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The Kyoto Protocol: The Battle Over Global Warming Heats Up

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Cover Page Footnote

J.D. expected May 1999, Florida State University College of Law. The author wishes to thank Professor Jim Rossi, Florida State University College of Law, whose encouragement and guidance contributed greatly to the development of this paper.

THE KYOTO PROTOCOL: THE BATTLE OVER GLOBAL WARMING HEATS UP

JEFFREY A. FERGUSON*

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"On and on, the rain will fall,
 Like tears from the storm,
 Like tears from the storm.
 On and on, the rain will see,
 How fragile we are,
 How fragile we are."¹

I. INTRODUCTION

Unbearable heat, outbreaks of tropical diseases carried by plagues of insects, drastic reductions in the size of the ice shelf in Antarctica, and vanishing habitats²—these are the typical predictions espoused by doomsayers confident the world is on the brink of total destruction due to global warming.³ While the debate rages over whether the Earth is actually experiencing any appreciable climate changes, it has become widely accepted that human activity is affecting the Earth's atmosphere.⁴

Due to the impossibility of predicting the total effect on the Earth, governments around the world have chosen to take a better-safe-than-sorry approach, hoping to avert disaster. However, this path may be flawed. Recently, at the Third Conference of the Parties to the United Nations Framework Convention on Climate Change, the governments of several nations created the Kyoto Protocol (Protocol).⁵ The Protocol is the first international agreement to establish target emission reduction levels and provides the framework to create an emissions trading program and joint implementation.⁶ However, such targets and programs are inadequate when it comes to addressing a problem of this scope. Different or additional measures, such as carbon taxes and domestic incentives, are necessary to

1. STING, *Fragile*, on *FIELDS OF GOLD* (A&M Records 1994).

2. See Paul Rauber, *Heat Wave*, *SIERRA*, Sept.-Oct. 1997, at 34-41.

3. See *id.* People are currently attributing many events that have occurred in the last few decades to the effects of global warming. Examples include: a forty-mile long crack that appeared in the Larson Ice Shelf in Antarctica, just after a chunk the size of Rhode Island broke free; the appearance of tropical diseases such as malaria, dengue fever, and hantavirus in areas of the United States where they have never been seen before; and a gradual expansion of plant life such as tundra, conifer forest, and broadleaf forest species. See *id.* at 36-38.

4. See *Global Climate Change and Air Pollutants: Hearings Before the Subcomm. On Health and the Environment of the House Comm. On Energy and Commerce*, 103d Cong., 1st Sess. 100 (1993) (statement of Robert Sussman, Deputy Administrator, EPA); *Administration Views on Global Climate Change: Hearings Before the Subcomm. on Economic Policy, Trade and Environment of the House Comm. on Foreign Affairs*, 103d Cong., 1st Sess. 4 (1993) (statement of Timothy E. Wirth, Counselor, Department of State).

5. See generally United Nations Framework Convention on Climate Change: Conference of the Parties: Report on its Third Session (Kyoto), Dec. 1-11, 1997, U.N. Doc. FCCC/CP/1997/7/Add. 1 (Mar. 18, 1998).

6. See *id.*; see also Sharon Begley, *Wake Up Call*, *NEWSWEEK*, Dec. 22, 1997, at 10.

escape the inevitable catastrophic consequences of global climate change.⁷

Part II of this Paper discusses the underlying theories and potential impacts of global warming. Part III provides a summary of the international legal background leading up to the Kyoto Summit. Part IV lays out the provisions of the Kyoto Protocol and their intended effects. Part V brings to light the shortcomings of the Protocol. Part VI discusses the steps necessary on both international and national levels to insure that the problem of climate change is abated. Finally, Part VII concludes that, although an important and historic first step to combat global warming, the Protocol should not be viewed as the instrument by which global warming will be eradicated, but as a first step on a long journey toward global atmospheric healing.

II. THE ATMOSPHERE AND GLOBAL WARMING

The thickness of the Earth's atmosphere relative to the size of the Earth has been compared to the skin of an apple relative to the size of an apple, yet the atmosphere is vitally important to life on Earth.⁸ The inner workings of the atmosphere are quite complex and still defy the world's best scientists of a complete understanding of how the atmosphere works. Fortunately, scientists understand enough to put together a picture sufficiently detailed to tell us our atmosphere is changing.

