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# ENVIRONMENTAL TERRORISM: LESSONS FROM THE OIL FIRES OF KUWAIT

Jesica E. Seacor\*

## INTRODUCTION

Eyewitnesses to the inferno on the Kuwaiti oil fields at the end of the Persian Gulf War<sup>1</sup> described the scene as "hell on earth."<sup>2</sup> Over seven hundred oil wells burned uncontrollably for eight months until a multinational coalition of firefighters extinguished the last oil well fire.<sup>3</sup> The

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1. See William M. Arkin, *The Gulf 'Hyperwar'—An Interim Tally*, N.Y. TIMES, June 22, 1991, at 23 (noting the impact of the Gulf War). The Persian Gulf War began on January 16, 1991, and officially ended on March 1, 1991, six weeks later. *Id.* The United States and a United Nations (U.N.) coalition of forces, collectively the Allied forces, fought against Iraq after it invaded Kuwait, a neighbor at its southern border. *Id.*

2. See *infra* part II (detailing events of the Persian Gulf War involving environmental destruction); see, e.g., HELL ON EARTH: THE KUWAITI OIL FIRES (Arts & Entertainment Network 1991) [hereinafter HELL ON EARTH] (depicting firefighting techniques employed by United States and Canadian teams to extinguish the blazes); Sebastio Salgado, *The Kuwaiti Inferno: A Photo Essay*, N.Y. TIMES, June 9, 1991, § 6 (Magazine), at 21 (portraying photographs of the fires and the firefighters who battled them).

3. HELL ON EARTH, *supra* note 2. Although the estimated number of oil wells damaged by the fires ranged from 500 to 900, the official count by firefighters was 732. *Id.*; *infra* note 63 (providing the widest range of estimated oil fires); see *World News Tonight with Peter Jennings* (ABC television broadcast, Nov. 7, 1991) (interviewing firefighters putting out the last oil well fire). Firefighters extinguished the fires on November 6, 1991, many months earlier than firefighting experts had predicted. *Id.* Red Adair, a legendary oil well firefighter whose company was one of the U.S. teams hired by the Kuwaiti government to stamp out the blazes, testified before the U.S. Senate Environment and Public Works Committee [hereinafter Senate Com-

retreating Iraqi troops had deliberately set the wells ablaze.<sup>4</sup> Simultaneous media coverage of the event grimly reminded Western nations of their continuing dependence on oil from the Middle East.<sup>5</sup>

The oil fires also signified a more menacing threat: their lasting impact on the environment and population of the region could not be measured.<sup>6</sup> While the cost of the firefighting alone reached \$2 billion, the personal cost to civilians, military personnel, and firefighters affected by exposure to the oil fires and polluted air is still being calculated.<sup>7</sup>

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mittee] that the task would take up to five years to complete. *See also Kuwait Oil Fires: Hearing of the Gulf Environmental Task Force of the Senate Environment and Public Works Comm.*, 102d Cong., 2d Sess. (1991) (statement of Paul "Red" Adair, The Red Adair Co.), FED. NEWS SERVICE, June 11, 1991, available in LEXIS, LEGIS Library, FEDNEW File [hereinafter *Hearings I*]; FIRES OF KUWAIT (IMAX 1992) (documenting the firefighters, including Red Adair's team, struggling to put out the blazes amid the bleak desert landscape).

4. *See* Jennifer Parmalee, *Kuwaiti Emir Snuffs Out Last Iraqi-Lit Oil Fire*, WASH. POST, Nov. 7, 1991, at A1 (indicating that retreating Iraqi troops intentionally set the oil well fires).

5. *See* THE PRIZE: THE EPIC QUEST FOR OIL, MONEY AND POWER (Majestic Communications Ltd. & MICO 1993) (chronicling the rise of the U.S. oil industry and factors leading to Western dependence on foreign oil, particularly from the Middle East). The documentary is based on the novel by Daniel Yergin, DANIEL YERGIN, THE PRIZE: THE EPIC QUEST FOR OIL, MONEY, AND POWER (1991). Some commentators believe, though, that the West's dependence on foreign oil will decrease in the future as oil becomes less critical to industrialized economies, and solar power and nuclear fusion become more important. Bruce W. Nelan, *How the World Will Look in 50 Years*, TIME, Fall 1992, at 36. Others, like Yergin, assert that oil will continue to dominate the industry until a breakthrough occurs, that will meet both energy and environmental demands. Daniel Yergin, *Clinton's Oil Policy Will Cater to Environment*, HOUSTON CHRON., Jan. 14, 1993, at A21.

6. *See* THE MEDIA AND THE GULF WAR (Hedrick Smith ed., 1992) (discussing censorship of Gulf War data and uncertainty concerning the veracity of available information); *infra* part III (detailing censorship of information). For a graphic firsthand account of the environmental impact of the war, see JASSIM MOHAMMAD AL-HASSAN, THE IRAQI INVASION OF KUWAIT, AN ENVIRONMENTAL CATASTROPHE (2d prtg. 1992).

7. *See* John Horgan, *Up in Flames: Kuwait's Burning Oil Wells Are a Sad Test of Theories*, SCI. AM., May 1991, at 17 [hereinafter Horgan, *Up in Flames*] (discussing views of international scientists collecting data on the impact of the conflagration); John Horgan, *Burning Questions: Scientists Launch Studies of Kuwait's Oil Fires*, SCI. AM., July 1991, at 17 [hereinafter Horgan, *Burning Questions*] (focusing on various computer models for predicting effects of oil well fires on decreases in solar radiation and total soot fallout). Initial reports assessing the extent of damage caused by the burning Kuwaiti oil wells predicted that the smoke plumes would have a global impact, contributing to acid rain, global warming, and ozone depletion. Horgan, *Up in Flames, supra*. Later reports, however, claimed that the fires had not

What appears certain, though, is the recognition that the environment and population in the region suffered senselessly for the sake of human politics.<sup>8</sup>

To better understand the Persian Gulf War in the context of its environmental impact, this Comment studies the environmental effects of the war and recommends under international law a course of action to prevent this type of "environmental terrorism" from recurring.<sup>9</sup> Part I provides an overview of the Persian Gulf War, Iraq's bombing of Kuwait's oil facilities, and the setting of the oil well fires. Part II analyzes data on the human and environmental impact of the oil fires and related oil spills. Part III suggests the reasons for the U.S. government's gag order restricting publication of some of the information relating to the extent of the war's impact.<sup>10</sup> Part IV prescribes recommendations under inter-

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had the global environmental impact earlier feared. See, e.g., *Kuwait Oil Fires Had No Global Effect on Atmosphere, World Weather Agency Says*, 15 Int'l Env't Daily (BNA) No. 12, at 412 (June 17, 1992) (recapping a World Meteorological Organization finding that the impact was severe in Persian Gulf region but only short-term); Bill Dietrich, *Kuwait's Oil Fires Caused Little Damage*, GAZETTE (Montreal), May 17, 1992, at B6 (interviewing a scientist studying unfounded "nuclear winter" concern); *Effects of Oil Fires in Kuwait Still Inconclusive, Panel Says*, 14 Int'l Env't Daily (BNA) No. 21, at 576 (Oct. 23, 1991) (discussing conclusions of the Senate Committee task force which downplayed the health effects of the fires).

Although the inferno's impact is no longer considered to be global, the regional impact continues to be dire. See Matthew L. Wald, *No Global Threat Seen From Oil Fires*, N.Y. TIMES, June 25, 1991, at C5 (confirming that the oil fires were causing substantial regional environmental changes).

8. A report issued by the Arab Monetary Fund estimated that the war cost the region \$676 billion in 1990 and 1991, excluding figures measuring the damage to the environment and economies of the region. Youssef M. Ibrahim, *War Is Said to Cost the Persian Gulf \$676 Billion in 1990 and '91*, N.Y. TIMES, Apr. 25, 1993, at 14.

9. See *Millions of Gallons of Crude Oil Flow into Persian Gulf from Kuwaiti Tanks*, 14 Int'l Env't Rep. Current Rep. (BNA) No. 2, at 37 (Jan. 30, 1991) [hereinafter *Millions of Gallons*] (noting that a Pentagon official called the Gulf spill "an act of environmental terrorism"); *U.S. Trade Mission Pushes Debt-Nature Swaps*, 14 Int'l Env't Rep. Current Rep. (BNA) No. 13, at 377 (July 3, 1991) (stating that International Green Cross called Hussein's acts "ecological terrorism"); see also Steven Emerson, *When Earth Takes the Hit*, 21 Int'l Wildlife 38 (1991) (labeling Iraq's actions as "environmental terrorism"). The terms "environmental terrorism," "ecological terrorism," and "ecocide" were coined by various groups to describe Iraq's method of warfare. *Id.*

10. See John Horgan, *U.S. Gags Discussion of War's Environmental Effects*, SCI. AM., May 1991, at 24 (discussing the existence of a gag order). Among other agencies, the U.S. Department of Energy ordered its facilities and contractors to discontinue discussion of "war-related research and issues" with the media: "Most inde-

national law to punish willful violators of the law, whether the perpetrators are individuals or governments, and to deter such deliberate environmental destruction from recurring.

## I. OVERVIEW OF THE PERSIAN GULF WAR

On August 2, 1990, Iraqi military forces invaded the neighboring nation of Kuwait.<sup>11</sup> Iraq's President Saddam Hussein apparently wanted to seize control over Kuwait primarily due to its oil pricing, production and sales.<sup>12</sup> Kuwait's unwillingness to raise its oil prices in the world market may have triggered Iraq to attack.<sup>13</sup> In addition, Iraq was struggling to pay off its lingering debt from the 1980-88 war with Iran.<sup>14</sup> Finally, President Hussein believed that because Kuwait had been situated historically within Iraq's borders, Iraq was entitled to Kuwait's oil resources and revenues.<sup>15</sup>

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pendent studies and experts suggest that the catastrophic predictions in some recent news reports are exaggerated. We are currently reviewing the matter, but these predictions remain speculative and do not warrant any further comment at this time." *Id.*; see *infra* part III (discussing the reasons behind the gag order, including national security interests and inconclusiveness of data).

11. See Michael R. Gordon, *Iraq Army Invades Capital of Kuwait in Fierce Fighting*, N.Y. TIMES, Aug. 2, 1990, at A1 (describing the Iraqi invasion of Kuwait). The invasion began at 2:00 a.m. when over 80,000 Iraqi soldiers crossed the Iraq-Kuwait border. *Id.* By mid-morning, Kuwait City, located 80 miles south of the border, was occupied in a "lightning-like" conquest. Walter V. Robinson, *Iraq Tightens Its Control Over Kuwait; 'Revolutionary' Regime Installed; Arab Leaders Withhold Criticism; The Invasion of Kuwait*, BOSTON GLOBE, Aug. 3, 1990, at 1; see also WILLIAM M. ARKIN ET AL., GREENPEACE, ON IMPACT 25 (1991) (detailing events at the outbreak of Persian Gulf War).

12. See Gordon, *supra* note 11, at A1 (noting reluctance by Kuwait to reduce oil production so that Iraq's sales revenues would improve internationally).

13. See Zedalis, *infra* note 15, at 712 (linking the Iraqi invasion of Kuwait to Iraq's dropping oil sales). For a concise analysis of the relevance of the Iraqi invasion of Kuwait to the global oil market, see YERGIN, *supra* note 5, at 769-81.

14. See Zedalis, *infra* note 15, at 712 (noting that Kuwait's oil revenues would help Iraq address its war debt).

15. See Gerald F. Seib, *Iraq Has Shaky Claim to Kuwait*, WALL ST. J., Aug. 13, 1990, at 5 (articulating Iraq's historical claim to portions of Kuwait considered to be its own); Roger Vielvoye, *Kuwait-Iraq Border Dispute*, 88 OIL & GAS J. 32 (1990) (focusing on Iraq's interest in oil near Kuwait border). Another source mentioned Iraq's possible aspirations towards Saudi Arabia as well. Rex J. Zedalis, *Burning of the Kuwaiti Oilfields and the Laws of War*, 24 VAND. J. TRANSNAT'L L. 711, 712 (1991); see also YERGIN, *supra* note 5, at 771-72 (1991) (tracing the historical tensions between Iraq and Kuwait, especially after the discovery of oil in the Gulf re-

The United Nations closely monitored the Iraqi occupation of Kuwait.<sup>16</sup> Between the August 2, 1990 invasion and the end of November 1990, the U.N. Security Council drafted a series of resolutions mandating the unconditional withdrawal of Iraqi forces from Kuwait.<sup>17</sup> On December 3, 1990, the U.N. Security Council adopted Resolution 678, authorizing member states to employ the necessary means to uphold the previous resolutions if Iraq continued to disobey them.<sup>18</sup>

The deadline for withdrawal expired on January 15, 1991.<sup>19</sup> The next day, an allied coalition of military forces from thirty-four nations initiated Operation Desert Storm with U.N. authorization to use force against Iraq for its failure to comply with the withdrawal order.<sup>20</sup> Within a week, intense and unprecedented bombing by the coalition forces maimed the massive Iraqi army.<sup>21</sup>

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gion).

After the war ended, the U.N. established a new border between Iraq and Kuwait, providing Kuwait with ten new oil wells and a former Iraqi naval base. *Iraq Lawmakers Reject New UN-Drawn Kuwait Border*, CHI. TRIB., May 21, 1992, at 4. Iraq condemned the U.N. for violating international law by establishing the demilitarized border zone. Chris Hedges, *After 'Confusion' Iraq Frees U.S. Munitions Expert*, N.Y. TIMES, Oct. 11, 1992, at 12 (describing release of American captured at Iraq-Kuwait border).

Four years after the invasion, Iraq finally has recognized Kuwait's sovereignty. See Julia Preston, *Iraq Accepts Sovereignty of Kuwait*, WASH. POST, Nov. 11, 1994, at A1 (speculating that the action was motivated by Iraq's desire to hasten the lifting of its U.N. sanctions). The sanctions have crippled Iraq's economy. Caryle Murphy, *In Iraq, 'Every Day Worse Than the Day Before'*, WASH. POST, July 24, 1994, at A1 (describing the devastating impact the sanctions have had on the daily life of Iraqis).

16. See Zedalis, *supra* note 15, at 712-13 (discussing role of U.N. Security Council and its resolution with regard to the Iraqi invasion).

17. See *id.* at 713 n.4 (listing U.N. resolutions penalizing Iraq for failing to withdraw its forces from Kuwait). The U.N. Security Council resolutions also imposed a trade embargo on Iraq, scorned Iraq's mistreatment of civilians, and condemned Iraq's diplomatic violations. *Id.* at 713.

18. U.N. SCOR, 45th Sess., 2963rd mtg. at 1, U.N. Doc. S/Res/678 (1990), reprinted in 1 U.S. DEP'T ST. DISPATCH, Dec. 3, 1990, at 298.

19. See Zedalis, *supra* note 15, at 713 (indicating withdrawal order's deadline).

20. See Andrew Rosenthal, *War in the Gulf: The Overview, U.S. and Allies Open Air War on Iraq; Bomb Baghdad and Kuwait Targets; No 'Choice' but Force, Bush Declares*, N.Y. TIMES, Jan. 17, 1991, at A1 (summarizing events leading to U.S. involvement in the Persian Gulf crisis).

