraq and Iran have been the worst-hit countries in the region.⁵³

In addition to the acid rain, the smoke and soot itself can have a negative impact on humans, resulting in respiratory problems, serious increases in asthma attacks, and pneumonia in elderly patients.⁵⁴ Greenpeace predicted that local drinking supplies of water would be polluted, farm land contaminated, and the health of children, the aged, and people with heart and respiratory problems endangered.⁵⁵ Also, there is a psychological toll.⁵⁶ Finally, this soot and smoke is not particularly aesthetically pleasing either: "Trees, cars, houses, and the ground itself are not only crusted, but sticky with oil."⁵⁷

The other primary effect that the burning oil wells will have on the environment, is the possible climate changes that may result. The release of sooty smoke seriously affects the atmospheric radiation balance because it absorbs sunlight and gives rise to atmospheric perturbations.⁵⁸ Soot and smoke reduce sunlight reaching the earth's surface, which reduces daytime temperatures.⁵⁹ Some scientists, including Carl Sagan, argue that the fires could disrupt the climate over part of the Northern Hemisphere and lead to tragic crop failures.⁶⁰ Other scientists say the smoke from the fires might

Bahrain have been complaining of headaches and nausea. *War Scars Gulf's Fragile Environment*, Gannett News Service (February 27, 1991) (LEXIS, Nexis library, Int'l file) [hereinafter *War Scars*].

53. *War Scars*, *supra* note 52.

54. See *The Spoils of War*, *supra* note 36, at 16. "Breathing the air in Kuwait and its surrounding areas is comparable to smoking 24 hours a day, seven days a week," said Alan Moghissi, vice president for environmental health and safety at the School of Medicine, University of Maryland at Baltimore. See *European Oil Industry*, *supra* note 52.

55. *Gulf War Heightens Fears of Long-Term Impact on Climate*, The Reuters Library Report (Feb. 22, 1991) (LEXIS, Nexis library, Int'l file); See also *The Spoils of War*, *supra* note 36, at 16. "With unfavorable wind conditions," Brent Blackwelder, vice president for policy for Friends of the Earth, had earlier warned a U.S. Senate Committee, "the smoke people are breathing is not unlike putting your head over a barbecue pit or like standing behind the exhaust pipes of hundreds of malfunctioning diesel trucks." *Id.*

56. *The Spoils of War*, *supra* note 36, at 16. "This smoke makes some people break down . . . people are sitting inside their house. . . and sometimes this affects them emotionally." *Id.*

57. *Id.*; see also, News Conference with Worldwatch, *supra* note 40, at 9. When Michael Renner, Senior Researcher, Worldwide Institute, was asked to describe the air pollution in layman's terms he stated, "I think L.A. on a smoggy day is paradise compared with what we're seeing over there now. Apparently, large areas are covered with such thick and heavy smoke that in the middle of the day it looks like you are really in the nighttime." *Id.*

58. See Toukan, *supra* note 5, at 98.

59. *Id.*; see also News Conference With Worldwatch, *supra* note 40 at 9. ". . . [Y]ou literally have to use your headlights in the middle of the day when the smoke is at its thickest now." *Id.* Another result of this smoke is that in areas of the Saudi Arabian peninsula, there has been reported incidents of rain where there has been no rain for eighty-five to one hundred years. Address by Morad Eghbal, The Dickinson School of Law Symposium on Global Environmental Regulation (Oct. 26, 1991).

60. See *War Scars*, *supra* note 52.

block sunlight and lower temperatures enough to affect agriculture in the Middle East; and as far as 1,000 miles away in India and Pakistan.⁶¹

The impact of the oil spills had equally deleterious effects on the environment. The Persian Gulf is about 600 miles long and its width varies from between fifty miles at the Straits of Hormuz to 200 miles in other sections.⁶² Its average depth is only thirty-five meters, and nowhere in the Gulf is it deep enough for marine life to escape an oil slick. The Gulf is almost an entirely enclosed sea, with the Strait of Hormuz forming a bottleneck, causing salinity rates and hence density to rise. As a result, water exchange between the Gulf and the adjacent Indian Ocean has a low turnover time. It takes between three to five and one half years for all the Gulf Water to be replaced with the waters of the open sea.⁶³ Therefore, any oil spill would remain in the Gulf region until the oil dissipated.

The effects of the spilled oil have been apocalyptic. Over 450 unbroken miles of coastline have been fouled by the oil spill.⁶⁴ Severe damage has been seen on beaches and marshes on the northwestern shore of the Persian Gulf. Thick mats of congealing oil have paved beaches and washed into coastal wetlands, including mangrove swamps and salt marshes. Ponds and lakes of oil have caught fire.⁶⁵ Experts of Britain's Royal Society for the Prevention of Cruelty to Animals, said it could take twenty years for the Gulf to recover from the effects of the oil slicks caused by the war.⁶⁶

The Gulf is a delicate and rich ecosystem-home to shrimp fisheries; more than 100 species of commercial fish; and dozens of spe-

61. *Id.* Two meteorology specialists at Rutgers' Cook College in New Jersey warned that heavy oil field fires could create large clouds that could block the sun's rays from reaching Earth. That would cause what they called a "petroleum winter" - a global climatic cooling that could lead to widespread agriculture failures. *Oil as a Weapon*, *supra* note 33, at 2.

Meanwhile other studies have reached conflicting conclusions. . . .

[W]orse-case scenarios have been avoided. The dense, poisonous smoke stayed below the cloud layer, where it's less likely to block out the sun and cause a condition similar to a nuclear winter. Nor does it seem that the billowing blackness will interfere with weather systems that drive Indian monsoons . . .

Hellfighters, *supra* note 50, at 27.