Essential to an understanding of global warming is an understanding of the Earth's climate. The planetary climate system is affected by numerous physical components, both internal and external to the system.⁹ Changes in any of these components, occurring naturally or caused by external factors, trigger the earth's climate to change.¹⁰ The driving force behind everyday changes in

7. See Richard N. Cooper, *Toward a Real Global Warming Treating*, COUNCIL ON FOREIGN AFFAIRS, Mar.-Apr. 1998, at 66, 68-77 (discussing the need to create incentives for citizens to change their behavior so that countries can reach their quantitative emissions targets).

8. See Marvin S. Soroos, *The Thin Blue Line: Preserving the Atmosphere as a Global Commons*, ENVIRONMENT, Mar. 1998, at 6-7 (explaining that the depth of the Earth's atmosphere is only a quarter of the radius of the planet).

9. See WORKING GROUP I OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 1995, at 55 (1996) [hereinafter WORKING GROUP I]. The internal components include "the atmosphere, the oceans, sea ice, the land and its features, . . . snow cover, land ice . . . and hydrology. . . ." *Id.* The external components include the Sun, "the Earth's rotation, Sun-Earth geometry, . . . the physical components of the Earth system such as the distribution of land and ocean, the geographic features of the land, the ocean bottom topography, . . . and the mass and basic composition of the atmosphere and ocean." *Id.*

10. See *id.* at 56. An excellent example of an internal event that can have a profound effect on the Earth's climate is a volcanic eruption. See *id.*

climate is radiation from the Sun and the attendant absorption or loss of long-wave radiation or heat via the Earth's atmosphere.¹¹ The Earth's ability to absorb or emit this long-wave radiation is dependent on the internal and external factors discussed above.¹²

Four gases account for approximately ninety-nine percent of the Earth's atmosphere: oxygen, nitrogen, argon, and carbon dioxide.¹³ The remaining one-percent is composed mainly of forty trace gases, such as neon, helium, ozone and hydrogen.¹⁴ The atmosphere also contains water vapor and, nearer to the surface, solid particles known as aerosols.¹⁵

As described above, the Earth absorbs solar radiation generated by the Sun.¹⁶ Most of the radiation is re-radiated back into space.¹⁷ Of this radiation, a large portion escapes into space, and a small portion is absorbed by gases in the atmosphere and radiated back towards Earth.¹⁸ The rates of the re-radiation and subsequent re-radiation are affected by the physical attributes listed above.¹⁹ This absorption, re-radiation and subsequent re-radiation is called the "greenhouse effect" and the gases that perform this operation are called "greenhouse gases."²⁰ This effect is responsible for maintaining surface temperatures that are conducive to life.²¹

As more of these chemicals that trap radiation are emitted into the atmosphere, more radiation is showered upon the Earth's surface.²² This increase in radiation creates what has become known as "global warming."²³ Elevated levels of these greenhouse gases results in a gradual warming of the Earth's atmosphere.²⁴

In some situations, it has been easy to identify human activities that contribute to the elevated levels of greenhouse gases, while

11. *See id.* at 57.

12. *See id.*; *see also supra* text accompanying note 9.

13. *See Soroos, supra* note 8, at 8.

14. *See id.*

15. *See id.* Aerosols include dust particles, pollen, sea salt, and pollutants from human activity. *See id.*

16. *See* William C. Burns, *Global Warming—The United Nations Framework Convention on Climate Change and the Future of Small Island States*, 6 DICK. J. ENVTL. L. & POL'Y 147, 150 (1997).

17. *See id.*

18. *See id.* Most of the re-radiated radiation is absorbed by water vapor. *See id.* Methane, carbon dioxide, ozone, nitrous oxide, and clouds also absorb small amounts. *See id.*

19. *See* WORKING GROUP I, *supra* note 9, at 57.

20. *See* Burns, *supra* note 16, at 150.

21. *See id.*

22. *See* Soroos, *supra* note 8, at 8.