21. See ARKIN ET AL., *supra* note 11, at 26 (quoting Gen. Carl E. Vuono, Chief of Staff, U.S. Army, before the Senate Armed Services Committee, Mar. 19, 1991). Arkin provides a detailed description of the execution of the four phases of the battle plan, which concluded in forty-three days. *Id.* at 25-39. The air campaign, the key

In retaliation, however, the Iraqi forces launched an attack on the environment of the Persian Gulf that some suggest was a foreseeable disaster.<sup>22</sup> Saddam Hussein's apparent motive was to deter an allied invasion of Kuwait by air, land, and water.<sup>23</sup> Iraqi forces bombed one of the largest Kuwaiti oil fields near the Saudi Arabian border, two major mainland refineries, an offshore loading terminal, and anchored tankers.<sup>24</sup>

By late January 1991, Iraq pumped several million barrels of oil into the Persian Gulf from supply lines between the refineries and an offshore terminal, creating a slick at least nine miles long.<sup>25</sup> The spill im-

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component to the allied strategy, was unprecedented in terms of its lethality, precision, and intensity. *Id.* at 29.

As a result of the air assault, tens of thousands of unexploded munitions, particularly cluster bomblets, lay partially exposed on the desert floor and beneath the residual oil lakes formed by the damaged Kuwaiti oil wells. Chris Hedges, *With a Bang! Bang! Bang! War Clean Up Goes On*, N.Y. TIMES, Oct. 15, 1992, at A4.

22. See *Millions of Gallons*, *supra* note 9, at 37 (reporting on widespread environmental destruction of wildlife due to oil spills and fires). Some commentators reported that Saddam Hussein had threatened to ignite Kuwaiti oil wells, "flush" Kuwaiti oil into the Persian Gulf, and destroy desalination plants supplying fresh water to Saudi Arabia as early as September 1990, five months before he took action. Tom Wicker, *In the Nation; Smoke over Kuwait*, N.Y. TIMES, Apr. 3, 1991, at 21 (chronicling the effects of burning oil wells); R.W. Apple Jr., *War in the Gulf; U.S. Says Iraq Pumps Kuwaiti Oil into Gulf; Vast Damage Feared from Growing Slick*, N.Y. TIMES, Jan. 26, 1991, at 1 (describing extent of oil spill's impact).

23. See *Millions of Gallons*, *supra* note 9, at 37 (noting that Iraqi forces deliberately dumped crude oil into the Persian Gulf in an apparent effort to hamper allied forces actions).

24. See *Kuwaiti Oil Field, Refineries Ablaze*, TULSA WORLD, Jan. 23, 1991, at A1 (describing the Al-Wafra oil field fire). Texaco managed the Al-Wafra, which was producing 135,000 barrels of oil daily prior to the Iraqi invasion. *Id.*; see also Philip Shenon, *War In the Gulf: The Overview; Iraq Sets Oil Companies Afire as Allies Step Up Air Attacks; Missiles Pierces Tel Aviv Shield*, N.Y. TIMES, Jan. 23, 1991, at A1, A4 (noting that Mina Abdullah and Shuaiba are two of Kuwait's largest refineries). The oil flowed into the Gulf from two primary sources: tankers anchored south of Kuwait City at Mina al-Ahmadi, and from the Sea Island Terminal, a nearby offshore loading dock. R.W. Apple Jr., *supra* note 22, at 1; cf. *Saddam's War on the Gulf's Environment*, L.A. TIMES, Mar. 5, 1991, at A6 (citing third source of spill at Iraqi facility in Gulf's far northwestern corner). This source was not made public due to U.S. efforts to make Iraq appear solely responsible for the environmental destruction caused by the war. Horgan, *supra* note 10, at 24. Instead, the United States asserted that its bombing of Kuwaiti oil facilities was an attempt to stop the flow of oil into the waters of the Gulf. Shenon, *supra*; see also *infra* part III (discussing the suppression of information relating to the war's impact).

25. See Robert D. McFadden, *War in the Gulf: The Environment; Oil Threatens*

mediately affected the wildlife in the region, including migratory birds and sea turtles.<sup>26</sup> Moreover, the spill contaminated the fresh water supply to Kuwait and eastern Saudi Arabia provided by desalination facilities.<sup>27</sup> The burning oil facilities and Gulf spill captured worldwide media attention and prompted grave concern for the environmental consequences.<sup>28</sup> Nevertheless, Iraqi troops continued to attack Kuwait's oil fields as the forces retreated, igniting oil wells and facilities at several hundred locations.<sup>29</sup> By the end of February, the troops had surrendered.<sup>30</sup>

Although the war officially ended on March 1, 1991, concluding forty-three days of technologically sophisticated "hyperwar,"<sup>31</sup> the re-

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*Fishing and Water Supply*, N.Y. TIMES, Jan. 26, 1991, at 1 (noting Gulf's oil slick). Scientists estimated that the spill equaled ten million barrels of oil covering 350 square miles by January 30, 1991. *Millions of Gallons*, *supra* note 9, at 37. This is approximately twenty-five times the size of the Exxon-Valdez oil spill. *Id.* at 37. Over 250,000 barrels spilled in Prince William Sound in the 1989 Exxon tanker accident off the coast of Alaska. Anne McLroy, *Oil is Everywhere in Kuwait; After the 8-Month Inferno, There Are 252 Oil Lakes, Many Covering Suspected Mine Fields*, GAZETTE (Montreal), Dec. 7, 1991, at K6.

26. See GREENPEACE, *THE ENVIRONMENTAL LEGACY OF THE GULF WAR* (giving a thorough report on the war's impact on the Gulf coast, air quality, marine mammals, turtle population, and coral reef).

27. See Alan Crowell, *The World; More Precious Than Oil, and Maybe as Volatile*, N.Y. TIMES, Mar. 17, 1991, § 4, at 3 (commenting on scarcity of water in region). Iraqi forces destroyed Kuwait's desalination plants, drastically affecting the fresh water supply for eastern Saudi Arabia, coalition military personnel, and Kuwaiti civilians. *Id.*; see also part II.D. of this Comment (discussing water issues in the Gulf).

28. See, e.g., R.W. Apple Jr., *Relentless Tide of Oil Fouls Shores of Empty Saudi City*, N.Y. TIMES, Jan. 28, 1991, at A1 (noting the oil slick's effect on the Saudi Arabian shoreline); John Holusha, *U.S. Companies to Join Bid to Minimize Gulf Oil Spill*, N.Y. TIMES, Jan. 29, 1991, at A11 (indicating that U.S. companies were supporting Gulf environmental clean up efforts); John Holusha, *War's Hazards for Environment are Assessed*, N.Y. TIMES, Jan. 24, 1991, at D6 (recognizing the massive destruction to the region's environment caused by munitions, oil fires and spills).

29. See R.W. Apple Jr., *Record Number of Raids Flown Over Kuwait - Iraqis Burn Wells*, N.Y. TIMES, Feb. 23, 1991, at A1 (mentioning the facilities attacked).

30. See Carol Morello, *For Many Soldiers, A Bumper-to-Bumper War*, PHILADELPHIA INQUIRER, Mar. 3, 1991, at 1 (describing Iraqi forces surrendering in droves). For pool reporters' descriptions of the conditions of Iraqi troops surrendering, see ARKIN ET AL., *supra* note 11, at 34-37.

31. See Arkin, *supra* note 1, at 23 (describing intensity of the warfare). Pentagon officials coined "hyperwar" to describe the modern, rapid, and technologically devastating battle plan. *Id.* More Iraqis died in the Gulf war than during the eight-year conflict against Iran. See DILIP HIRO, *THE LONGEST WAR: THE IRAN-IRAQ MILITARY*



treating Iraqis' final act of igniting hundreds of Kuwaiti oil wells remains the most enduring legacy of the war.<sup>32</sup> As the fires consumed ten percent of the world's daily oil ration each day,<sup>33</sup> environmental concerns heightened.<sup>34</sup> This final act, coupled with the oil spills and earlier fires, galvanized the international community to respond to the deliberate destruction of the Persian Gulf environment.<sup>35</sup>

Before turning to the international legal implications of Iraq's environmental assault, the following sections focus on the range of the environmental destruction. Part II deals specifically with the widespread impact of the oil fires.

## II. THE KUWAITI OIL FIRES

This section addresses the oil well fires, related oil spill hazards, and the resulting air and water pollution's threat to human health. Although most of the oil fires were lit after the war had officially ended, their effect on the environment lingers.<sup>36</sup>

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CONFLICT 250 (1991) (estimating total war dead at 367,000: 262,000 Iranians, 105,000 Iraqis). For exact figures on casualties tolled, including Kurdish refugees fleeing Iraq after the Gulf war ended, see ARKIN ET AL., *supra* note 11, at 42-44.

32. See Wicker, *supra* note 22, at 21 (noting that post-war destruction is slowly being remedied); see also HAWLEY, *supra* note 8 (discussing the Persian Gulf War and the region's lingering environmental devastation).

33. See Daphne Bramham, *Fires of War Continue to Take Toll*, CALGARY HERALD, July 23, 1991, at A5 (noting oil lost to the fires). An estimated five to six million barrels of oil per day burned as a result of the oil well fires. *Id.* In the United States, automobiles utilize 6.7 million barrels of oil daily. GREPEACE, *supra* note 26, at 38. This is 10% of the world's daily oil ration. *Id.* (quoting James Leggett, Environmental Responsibilities in the Oil and Gas Industry: A View from the Environmental Movement (Nov. 11, 1991) (paper for first International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production, The Hague, Netherlands)). In addition, Kuwait lost \$90 million worth of oil per day. *Saddam Hussein's Inferno*, N.Y. TIMES, June 9, 1991, § 4, at 16.

34. See Michael Ross, *Experts Blame Saudis, Kuwaitis As Spill, Oil Fires Go Unchecked*, L.A. TIMES, Apr. 12, 1991, at A10 (calculating the impact of "the worst man-made environmental disaster in history").

35. See, e.g., *Commission Announces \$20 Million Plan to Help Fight Pollution in Persian Gulf*, 14 Int'l Env'tl. Rep. (BNA) No. 8, at 222 (Apr. 24, 1991) (detailing the European Community's plan to provide training for clean-up and firefighting assistance). The United States, Canada, and the International Maritime Organization, among others, also contributed to the clean-up effort. Katherine M. Kelly, *Declaring War on the Environment: The Failure of International Environmental Treaties During the Persian Gulf War*, 7 AM. U. J. INT'L L. & POL'Y 921, 937 (1992).

36. See Wald, *supra* note 7, at C5 (confirming that the fires' regional impact

## A. THE SOURCE OF THE SMOKE

Six days after the ceasefire, Saddam Hussein ordered his troops to set fire to the Kuwaiti oil fields.<sup>37</sup> Characterized as insane vindictiveness, Hussein's last command was his most desperate.<sup>38</sup> Of the 732 oil wells ignited, half were located in the Greater Burgan oil fields, the world's second largest oil reserve.<sup>39</sup> Iraqi troops torched the wells and blasted the valves that could normally choke the oil flow to the wellhead.<sup>40</sup>

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continues to be dire).

37. See Parmalee, *supra* note 4, at A1 (stating that Iraqi troops deliberately set the oil fires as they retreated); see also Kelly, *supra* note 35, at 948 (suggesting oil fires are both offensive and defensive tactics).

38. *Saddam Hussein's Inferno*, *supra* note 33, at 16 (calling decision to ignite oil wells "an act of insane vindictiveness). Hussein was not the first ruler, however, to sabotage oil fields in battle. YERGIN, *supra* note 5, at 131. During the first Russian revolution in 1905, Tatars revolted in Baku against Armenians, destroying their property, including oil derricks. *Id.* One witness wrote, "The flames from the burning derricks and oil wells leaped up into the awful pall of smoke which hung over the inferno. I realized for the first time in my life all that can possibly be meant by words 'Hell let loose.'" *Id.* In 1916, the British, under the direction of Col. John Norton-Griffiths, M.P. (a.k.a. Hell-fire Jack and Empire Jack), set out to destroy Romania's oil industry. *Id.* at 179-82.

39. See John H. Cushman Jr., *Environmental Toll Mounting in Kuwait As Oil Fires Burn On*, N.Y. TIMES, June 25, 1991, at C4 (providing a map of the locations of burning Kuwaiti oil fields, including Al Burgan, located in Kuwait's southeastern corner). The world's largest oil reservoir is beneath Siberia in the former Soviet Union (the U.S.S.R.). *Id.* at 773. In 1989, the U.S.S.R., the world's largest producer and second largest exporter, more than doubled the oil output of Saudi Arabia, the world's largest exporter. *Id.* If the republics of the former Soviet Union realize the tremendous oil and natural gas potential of the region, the Organization of Petroleum Exporting Countries (OPEC) will probably lose its strong grip on the world's oil market. *Id.*; see also Hobart Rowen, *Dying OPEC Not the Nightmare It Was*, HOUSTON CHRON., Jan. 7, 1993, at B10 (explaining OPEC's current struggle for control over its members' and other oil producing countries' production and pricing).

40. Horgan, *Up in Flames*, *supra* note 7, at 17. The flow of oil up to the wellhead exceeded the "prewar capacity," due to explosions that rendered the valves regulating the flow useless. *Id.* The pipes to the control valves are greater in diameter than the pipes to the wellhead. Frank Barnaby, *Kuwait: A Burning Question Remains Concerning Environmental Effects of the Gulf War*, GUARDIAN, Mar. 8, 1991, at 29. When Iraqi placed mines blew up the control valves, the oil flowed at an even faster rate than normal. *Id.* Iraqi troops also constructed a pipeline to pump oil directly into the Gulf to avoid an allied invasion. FIRES OF KUWAIT, *supra* note 3. Coalition forces bombed the pipeline, however, to stop the flow of oil. *Id.* Philip Shenon, *U.S. Bombs Kuwait Oil Stations, Seeking to Cut Flow into Gulf; More Iraqi Planes Fly to*

Some of the wellheads gushed without igniting to create lakes of oil, from a few inches deep to three to four feet deep and seven miles long.<sup>41</sup> The oil lakes threatened the underground fresh water supply<sup>42</sup> and lured migratory birds to their deaths.<sup>43</sup> Beneath the oil lakes were mines, laid by retreating Iraqi soldiers, and unexploded munitions to that hampered the firefighters and subsequent cleanup efforts in the desert.<sup>44</sup>

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Iran, N.Y. TIMES, Jan. 28, 1991, at 1.

41. See *Kuwait Oil Fires: Hearing of the Gulf Environmental Task Force of the Senate Environment and Public Works Comm.*, 102d Cong., 2d Sess. (1991) (statement of Henry Kendall, Union of Concerned Scientists), FED. NEWS SERVICE, June 11, 1991, available in LEXIS, LEGIS Library, FEDNEW File [hereinafter *Hearings II*] (describing the oil fires' impact on the desert landscape).