62. See Toukan, *supra* note 5, at 97.

63. Vine, *No Hiding Place in a Blackened Sea*, THE TIMES, Jan. 28, 1991 (LEXIS, Nexis library, Int'l file). Greater depths off Iran and shallower waters off Saudi Arabia contribute to the flow pattern. As the denser water sinks, it draws in water from the Indian ocean, setting up an anti-clockwise circulation. Ironically, such a situation was predicted in 1980. See *supra* note 25.

64. *Persian Gulf Needs Decades to Recover From War Pollution*, The Reuters Library Report (Aug. 7, 1991) (LEXIS, Nexis library, Int'l file).

65. See Cooke, *supra* note 50, at 56.

66. *Gulf War Heightens Fears of Long-Term Impact on Climate*, The Reuters Library Report (Feb. 22, 1991) (LEXIS, Nexis library, Int'l file). The experts went on to say, "The effects of the oil are devastating on wildlife. Tens of thousands of birds are dying, the shrimp and fishing industry are badly affected, and parts of the coral reef which have taken hundreds of years to form are destroyed." *Id.*

cies of mammals; as well as birds and reptiles, some of which are endangered.⁶⁷ The toll on plant and animal life has been substantial, particularly for the bird population.⁶⁸ In fact, as of June 1991 estimates of total bird loss were estimated at between 30,000 and 40,000 of the Gulf's bird population of one million.⁶⁹ Marine life may also suffer. Herds of dugong, an endangered species of mammals which gave rise to the mermaid legend, may have been hit by the oil spill because they breath air close to the surface and eat seaweed which could be contaminated.⁷⁰ Dolphins in the Gulf could also have been injured for similar reasons. Other creatures that may have been harmed include sea birds, turtles,⁷¹ sea-snakes, and porpoises. The threat also exists for species from the midwater zone of plankton-feeding anchovies and larger fish, down to the rich seabed where meadows of seagrasses sustain the commercially important shrimps, pearl oysters, and a host of other species.⁷²

One of the most important considerations for the Gulf's economic health is the potential impact of the spilled oil on the region's desalination plants, power plants, and other industrial facilities. Most countries in the Gulf region depend heavily on desalinated and brackish water for their water supply. People everywhere in the region will suffer as a result of the environmental destruction caused by the Gulf War, coupled with the potential for further damage to the region's desalination plants.⁷³

IV. Legal Ramifications of Environmental Warfare

It has long been recognized in the international community, that intentional attacks on the environment during hostilities are discouraged, if not illegal, under international custom and law. Iraq's intentional attack on the environment is a blatant example of such a prohibited activity and should not go unpunished. There are a num-

67. *War Scars*, *supra* note 52, at 2. There have also been reports that the Saudi shrimp industry has been wiped out and that the destruction of plankton and coral reefs could undermine the food chain. See News Conference with Worldwatch, *supra* note 40, at 3.

68. See *The Spoils of War*, *supra* note 36, at 18, 29.

69. *Id.* at 29.

70. See Vine, *supra* note 63, at 1. Contrary to predictions, only a few turtles and no dolphins and dugongs are known to have died from the effects of the spill. See *The Spoils of War*, *supra* note 36, at 17.

71. See *The Spoils of War*, *supra* note 36, at 26. The International Maritime Organization cleared prime sea turtle nesting islands before the turtles came ashore; funded efforts to keep the last two tiny stretches of salt marsh clean, and tried to stop oil leaks still coming down from Kuwait. *Id.*

72. See Vine, *supra* note 63, at 1.

73. See Toukan, *supra* note 5, at 97. The Water desalination plants and eleven environmentally sensitive areas along the Saudi coast were designated top priority sites for protection against the oil, Bukro, *Oil Spill Cleanup Just Starting Gulf Effort Includes High-tech and Ecumenical Move*, Chic. Trib., March 1, 1991, at C10. Oil companies from Britain, Denmark, Greece, Japan, the Netherlands, Norway, and the United States immediately dispatched emergency oil spill equipment, and were able to recover 115,000 barrels of oil. *Id.*

ber of mechanisms under international law, in the form of international and regional treaties, which provide some insight into what the legal remedies might be for Iraq's intentional spoilage of the Persian Gulf's regional environment.

The first of these treaties is the Convention Respecting the Laws and Customs of War on Land (Hague Convention of 1907).⁷⁴ In attempting to define and revise the rules of war, and thereby diminish the evils of it, this Convention adopted a code of laws which attempted to reach standards that civilized countries would exercise, from the laws of humanity in conjunction with the dictates of the public conscience.⁷⁵ Specifically, the Convention states in Section II, Chapter I, Article 23, ". . . it is especially forbidden [for a country] (e) To employ arms, projectiles, or material calculated to cause unnecessary suffering."⁷⁶ The Convention continues to say that it is also forbidden, "(g) To destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war."⁷⁷

While the Hague Convention has neither been adopted nor signed by Iraq, it stands as an example of the custom of international opposition to environmental warfare, and may be applicable to the situation at hand. Customary international law, which is applicable to all nations, is a general and consistent practice of nations that is followed over a period of time out of a sense of legal obligation. The practices need not be universal, but must be followed by a significant number of states involved in the activity in question.⁷⁸ A United Nations resolution may serve as "instantaneous" customary law, eliminating the temporal element, if the context in which it is adopted and the voting record indicate widespread support of the Member States.⁷⁹ The ideas of the Hague Convention (*i.e.*, the prevention of wanton destruction) have been repeatedly applied in many instances, both in United Nations Resolutions and in other regional conventions. These instances make the applicable sections mentioned in the Hague Convention customary international law, and therefore,

74. Convention Respecting the Laws and Customs of War on Land, Oct. 18, 1907, *reprinted in* GOLDBLAT, AGREEMENTS FOR ARMS CONTROL: A CRITICAL SURVEY 122 (1982). [hereinafter Hague Convention]

75. *Id.* The preamble of the Hague Convention states the following:

Until a more complete code of laws of war has been issued, the high contracting Parties deem it expedient to declare that . . . the inhabitants and belligerents remain under the protection and the rule 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.