23. *See id.*

24. *See* WORKING GROUP I, *supra* note 9, at 59. Experts estimate that the amount of carbon dioxide in the atmosphere has increased by more than twenty-five percent in the last decade. *See id.* The increase is attributed to the industrial revolution, the accompanying consumption of fossil fuels, and the removal of forests. *See id.*

other situations have proved more elusive. Both natural and unnatural occurrences are easily identifiable. Sunspots and any minor changes in the varying eccentricity of the Earth's elliptical orbit, the tilt of the planet, or the wobble of the Earth's rotation all contribute naturally to climate change.²⁵ Aside from these naturally occurring phenomena, it is widely accepted that human-induced emissions of greenhouse gases in seemingly insignificant quantities as well as mass deforestation also contribute to climate change.²⁶

The effects of this gradual warming are in serious dispute. Some of the most commonly cited effects include rising sea levels,²⁷ minute increases in average world temperatures,²⁸ and the melting of the polar ice caps.²⁹ The effects are not only terrestrial in nature, they are also biological and ecological. Insects are moving farther north, away from what has been called the "equatorial belt," carrying tropical diseases to new areas.³⁰ Species of plants and animals are moving farther north as well.³¹

One of the events that some scientists are confident has been created by global warming is a gradual rise in sea level occurring over the last one hundred years.³² Essentially, changes in sea level are difficult to determine.³³ To account for this difficulty, scientists look to other factors that affect sea levels to determine if such changes have occurred.³⁴ Presently, the evidence available suggests that human activities are definitely having an effect on sea levels.³⁵

Scientists are in general disagreement over whether current events are precipitated by climate change and its eventual effects.³⁶ But they are in agreement that the climate is changing and the effects

25. See Gerald Westbrook, *After Kyoto, Science Still Probes Global Warming Causes*, OIL & GAS J., Jan. 19, 1998, at 40-41.

26. See generally Rauber, *supra* note 2.

27. See *Satellite Data Reveals Sea Level Rise*, GLOBAL ENVTL. CHANGE REPORT, May 12, 1995, available in LEXIS, Nexis Library.

28. See *Climate Change: Average World Temperature Reaches New High*, GREENWIRE, Jan. 9, 1998, available in LEXIS, Nexis Library, Greenwire File.

29. See Dick Thompson, *Melt Away Future*, TIME, Nov. 1, 1997, at 38.

30. See Rauber, *supra* note 2, at 37.

31. See *id.* at 37-39.

32. See WORKING GROUP I, *supra* note 9, at 363.

33. See *id.* at 365. This difficulty stems from the method chosen to measure sea levels, the Permanent Service for Mean Sea Level data set, and this methodology's inability to account for vertical land movements, such as continuing readjustments of the Earth's crust. See *id.*

34. See *id.* at 366. These factors include oceanic thermal expansion, changes in the amount of land ice, better known as glaciers and ice caps, the Greenland and Antarctic Ice Sheets, and surface and ground water storage capabilities. See *id.* at 366-80.

35. See *id.* at 363.

36. See Thompson, *supra* note 29.

may be devastating.³⁷ The anticipated effects are numerous. A rise in sea level with accompanying destruction of low-lying areas and small islands is anticipated.³⁸ Poleward shifts of forests into areas never before inhabited by specific vegetative species is also expected.³⁹

In addition to the anticipated biological and geological effects of global warming, scientists have identified potential socio-economic impacts.⁴⁰ Among them are adverse impacts on agriculture, water supply, space cooling and heating, insurance, health, air pollution, water pollution, and human amenity.⁴¹

III. THE INTERNATIONAL LEGAL BACKDROP: THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

With the scientific community largely in agreement, the stage was set for serious climate change policymaking. Up until this developing consensus, governments paid little or no attention to the

37. *See id.* But see THE TRUE STATE OF THE PLANET (Run Bailey ed., 1997); *Study Challenges Global Warming Prediction*, ATMOSPHERIC MONITORING & ABATEMENT NEWS, Oct. 1, 1995, available in Westlaw Library, Environmental News File (challenging global warming predictions).

38. *See* WORKING GROUP I, *supra* note 9, at 364. Projections vary anywhere from a conservative fifty centimeter rise in sea levels to the more extreme estimate of eighty-six centimeter rise by the year 2100. *See id.*

39. *See id.* at 459. A gradual shift northward of both "northern-hemisphere taiga, temperate deciduous, and warm temperate evergreen/warm mixed forest belts, . . . Eurasian taiga, and a slight expansion of tropical seasonal and rain forests into areas of warm-temperate evergreen forests" is expected. *Id.*

40. *See* WORKING GROUP III OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 1995, at 179-218 (1996) [hereinafter WORKING GROUP III].