42. See Christine Hauser, *Gulf: Water Resources More Precious than Oil in Arid GCC States*, INTER PRESS SERVICE., Apr. 7, 1992, available in LEXIS, NEXIS Library, INPRES File (discussing threat posed by oil lakes). Oil lakes covered at least 60% of the desert terrain, killing vegetation and posing a serious threat to the underground water supply of the United Arab Emirates (U.A.E). *Id.* Because fresh water is such a critical issue for the region, the U.N. expects water sharing to lead to future wars. *Id.* Currently, the U.A.E. has allocated \$137 million for a new desalination facility and \$900 million for other electricity and water projects, while Bahrain has set aside \$196 million for a new desalination facility and utilities projects. *Id.*

43. See Samia Nakoul, *Oil Lakes in Kuwait are Traps for Birds*, INDEPENDENT, Dec. 10, 1991, at 12 (estimating that 20,000 to 30,000 sea birds were trapped in oil after mistaking the shiny surface of oil lakes for water); Bramham, *supra* note 33, at A5 (describing the fate of birds in the region). Thousands of birds died as a result of flying through the toxic clouds, blinded by toxins, unable to find food, and thus starving to death. *Id.*

44. See Ron Martz, *Mines Pose Hidden Danger in Kuwait; Oil Fires Hamper Desert Cleanup*, ATLANTA J. & CONST., Dec. 15, 1991, at A21 (noting the dangers of clean up efforts). The Kuwaiti government divided up the country into six sectors and contracted with various coalition nations for the cleanup of over 10,000 Iraqi land mines, 1,000 lb. bombs, unexploded artillery shells, and cluster bomblets the size of baseballs. *Id.* The nations engaged in the cleanup, the United States, Bangladesh, Britain, Egypt, France, Pakistan, and Turkey, operate under two to three year contracts with Kuwait totalling \$1 billion worth of business. Hedges, *supra* note 21, at A4. The United States sector, located in southeastern Kuwait, contains an estimated 500,000 mines, hundreds of tank wreckages, and oil lakes, making the 1,200 square mile sector one of the most difficult to handle. Martz, *supra*, at A21. For a detailed description of the long-term damage sustained by the Kuwaiti desert, see Constance Holden, *Kuwait's Unjust Deserts: Damage to Its Desert*, SCI., Mar. 8, 1991, at 1175; see also Randy Lee Loftis, *Weighing the Damages of War*, TORONTO STAR, Jan. 17, 1991, at A23 (noting overlooked impact of Gulf war on desert); Cushman, *supra* note 39, at C4 (asserting damage to healthy desert was very severe and yet underreported because desert is not populated).

## B. AIR POLLUTION AND HUMAN HEALTH

The blazing wellheads generated a smoke plume reaching at least 22,000 feet into the atmosphere<sup>45</sup> and initially stretching over 800 miles<sup>46</sup> to blacken the skies over the region. Early reports indicated that because of the rapidity with which the smoke was rising<sup>47</sup> and the

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45. See Horgan, *Burning Questions*, *supra* note 7, at 17 (discussing controversy among researchers over how high the plumes actually reached). A British team of observers concluded that the smoke did not go far above 5,000 meters, while scientists in Hawaii and Wyoming independently found "spikes" of soot at higher levels in the troposphere. *Id.* The most critical concern was that the smoke would break into the stratosphere, which begins at 35,000 feet in the Persian Gulf region, and circulate around the globe. Wald, *supra* note 7, at C5; Peter Warren, *Kuwait: The Secrecy Surrounding Ecological Damage in the Gulf*, *GUARDIAN*, Aug. 2, 1991, at 27; William Booth, *Fires in Kuwait Not a Threat to Global Climate, Federal Study Finds*, *WASH. POST*, June 25, 1991, at A3. Once in the stratosphere, the tiny particulates would be dispersed irretrievably, whereas in the lower atmospheric layers, natural processes, such as rain, would rinse them from the skies. Horgan, *Up in Flames*, *supra* note 7, at 24. Water vapor in the atmosphere attracts the oily particulates from the oil fires, preventing an accumulation of pollutants including two million tons of carbon dioxide and 5,000 tons of soot, that spew into the air each day the fires continued to burn. Warren, *supra* (citing a study conducted by the National Science Foundation involving thirty-five research flights monitoring oil well fires).

46. See Wald, *supra* note 7, at C5 (detailing the regional environmental impact of the oil fires). If the smoke plume were superimposed over a map of the United States, with the oil fires originating in an area the size of Manhattan, the plume would cover Florida and stretch several hundred miles wide. *Id.* A Seattle scientist noted that the amount of soot rising out of the fires was equal to 46 million heavy-duty diesel trucks going about thirty miles an hour. Robert Cooke, *Hell on Earth*, *NEWSDAY*, July 30, 1991, at 55.

47. See Stephen Bakan et al., *1991 Climate Response to Smoke from the Burning Oil Wells in Kuwait*, 351 *NATURE* 367-71 (1991) (assessing reports of the climatic effects of the oil fires). The high pressures and temperatures caused the smoke to rise very rapidly in the region's low pressure system, typical of summer months. *GREENPEACE*, *supra* note 26, at 19 (citations omitted). Immediate concerns were that the Gulf region's drop in temperature would adversely affect the Asian monsoon, the rainy season upon which agriculture in southern Asia depends. Horgan, *Burning Questions*, *supra* note 7, at 20. Monsoons are the result of warm, moist air rising from the oceans in the summer months moving over the continent. *Id.* Although many scientists ultimately dispensed with the notion that the oil fires would affect the monsoon season, two groups studied the huge typhoon that struck Bangladesh on May 1, 1991 to look for guidance. *Id.* Researchers from Germany's Max Planck Institute for Chemistry questioned whether the smoke could have triggered the massive typhoon which killed over 100,000 people. *Id.* One researcher concluded that there was no connection; typhoons typically strike during early May. *Id.* An expert on monsoons

composition of the burning, unrefined oil,<sup>48</sup> the temperature of the region would drop ten degrees Fahrenheit.<sup>49</sup>

### 1. Threat to Civilians

The most immediate threat to civilians in the region was the nighttime thermal inversion, which consisted of a warm layer of air that trapped a cooler layer of air at the earth's surface.<sup>50</sup> The trapped air contained the oil fires' noxious fumes, holding them close to the ground where the polluted air could be inhaled by humans.<sup>51</sup> Normally, the heat of the morning sun breaks thermal inversions and allows the trapped air to rise and disperse.<sup>52</sup> Because the oil fires emitted such dense smoke, however, little sunlight could break through the sooty clouds to trigger the thermal inversion.<sup>53</sup>

Outbreaks of respiratory and skin disorders reinforced the concern about polluted air hovering too close to the ground.<sup>54</sup> Health officials issued warnings to residents in at-risk groups, such as the elderly, young children, and persons suffering from asthmatic conditions, to stay in-

disagreed with that finding, however. *Id.* He asserted that the typhoon's two feet high flooding and heavy rains were unusually severe and may be linked to the Kuwaiti fires. *Id.*

48. See GREENPEACE, *supra* note 26, at 20 (analyzing chemical content of burning oil). Kuwaiti crude oil contains a very high sulfur concentration, that combine with the fires' oxygen to create daily emissions of more than 40,000 - tons of sulfur dioxide, the major chemical component to acid rain. *Id.* The daily sulfur dioxide emissions of France, Germany and Great Britain combined are less than the oil fire's contribution to air pollution. *Id.* The soot of the fires, however, is what contributed to the darkened skies and lowered regional air temperature. Horgan, *Up in Flames*, *supra* note 7, at 17. Scientists recorded approximately 100,000 tons of soot (carbon compounds) and 800,000 tons of carbon dioxide (carbon combined with the fires' oxygen) at the height of the conflagration. *Id.*

49. See Horgan, *Burning Questions*, *supra* note 7, at 24 (predicting temperature change in Gulf region).

50. See GREENPEACE, *supra* note 26, at 20 (describing the effects of thermal inversion).

51. *Id.* A thermal inversion, which is very common in industrial areas situated in mountain valleys, such as Denver, Colorado and Mexico City, is "an atmospheric condition in which a layer of warm air traps cooler air near the surface of the earth, preventing the normal rising of surface air." WEBSTER'S NEW WORLD DICTIONARY 741 (2d ed. 1980).

52. See GREENPEACE, *supra* note 26, at 20 (explaining thermal inversion).

53. *Id.*

54. See Warren, *supra* note 45, at 27 (linking respiratory ailments to thermal inversions).

doors when the smoke clouds were overhead.<sup>55</sup> Consequently, the region's levels of mortality from lung cancer, and other respiratory and skin diseases is expected to rise dramatically over the next ten years due to the heightened exposure to the air pollution.<sup>56</sup>

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55. See Matthew L. Wald, *After the War; Kuwaitis, Having Survived Hussein, Now Find Their Environment Toxic*, N.Y. TIMES, Apr. 27, 1991, § 1, at 14 (reporting lingering human health impact of oil fires). The World Health Organization issued the warnings to Kuwaiti residents. *Id.* Doctors were also advising people with chronic respiratory ailments not to return to Kuwait until the smoke had cleared. BUREAU OF CONSULAR AFFAIRS, DEP'T OF STATE, TRAVEL ADVISORY KUWAIT-CAUTION, (Oct. 11, 1991).

56. See GREENPEACE, *supra* note 26, at 20-21 (predicting long-term human health risk of oil fires). Because little is known about the long-term health effects on a population from burning crude oil, researchers disagree about how to compare its potential impact to known effects, such as coal-related pollution or photochemical oxidants (smog). *Id.* For example, one researcher estimated that 1,000 excess deaths would occur in the year following the war, 20% higher than Kuwait's mortality rate before the war began. John Horgan, *The Danger from Kuwait's Air Pollution; Smoke from Oil Fires Threatens Health*, SCI. AM., Oct. 1991, at 30. The estimate was based on data from a 1952 air pollution episode in London in which 4,000 people died in two weeks from coal fumes mixed with dense fog. *Id.*; Horgan, *Up in Flames*, *supra* note 7, at 20.

Another scientist testified before the Senate Committee that although the concentration of inhalable particles increased, it was not higher than exposure levels experienced in urban areas in the United States during the summer months. *Effects of Oil Fires in Kuwait Still Inconclusive, Panel Says*, 14 Int'l Env't Daily (BNA) No. 21, at 576 (Oct. 23, 1991) [hereinafter *Effects of Oil Fires*]. The scientist compared data from earlier instances of air pollution, such as the lethal 1952 London fog and 1930 New York City smog, where one in 2,000 deaths occurred during a five day period. *Id.*

More common estimates predict the mortality rate for infants and the elderly, the most vulnerable groups, to rise 10%. Anne McIlroy, *U.S. Hiding the Facts Critics Say*, GAZETTE (Montreal), Dec. 7, 1991, at A6 (citing a report by a doctor at Harvard's School of Public Health). Other scientists predict prolonged respiratory problems based on the ailments afflicting patients visiting the region's hospitals. Warren, *supra* note 45, at 27.

One British scientist expects a jump in the lung cancer rate over the next two decades, due to the very high levels of particulate fall out, composed of trace metals which are known carcinogens. *Id.* Sulfur dioxide's corrosive effect on lung tissue when mixed with mucus poses other respiratory complications. *Id.* Furthermore, doctors reported an unprecedented increase in cases of asthma, emphysema, severe eczema, and eye irritation due to the smoke. *Id.*

Although there is uncertainty as to what the cumulative effects of exposure to the oil fires will be, cancers and birth defects are almost a certainty. GREENPEACE, *supra* note 26, at 21.

## 2. Threat to Military Personnel

The air pollution affected the troops as well as the civilians, despite the coalition governments' apparent attempts to downplay what some U.S. veterans of Operation Desert Storm have dubbed "The Black Lung Tour."<sup>57</sup> Officials from the U.S. Department of Defense (DOD) and the U.S. Environmental Protection Agency (EPA) carefully monitored the respiratory complaint rate of military personnel before and after the fires started to ensure the tracking of short-term and long-term exposure.<sup>58</sup> Although early reports concluded that the pollution would not pose a health risk to people with normal respiratory capacity, government scientists continue to conduct long-term studies of possible health risks.<sup>59</sup>

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57. Horgan, *supra* note 56, at 30; *see infra* part III (discussing efforts to avoid negative publicity).

58. *Hearings II, supra* note 41. Army Col. Frederick Erdtman testified before the Senate Committee that "[t]he initial findings of the inter-agency assessment team indicated that the toxic gases from the smoke were below hazardous levels and that immediate health threats would be considered minimal for healthy populations such as the military." *Id.* Military officials instructed their personnel "to avoid contact with the smoke plumes when operationally feasible and to use scarfs and goggles that had been issued . . . and . . . to cover any exposed skin surfaces." *Id.* Col. Erdtman further stated that military members who did seek treatment for wheezing, coughing, eye irritations, or sore throats were properly cared for, but that "[t]he respiratory complaint rate was not noticeably higher among DOD personnel after the oil fires as compared to rates prior to those fires." *Id.*; Soraya S. Nelson, *Smoke from Burning Wells Poses Health Risk*, NAVY TIMES, Apr. 1, 1991, at 10.

One example of inconsistent statements, however, was the EPA's response to concerns of the families of United States troops about the soldiers' health risks associated with exposure levels to the fires. Lee Hockstader, *UN Official Urges Fast Assessment of Health Risks Posed by Oil Fires*, WASH. POST, Mar. 29, 1991, at A14. A Pentagon official noted that he found no imminent danger to U.S. soldiers or civilians in the region due to the polluted air caused by the fires. *Id.* When asked about the conclusion, an EPA spokesman responded, "Maybe he's got information we don't have." *Id.*; *see infra* part III (noting that there is great confusion over how to handle these critical health issues).

59. Richard L. Hembra, *Introduction to U.S. GEN. ACCT. OFF., KUWAITI OIL FIRES—CHRONIC HEALTH RISKS UNKNOWN BUT ASSESSMENTS ARE UNDER WAY* (1992). The report reviews and affirms the findings of an April 3, 1991 report, entitled KUWAIT OIL FIRES: INTERAGENCY INTERIM REPORT, which assuaged grave concerns raised by officials in Kuwait about the pollution from the fires and acute health effects. *Id.*; *see Hearings II, supra* note 41 (describing specific studies underway by DOD research teams on the long-term health impact of the fires on military personnel).

Recent reports indicate that the U.S. military, despite its reluctance to acknowledge any oil fire-related health risks, consented to monitor Gulf War veterans afflicted with severe, unknown illnesses, now termed "Gulf War Syndrome."<sup>60</sup>

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Despite statements that the health risks appear minimal, some scientists are outraged by the paucity of information gathered and disseminated. Horgan, *supra* note 56, at 30. One DOD official acknowledged that the studies were being conducted to protect the Government from lawsuits by American veterans who are likely to develop cancer, heart disease, chronic respiratory ailments such as emphysema, or other smoke- and smog-related problems resulting from their Gulf war duty. *Id.* United States soldiers who had fought in Vietnam brought lawsuits against the government as a result of their exposure to the cancer-causing Agent Orange, which was used as a defoliant in the jungles. Rae Tyson & Sam Vincent Meddis, *Oil Fires Threaten Health; Kuwait Blazes Compared to Agent Orange*, U.S.A. TODAY, Mar. 15, 1991, at 1A (repeating Navy official's assertion that U.S. military learned a lesson from the Agent Orange experience); see Alison Leigh Cowan, *Reopening of Defoliant Case Sought*, N.Y. TIMES, Nov. 30, 1993, at D4 (reporting that Vietnam veterans sought to reopen litigation against Agent Orange manufacturers after learning about health problems related to the herbicide).