Id.

76. *Id.* § II, ch. I, art. 23.

77. *Id.*

78. See Kass & Gerrard, *supra* note 49, at 7.

79. *Id.*

Iraq may be subject to them.

Assuming that the Hague Convention can be applied in this situation, Iraq was clearly in violation of its mandates when it intentionally spilled oil into the Gulf, aimed at affecting Saudi Arabian desalination plants, and, causing unnecessary suffering to millions of people in that country. Furthermore, Iraq violated the Convention by deliberately setting fire to Kuwaiti oil wells, which was not "imperatively demanded by the necessities of war."⁸⁰

Another applicable treaty of international law, which may prove useful in analyzing possible remedies for Iraq's intentional violence against the environment, is the Declaration of the United Nations Conference on the Human Environment.⁸¹ This Declaration was intended to develop common principles to inspire and guide the peoples of the world towards the preservation and enhancement of the human environment, in light of the many various problems that threaten it.⁸²

The Declaration sets out several principles and recommendations, applicable to the Persian Gulf situation. Principle 2 states that: "The natural resources of the earth, including the air, water . . . must be safeguarded for the benefit of present and future generations through careful planning and management."⁸³ In addition, Principle 6 states that:

The discharge of toxic substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems.⁸⁴

Especially appropriate are Principles 7, 21, 22, and 24. Principle 7 obligates states to take all possible steps to prevent pollution of the

80. See Hague Convention, *supra* note 74. It should be noted that an argument can be made by Iraq, however, that in light of the potential deterrent effects that the oil fires and oil spill may have had on allied operations, the destruction that Iraq perpetrated was absolutely necessary, and therefore, it is at least possible, that this defense could be successfully asserted by Iraq. See Kass & Gerrard, *supra* note 49, at 9.

81. Declaration of the United Nations Conference on the Human Environment, June 16, 1972, 11 I.L.M. 1416 [hereinafter Declaration of United Nations]. This declaration was an expansion of the *Trail Smelter* case, *Trail Smelter Case* (U.S. v. Can.), 3 U.N. Rep. Int'l Arb. Awards 1905 (1949). In the *Trail Smelter* arbitration, which involved damage to farmland in the State of Washington due to the emission of sulphur dioxide fumes from a smelter in Canada, the arbitration tribunal ruled that "under the principles of international law . . . 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 or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence," *quoted in* Kass & Gerrard, *supra* note 49, at 11.

82. Declaration of United Nations, *supra* note 81, art. I, at 1416.

83. *Id.* prin. 2, at 1418.

84. *Id.* prin. 6.

seas by harmful substances.⁸⁵ Principle 21 gives states the right to exploit sovereign natural resources, so long as such exploitation does not cause harm to the environment or to other states.⁸⁶ Principle 22 orders states to co-operate in developing mechanisms to compensate victims of environmental damage, caused by activities occurring within a particular state, which affect areas outside of that state.⁸⁷ Finally, Principle 24 encourages co-operation between nations to prevent, reduce and eliminate adverse environmental conditions caused from international conditions.⁸⁸

Iraq, as a member of the United Nations (UN), is bound by customary law to all resolutions, declarations, and agreements that are adopted by the UN. Therefore, Iraq is bound to the principles articulated in the Declaration of the United Nations Conference on the Human Environment, and it has violated these principles with its intentional pollution of the Gulf region. Iraq not only exploited its own sovereign resources, but also the resources of Kuwait and all Gulf States when it discharged toxic materials into the Gulf, inflicting serious, if not irreversible damage. Furthermore, Iraq created a hazard to human health and marine life, which caused damage to the environment of other states, or areas beyond the limits of its national jurisdiction.

85. *Id.* Principle 7 states that:

States shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

Id.

86. *Id.* prin. 21, at 1420. Principle 21 states:

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 or other States or of areas beyond the limits of natural jurisdiction.

Id.

Also, The Charter of the United Nations establishes that, "All Members shall settle their international disputes by peaceful means . . . [and] shall refrain in their international relations from the threat or use of force . . ." SIPRI, *supra* note 10, at 189. Adherence to the spirit of the covenant would, among other things, obviate the necessity of further proscriptions against military actions of an anti-environmental nature. *Id.*

87. Declaration of United Nations, *supra* note 81, prin. 22, at 1420. Principle 22 articulates that:

States shall co-operate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction.

Id.

88. *Id.* prin. 24. Principle 24 provides:

Co-operation through multilateral or bilateral arrangements or other appropriate means is essential to effectively control, prevent, reduce and eliminate adverse environmental effects resulting from activities conducted in all spheres, in such a way that due account is taken of the sovereignty and interests of all states.

Id.