41. *See id.* at 188-200. The anticipated risks to agriculture include decreased soil moisture, heat stress, increased incidence of pests and diseases, and changes in the growing cycles of many plants. *See id.* at 189. The expected effects on water supplies are considered regional and include the intensity and frequency of precipitation events and the effect of salt-water intrusion into freshwater supplies caused by rising sea levels. *See id.* at 193. Although a benefit will be seen in the form of decreased heating costs, a net increase in heating/cooling costs is anticipated due to rising cooling costs and the accompanying increase in frequency of use. *See id.* Increases in insurance premiums and cost are also predicted due to an expected increase in the number and catastrophic effects of major weather occurrences, such as hurricanes, floods, and fires. *See id.* at 194.

The impact to health is considered two-fold. First, direct impacts, such as increases in the number of heat related injuries and deaths such as heat stroke and coronary and respiratory difficulties, will become more frequent. *See id.* at 195. Second, an increase in temperature coincides with illnesses and death caused by vector-borne diseases, most notably carried by what are considered tropical insects. *See id.* Both problems are expected to be further exacerbated in developing and least developed countries where medical technology and availability typically lag behind the rest of the world. *See id.* at 198.

Additionally, global climate change is expected to increase air and water pollution. *See id.* at 198-99. For example, numerous studies have shown that ozone concentrations increase with a corresponding increase in temperature. *See id.* at 198. Global warming is also expected to cause a decrease in river flow causing an increase in pollution concentrations and adversely affecting the river's ability to carry away natural and man-made wastes. *See id.*

problem⁴² largely because of the shortcomings of science and technology, the complexity of the problem, and the inability to witness first hand the effects of climate change.⁴³ In addition to the consensus reached by the scientific community, the attention governments now give to the problem is thought to have been influenced by three additional factors.⁴⁴ First, scientists came to a consensus and began promoting their global warming theories and findings to governments through conferences, reports and personal contacts.⁴⁵ Second, the discovery of holes in the ozone layer raised the issue to a new level of prominence.⁴⁶ Third, an enormous boost to global warming theorists came after the heat wave and drought of 1988.⁴⁷

By the late 1980s, an international response had begun to grow steadily. Two international events are credited with laying the groundwork for global negotiations and agreements focusing on climate change. The first came with the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the World Meteorological Organization and the United Nations Environment Programme in 1988.⁴⁸ The IPCC's mandate was to "provide internationally co-ordinated scientific assessments of the magnitude, timing and potential environmental and socio-economic impact of climate change and realistic response strategies."⁴⁹ Finally, in 1990, the IPCC finalized its assessment and distributed its findings in the first of several reports.⁵⁰ Among its findings, the IPCC predicted that the global mean temperature will rise during the next century an average of 0.3 degrees Celsius per decade—a rate of change unprecedented in human history.⁵¹ Additionally, the report did not rule out surprises such as a drastically increased rate of warming.⁵² The

42. See generally Daniel Bodansky, *The United Nations Framework Convention on Climate Change: A Commentary*, 18 YALE J. INT'L L. 451, 458-70 (1993).

43. See *id.* at 460-61 (discussing the factors that brought the climate issue to the attention of the international community).

44. See *id.* at 461

45. See *id.*

46. See *id.* at 461.

47. See *id.*

48. See *id.* at 464.

49. Protection of Global Climate for Present and Future Generations of Mankind, G.A. Res. 53, U.N. GAOR, 43rd Sess., U.N. Doc. A/RES/43/53 (1988).