The issue of holding the U.S. Government liable for illnesses contracted during military service and possible exposure to biological or chemical weapons, however, is far from settled. See, e.g., Keith Bradsher, *Senator Says U.S. Let Iraq Get Lethal Viruses*, N.Y. TIMES, Feb. 10, 1994, at A9 (uncovering shipments of viruses to Iraq that contained suspect viruses); *Gulf Veterans Sue Over Illnesses*, N.Y. TIMES, June 9, 1994, at B11 (identifying eleven U.S. companies being sued by Gulf veterans suffering from mysterious illnesses).

60. See *Some Gulf War Vets Afflicted with Mysterious Symptoms* (CNN television broadcast, Jan. 7, 1993) (interviewing a veteran suffering from environmental illness presumably contracted during his Gulf War tour of duty); *Study of Sick Gulf War Vets*, 18 WORLD ENV'T REP. No. 23 (Nov. 10, 1992) (estimating between 150 and 1,000 vets are suffering from illnesses doctors cannot identify). More recently, the U.S. Department of Veterans' Affairs reported that approximately 14,500 veterans out of the 696,562 U.S. forces deployed to the Gulf suffer from unexplained illnesses. See David Brown, *Triumphant in the Desert, Stricken at Home*, WASH. POST, July 24, 1994, at A1, A18 (charting the illnesses among coalition member forces); see also David Brown, *Colonel Loses Ground to a Faceless Enemy*, WASH. POST, July 26, 1994, at A1 (chronicling the changes affecting one Gulf veteran).

As a result of these claims, Congress will study and report on the possible causes of the veterans' illnesses. See David Masci, *Persian Gulf Syndrome Bill Heads to President*, CONG. Q., Oct. 15, 1994, at 2960 (reporting on the Senate measure to compensate veterans suffering from Persian Gulf Syndrome); Bill McAllister, *Compassion May Take Act of Congress; Veterans Agency Balked at Early Response on Gulf War Problem*, WASH. POST, July 25, 1994, at A1 (discussing Congress' response to the veterans' claims that their illnesses were linked to their Gulf War service); David Brown, *Studies Will Frame a Picture of Gulf Veterans' Problems*, WASH. POST, July 25, 1994, at A9 (outlining the strategies to be used by various agencies to track the



### 3. Threat to Firefighters

Of the population groups in the region, however, the firefighting teams were the most directly exposed to the oil fires.<sup>61</sup> Approximately 10,000 firefighting personnel representing forty countries contracted with the Kuwaiti government to extinguish the massive blazes, unquestionably the world's worst oil field disaster to date.<sup>62</sup> In just eight months, they

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health of Gulf War veterans); David Brown, *The Search for Causes*, WASH. POST, July 24, 1994, at A19 (categorizing possible causes for the veterans' illnesses, ranging from smoke to psychological contagion); *Administration Backs Aid for Gulf Veterans*, N.Y. TIMES, June 10, 1994, at A15 (confirming the Clinton Administration's endorsement of a bill to compensate Gulf veterans suffering from Persian Gulf Syndrome); Bill McAllister, *Illness Pay for Gulf Vets Is Endorsed*, WASH. POST, June 10, 1994, at A1 (noting that Gulf veterans will be compensated even though the ailment remains a mystery).

During the previous year, though, officials were still debating whether to classify the veterans' mysterious illnesses as a "syndrome." Philip J. Hilts, *Gulf War Syndrome: Is It a Real Disease?*, N.Y. TIMES, Nov. 23, 1993, at C1 (discussing the skepticism about calling the puzzling symptoms a disease); *Health Panel Finds No Single Cause for Gulf Veterans' Illnesses*, N.Y. TIMES, May 1, 1994, at 40 (noting that veterans "are suffering from illnesses of unknown cause, but no single syndrome is discernible," according to a report by an independent panel of experts).

For a more in-depth analysis of the reproductive health effects possibly associated with Gulf War Syndrome, see U.S. GEN. ACCT. OFF., OPERATION DESERT STORM—QUESTIONS REMAIN ON POSSIBLE EXPOSURE TO REPRODUCTIVE TOXICANTS (1994) (evaluating the reproductive hazards to Persian Gulf war veterans' offspring); U.S. GEN. ACCT. OFF., OPERATION DESERT STORM—POTENTIAL FOR REPRODUCTIVE DYSFUNCTION IS NOT BEING ADEQUATELY MONITORED (1994) (statement of Kwai-Cheung Chan, Issue Area Director, Program Evaluation & Methodology Division) (recommending further studies to address issues about the war's long-term reproductive health effects). Interestingly, the DOD did not assess the potential reproductive effects of exposure to oil-well fires before deployment because such fires were not expected. There were also no studies on other petroleum exposure reported in the Persian Gulf war—using diesel fuel as a sand suppressant, drying sleeping bags with leaded exhaust, and so on—because these activities were not standard operating procedures that soldiers were trained to perform. OPERATION DESERT STORM—QUESTIONS REMAIN ON POSSIBLE EXPOSURE TO REPRODUCTIVE TOXICANTS, *supra*, at 16.

61. See Matthew L. Wald, *Experts Worried by Kuwait Fires*, N.Y. TIMES, Aug. 14, 1991, at A7 (noting the fires' adverse impact on the life expectancy of 50,000 Kuwaitis). While civilians are the subjects of both long and short-term studies, the studies are not concerned with firefighters *per se*. *Id.*; see also *infra* note 64 (detailing the health risks of oil firefighters).

62. See FIRES OF KUWAIT, *supra* note 3 (depicting firefighting squads at work in Kuwait). The firefighters received \$1,000 to \$2,000 for their twelve-hour daily shifts where they faced temperatures up to four thousand degrees Fahrenheit. HELL ON

"killed" over seven hundred fires, many years ahead of the most conservative estimates of when the fires could be extinguished.<sup>63</sup>

Even fewer statistics are available to assess what the short-term and long-term effects of oil fires are on the firefighters.<sup>64</sup> Unlike the tissue samples taken from deceased military personnel to analyze pollutant levels,<sup>65</sup> the remains of firefighters are usually so badly burned that not much data is retrievable.<sup>66</sup>

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EARTH, *supra* note 2. The few specialized firefighting squads who travel all over the world to "kill" oil field fires asserted that the conflagration on the Kuwait oil fields dwarfed any they had ever seen. *Hearings I, supra* note 3; David Maraniss, *No Computers Needed, Pahdner, as Firefighters Face Kuwait Infernos*, WASH. POST, Mar. 9, 1991, at A3; Matthew L. Wald, *Surge of Water in Uncapped Wells to Hamper Kuwait Oil Production*, N.Y. TIMES, Apr. 9, 1991, at A1.

63. See *Hearings I, supra* note 3 (transcribing Red Adair's claim that Kuwait will be lucky to extinguish all fires within four to five years). "Kill" is a Texan term of art which firefighters use to describe an extinguished well fire, according to Paul "Red" Adair, a legendary oil field firefighter. *Id.* Estimates varied as to exactly how many wells were burning and how many years it would take for firefighters to battle the blazes. *Id.* While the Kuwaiti Oil Company claimed that all 950 of its producing oil wells ignited, other reports show that 732 well fires burned. Nicholas Schoon & Susan Watts, *Crisis in the Gulf: Pollution is Graphic Legacy of War*, INDEPENDENT, Mar. 2, 1991, at 9; *Effects of Oil Fires, supra* note 56, at 576. Other figures represented 600 wells on fire by the end of the war, with an additional eighty wells gushing oil uncontrollably but not ablaze. Cushman, *supra* note 39, at C4. At most, 1,250 Kuwaiti wells perished, including 500 wells in the neutral zone between Saudi Arabia and Kuwait that Iraq also seized. Horgan, *Up in Flames, supra* note 7, at 17. Predictions as to the length of time needed to put out all of the fires ranged from two to ten years. ARKIN ET AL., *supra* note 11, at 72; *Hearings I, supra* note 3 (providing Red Adair's estimate of five years to complete firefighting effort).

64. See John Travis, *A Legacy of War*, 140 SCI. NEWS 24, 25-26 (1991) (describing how small particles of soot are trapped in the human respiratory system which inhibit proper breathing). Oil firefighters often cannot wear protective face masks because of their tendency to melt. FIRES OF KUWAIT, *supra* note 3. As a result, they are more susceptible to health problems due to their proximity to the fires than are civilians. *Id.*

65. See Horgan, *supra* note 56, at 30 (noting tissue analysis method). The United States Armed Forces Institute of Pathology based a study on an analysis of tissue samples from soldiers who were killed during combat or otherwise, in Kuwait and Saudi Arabia. *Id.* The investigation focused on the differences between smoke-induced changes, such as cellular or genetic damage, and elevated levels of toxins. *Id.*

66. FIRES OF KUWAIT, *supra* note 3. The most dangerous part of the firefighting operation occurs just as firefighters cap and kill the blazing wellhead. *Id.* Methane gas, which has no scent and is extremely volatile, lingers unless a special tube, called a diverter tube, is attached to the wellhead to draw the gas away from the workers bolting the new wellhead in place. HELL ON EARTH, *supra* note 2. A spark from the

Despite the inherent danger of this particular form of firefighting, few deaths resulted from the Kuwaiti assignment.<sup>67</sup> In fact, more civilians than firefighters died as a result of the Persian Gulf War.<sup>68</sup> Nonetheless, the direct exposure to the flames' searing heat, burning crude oil, and detonations will have a profound though not yet measured impact on the lives of the firefighters.<sup>69</sup>

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pneumatic wrench securing the new valve could mean instantaneous death for the workers, so rubberized tools are used wherever possible. *Id.*

67. *Hearings I, supra* note 3 (providing Red Adair's testimony that he had lost no men to the Kuwaiti oil fires). James Deckard, the cameraman who filmed *Hell on Earth*, spent six weeks filming the firefighters, who called themselves "Hell fighters." Zan Dubin, *O.C. Cameraman Found 'Hell on Earth' in Kuwait*, L.A. TIMES, Jan. 9, 1992, at F1. Deckard remarked, "Most of the (firefighters) themselves are high school graduates, . . . they're just doing a job they wanted for the money (which ranged from \$1,00 to \$2,000 a day). But they risk their lives and they also understood how important (their job) was . . . I think they're heroes." *Id.* (parentheticals in original). Although over 10,000 firefighting support staff were involved in the effort, there were 550 firefighters specialized in oil field firefighting. *Id.*; see *Hearings I, supra* note 3; *Hearings II, supra* note 41 (describing the mine clearing and firefighting techniques); see also HELL ON EARTH, *supra* note 2; FIRES OF KUWAIT, *supra* note 3 (showing actual film footage of the innovative firefighting techniques used to extinguish the oil well blazes).

68. See Hedges, *supra* note 21, at A4 (describing "sappers" who deactivate mines and clear away unexploded munitions in the desert). Four thousand sappers combed the Kuwaiti desert even after firefighters extinguished the oil fires, in search of 500,000 land mines and 100,000 tons of unexploded munitions dropped during the war. *Id.* Over fifty sappers accidentally died due to the explosives, including the entire five-person team from Kuwait. *Id.* Many attributed the deaths to the long exposure to the elements, which made many shells and mines unstable during routine handling. *Id.* In addition, the weapon often exploded before the detection device could signal its presence to the sapper. *Id.* The sappers perform their work just ahead of the firefighters to ensure that they diminish the danger posed by undetected mines as much as possible to both firefighters and unsuspecting civilians. HELL ON EARTH, *supra* note 2. Despite the precautions, however, there were 1,500 civilian casualties and one hundred injuries. Hedges, *supra* note 21.

Moreover, an international minesweeping flotilla cleared commercial shipping lanes of the 1,200 mines laid in the Gulf, using global-positioning systems (navigational devices able to calculate precise geographic locations at sea via satellite hook-up). Eric Schmitt, *Allied Flotilla Quickly Clears Mines Off Kuwait*, N.Y. TIMES, June 25, 1991, at A10.

69. See FIRES OF KUWAIT, *supra* note 3 (suggesting that firefighters will suffer major health problems as they age due to their line of work). The most common method of extinguishing blazing oil wellheads is to blow them up with dynamite and other types of explosives, such as plastique, an easily molded, putty-like substance. *Kuwait: Deliberate Oil Pollution Threatens to Be an Environmental Catastrophe*,

## C. COMPOSITION OF THE OIL SMOKE

Coupled with human health concerns, the composition of chemicals in the oily smoke alarmed researchers.<sup>70</sup> The researchers had little data on the subject because no studies were available that assessed the impact of burning crude oil on the population at large on the environment.<sup>71</sup> Lacking scientific evidence, many scientists feared that the smoke's fine particles would contribute to the world's acid rain, ozone depletion, or global warming problems.<sup>72</sup> A few scientists even argued to the other extreme, asserting that the ozone layer above the region actually had thickened,<sup>73</sup> potentially causing a minor nuclear winter.<sup>74</sup>

To begin their measurements, scientists investigated the chemical composition of oil, which includes sulfur, carbon, nitrogen oxides, and

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GUARDIAN, Mar. 12, 1991, at 2. Once briny water pumped through high-pressure hoses cools the wellhead, a package of explosives is lowered into the wellhead and detonated, severing the supply of oil to the flame and "capping" the wellhead with sandy debris. *Id.*

70. GREENPEACE, *supra* note 26, at 20 (citation omitted). The unique situation posed by the Kuwaiti oil fires was commented upon by a Kuwaiti official in the Environmental Protection Department: "Because the crude oil smoke particles have a different chemical composition[,] their relative toxicity compared to coal smoke particles is an unknown." *Id.*

71. See Horgan, *Up in Flames*, *supra* note 7, at 24 (noting paucity of information linking oil well fires to human health). One biomass expert at the National Aeronautics and Space Administration indicated that the scant information that does exist on oil well fires is classified for reasons of national security. *Id.*; see *infra* part III (discussing the rationale behind the suppression of information about the war).

72. See Horgan, *Burning Questions*, *supra* note 7, at 17, 20 (noting scientists' contention that due to lack of evidence, global effects should not be ruled out); see also Warren, *supra* note 45, at 27 (raising concerns over lack of available environmental impact data). See generally Horgan, *Up in Flames*, *supra* note 7, at 20, 24 (discussing oil fires' potential environmental impact); GREENPEACE, *supra* note 26, at 24 (addressing local and global environmental effects of the Gulf War).

73. See ENVIRONMENTAL LEGACY, *supra* note 26, at 21 (describing how ozone build-up occurred at air pollution sampling locations where high levels of hydrocarbons and nitrogen oxides were recorded).

74. Horgan, *Up in Flames*, *supra* note 7, at 20, 24. The nuclear winter theorists, such as Carl Sagan and Richard Turco of the United States, created models to show how the smoke plume would reach into the upper atmosphere and disperse and block out the sun's rays to cool the earth's surface. *Id.* Their models were heavily criticized internationally, however, for promoting a political antiwar agenda. *Id.* One climatologist commented that the air pollution would be analogous to a bad day at the Los Angeles airport. *Id.* (citation omitted).

trace metals.<sup>75</sup> When ignited, these chemicals combine with oxygen to create sulfur dioxide, carbon monoxide, carbon dioxide, complex nitrogen oxides and ozone, all of which are compounds that will seriously alter the planet's ecological balance.<sup>76</sup> In fact, some scientists liken the Kuwaiti inferno to a petroleum Chernobyl.<sup>77</sup>

Each compound found in the oily smoke harms the environment in a different way. Sulfur dioxide, for example, is the chief component in acid rain, which has been linked to the gradual destruction of lakes, crops, and forests in industrial regions.<sup>78</sup> Another compound, carbon dioxide, which contributes to acid rain and global warming, was the most prevalent by-product of the oil fires.<sup>79</sup> The oil fires' release of carbon dioxide hindered governments' efforts to reduce such emissions over the next decade.<sup>80</sup> Moreover, scientists detected nitrogen oxides at elevated concentrations in the smoke.<sup>81</sup> Nitrogen oxides, combined with

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75. See GREENPEACE, *supra* note 26, at 17 (indicating chemical composition of smoke plume produced from oil).