Another treaty applicable to this case is the 1972 Convention for the Protection of the World Cultural and Natural Heritage.⁸⁹ This Convention is an attempt to protect the irreplaceable items of natural and cultural heritage for all the peoples of the world, on an international scale.⁹⁰ The applicable sections of this Convention deal with the preservation of "natural heritage."⁹¹ Especially important is Article 6, Section 3, Chapter II, which states the following: "Each State Party to this Convention undertakes *not to take any deliberate measures which might damage directly or indirectly the cultural and natural heritage* referred to in Article . . . 2 situated on the territory of other States Parties to this Convention." (emphasis added).⁹²

There is no question that this Convention applies to Iraq, for Iraq signed the Convention for the Protection of the World Cultural and Natural Heritage on December 17, 1975; in addition, it was signed by Saudi Arabia on November 7, 1978 and Iran on December 17, 1975. In this case, Iraq has undertaken deliberate measures—the burning of the oil wells and the intentional spilling of oil into the Gulf—that have directly and indirectly damaged the natural heritage of other parties to the Convention. Such acts have threatened species of plants and animals of outstanding universal value (*i.e.*, dolphins, sea turtles, birds, plankton, dugongs, etc.), biological formations (*i.e.* coral reefs), and other natural sites of beauty. Therefore, Iraq is in violation of this Convention.

A treaty of major importance, the Geneva Convention of 1949,⁹³ plays a significant role in interpreting possible punishments for Iraq's actions. In particular, the Protocol Additional to the Geneva Convention of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I),⁹⁴ specifically provides for protection of the environment during times of war.

89. Convention for the Protection of the World Cultural and Natural Heritage, Nov. 23, 1972, reprinted in SELECTED MULTILATERAL TREATIES IN THE FIELD OF THE ENVIRONMENT 276 (A. Kiss ed. 1983).

90. *Id.*

91. *Id.*, ch. I, art. 2. Natural heritage is defined as: natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view; geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation; natural sites or precisely delineated areas of outstanding universal value from the point of science, conservation, or natural beauty. *Id.*

92. *Id.*, § 3, ch. 2, art. 6 (emphasis added).

93. Geneva Convention Relative to the Protection of Civilian Persons in Time of War, Aug. 12, 1949, 6 U.S.T. 3516, T.I.A.S. No. 3365, 75 U.N.T.S. 287. The United States, Iraq, and Kuwait, among many others, are parties to this treaty.

94. Protocol Additional to the Geneva Convention of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), June 8, 1977, reprinted in J. GOLDBLAT, AGREEMENTS FOR ARMS CONTROL: A CRITICAL SURVEY 239 (1982).

Protocol I mandates: "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."⁹⁵ Protocol I also limits "attacks" only to military targets.⁹⁶

In addition, Article 54 of the Protocol provides for the protection of objects indispensable for the survival of the civilian population. Such objects include: foodstuffs, drinking water installations, and supplies, and irrigation works.⁹⁷ Protocol I of the Geneva Convention also encourages the protection of the natural environment, discourages the use of methods of warfare that are expected to cause damage to the environment or health or welfare of the population, and prohibits retaliatory attacks against the environment.⁹⁸

In essence, Protocol I to the Geneva Convention states that parties will not make the environment or civilian populations objects of attack.⁹⁹ Iraq's destruction of oil wells, and its deliberate oil spills entailed the type of widespread, long-term and severe damage against the environment that was prohibited by the 1977 Protocol. Neither the United States nor Iraq have ratified this treaty so, while they may be parties to it, there is a problem in using it as a source of liability.¹⁰⁰ While some argue that Protocol I merely codifies customary international law, this is not a widely accepted view.¹⁰¹ Thus, it is merely speculation as to whether the Geneva Convention Protocol may be used to hold Iraq responsible for its intentional destruction of the environment.¹⁰²

95. *Id.* Part III, § I, ch. I, art. 35, at 240. The right of parties in armed conflict to choose methods or means of warfare is not unlimited. *Id.*

96. *Id.* Part IV, § I, ch. I, art. 48, at 242. "Attacks" are defined as acts of violence against the adversary, whether in offense or in defense. *Id.* art. 49.

97. *Id.* Part IV, § I, ch. III, art. 54, at 243. Article 54 provides:

It is prohibited to attack, destroy, remove, or render useless objects indispensable to the survival of the civilian population, such as foodstuffs, . . . drinking water installations and supplies and irrigation works, for the specific purpose of denying them for their sustenance value to the civilian population or to the adverse Party, whatever the motive, whether in order to starve out civilians, to cause them to move, or for any other motive.

Id.

98. Article 55 states:

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

2. Attacks against the natural environment by way of reprisals is prohibited.

Id. art. 55, at 244.

99. See SIPRI, *supra* note 10, at 198.

100. See Kass & Gerrard, *supra* note 49, at 9.

101. *Id.* The United States is reported to take the position that the protocol's prohibition against severe harm to the environment is too broad and vague, and therefore, not part of the customary international law of war. *Id.*

102. Protocol II to the Geneva Convention also, provides additional relevant protection concerning the environment, but its applicability is in question for the same reasons as Protocol I. Protocol II states:

Still another treaty that might be useful in holding Iraq accountable for their damage to the environment is the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD).¹⁰³ This Convention prohibits the "military or other hostile use of environmental modification techniques having widespread,¹⁰⁴ long-lasting¹⁰⁵ or severe effects¹⁰⁶ as the means of destruction, damage or injury to any other State Party."¹⁰⁷ The other applicable section defines the term "environmental modification techniques" as "any technique for changing—through the deliberate manipulation of natural processes—the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere, and atmosphere, or of outer space."¹⁰⁸

ENMOD's "widespread, long-lasting, or severe effects" requirement would appear to be satisfied. The well fires and oil spills have at least regional effects. Raging for several months, the well fires are likely to substantially affect the economy of Kuwait and the health of the people in the region for years to come.¹⁰⁹ However, like the Geneva Convention, there may be some problems in holding Iraq accountable for its deliberate manipulations of the environment. Although Iraq signed the ENMOD Convention on August 15, 1977, it has yet to ratify the Convention. In addition, since only fifty-five states have ratified it, its value as a reflection of customary international law is questionable.

Starvation of civilians as a method of combat is prohibited. It is therefore prohibited to attack, destroy, remove or render useless, for that purpose, objects indispensable to the survival of the civilian population, such as foodstuffs, agricultural areas for the production of foodstuffs, crops, livestock, drinking water installations and supplies and irrigation works.

Protocol II to the Geneva Convention, June 8, 1977, 16 I.L.M. 1442, art. 14, *quoted in* Comments of Joel R. Burcat, Esquire, General Counsel, National Wilderness Institute, to United States Senate, Committee on Environmental and Public Works, Regarding Iraqi Reparations for Damages to the Environment resulting from Iraq's Actions During the Persian Gulf War (April 10, 1991) [hereinafter Burcat].

103. Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, May 18, 1977, 31 U.S.T. 335, T.I.A.S. No 9416 [hereinafter ENMOD].

104. The Convention was accompanied by a group of "Understandings" worked out by the Conference of the Committee on Disarmament, but not written into the Convention. These statements clarify and amplify some Convention articles and are considered essential for the comprehension of the drafters' intentions. "Widespread" was defined as encompassing an area on the scale of several hundred square kilometers. *Environmental Modification Ban Faithfully Observed, States Parties Declare*, 21 UN MONTHLY CHRON. 27-28 (July 1984). [hereinafter *Environmental Modifications*].

105. *Id.* "Long-lasting" was defined by the "Understandings" as meaning, lasting for a period of months, or approximately a season. *Id.*

106. *Id.* "Severe" was defined by the "Understandings" as involving serious or significant disruption or harm to human life, natural and economic resources or other assets. *Id.*

107. See ENMOD, *supra* note 103, art. I. Secretary-General Javier Perez de Cuellar stated that, "The Convention was designed to spare mankind from the disastrous consequences of environmental warfare." *Environmental Modifications, supra* note 104, at 28.

108. See ENMOD, *supra* note 103, art. II.

109. See Kass & Gerrard, *supra* note 49, at 9; See also *Regional Survey, supra* note 49.

Furthermore, the ENMOD Convention has been widely criticized. These criticisms arise because the type of environmental warfare that the Convention prohibits is ill-defined.¹¹⁰ At a review conference in September 1984, critics stated that the threshold of "widespread, long-lasting or severe" is ambiguous and the pact does not allow some level of environmental change. Also, the Convention has been criticized because it only bans signatories from carrying out environmental warfare against other signatories.¹¹¹ Although the review conference overwhelmingly affirmed the ENMOD Convention,¹¹² its' lack of universal acceptance detracts from any viability that the Convention may have in punishing international environmental crimes, such as those perpetrated by Iraq.

The Kuwait Regional Convention for Co-Operation on the Protection of the Marine Environment From Pollution, a regional convention, may add some insight to possible means of punishment for intentional environmental pollution.¹¹³ This treaty, entered into between nations bordering on the Persian Gulf, obligates Iraq to "take all appropriate measures . . . to prevent, abate, and combat pollution of the marine environment" in the Persian Gulf.¹¹⁴ The following articles are particularly applicable to the current question: Article V (Pollution Caused by Dumping from Ships and Aircraft)¹¹⁵; Article VI (Pollution from Land-Based Sources)¹¹⁶; and Article XIII

110. *U.S. Supports Treaty Banning Warfare Ruining Environment*, Reuters North European Service, (September 10, 1984) (LEXIS, Nexis library, Int'l file).

111. *Id.* Critics call for amendments so that the acts themselves are outlawed regardless of status of the victim. *Id.*; See also WESTING, *supra* note 9, at 70.

112. "The Conference is convinced that the continued observation of this Article [I] is essential to the objective which all States Parties share of preventing military or any other hostile use of environmental modification techniques." *Review Conference Held on Environmental Modification Convention*, Department of State Bulletin (Nov., 1984) (LEXIS, Nexis library, Int'l file). "This Conference reaffirms its support for this Article [II] containing the definition of the term "environmental modification techniques." *Id.* The Conference is of the opinion that this definition, taken together with the understandings relating to Articles I and II, is adequate to fulfill the purpose of the Convention." *Id.*

113. Kuwait Regional Convention For the Cooperation on the Protection of the Marine Environment From Pollution, Apr. 24, 1978, reprinted in *SELECTED MULTILATERAL TREATIES IN THE FIELD OF THE ENVIRONMENT* 486 (A. Kiss ed. 1983) [hereinafter *Kuwait Regional Convention*].

114. See Burcat, *supra* note 102, at 4; See also Kuwait Regional Convention, *supra* note 113, art. III(a); 11 Middle East Exec. Reports 21 (October, 1988).

115. Kuwait Regional Convention, *supra* note 113, art. V, at 487. Article V states:

The Contracting States shall take all appropriate measures to prevent, abate and combat pollution in the Sea Area caused by dumping of wastes and other matter from ships . . . and shall ensure effective compliance in the Sea Area with applicable international rules

Id.

116. *Id.*; art. VI. Article VI states:

The Contracting States shall take all appropriate measures to prevent, abate and combat pollution caused by discharges from land reaching the Sea Area whether water-borne, air-borne, or directly from the coast including outfalls and pipelines.

Id.

(Liability and Compensation) which states that:

The Contracting States undertake to co-operate in the formation and adoption of appropriate rules and procedure for the determination of:

(a) civil liability and compensation for damage resulting from pollution of the marine environment, bearing in mind applicable international rules and procedures relating to those matters; and

(b) liability and compensation for damage resulting from violation of obligations under the present Convention and its protocols.¹¹⁷

An intentional spill of oil, whether it be from ships or pipelines, is clearly in violation of the Kuwait Regional Convention. Since Iraq is one of the eight signatories to this Convention, and she has clearly violated it by intentionally dumping oil into the Gulf by both mentioned methods, Iraq may be held accountable for compensation to the other parties.