76. *Id.*

77. See James George & Brent Blackwelder, *Oil Fires: A Middleast Chernobyl?*, TORONTO STAR, July 10, 1991, at A21 (comparing oil fires to 1986 Ukrainian nuclear power plant accident); see also Daphne Bramham, *Environment Damage Downplayed by U.S.*, OTTAWA CITIZEN, July 27, 1991, at B4 (making Chernobyl analogy).

78. See Ken Wells, *Legacy of War: The Battles Are Over, But Gulf Environment Still Fights for Its Life*, WALL ST. J., Oct. 15, 1991, at A1 (noting the linkage between sulfur dioxide and acid rain affecting crops and water sources).

79. See Horgan, *Up in Flames*, *supra* note 7, at 17 (providing tonnages estimates of compounds emitted into the air by the fires).

80. See *id.* (noting scientists' criticism of the government's attempts to reduce global carbon dioxide emissions as meager, in light of high emissions from the oil fires); see also *Kuwaiti Oil Fires Had No Global Effect on Atmosphere*, World Weather Agency Says, 15 Int'l Env'tl Daily (BNA) No. 12, at 412 (June 17, 1992) (recognizing heavy carbon dioxide levels in the Gulf due to fires). On June 24, 1991, the National Science Foundation found that the oil fires released one to two million tons of carbon dioxide into the atmosphere, approximately one percent of the world's annual production of carbon dioxide. *Id.* Other scientists predicted that the Philippine volcano, Mount Pinatubo, would have a greater impact on global air pollution than the smoke from the Kuwaiti oil fires. William Booth, *Fires in Kuwait Not a Threat to Global Climate, Federal Study Finds*, WASH. POST, June 25, 1991, at A3; Daphne Bramham, *Black Death in the Gulf: Environmentalists Accuse Governments of Playing Down Potential Dangers from Blazing Oil Wells*, VANCOUVER SUN, July 27, 1991, at B1, B4, B6.

81. GREENPEACE, *supra* note 26, at 21. One researcher found, however, that the levels of nitrogen oxides were actually lower than normal, due to the decrease in automobile traffic, which is a common producer of the pollution. *Id.*; *Effects of Oil Fires in Kuwait Still Inconclusive, Panel Says*, 14 Int'l Env'tl Daily (BNA) No. 21, at

carbon compounds in the presence of sunlight, create photochemical smog.<sup>82</sup> The smoke also contained trace metals, some of which are human carcinogens.<sup>83</sup>

#### D. WATER POLLUTION AND HUMAN HEALTH

In addition to the air pollution caused by the burning oil wells, the region's environment suffered "unprecedented" devastation.<sup>84</sup> The precious fresh water supply was severely threatened,<sup>85</sup> including dozens of desalination plants that convert salty Gulf water into potable water for the region.<sup>86</sup> As the region continues to industrialize and populate rap-

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576 (Oct. 23, 1991).

82. *Id.*

83. *See id.* (citing Kuwait Environmental Protection Department report regarding Kuwaiti oil fire atmosphere, presented to World Meteorological Organization, Geneva, Apr. 27-30, 1991). Varying levels of zinc, cadmium, chromium, lead and vanadium were detected in the smoke plume. *Id.* Cadmium and chromium are carcinogenic even at low levels of exposure. *Id.* (citing Stephen Pain, *Is Kuwait's Foul Air Fit to Breathe?* NEW SCI., Oct. 26, 1991). Dichlorobenzene was also found in the plume at levels 200 times greater than United States standards permit. McIlroy, *supra*, note 56, at K6. Dichlorobenzene damages the liver, kidneys and respiratory system. *Id.* Benzene, a chemical linked with leukemia, and xylene, another significant smog contributor, were also discovered in the plume. GREENPEACE, *supra* note 26, at 21.

84. *See Kuwait: Deliberate Oil Pollution Threatens to Be an Environmental Catastrophe*, GUARDIAN, Mar. 12, 1991, at 2 (describing the "unprecedented" environmental impact of the oil fires). In addition to comparing the Kuwaiti oil fires to the Chernobyl nuclear accident, one fire researcher stated, "[W]e have never seen a pollution event of this scale." Horgan, *Up in Flames*, *supra* note 7, at 24. A biomass burning expert added, "This is the most intense burning source, probably, in the history of the world." *Id.*

85. *See* Alan Cowell, *More Precious Than Oil, and Maybe as Volatile*, N.Y. TIMES, Mar. 17, 1991, § 4, at 3 (discussing notion that increasing water scarcity will likely be the next cause of war in the Middle East). Iraqi troops targeted and destroyed Kuwait's desalination facilities. *Id.*; SEN. ALBERT GORE, *EARTH IN THE BALANCE: ECOLOGY AND THE HUMAN SPIRIT* 113 (1992) (mentioning that Iraq's intentional release of oil into the Gulf fouled the area's drinking water pipes). Additionally, the Gulf oil spill aggravated India's immense water pollution problem. Hauser, *supra* note 42. Seventy percent of India's water is polluted. *Id.*

86. *See* Hauser, *supra* note 42 (noting the large number of desalination operations in region). Seventy percent of the region's fresh water is supplied by one hundred desalination plants operated by the Gulf Cooperation Council (GCC) states, composed of Saudi Arabia, Oman, Qatar, United Arab Emirates, Bahrain and Kuwait. *Id.* Bahrain expects to build additional desalination and utilities projects with \$196 million already set aside for the plan, while the United Arab Emirates is funding a \$137 million desalination plant as well as \$900 million in new water and electric facilities.

idly, the demand for clean water will be even more critical than it is now.<sup>87</sup>

Although the six million barrels of oil Iraqi troops deliberately dumped into the Gulf may be the world's worst oil spill to date,<sup>88</sup> approximately two million barrels of oil were recovered from the placid Gulf waters.<sup>89</sup> The recovered oil would most likely have damaged the industrial and desalination facilities had it not been retrieved.<sup>90</sup> Because

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*Id.* Other plans of GCC states to obtain fresh water include importing water via a pipeline from Turkey to Oman, attempting to supplement eighty-five billion gallons of water currently desalinated by seventeen facilities. *Id.*

87. Hauser, *supra* note 42. Conservation of water resources is considered to be "the most pressing issue for the next decade." *Id.* Some suggest that a dispute over water rights will be the next cause of war. *See, e.g.*, GORE, *supra* note 85, at 113 (discussing the possibility that "geopolitical conflicts over water" will not be resolved peacefully and may lead to war, using as an example, Turkey's threat against Iraq during Persian Gulf war to cut flow of Tigris); Irwin Ploss & Jonathan Rubinstein, *Water for Peace*, NEW REPUBLIC, Sept. 7-14, 1992, at 20-22 (proposing that the resolution of water rights conflicts will bring peace to the Middle East); Norman Myers, *Environment and Security*, 74 FOREIGN POL'Y 23, 38-39 (Spring 1989) (arguing that focusing on environmental issues is key to national security in U.S.-"Third World" relationships, and noting that competition for water in the Middle East is the source of the greatest environmental conflict).

88. GREENPEACE, *supra* note 26, at 6 (citing Saudi Arabian Ministry of Defence and Aviation report on oil and air pollution) (citation omitted). Some researchers argue, however, that the region was already seriously polluted even before the Gulf war began. *Gulf States Urged to Respond to Pollution Threat*, AGENCE FRANCE PRESSE, Mar. 23, 1992, available in LEXIS, EUROPE Library, AFP File. Residual oil spills from the Iran-Iraq war, oil tanker bilge, and other oil leakages account for nearly two million barrels of oil spilled every year. *Id.* In fact, an estimated six million barrels of oil per year pollute the world's seas and oceans. *Id.*

89. *See Hearings II, supra* note 41 (remarks of Bill Reilly, former head of the EPA) (comparing the calmer and warmer Persian Gulf to Prince William Sound, where the *Exxon-Valdez* tanker spill occurred in 1989). The Gulf waters exchange over a period of five years through the Straits of Hormuz, whereas the waters off the rocky coast of Alaska very actively exchange with the Gulf of Alaska. *Id.* The warm Gulf waters also aided the natural processes of evaporation and volatilization, which did not occur in the frigid Alaskan waters. *Id.* One U.S. official stated that half of the six million barrels of oil which spilled eventually evaporated or volatilized. *Id.* For an in-depth account of the spill's impact on the Gulf and its coastline, see GREENPEACE, *supra* note 26, at 8-16; *see also* Kelly, *supra* note 35, at 927 n.37 (describing the Persian Gulf's geography).

90. *See Greenpeace News Conference: Environmental, Military, and Human Effects of the Persian Gulf War One Year Later*, FED. NEWS SERVICE, Jan. 10, 1992, available in LEXIS, NEXIS Library, FEDNEW File (asserting that the industrial and desalination facilities were protected at the expense of the most environmentally sensi-

the Gulf's waters are shallow, the remaining oil easily penetrated the coastline, contaminating marshes, fishing, and shrimping areas.<sup>91</sup> Some of the oil solidified after the toxins evaporated, leaving an asphalt-like residue which sank to the Gulf's sandy bottom.<sup>92</sup>

### III. SUPPRESSION OF INFORMATION

The information presented to this point was compiled from sources carefully monitored by the coalition governments, in particular the governments of Kuwait, the United States, and Saudi Arabia.<sup>93</sup> The following section explores the reasons why these governments continue to suppress information relating to the war's human and environmental effects.<sup>94</sup>

Although recent studies suggest that the Kuwaiti oil fires did not have a global impact,<sup>95</sup> many people distrust the findings.<sup>96</sup> Some believe

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tive Gulf areas). Because cleanup efforts initially focused on the industry-related sections of the Gulf region and not on the less developed areas, the fragile ecosystems were unnecessarily damaged. *Id.*; Ken Wells, *Legacy of War: The Battles Are Over, but Gulf Environment Still Fights for Its Life*, WALL ST. J., Oct. 15, 1991, at A10. Furthermore, because the spill affected a 460-mile continuous stretch of coastline, neither plants nor animals were able to begin the natural healing processes. *Id.*

91. See GREENPEACE, *supra* note 26, at 34 (noting the impact on the fish and shrimp industry); Francis McKenna, *Oil Cleanup Efforts Move Into Top Gear*, MIDDLE E. NEWS NETWORK, Apr. 13, 1991, available in LEXIS, MDEAFR Library, ALLNWS File (observing that seafood catches had decreased by an estimated 15%). Dolphins, turtles, fish, shrimp, birds, mangroves, coral reef and plankton were seriously affected by the pollution. Samia Nakoul, *Oil Lakes in Kuwait Are Traps for Birds*, INDEPENDENT, Dec. 10, 1991, at 12. For example, shrimp stock was at less than one percent of its 1990 level. Indira Chand, *Pollution Hitting Gulf Shrimp Stocks; Shrimping Ban Urged*, MIDDLE E. NEWS NETWORK, June 3, 1992, available in LEXIS, MDEAFR Library, ALLNWS File.

92. See Cooke, *supra* note 46, at 55 (commenting on unrecovered oil in Gulf); *Kuwait: Deliberate Oil Pollution Threatens to Be an Environmental Catastrophe*, GUARDIAN, Mar. 12, 1991, at 2 (pointing out lasting oil damage to Gulf).

93. See sources cited *infra* notes 96-98 and accompanying text (discussing the adequacy of available information).

94. See sources cited *infra* notes 96-98 and accompanying text (discussing the adequacy of available information).

95. See, e.g., Wald, *supra* note 7, at C5 (summarizing a study conducted by the National Science Foundation concluding that the oil fires had a major impact on the Gulf region but not the rest of the planet); *Kuwait Oil Fires Had No Global Effect on Atmosphere, World Weather Agency Says*, 15 Int'l Env't Daily (BNA) No. 12, at 412 (June 17, 1992) (reporting that the World Meteorological Organization found that the fires had a regional impact); Booth, *supra* note 80, at A3 (finding regional, but



that the data are being manipulated to place a "positive spin" on what is otherwise evidence of widespread damage.<sup>97</sup> Others contend that a gag order put in place by coalition governments, particularly the United States, Kuwait, and Saudi Arabia, has led to a scarcity of data.<sup>98</sup> The possible reasons behind each government's actions, or inactions, are discussed below.

#### A. THE U.S. MOTIVE FOR SUPPRESSING INFORMATION

Long before the tensions in the Persian Gulf region erupted into war, the United States was carefully watching maneuvers in the Middle East for reasons of national security.<sup>99</sup> National security has traditionally

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not global, effects in a government-sponsored study).

96. See Booth, *supra* note 80, at A3 (noting that environmentalists accused government-sponsored scientists of "putting a positive spin" on findings). Several commentators question the adequacy of the information available. See McIlroy, *supra* note 56, at K6 (suggesting that the existence of a gag order on information is due to recent U.S. elections). Greenpeace concluded its report on the environmental impact of the Gulf war by responding to the argument that the scientific evidence does not prove that the fires have had a global effect:

[A]bsence of scientific proof should not lead to assumptions that damage has not occurred or will not become evident in the future, but to more good quality studies. It is imperative that the authorities in the region and the international community increase their efforts to discover the extent to which the environment and public have been affected. That they have been affected is beyond question—the extent has yet to be discovered.

GREENPEACE, *supra* note 26, at 34.

97. See Booth, *supra* note 80, at A3 (suggesting "positive spin" on findings may be due to government pressure).

98. See John Horgan, *Why Are Data Being Withheld?*, SCI. AM., July 1991, at 20; Horgan, *supra* note 10, at 24. Greenpeace's William Arkin asserts that "the paucity of data . . . is the result of aggressive policies of secrecy on the part of the Bush Administration and allied governments." ARKIN ET AL., *supra* note 11, at 9.

99. See Matthew L. Wald, *Gulf Victory: An Energy Defeat?*, N.Y. TIMES, June 18, 1991, at D1 (analyzing the growing U.S. dependence on OPEC oil, despite their tenuous relationship since the 1970s). OPEC's hold on the world oil market, however, may be loosening as its own members are disobeying production and pricing policies. Rowen, *supra* note 39, at B10.