The Kuwait Regional Convention was created and signed in conjunction with the Protocol Concerning Regional Co-Operation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency (Oil Pollution Protocol).¹¹⁸ This Protocol was added to emphasize the urgency of potential emergencies, that result from substantial pollution by oil or other harmful substances, and to provide co-operative and effective measures to deal with them¹¹⁹. Furthermore, this Protocol obligates Iraq, in situations in which it is responsible for an oil spill, to "take every appropriate measure to combat pollution and/or rectify the situation."¹²⁰ However, Iraq has completely failed to take any action to combat the pollution it caused, or to rectify the effects. Iraq's clear violation of the Oil Pollution Protocol calls for responsible nations to take action where Iraq has failed to do so.¹²¹

A final international document that might be useful in holding Iraq liable for the damage it inflicted on the environment is the World Charter for Nature.¹²² This Charter was drafted for the protection of animals and plants and their environment. Specifically, it states in its general principals that: "All areas of the earth, both land and sea, shall be subject to these principles of conservation; spe-

117. *Id.*, art. XII, at 488.

118. Protocol Concerning Regional Co-Operation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency, April 24, 1978, *reprinted in* SELECTED MULTILATERAL TREATIES IN THE FIELD OF THE ENVIRONMENT 492 (A. Kiss ed. 1983).

119. *Id.*

120. *Id.*, art. X, at 494.

121. See Burcat, *supra* note 102, at 4.

122. *World Charter for Nature*, 37 U.N. GAOR (No. 7), U.N. Doc. A/37/L4 and Add.1 (1982), *reprinted in* [1982] 36 U.N. Y.B. 1024.

cial protection shall be given to unique areas, to representative samples of all the different types of ecosystems and to the habitats of rare or endangered species."¹²³ Another important principle states: "Nature shall be secured against degradation caused by warfare or other hostile activity."¹²⁴ Article II of the Charter ("Functions") states that:

11. Activities which might have an impact on nature shall be controlled . . . in particular: (a) Activities which are likely to cause irreversible damage to nature shall be avoided; (b) Activities which are likely to pose a significant risk to nature shall be preceded by an exhaustive examination; . . .
12. Discharge of pollutants into natural systems shall be avoided. . .¹²⁵

Article III (Implementation) finds that military activities damaging to nature shall be avoided.¹²⁶

The World Charter for Nature was adopted by the General Assembly by an overwhelming vote.¹²⁷ Since Iraq was an adoptee of the Charter, and since it was adopted by a significant number of states, at the very least the Charter is incorporated in customary international law and is enforceable against Iraq.

In addition to the formal treaties that are mentioned above, and the customary norms against transboundary pollution, there is a vast array of conventions that attempt to reduce transboundary air and water pollution.¹²⁸ However, claimants attempting to rely upon such conventions would be hampered both by the vagueness of many of the standards they set, and by the fact that Iraq is not party to many of the major treaties in force. In addition, whether relying on conventional or customary norms, there remains a question whether such laws apply in the context of armed conflict.¹²⁹

123. *Id.*, § 3, art. I, at 1025.

124. *Id.*, § 5.

125. *Id.*, §§ 11, 12, art. II.

126. *Id.*, art. III.

127. *Id.* at 1026. The vote of the Assembly was 103 in favor, one against (U.S.), and eighteen abstentions. Iraq voted to adopt it. This treaty could be used against Iraq even though the U.S. did not vote in favor of it. The U.S. stated that they voted against the Charter, because they felt that more precision in the language should have been aimed for, and that it objected to the Charter's purporting to create obligations for individuals. *Id.* Even without the U.S. support, the overwhelming character of the Charter is exemplary of customary adoption of an international treaty.

128. See Kass & Gerrard, *supra* note 49, at 11. These conventions include: the Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403, T.I.A.S. No. 8165, *reprinted in* 11 I.L.M. 1294; United Nations Convention on the Law of the Sea, opened for signature Dec. 10, 1982, U.N. Doc. A./CONF.62/122, *reprinted in* 21 I.L.M. 1261 (1982); and the Convention on Long-Range Transboundary Air Pollution, Nov. 13, 1979, *reprinted in* 18 I.L.M. 1442 (1979).

129. *Id.*

V. Remedies

It is generally accepted under customary international law that the breach of an international obligation creates liability for reparations for the wrongful act or omission.¹³⁰ As a measure of compensation, the Permanent Court of International Justice (PCIJ) established that "reparation must, as far as possible, wipe out all the consequences of the illegal act and must establish the situation, which would in all probability have existed if that act had not been committed."¹³¹

Several steps have been taken, both by the United States and the United Nations, in attempts to make Iraq pay for its environmental crimes in the way of war reparations. The United States House of Representatives has made several resolutions condemning Iraq's actions and calling for the payment of reparations. The most prominent of these resolutions was H. Con. Res. 57, *Deploring the Release of Millions of Gallons of Oil into the Persian Gulf*.¹³² This resolution declared that Saddam Hussein and Iraq should be held legally, morally, and financially accountable for its' cruel acts against the environment.¹³³ Specifically, the resolution states that the Congress:

- (1) deplores Saddam Hussein's vicious attacks against the environment in releasing millions of gallons of oil into the Persian Gulf and torching hundreds of oil wells in Kuwait; and
- (2) declares that Saddam Hussein and the current Iraqi regime should be held liable under United Nations Security Council Resolution 686 (1991) for the costs resulting from these deliberate acts, including —
 - (A) the costs of containment incurred by any nation,
 - (B) the clean-up costs incurred by any nation,
 - (C) the costs of restoration of the natural resources, and
 - (D) Any other costs associated with these environmental catastrophes.¹³⁴

The United Nations has condemned Iraq's actions, and is preparing to deduct a percentage of Iraq's oil revenues to pay for the damages resulting from the Persian Gulf War.¹³⁵ The Security

130. *Chorzow Factory Case*, 1928 P.C.I.J. (ser. A) No. 17, at 47, cited in Kass & Gerard, *supra* note 49, at 12.

131. *Id.*

132. H.R. REP. NO. 57, 102d Cong., 1st Sess., 137 CONG. REC. 1824-27 (1991).

133. *Id.* at 1824.

134. *Id.* at 1825. See also 137 CONG. REC. H715 (daily ed. Jan. 29, 1991)(statement by Rep. Lagomarsino), in which a resolution was introduced to hold Iraq 100% responsible for all economic and environmental damages and calls upon the U.S. President and the leaders of other allied nations to demand adequate compensation for economic losses, environmental damages, and cleanup costs.

135. *U.N. Prepares to Take Iraqi Oil Revenues to Pay for Gulf War Damages*, *Official*

Council, in adopting United Nations Resolution 674,¹³⁶ recognized Iraq's obligation to make reparations for the various forms of damage that it inflicted. This Resolution addresses principles of international law which require Iraq to pay for "any loss, damage or injury arising in regard to Kuwait and third States, and their nationals and corporations, as a result of the invasion and illegal occupation of Kuwait by Iraq."¹³⁷

United Nations Resolution 687 also reaffirms Iraq's liability for environmental damage and the depletion of natural resources under international law.¹³⁸ However, the lack of a clear legal basis for such liability leaves a number of legal questions unresolved, thereby diminishing the usefulness of Resolution 687 as a precedent in future cases, and to a lesser degree, undermining its persuasiveness in the present dispute.¹³⁹

There are several methods which may be used to compel a nation to make reparations. The first of these methods is involves the cease-fire agreement. This is the most immediate form of relief and is most likely to result in adequate reparations payments. The cease fire resolution, adopted by the United Nations Security Council,¹⁴⁰ regarding reparations for environmental damage states as follows:

[The United Nations Security Council:]

16. Reaffirms that Iraq . . . is liable under international law for any direct loss, damage, including environmental damage and depletion of natural resources, or injury to foreign Governments, nationals and corporations, as a result of Iraq's unlawful invasion and occupation of Kuwait;¹⁴¹

The mechanisms established for the payment of reparations has several components: First, Iraq is obligated to pay reparations, including reparations for the environmental damage caused by Iraq; second, a fund will be established to pay compensation for the damages caused by Iraq and a UN Commission will be established to administer the fund; third, the fund will be financed by petroleum and pe-

Says, Int'l Env. Daily (BNA), at 1 (July 12, 1991). Plans are being made for the first session of the Commission's Governing Council in Geneva which will consider procedures for receiving and paying claims, and collecting amounts due from Iraq. Among other things, the Commission will need to consider how such damage will be quantified, what proof of damage will be required, and how to deal with potential long-term damage whose side effects may not be immediately clear. Id.

136. See Burcat, *supra* note 102, at 5.

137. *Id.*

138. E.S.C. Res. 687, April 3, 1991, par. 16, U.N. Doc. No. S/RES/687 (1991).

139. See Kass & Gerrard, *supra* note 49, at 13. Alternatively, Resolution 687 might be viewed as evidence that the environmental provision of Protocol I, ENMOD or the U.N. Conference on the Human Environment have now crystallized into customary international law. *Id.*

140. April 3, 1991, U.N. S.C. Res. 687, *quoted in* Burcat, *supra* note 102, at 6.

141. *Id.*

troleum products revenue from Iraq; and fourth, the fund and Commission will be established by the Security Council with input from the Secretary-General of the U.N.¹⁴²

Other methods of repayment could come from international claims brought before the PCIJ at the Hague, by the affected nations. Article 94 of the United Nations Charter provides that the Security Council may thereafter enforce the judgment of the PCIJ.¹⁴³ Also, a member of the United Nations (such as the United States or Kuwait) may bring an action for pacific dispute resolution before the United Nations Security Council, under Article 35 of the United Nations Charter.¹⁴⁴ Finally, international arbitration may be invoked to require reparations.¹⁴⁵

VI. Recent Developments

As of January 1992 little has been done in the way of environmental clean up. Although the oil-well fires are now out, the damage to the environment remains. There are lakes and rivers of oil spilled all over the desert of Kuwait. A January 1992 report by Greenpeace reported that 160 million barrels of oil now cover 60% of Kuwait.¹⁴⁶ Throughout the eastern portion of the country, the Kuwaiti desert is black with wind-driven oil and ash.¹⁴⁷ Kuwaiti agriculture also has suffered. A large Kuwaiti oasis that once produced an abundance of vegetables was devastated by both the fighting and the oily soot spawned by the well fires.¹⁴⁸

Kuwait, however, is not the only victim. In Saudi Arabia, crop production has slipped by an average of 40% because of the Kuwait fires. Farm animals have died from digesting grass contaminated with toxins from the oily smoke, and it has been predicted that the pollution in Saudi Arabia will last for years.¹⁴⁹ Low levels of hydrocarbons and heavy metals have been detected in Persian Gulf marine life and it is expected that it will take decades for the marine life in

142. *Id.*

143. *Id.*, at 5.

144. *Id.*

145. See Society of Organizations For Reparations for the Environment (SORE) Press Conference, Federal News Service (March 19, 1991) (LEXIS Nexis library, Int'l file).