Since the end of the war, the oil market has continued to fluctuate around the world, with industrializing nations demanding increasing amounts of oil. See, e.g., Douglas Jehl, *Iran Said to Buy Oil from Baghdad*, N.Y. TIMES, Mar. 29, 1993, at A7 (noting concern for purchases of Iraqi oil by Iran); William Branigin, *Oil-Hungry Asia Relying More on Middle East*, WASH. POST, Apr. 18, 1993, at A33 (reporting soaring demand for oil by Asian countries); Youssef M. Ibrahim, *Oil Prices, Plunging, May Not Have Hit Bottom*, N.Y. TIMES, Sept. 13, 1993, at D1 (providing historical per-

been linked to oil security.<sup>100</sup> Because the United States is the world's largest oil consumer, it must be able to rely on an uninterrupted flow of imported oil,<sup>101</sup> the Iraqi invasion of Kuwait threatened that supply.<sup>102</sup> Consequently, when Iraq invaded Kuwait in August 1990, the U.S. military was on the alert.<sup>103</sup> After the Bush Administration amassed overwhelming public support for the commitment of U.S. military forces to battle,<sup>104</sup> the coalition forces commenced their strike and achieved almost instantaneous victory.<sup>105</sup>

The sudden victory, however, was clouded by growing concern for human and environmental health relating to the oil fires that burned after the war ended.<sup>106</sup> The U.S. Department of Energy responded by issuing the following statement: "Most independent studies and experts suggest that the catastrophic predictions in some recent news reports are exaggerated. We are currently reviewing the matter, but these predictions remain speculative and do not warrant any further comment at this time."<sup>107</sup>

When asked to comment on the statement, an agency spokesman said the order was temporary and was designed to protect the security of allied military operations.<sup>108</sup> A more probable reason, however, is that satellite images revealed huge smoke plumes caused by U.S. bombing of

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spective to the drop in oil prices due to record oil production worldwide). At present, Kuwait predicts that its oil exports will exceed its pre-war levels. Joseph B. Treaster, *Kuwait's Oil Industry Rises From the Ashes of War*, N.Y. TIMES, Nov. 6, 1994, at 12.

100. See YERGIN, *supra* note 15, at 770 (explaining U.S. shrinking "security margin" gap between oil demand and production capacity); see also THE PRIZE, *supra* note 5 (depicting the U.S. quest for foreign oil supplies to replace domestic reserves). But see YERGIN, *supra*, at A21 (suggesting shift from "security dimensions" of oil to its "environmental dimensions").

101. See YERGIN, *supra* note 5, at 745 (explaining the difficult role of the United States as both the world's largest oil importer and second largest oil producer in the mid-1980s).

102. *Id.* at 772-73.

103. See generally ARKIN ET AL., *supra* note 11, at 10 (describing preliminary military activity to prepare for war).

104. *Id.* at 25-39.

105. *Id.*

106. See *supra* part II.B (raising concern over effects of oil fires on human and environmental welfare).

107. Horgan, *supra* note 10, at 24 (quoting a Department of Energy memorandum ordering that all Department personnel and contractors discontinue speaking to the media about war-related research until further notice).

108. *Id.*

Iraqi facilities.<sup>109</sup> If such images were released, the notion that all of the environmental destruction was caused solely by the Iraqis would have been dispelled, forcing the United States to share the burden of responsibility for the devastation.<sup>110</sup>

Moreover, the United States had learned a painful lesson during the Vietnam war when military personnel began to sue the government for their exposure to Agent Orange.<sup>111</sup> The present policy of limiting official discussion of the potential health hazards resulting from the oil fires reflects that lesson.<sup>112</sup>

#### B. KUWAITI AND SAUDI ARABIAN MOTIVES FOR SUPPRESSING INFORMATION

While the United States argued that releasing war-related information could threaten national security,<sup>113</sup> Kuwait's concerns dealt more with repopulating its country.<sup>114</sup> Over one million citizens fled Kuwait after the Iraqi invasion.<sup>115</sup> Furthermore, both the Kuwaiti and Saudi Arabian governments wanted to maintain their privacy in light of all the intrusions by environmentalists and media personnel.<sup>116</sup>

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109. *Id.*

110. *Id.*; see Horgan, *supra* note 98, at 20 (chronicling the Bush Administration's efforts to downplay environmental reports of burning oil wells); Angela Singer, *Will There Be Swallows Next Summer?*, UNIV. NEWS SERVICES, Oct. 10, 1991 (interviewing researcher who had difficulty obtaining data from the U.S. military due to its classified nature and the military's reluctance to admit to any environmental damage it inflicted).

111. See *supra* note 59 and accompanying text (noting the Agent Orange controversy of the Vietnam War).

112. See *supra* note 59 and accompanying text (discussing the U.S. military's concern over being held liable to Gulf veterans). But see *supra* note 60 and accompanying text (stating that the military consented to monitor Gulf veterans afflicted with mysterious illnesses); John F. Harris, *U.S. to Probe 'Persian Gulf Syndrome'*, WASH. POST, May 13, 1994, at A4 (confirming that the military would conduct a new probe to determine the cause(s) of the illnesses).

113. See *supra* notes 99-100 and accompanying text (noting national security reasons behind suppressing war data).

114. See Simon Tisdall, *Fall-Out from Burning Oil Wells is Causing Mass Sickness*, GUARDIAN, Mar. 26, 1991, at 22 (noting that the population of Kuwait before the invasion was 1.7 million, and estimating that only 450,000 remained).

115. *Id.*

116. See ARKIN ET AL., *supra* note 11, at 13 (describing environmental and media intrusion into daily lives of Kuwaitis and Saudi Arabians).

Additionally, Kuwait and Saudi Arabia were interested in limiting full disclosure of the war's environmental impact because the cleanup was occurring slowly due to inadequate procedures and other restraints.<sup>117</sup> The neighboring nations wanted to regain a sense of normalcy without intrusive media coverage.<sup>118</sup>

#### IV. RECOMMENDATIONS UNDER INTERNATIONAL LAW

Despite apparent attempts by coalition leaders to downplay the urgency of the situation, the Persian Gulf War's massive toll on human and environmental health cannot be overlooked.<sup>119</sup> This section confronts the existing international legal mechanisms, and recommends the incorporation of more proactive remedies, whether by way of an international criminal court,<sup>120</sup> a "Green Cross,"<sup>121</sup> or through a fifth Geneva Convention on the environment.<sup>122</sup>

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117. *Id.* The countries' oil industries were also cautious about publicizing the extent of damage suffered. Wald, *supra* note 99, at D1; William Booth, *Kuwait's Oil Woes May Be Permanent*, WASH. POST, May 2, 1991, at A1.

118. *Id.*; see *Greenpeace News Conference on Impact of the Persian Gulf War on the Persian Gulf*, FED. NEWS SERVICE, May 29, 1991, available in LEXIS, LEGIS Library, FEDNEW File [hereinafter *Greenpeace News Conference*] (noting the nervousness of Kuwait and Saudi Arabia over their lack of response to the oil fires' effects, and their eagerness to regain population and sovereignty). Coupled with the countries' concern for repopulation were fears that investment capital would be channeled outside of the Persian Gulf. See Ibrahim, *supra* note 8, at 14 (tallying the figures reported by the Arab Monetary Fund that excluded the war's toll on the environment and the region's economic growth).

119. See ARKIN ET AL., *supra* note 11 at 13 (probing the health and environmental effects of oil fires).

120. See *Persian Gulf: The Question of War Crimes: Hearings Before the Senate Comm. on Foreign Relations*, 102d Cong., 1st Sess. 20 (1991) (statement of Robert Woetzel) [hereinafter *Hearings III*] (proposing an international adjudication system to handle war criminals, including those who use the environment as a weapon).

121. See Susan Watts, *Environment Should Be Protected During War*, INDEPENDENT, June 4, 1991, at 3 (endorsing Greenpeace's call for an environmental version of the International Red Cross).

122. See Sarah Lee, *A Geneva Convention for the Environment*, 135 SOLIC. J. 386, 386 (1991) (outlining the convention to outlaw use of the environment as a weapon); Amanda Brown, *Call to Make Environmental Destruction a War Crime*, PRESS ASSOC. NEWSFILE, June 3, 1991 (reporting EC Environment Commissioner's plea to establish independent tribunal under fifth Geneva Convention to prosecute war criminals); Wendy Benedetto, *Big Job Waiting for U.S. Firms with the Know-How*, USA TODAY, Apr. 30, 1991, at 11A (supporting the convention to forbid using the environment as a weapon of war and to obligate warring nations to minimize destruc-

## A. CURRENT INTERNATIONAL LEGAL MECHANISMS

International law has struggled for almost a century with the issue of environmental destruction during wartime,<sup>123</sup> applying tenets from areas of international environmental law as well as the law of international warfare.<sup>124</sup> Within each of these categories of international law are areas of conventional law and customary law. Conventional law or "hard law" is the result of agreements, conventions, and treaties entered into by a nation voluntarily,<sup>125</sup> whereas customary law or "soft law" evolves slowly over time through state practice.<sup>126</sup> The following discussion summarizes existing laws that are or may be applicable to Iraq's actions during the Persian Gulf War.<sup>127</sup>

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tion of environment in warfare).

123. See Kelly, *supra* note 35, at 922-23 (summarizing events of environmental destruction throughout history).

124. See ALEXANDRE KISS & DINAH SHELTON, INTERNATIONAL ENVIRONMENTAL LAW 18-19 (1991) (explaining the "functional approach" to applying international environmental law to an international legal system); Zedalis, *supra* note 15, at 711 (discussing the application of international laws of war regarding the destruction of property as a basis for holding Iraq liable for the damage to Kuwaiti oil fields). See generally ARKIN ET AL., *supra* note 11, at app. B (providing a chronological summary of legal documents pertaining to environmental protection during wartime).

125. See RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS OF THE UNITED STATES §§ 102, 103 (1987) (explaining sources and evidence of international law).

126. See Pierre-Marie Dupuy, *Soft Law and the International Law of the Environment*, 12 MICH. J. INT'L L. 420, 420-35 (1991) (explaining "soft law" as it relates to international environmental law).

127. See Kelly, *supra* note 35, at 944-45 (discussing how the U.N. should have forced Iraq to be accountable for its actions under specified conventions). While Iraq is not subject to the provisions of all of the international laws discussed herein, the laws are included to serve two purposes. See United Nations Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, May 18, 1977, 31 U.S.T. 333 (entered into force Oct. 5, 1978). First, Iraq has refused to become a party to many of the agreements. *Id.* Second, some of the agreements, such as the 1977 Environmental Modification Convention, may soon become customary law, in which case Iraq will be bound by them even in the absence of voluntary choice. *Id.* Consequently, if Iraq were to repeat its actions, these laws could bear some weight against Iraq in the future. *Id.*

## 1. International Environmental Law

If the 1990s prove to be the decade of international law,<sup>128</sup> international environmental law could be at the forefront of global decision making.<sup>129</sup> The environmental atrocities of the Persian Gulf War may be the point of departure for the trend.<sup>130</sup>

International environmental law currently operates through treaties, conventions, agreements, and state practice, but with limited global impact.<sup>131</sup> As the discussion below indicates, these arrangements must be strengthened if we are to provide international legal protection in and against future wars.<sup>132</sup>

### a. Conventional Law

Seventy-three countries have signed the 1954 International Convention for the Prevention of Pollution of the Sea by Oil.<sup>133</sup> The agreement is significant because it was the first multilateral treaty for the prevention of pollution.<sup>134</sup>

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128. See *Hearings III*, *supra* note 120 (suggesting that the current decade be devoted to international law).

129. *Id.*; see also William Walker, *Canada Urges 'Eco-Terrorism' Law*, TORONTO STAR, July 11, 1991, at A13 (quoting a Canadian defense official who called for a new law to prohibit ecological terrorism because existing international environmental law is "undeveloped").

130. See *Lee*, *supra* note 122, at 386 (labeling the Gulf War as "the first war against the environment"). A post-war example of Iraq's continuing hostilities against the people and natural resources of the Gulf region occurred within its own borders. See Thomas W. Lippman, *Iraq's War on 'Marsh Arabs'; Artillery, Bulldozers Assault Fragile Habitat*, WASH. POST, Oct. 18, 1993, at A1, A13 (describing the deliberate destruction of the marshes, "a fragile ecosystem unique in the region," and a "culture [in southern Iraq] which has been present in the marshes for thousands of years"); Chris Hedges, *In a Remote Southern Marsh, Iraq is Strangling the Shiites*, N.Y. TIMES, Nov. 16, 1993, at A1 (reporting on the campaign to drain the marshes and its cruel impact on the residents); Chris Hedges, *Iraqi Regime Fights To Kill a Way of Life*, N.Y. TIMES, Nov. 28, 1993, at 12 (exploring the history of the marsh Arab culture and its possible extinction at the hands of the current Iraqi regime).

131. *Lee*, *supra* note 122 at 386.

132. *Id.*

133. International Convention for the Prevention of Pollution of the Sea by Oil, May 12, 1954, 12 U.S.T. 2989, 327 U.N.T.S. 3. The agreement was amended in 1962, 1969 and 1971, and seventy-three states had signed the document by 1987. *Id.* Iraq has not yet become a party. *Id.*

134. *Id.* Iraq was entreated to sign the agreement by parties to the Action Plan

Almost twenty years later, in 1972, parties signed the convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter for the purposes of preventing marine pollution and protecting the oceans.<sup>135</sup> This convention was also designed to reduce the risk of damaging human health.<sup>136</sup>

Although Iraq is not a party to either of these broad conventions, it did sign a regional convention in 1978, the Kuwait Convention, to prevent marine pollution in the Persian Gulf.<sup>137</sup> The Kuwait Convention provides that contracting parties "shall take all appropriate measures to prevent . . . pollution caused by discharges from land reaching the Sea Area . . . ." <sup>138</sup> The parties to the Kuwait Convention also ratified an agreement providing that they "shall cooperate in taking the necessary and effective measures to protect the coastline and related interests of one or more of the States from the threat and effects of pollution due to the presence of oil . . . in the marine environment resulting from marine emergencies."<sup>139</sup> Despite Iraq's duty as a signatory to uphold the terms of the Kuwait Convention, it failed to abide by the agreement<sup>140</sup> during

for the Development of the Marine Environment and the Coastal Areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates, adopted Apr. 23, 1978, 17 I.L.M. 501 [hereinafter Action Plan].

135. Convention on 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. The agreement was signed by sixty-four states as of 1987. See RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 601 reporter's notes (1987). The Action Plan unsuccessfully attempted to persuade Iraq to sign this agreement. Action Plan, *supra* note 134, at 509.

136. See RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 601 reporter's notes (1987).

137. Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution, Apr. 24, 1978, 17 I.L.M. 511. Other similarly applicable conventions were also ratified during this time period, but are excluded from this Comment for the sake of brevity.

138. *Id.* art. IV, at 514.

139. Protocol Concerning Regional Co-operation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency, Apr. 24, 1978, 17 I.L.M. 526. Article I of the protocol defines "marine emergency" as any "incident, occurrence or situation, *however caused*, resulting in substantial pollution or imminent threat of substantial pollution to the marine environment by oil or other harmful substances." *Id.* art. I (emphasis added). Article X provides that "any Contracting State faced with a marine emergency situation . . . shall (a) take every appropriate measure to combat pollution and/or to rectify the situation . . . ." *Id.* art. X.

140. *Id.* art. X.

the Persian Gulf War. The most visible violations were the intentional dumping of oil and setting of the oil well fires.<sup>141</sup>

*b. Customary Law*

Many agreements, conventions, and treaties are grounded in customary law as a result of "wide acceptance among the States particularly involved in the relevant activity."<sup>142</sup> Unlike conventional law, however, a principle of customary law is not binding on a state that opposes the principle when it is developed.<sup>143</sup>

Again, with respect to releasing oil into the Persian Gulf, two customary laws, deriving from the 1982 Law of the Sea Convention,<sup>144</sup> are binding upon all States: the Stockholm Declaration of 1972<sup>145</sup> and the World Charter for Nature.<sup>146</sup> The Stockholm Declaration, which covers a wide range of protections for the environment, was followed by the World Charter for Nature to enhance the Stockholm Declaration's provisions and includes a section pertaining to environmental warfare.<sup>147</sup>

Fortunately, the Law of the Sea Convention is finally enforceable now that the requisite number of signatories have ratified the document.<sup>148</sup> Those who have signed, such as Iraq and the United States, are bound

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141. See *supra* notes 37-38 and accompanying text (discussing Iraq's deliberate efforts to ignite the oil well fires and release oil into the Persian Gulf).

142. RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 102 (1987).

143. *Id.*; Richard A. Falk, *Environmental Disruption by Military Means and International Law*, in ENVIRONMENTAL WARFARE: A TECHNICAL, LEGAL AND POLICY APPRAISAL 33, 41 (Arthur H. Westing ed., 1984).

144. United Nations Convention on the Law of the Sea, U.N. Doc. A/Conf.62/122 (1982), reprinted in 21 I.L.M. 1261 (1982) [hereinafter Law of the Sea Convention].

145. Stockholm Declaration of the United Nations Conference on the Human Environment, U.N. Doc. A/Conf.48/14 (1972), reprinted in 11 I.L.M. 1416 (1982).

146. World Charter for Nature, G.A. Res. 37/7 U.N. GAOR, 37th Sess., 48th plen. mtg. (1982).

147. See *id.* princ. 5 (stating that "[n]ature shall be secured against degradation caused by warfare or other hostile activities").

148. Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea, Dec. 10, 1982, 33 I.L.M. 1309 (1994) (entered into force on Nov. 16, 1994). On November 16, 1993, the convention garnered the requisite number of signatories for ratification to permit its entry into force in November 1994. See *UN Convention on Law of the Sea Finally Enters into Force*, Oil Spill Intelligence Rep., Nov. 17, 1994, available in LEXIS, NEWS Library, CURNWS File (discussing the ratification process and environmental provisions of the convention).



to its provisions under international law, including its environmental protections.<sup>149</sup> As an example of customary law becoming conventional law, the Law of the Sea Convention may be "the most complex international instrument that has ever been negotiated."<sup>150</sup>

### c. *International Case Law*

While not always controlling, international tribunals usually consider international case law to be persuasive evidence of the law.<sup>151</sup> One increasingly significant exception to that rule, however, was articulated in 1949 in *Trail Smelter* (Can. v. U.S.).<sup>152</sup> *Trail Smelter* established State liability for transboundary air pollution as customary law.<sup>153</sup> For example, if Country A pollutes the air and the pollution travels to Country B, Country A may be liable under customary international law for the harm the pollution causes in Country B.<sup>154</sup>

With respect to Iraq's deliberate act of setting fire to Kuwait's oil wells and the resulting air pollution, *Trail Smelter* should be applicable, according to the logic of the decision.<sup>155</sup> An even stronger argument for holding Iraq liable for the air pollution in Kuwait, and perhaps the entire Persian Gulf region, concerns Iraq's historical claims to Kuwait.<sup>156</sup> If Iraq has dominion over Kuwait as its rightful territory,<sup>157</sup>

149. See Law of the Sea Convention, *supra* note 144, art. 12 (describing provisions of protecting and preserving environment, including sections on enforcement of regional and global cooperation).

150. Rebecca J. Fowler, *Law of the Sea: An Odyssey to U.S. Acceptance*, WASH. POST, July 29, 1994, at A3 (quoting Secretary of State Warren Christopher, one of the key U.S. negotiators). Among its many provisions, the treaty supports environmental protection for the high seas, which represent the 'common heritage of mankind.' *Id.* Moreover, the treaty guarantees full sovereignty to signatories over the seas that extend twelve miles offshore. *Id.* For the purposes of this Comment, the treaty also offers a nation control over 200 miles from its coastline for oil and gas rights. *Id.*

151. See RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 103 cmt. b (1987).

152. *Trail Smelter* (Can. v. U.S.), 3 R. Int'l Arb. Awards 1905 (1949) (holding a Canadian smelter plant liable for serious environmental damage caused by its heavy sulfur dioxide emissions that adversely affected Washington state). The international tribunal that decided the case declared: "[N]o state has the right to use . . . its territory in such a manner as to cause injury . . . to the territory of another . . ." *Id.* at 1965.

153. *Id.*

154. See *id.* (interpreting the meaning of the international tribunal's decision).

155. *Id.*; see also John E. Read, *The Trail Smelter Dispute*, 1963 CANADIAN Y.B. INT'L L. 213 (analyzing problems and applications of the case in international law).

156. See *supra* note 15 and accompanying text (stating Iraq's notion that Kuwait

then Iraq should be liable for environmental damages caused in those areas within its control.<sup>158</sup>

Underlying these arguments is the principle of State responsibility.<sup>159</sup> State responsibility creates an obligation under customary international law for a country to remedy a wrongful act involving the natural resources or environment of another country.<sup>160</sup> Once again, however, the principle cannot be enforced against a recalcitrant nation under current international environmental law.<sup>161</sup>

## 2. International Warfare Law

International warfare law provides another source by which wartime environmental destruction can be remedied.<sup>162</sup> The two major conventions dealing with this issue are discussed below.

### a. Conventional Law

Two conventional warfare laws emphasize prohibitions on intentionally destroying the natural environment during wartime: the 1977 Environmental Modification Convention (ENMOD)<sup>163</sup> and Protocol I to the

is within its border).

157. See *supra* note 15 and accompanying text.

158. See *supra* note 15 and accompanying text.

159. See Geoffrey Palmer, *New Ways to Make International Environmental Law*, 86 AM. J. INT'L L. 259, 268 (1992) (stating the definition of state responsibility). The principle reads:

1. A State is responsible under international law for a breach of an international obligation relating to the use of a natural resource or the prevention or abatement of an environmental interference.
2. In particular, it shall:
  - (a) cease the internationally wrongful act;
  - (b) as far as possible, re-establish the situation which would have existed if the internationally wrongful act had not taken place;
  - (c) provide compensation for the harm which results from the internationally wrongful act;
  - (d) where appropriate, give satisfaction for the internationally wrongful act.

*Id.* (citing WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT, EXPERTS GROUP ON ENVIRONMENTAL LAW, ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT 32 (1987)).

160. *Id.*

161. *Id.*

162. See Kelly, *supra* note 35, at 927-35 (analyzing treaties applicable to destruction of environment during wartime).

163. United Nations Convention on the Prohibition of Military or Any Other Hos-

Geneva Convention of 1949 (Protocol I).<sup>164</sup> Iraq is a party to ENMOD, which prohibits engagement "in military . . . environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage, or injury to any other State Party."<sup>165</sup>

Similarly, Protocol I fortifies the provision of the Geneva Convention of 1949<sup>166</sup> which makes the destruction of property illegal in the absence of military necessity. Protocol I prohibits "methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment."<sup>167</sup> Consequently, Iraq's actions with respect to the oil well fires and oil spills would most likely satisfy the terms of Protocol I if Iraq had been a party to the Convention.<sup>168</sup>

Although both conventions are worded similarly, they cover different types of relationships.<sup>169</sup> ENMOD governs the use of environmental

tile Use of Environmental Modification Techniques, May 18, 1977, 31 U.S.T. 333 (entered into force Oct. 5, 1978) [hereinafter ENMOD]; see Kelly, *supra* note 35, at 932-35 (describing in detail the provisions of the ENMOD convention).

164. Protocol I on the Protection of Victims of International Armed Conflicts, *opened for signature* Dec. 12, 1977, 1125 U.N.T.S. 3 (entered into force Dec. 7, 1978); see Kelly, *supra* note 35, at 929-31 (outlining Protocol I's provisions and applications).

One source also cited to Protocol III to the 1980 Inhumane Weapons Convention as another current international mechanism to protect the environment. See Sarah Lee, *A Geneva Convention for the Environment*, SOLIC. J., Mar. 29, 1991, at 386 (listing four Geneva Conventions' provisions to protect the environment).

165. ENMOD, *supra* note 163, art. I.1. ENMOD defines "environmental modification techniques" as "any technique for changing—through the deliberate manipulation of natural processes—the dynamics . . . of the Earth . . ." *Id.* art. II.

166. Geneva Convention Relative to the Protection of Civilian Persons in Time of War, Aug. 12, 1949, 6 U.S.T. 3114, 75 U.N.T.S. 31 [hereinafter Geneva Convention of 1949] (entered into force Oct. 21, 1950). Article 53 states: "[A]ny destruction by the Occupying Power of real or personal property belonging individually or collectively to private persons, or to the State . . . is prohibited, except where such destruction is rendered absolutely necessary by military operations." *Id.* For an excellent analysis of article 53 and the military necessity exception of article 23(g) of the Hague Convention for Regulations, which prohibits the destruction of enemy property, see Zedalis, *supra* note 15.

167. Protocol I, *supra* note 164, art. 35.3.

168. See Kelly, *supra* note 35, at 931 (citing examples of the destruction caused by Iraq to meet the threshold of Protocol I).

169. See Ken Schafer, *The Relationship Between the International Laws of Armed Conflict and Environmental Protection: The Need to Reevaluate What Types of Conduct Are Permissible During Hostilities*, 19 CAL. W. L. REV. 287, 312 (1989) (distinguishing between international laws of armed conflict and of environmental protec-

modification techniques between or among its signatories or State Parties, whereas Protocol I controls any method of warfare intended to cause environmental damage between or among any warring nations.<sup>170</sup> As a result, Protocol I seems more directly applicable to the Gulf War.<sup>171</sup> Nevertheless, the provision presently lacks authority enforceable against Iraq, which is not a party to the Convention.<sup>172</sup>

### b. Customary Law

Under customary international warfare law, the Hague Conventions of 1899<sup>173</sup> and 1907<sup>174</sup> are applicable. Formerly sources of conventional law, they became binding sources of customary law following World War II.<sup>175</sup> The Hague Conventions were designed to "humanize" war practices and proscribed a broader range of behavior than the earlier restrictions, which focused primarily on eliminating the use of poisonous substances.<sup>176</sup>

By 1977, an additional protocol was ratified to prohibit the destruction of "useless objects indispensable to the survival of the civilian population, such as . . . drinking water installations and supplies and irrigation works . . ." <sup>177</sup> If Iraq were a party to the convention, this

tion, favoring stronger protection of the environment).

170. *Id.*

171. See Kelly, *supra* note 35, at 930 (suggesting that the Gulf War destruction meets the threshold requirements of Protocol I).

172. Kelly, *supra* note 35, at 931 (noting that Iraq was not a party to the convention).

173. See Convention Concerning the Laws and Customs of War by Land, (Hague II), July 29, 1899 [hereinafter Hague Convention of 1899], reprinted in DIETRIAH SCHINDLER & JIRI TOMAN, *THE LAW OF ARMED CONFLICTS*, 63, 91 (1988) (describing the provisions of the Hague Convention of 1899).

174. Convention concerning the Laws and Customs of War on Land (Hague IV), Oct. 18, 1907, 36 Stat. 2277, art. 55 [hereinafter Hague Convention of 1907].

175. See Falk, *supra* note 143, at 42. The Nuremberg Trials prosecuted military officials for war crimes committed during World War II. *Id.* The international tribunal held that the Hague Conventions of 1899 and 1907 had "the force of customary law—binding even on non-signatory States." *Id.* (noting Hague Conventions surpassed previous "orbit of consent"); see *infra* notes 188, 194-97 and accompanying text (revisiting purpose of Nuremberg Trials to prosecute Saddam Hussein).

176. See Hague Conventions of 1899 and 1907, *supra* notes 173 and 174 (applying international warfare law to human rights).

177. Protocol II Addition to the Geneva Convention of Aug. 12, 1949, Relating to the Protection of Victims of International Armed Conflicts, Dec. 12, 1977, 1125 U.N.T.S. 3 (entered into force 1978); see also Waldemar A. Solf, *Protection of Civil-*

protocol could apply to the damage inflicted on the desalination facilities, which produce most of the potable water in the region.<sup>178</sup>

This cursory view of applicable and potentially applicable international laws leads one to the conclusion that the present framework lacks specificity and authority to hold a nation such as Iraq liable for its aggressive environmental destruction rendered during wartime.<sup>179</sup> Moreover, the U.N. Security Council's attempt to finalize the hostilities of the Persian Gulf War<sup>180</sup> in Resolution 687<sup>181</sup> illuminates the dire need for the current system's reform. Resolution 687 alone cannot reconcile the vague and incomplete legal provisions discussed above to prevent this type of environmental devastation from recurring.<sup>182</sup>

Some commentators argue that Resolution 687 fails to hold Saddam Hussein personally liable for the destruction he ordered,<sup>183</sup> while others assert that it recognizes only the short-term cost of the war to the region.<sup>184</sup> The next section highlights some of the proposals to remedy

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*ians Against the Effects of Hostilities Under Customary International Law Under Protocol I*, 1 AM. U. J. INT'L L. & POL'Y 117, 133-34 (1986) (confirming Protocol II as a source of customary international law).

178. See *supra* note 90 and accompanying text (discussing desalination plants affected by the dumping of oil into the Persian Gulf); see also Kelly, *supra* note 35, at 931 n.58 (noting vital role of desalination facilities).

179. See Falk, *supra* note 143, at 33-51 (proposing a "convention on ecocide" to criminalize environmental destruction). Provisions in international agreements that penalize environmental offenders should be broad enough to serve their purpose. Sanford E. Gaines, *International Principles for Transnational Liability: Can Developments in Municipal Law Help Break the Impasse?* 30 HARV. INT'L L.J. 311, 314 (1989).

180. See Kelly, *supra* note 35, at 939-43 (summarizing the U.N.'s actions prior to and throughout the Persian Gulf War).

181. U.N. SCOR Res. 687, U.N. SCOR, 2981st mtg., at 7, U.N. Doc. S/RES/687 (1991) [hereinafter Resolution 687]. Resolution 687 makes Iraq accountable for "any direct loss, [or] damage, including environmental damage and the depletion of natural resources . . . as a result of Iraq's unlawful invasion and occupation of Kuwait." *Id.* The U.N. Security Council also established a fund to collect 25% of Iraq's revenues from annual oil sales in order to compensate claims against Iraq for destruction of Kuwaiti property. *Id.* at 18.

182. *Id.*

183. See Matthew Nimetz & Gidon Caine, *Crimes Against Nature*, AMICUS J., Summer 1991, at 9 (proposing leaders should be charged as war criminals for deliberately polluting environment).

184. See *U.S. Trade Mission Pushes Debt-Nature Swaps*, 14 Int'l Env't Rep. Current Rep. No. 13, at 377 (July 3, 1991) (citing International Green Cross' fundraising effort to "pursue charges against Iraq's President Saddam Hussein for having willfully set afire hundreds of oil wells"); *United Nations Establishes Compensation Commission for Iraqi War Damages*, MIDDLE E. EXECUTIVE REP., June 1991, at 8 (discussing

the current system's failure to handle these issues adequately and forcefully.<sup>185</sup>

## B. LEGAL PROPOSALS TO REMEDY THE CURRENT INTERNATIONAL SYSTEM

Three leading proposals address the urgent need within the international community to deter and punish environmental terrorists.<sup>186</sup> After assessing the strengths and weaknesses of each, this Comment concludes with some recommendations to achieve these ends.