146. This amount is twenty times the amount of oil spilled into Gulf waters. *Greenpeace Says Gulf War Severely Damaged Environment*, The Reuters Library Report (Jan. 10, 1992) (LEXIS World library, All World file). There are more than 252 oil lakes, formed mostly when much of the oil that burned in the well fires, fell back to earth in the form of black rain. McIlroy, *Oil is Everywhere in Kuwait*, The Montreal Gazette, Dec. 7, 1991, at K6 [hereinafter McIlroy]. The spill in the Gulf has also been recently found to be no less than twenty times the size of the Exxon Valdez disaster. *Id.*

147. Parmelee, *Environmentalists Survey the Blackened Wasteland That Was Kuwait*, The Wash. Post, Dec. 20, 1991, at A4, col. 1.

148. *Id.*

149. *Id.*

the Gulf to recover from this war.¹⁵⁰

There are two main criticisms of the war concerning the environmental situation. The first criticism is that special emergency preparedness measures, extra oil spill control equipment, special targeting, and perhaps non-conventional weaponry could have been considered for use against ecoterrorism. This is primarily because environmental destruction was considered likely by the administration before the initiation of the ground war offensive.¹⁵¹ No protective measures were applied to the environmentally sensitive areas. In fact, these areas have been sacrificed as a result of that policy.¹⁵²

The second chief criticism of the war is that the Gulf Nations have neither placed a priority on environmental repair nor provided the money to fund expensive cleanups.¹⁵³ In addition, the United States has neither contributed monetary assistance nor equipment to help in the clean up.¹⁵⁴ It has also been widely speculated that the Saudis, in particular, who have ignored numerous Persian Gulf oil spills in the past, were reluctant to establish a new precedent by responding with massive contributions.¹⁵⁵ Finally, it appears that Kuwait is also focusing more on rebuilding and producing oil, then it is on rehabilitating the environment.¹⁵⁶

The long term impact is still uncertain, especially in those areas where, for more than eight months, the Kuwaitis were exposed to toxic smoke caused by the burning fires. It has been estimated that Kuwait's death rate will increase by 10% this year, as a result of the toxic smoke.¹⁵⁷ Some scientists have even predicted that the smoke plume that hovered over the region for many months will have a cooling effect on the entire region and delay the monsoon season in India.¹⁵⁸ Tony Burgess, a desert ecologist from Arizona who visited

150. *Id.*; See also, Greenpeace News Conference, (January 10, 1992) [hereinafter Greenpeace]: "... You have to conclude that there is no remedy, no way, that the Gulf environment will ever recover to its pre-Gulf War status." *Id.*

151. *Current Developments: Analysis and Perspective*, 22 Env. Rep. (BNA), No. 35, at 2081 (Dec. 27, 1991).

152. Greenpeace, *supra* note 150. In fact, it is estimated that as much as a third of the 8 million barrels of oil that fouled the Gulf was the result of allied air strikes. See Parmelee, *supra* note 147.

153. Parrish, *Gulf's Postwar Cleanup Never Took Off*, L.A. Times, Jan. 12, 1992, at D10, col. 4 [hereinafter Parrish]. Some see the best source of money for substantial environmental cleanup in a fund that would accrue if Iraq begins to sell oil under the terms of the U.N. Secretary Council resolution passed after the war. This resolution would allow Iraq to export oil as long as the money is spent in certain ways. In one provision, 30% of the money would go into a fund to compensate Kuwait and other Gulf nations for war damages to government facilities, businesses, individuals, and — last and probably least — the environment. *Id.*

154. See Greenpeace, *supra* note 150.

155. See Parrish, *supra* note 153.

156. *Id.* Kuwait has asked for bids to recover the estimated 70 million to 100 million barrels of free oil left in the sprawling lakes around its fields, but it has not sought bids to clean up the soaked sand beneath. *Id.*

157. See McIlroy, *supra* note 146.

158. *Id.*

the region as part of a Friends of the Earth assessment team, believes it could take centuries for the region to recover. The worst case scenario would be that the region never will recover.¹⁵⁹

VII. Conclusion

Using the environment as a weapon in time of war causes economic and demographic catastrophes for the immediate participant nations in the conflict, and could even usher in global and ecological repercussions. The Gulf War raised this specter of deliberate environmental destruction, and the damage wrought by the conflict should serve as an impetus for a convention outlawing such ecological warfare.¹⁶⁰ One solution would be a definitive treaty, signed and ratified by the United Nations, prohibiting the utilization of the environment as a wartime weapon. The goal of such a treaty would be the avoidance of ecological destruction at the national, regional, and international levels.¹⁶¹

Another possible solution would be the establishment of a Fifth Geneva Convention.¹⁶² Such a convention would: (1) apply to all types of armed conflict; (2) outlaw the use of the environment as a weapon; (3) severely curtail incidental environmental damage through military force; and (4) outlaw environmental impacts on third party states, on international waters and on the atmosphere.¹⁶³

In any event, more clear-cut methods of enforcement need to be quickly established in the realm of international environmental protection. As we move further away from the threat of nuclear war, toward a supposed "new world order," a new type of conventional warfare threatens world security, whereby innocent parties, states, creatures, and organisms may be made objects of destruction.

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159. *Id.*

160. See Toukan, *supra* note 5, at 96.

161. *Id.* Such a treaty could follow the existing U.N. Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques. This convention was proven inadequate during the Gulf War. A new treaty protecting the environment in time of war would have to be far more explicit and possess greater regulatory power than any existing accord. *Id.* at 99.

162. Lee, *A Geneva Convention for the Environment*, 135 SOLIC. J. 386 (March 29, 1991).

163. *Id.*