### 1. International Criminal Court

Some commentators advocate the establishment of an international criminal court to try perpetrators of crimes that violate standards held by the international community.<sup>187</sup> The environmental destruction of the Persian Gulf War would be included as a crime for which Saddam Hussein could be tried in the international criminal court.<sup>188</sup>

The international criminal court could be fashioned after four possible models: (1) a permanent court to which nations would surrender their individual sovereignty; (2) a temporary international court whereby victors carry out trials and then disband the court; (3) a limited internation-

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lack of procedural rules for administering claims).

185. See, e.g., Lee, *supra* note 122, at 386 (proposing that a fifth Geneva Convention address environmental harm caused by any military power); Alan E. Boyle, *Marine Pollution Under the Law of the Sea Convention*, 79 AM. J. INT'L L. 347, 371 (1985) (urging more comprehensive marine pollution laws); William Walker, *Canada Urges 'Eco-Terrorism' Law*, TORONTO STAR, July 11, 1991, at A13 (reporting Canada's call for a strict international law to prohibit 'eco-terrorism').

186. See *supra* notes 120-22 and accompanying text (making recommendations for future international legal mechanisms that would deter military forces from unreasonably harming the environment); see also Walker, *supra* note 185, at A13 (reporting Canada's call for a strict international law to prohibit 'eco-terrorism').

187. See *Hearings III*, *supra* note 120, at 21 (statement of Mr. Woetzel) (discussing the viability of an international criminal court). Present at the Senate Foreign Relations Committee hearing were Robert Woetzel, President, Foundation for the Establishment of an International Criminal Court; Anthony D'Amato, Professor of International Law, Northwestern University; and Senators Jesse Helms, Christopher Dodd, Claiborne Pell, Paul Simon, Charles Robb, and Mitch McConnell. *Id.* at 1.

188. *Id.* (statement of Senator Pell); see also Tony Mauro, *U.S. Building Case for Post-War Trials*, GANNETT NEWS SERVICE, Feb. 13, 1991 (indicating that U.S. officials were collecting information for prosecuting Saddam Hussein in Nuremberg-style war trials after the Persian Gulf War).

al court founded upon Islamic principles to try defendants from Islamic nations; and (4) a United States national court to prosecute war criminals under U.S. laws, as was the case with Japanese war criminals following World War II.<sup>189</sup>

While the first model, the permanent international criminal court, should ideally be the proper forum to handle prosecutions at the international level, it assumes that countries would be willing to surrender their sovereignty to a higher forum.<sup>190</sup> The U.N. has tried a similar approach via the International Court of Justice (ICJ), but the court's decisions have been criticized heavily by the United States and developing countries.<sup>191</sup> Questions of who would be proper judges and where the forum would be held would also have to be addressed.<sup>192</sup> Given the current number of international conflicts, the world is not yet capable of managing this kind of system.<sup>193</sup>

The second model, the special international court, may be more promising because sovereignty issues are not involved to the same extent.<sup>194</sup> Nevertheless, the role of the victors as conductors of the trials has proven troublesome for some commentators, who assert that the victors will not serve justice blindly.<sup>195</sup> It should be noted here that the Nuremberg trials initially generated similar controversy, but have since become regarded as established precedent.<sup>196</sup>

189. See *Hearings III, supra* note 120, at 16 (statement of Senator Helms) (outlining choices for an international criminal court arrangement).

190. *Id.*

191. *Id.* at 17 (statement of Mr. D'Amato).

192. *Id.* at 26-27 (statements of Mr. D'Amato and Mr. Woetzel).

193. See *A Survey of Defence in the 21st Century*, ECONOMIST, Sept. 5, 1992, at 3-5 [hereinafter *Survey*] (discussing the large number of wars of interest and wars of conscience currently plaguing the planet).

194. See *Hearings III, supra* note 120, at 16 (statement of Senator Helms) (comparing the function of a temporary court to that of the Nuremberg trials of Nazi war criminals).

195. See *id.*, at 26 (statement of Mr. D'Amato) (asserting that justice would be inhibited unless a general consensus among the leaders of nations existed on the acceptable international norms of behavior). An international court should prosecute only substantial deviations from generally accepted international norms. *Id.*

196. See *id.*, at 17 (statement of Mr. D'Amato) (reviewing the gradual acceptance of the Nuremberg prosecution as a solid and entrenched precedent); *id.* at 26 (statement of Mr. D'Amato) (arguing that an international prosecution of Iraqi leaders would be fair in consideration of the fact that the international court would be applying the same law Iraq adopted over thirty years ago).

The third model, an Islamic court for trying Islamic offenders, acknowledges possible prejudice against non-Western defendants in Western courts.<sup>197</sup> The United States, however, argues that the educational impact of the trial would be diminished if only a regional group of judges were permitted to carry out the war crimes inquiry.<sup>198</sup>

The fourth model, a U.S. national war crimes court, appeases concerns that the world will not witness the prosecution of the war criminals, but also raises questions of sovereignty.<sup>199</sup> Is the U.S. criminal justice system the appropriate arena in which to try international criminals?

These models each offer a fresh perspective on handling the volatile issue of whether to prosecute war criminals, and if so, how. Of the four examples, the temporary international court seems most logical in the sense that its purpose is clear: the court is established only to prosecute perpetrators of crimes in a war that has just been waged. In order to avoid charges of imperialism or ethnocentrism, the war crimes trials should be held in a neutral country removed both politically and geographically from the warring nations. The U.N. should select the location as well as the judges from nations with excellent human rights records.<sup>200</sup>

## 2. The International Green Cross/Green Crescent

Another innovative proposal to remedy the current international system is the establishment of the International Green Cross/Green Crescent for the protection of the environment during time of war and natural disaster.<sup>201</sup> Just as the International Red Cross protects civilians during

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197. *See id.* at 16 (statement of Senator Helms) (preferring as more equitable an Islamic court for Islamic offenders).

198. *See id.*, at 12 (statement of Dr. Wiesel) (stating that violations of international standards of conduct should be tried in the dramatic setting of an international court).

199. *See id.*, at 17 (statement of Mr. D'Amato) (arguing that an international court would not affect United States sovereignty because the U.S. adheres to the law the court would be applying).

200. *See Kelly, supra* note 35, at 944-45 & n.134 (suggesting that the U.N. should have brought Iraq to trial for the damage it caused to the environment). Bringing Iraq to trial would have served both as a general deterrent of war and as a partial remedy for the war's victims. *Id.*; *see also Hearings III, supra* note 120, at 18 (statement of Mr. D'Amato) (proposing that bringing such charges against Iraqi leaders could generate positive steps to protect the environment, just as the Nuremberg trials brought about an advancement of human rights causes).

201. *See Watts, supra* note 121, at 3 (recounting the meeting which proposed an



wartime and the Red Crescent mobilizes to provide disaster relief, the mission of the International Green Cross/Green Crescent is to address both causes of environmental degradation.<sup>202</sup> Once environmental damage is assessed, the Green Cross will forward its recommendations to an independent tribunal responsible for determining the punishment and reparations necessary to address the harm suffered by the environment, war's "forgotten victim."<sup>203</sup>

Similar to the special international court, the Green Cross and its recommendations will face resistance.<sup>204</sup> Nations distrustful of the kinds of recommendations made and reparations imposed would most likely defy the Green Cross and the tribunal.<sup>205</sup>

The Green Cross does, however, offer an advantage over the court systems mentioned above.<sup>206</sup> After initial opposition or reluctance, nations may better understand the need to protect the environment from wartime damage, especially when considering the lingering effects of the Persian Gulf War.<sup>207</sup> The Green Cross could also be effective in con-

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International Green Cross to provide permanent representation for environmental concerns throughout the international community). The meeting was organized by the London School of Economics, the Defence Research Society, and Greenpeace. *Id.*

Former Soviet leader Mikhail Gorbachev is now the president of the International Green Cross/Green Crescent, a private organization established in April 1993 to coordinate global environmental initiatives. See Michael Wines, *Capitol Stirs To Mr. Green, Né Gorbachev*, N.Y. TIMES, Apr. 16, 1993, at A10 (discussing Gorbachev's role in promoting the organization's mission); Eugene Linden, *Gorby—Moving from the Cold War to Global Warming, the Former Soviet Leader Searches for a New Role*, TIME, Sept. 6, 1993, at 52 (focusing on the organization's efforts to address environmental issues worldwide under the leadership of Gorbachev).

202. Watts, *supra* note 121, at 3; see *International Green Cross Outlines First Series of Environmental Programs*, Int'l Env't Daily (BNA) (Feb. 17, 1994), available in LEXIS, NEWS Library, CURNWS File (summarizing the formation and implementation of the "Green Cross" concept).

203. Watts, *supra* note 121, at 3.

204. See *Greenpeace News Conference*, *supra* note 118 (reporting that the United States caused much of the environmental destruction, and concluding that both the Americans and the Iraqis were responsible for unacceptable harm to the environment).

205. See *Hearings III*, *supra* note 120, at 37 (noting that the United States and third world countries evade the rule of law under the ICJ because the court has a history of inhibiting the range of action available for reacting to perceived threats).

206. See *Greenpeace News Conference*, *supra* note 118 (describing the early opposition of Greenpeace to the Persian Gulf War on the grounds that the environmental damage would be unacceptable). Greenpeace was severely criticized for opposing a necessary war. *Id.*

207. See Cooke, *supra* note 46, at 55 (stating that the plume of sooty-smoke from the burning oil wells would reach from New York to Florida).

junction with the provisions of a fifth Geneva Convention, discussed in the next section.<sup>208</sup>

### 3. A Fifth Geneva Convention on the Environment

At the present time, four Geneva Conventions establish a framework to secure human rights during wartime.<sup>209</sup> These conventions, however, afford the environment few protections.<sup>210</sup> As a result, many groups urge the meeting of a fifth Geneva Convention to provide a legal framework for global environmental protection.<sup>211</sup>

The fifth Geneva Convention would address concerns stemming from the preceding Geneva Conventions as well as the dire need to protect the environment during wartime.<sup>212</sup> One of the major weaknesses of the earlier Geneva Conventions, the military exception, which allows punishable actions to be forgiven by law, is not permitted in the proposed fifth Convention.<sup>213</sup> Proponents recommend including the following objectives:

- (1) to ensure application of the rules to all forms of armed conflict;
- (2) to outlaw the use of the environment as a weapon;
- (3) to curtail the incidental environmental damage resulting from military force; and
- (4) to forbid environmental damage to third party nations, international waters, and the atmosphere.<sup>214</sup>

The theories behind a fifth Geneva Convention are deterrence and punishment.<sup>215</sup> If a strong international legal framework is in place,

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208. See Watts, *supra* note 121, at 3 (suggesting that the Green Cross could work effectively under the terms of a fifth Geneva Convention on the environment).

209. See JOSEPH MODESTE SWEENEY ET AL., *THE INTERNATIONAL LEGAL SYSTEM* 742-44, 758, 760-61 (3d ed. 1988) (describing the Geneva Conventions).

210. See part IV. section A above (outlining current laws to protect the environment during war).

211. See Lee, *supra* note 122, at 386 (outlining the provisions of a convention dedicated to environmental protection); *Greenpeace News Conference*, *supra* note 118 (providing an overview of the Persian Gulf War's environmental atrocities); Amanda Brown, *Call to Make Environmental Destruction a War Crime*, PRESS ASSOC. NEWSFILE, June 3, 1991 (classifying environmental destruction as a punishable war crime).

212. See Lee, *supra* note 122, at 386 (noting that the current four Geneva Conventions define acceptable limits for violations of human rights during war but do not define similar limits for damage to the environment).

213. *Id.*

214. *Id.*

215. See Michael Binyon, *Plan to Save Environment*, *TIMES*, Mar. 14, 1991 (dis-

potential violators may be deterred from using the environment as a weapon, particularly if the leader(s) will be prosecuted for war crimes.<sup>216</sup> Furthermore, if the threat of prosecution does not prevent the act, the punishment inflicted may serve as a general deterrent, notifying potential violators that behavior deplorable to the international community will not go unchecked.<sup>217</sup> Above all, a fifth Geneva Convention would symbolize the international community's intolerance for and solidarity against environmental terrorism.<sup>218</sup>

### CONCLUSION

After assessing the current international legal framework and proposed remedies, the soundest conclusion is that the U.N. and its agencies must be allowed to play a more forceful role in resolving disputes and negotiating settlements between warring neighbors before the environmental atrocities of the Persian Gulf War are repeated elsewhere. With the U.N. as mediator, perhaps the nations of the world will come to view warfare, particularly against the environment, as the least desirable means to achieve their objectives.<sup>219</sup>

Given the current number of conflicts throughout the world, however, that vision is not yet a reality. Until war becomes obsolete, international as well as intranational conflicts will continue to consume valuable human and environmental resources.<sup>220</sup> To prevent the kind of devastation that occurred during the six weeks of the Persian Gulf War, an ad hoc and independent international tribunal should be given the authority

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cussing several incidents involving environmental destruction and reviewing the weaknesses in the current Geneva Conventions).

216. See *Hearings III*, *supra* note 120, at 2-3 (statement of Senator McConnell) (suggesting that Saddam Hussein be punished as a war criminal for the deliberate environmental destruction he caused).

217. *Id.*, at 3 (asserting that punishing Iraqi leaders would deter other leaders from developing fiscal plans based on aggression against neighboring countries).

218. See *Lee*, *supra* note 122, at 386 (noting that the terms "ecocide" and "environmental terrorism" first appeared in military jargon during the Persian Gulf War).

219. See Bruce W. Nelan, *How the World Will Look in 50 Years*, *TIME*, Fall 1992, at 36 (predicting that war will become "essentially irrelevant" for democratic nations in future decades); *Survey*, *supra* note 193, at 22 (concluding that the future military challenges for democracies will consist of maintaining an efficient common defense force to control any despotic regimes).

220. See Nelan, *supra* note 219, at 36 (suggesting that decision makers in the democracies will avoid warfare as too costly).

to prosecute environmental terrorists and to impose the harshest sanctions and sentences against them.<sup>221</sup>

Ultimately, an international agreement such as a fifth Geneva Convention<sup>222</sup> should be drafted to provide a more permanent body of law upon which the international community could rely for guidance; the current international legal framework is vague and unenforceable in environmental matters. If deterrence and punishment are the most critical underpinnings of an effective international criminal justice system,<sup>223</sup> a fifth Geneva Convention would be a proactive remedy, providing both predictability in enforcement and severity in punishment. To prevent future acts of environmental terrorism, the international legal community must provide a more comprehensive and predictable system of resolving conflicts, providing remedies, and prosecuting war criminals.<sup>224</sup>

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221. See *Hearings III*, *supra* note 120, at 23 (statement of Mr. Woetzel) (noting the flexibility and cost-effectiveness of ad hoc international courts for trying war criminals).

222. See *Lee*, *supra* note 122, at 386 (advising that the international community next agree on the definitions for intolerable abuses of the environment). If nations would agree, a fifth Geneva Convention would provide the legal basis for deterring and punishing international environmental crimes. See *id.* (proposing general agreements to enforce a limit on the environmental impact of any armed conflict).

223. See *id.* at 386 (proposing that an international system for deterring and punishing environmental crimes derives from general agreements to enforce limits on military actions).

224. See *Hearings III*, *supra* note 120, at 25 (indicating the urgent need to promote "responsibility and accountability" for nations and individuals). The legal fiction of the "nation-state" should not provide protection for irresponsible actions that lead to irreparable harms. *Id.*