50. See generally IPCC, CLIMATE CHANGE: THE IPCC SCIENTIFIC ASSESSMENT (J.T. Houghton et al. eds., 1990).

51. See *id.* at xx-xxiii.

52. See *id.* Recently, the scientific community has introduced a previously undiscovered effect of global warming—climate flips. See Patricia Beaulieu, *Scariest Thing About Climate Change: Climate Flips*, 23 ALTERNATIVES J., Mar. 1, 1997, at 9. After extensive research of past climate changes, the theory simply holds that the atmosphere will only take so much abuse. See *id.* It will then fluctuate wildly for period of time before stabilizing. See *id.* The most

IPCC's scientific assessment quickly became the authoritative statement on the climate change issue,⁵³ although it was the subject of heated debate.⁵⁴

The second event was the Conference on the Changing Atmosphere held in Toronto, Canada, in 1988. With the goal of bridging the gap between scientists and policymakers as a starting place,⁵⁵ the conference recommended the following initial actions: "(1) a twenty percent reduction in global carbon dioxide emissions by the year 2005; (2) development of a comprehensive global framework convention to protect the atmosphere; and (3) establishment of a World Atmosphere Fund partly financed by a tax on fossil fuel consumption in industrialized countries."⁵⁶ Additionally, out of the conference grew the themes that developed countries should bear the brunt of the responsibility in addressing the climate change problem and ought to foster the transfer of financial resources and technology to developing countries to aid these countries in battling the effects of global warming.⁵⁷

As governments of the world came to realize the magnitude of the climate change problem, a small storm was brewing on the horizon. While the themes of the conference in Toronto began to address the issue of handling responsibility, there were large differences of opinion regarding who should actually bear the responsibility for the climate change problem.⁵⁸ On the one side were the developed or industrialized countries fighting among themselves over whether specific targets and timetables should be established.⁵⁹ On the other side were the developing countries with some very real concerns.⁶⁰ First was the belief that developed countries should pay the price since they were primarily responsible for the problem.⁶¹ Additionally, developing countries pointed out concerns about internal problems such as poverty, drought, and famine.⁶²

In response to the growing concern over climate change, the United Nations General Assembly established the Intergovernmental Negotiating Committee for a Framework Convention on Climate

unnerving part of the theory is that the new climate may be drastically different from its predecessor. *See id.*

53. *See* Bodansky, *supra* note 42, at 469.

54. *See id.*

55. *See id.* at 462.

56. *Id.*

57. *See id.*

58. *See id.* at 467.

59. *See id.* at 478.

60. *See id.* at 479.

61. *See id.*

62. *See id.*

Change (INC).⁶³ On May 9, 1992, the INC adopted the United Nations Framework Convention on Climate Change (FCCC).⁶⁴ One hundred and fifty four countries and the European Community signed the FCCC when it was opened for signature at the United Nations Conference on Environment and Development in July 1992.⁶⁵

A. The United Nations Framework Convention on Climate Change

The stated objective of the FCCC is "to achieve . . . stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."⁶⁶ This stabilization should occur "within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."⁶⁷ This simple objective makes a powerful statement that the stabilization of atmospheric concentrations of greenhouse gases has become a matter of international concern.⁶⁸ Implicitly, it also recognizes the disproportionate role developed countries have played in the buildup of greenhouse gases as well as a desire for those countries to take the lead in mitigating current damages and preventing future damages.⁶⁹

To provide countries with some guidance in obtaining the stated objective, the FCCC enumerates several guiding principles. The first principle contains three basic concepts: (1) that protection of the climate should be for the "benefit of present and future generations" of mankind; (2) there should be differentiated responsibilities based on respective capabilities; and (3) an overriding principle of equity.⁷⁰ The second principle recognizes the unique vulnerabilities of those countries, particularly developing countries, which will bear a

63. See Protection of Global Climate for Present and Future Generations of Mankind, G.A. Res. 45/212, U.N. GAOR, 45th Sess., 71st plen. mtg., U.N. Doc. A/RES/45/212 (1990).

64. See Bodansky, *supra* note 42, at 453-454; see generally United Nations Conference on Environment and Development: Framework Convention on Climate Change, May 9, 1992, in Report of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change on the Work of the Second Part of Its Fifth Session, INC/FCCC, 5th Sess., 2d part, at annex I, U.N. Doc. A/AC.237/18 [hereinafter FCCC].

65. See Bodansky, *supra* note 42, at 453-454.

66. FCCC, *supra* note 64, art. 2.

67. *Id.*

68. See Bodansky, *supra* note 42, at 500.

69. See L.D. Danny Harvey and Elizabeth J. Bush, *Joint Implementation: An Effective Strategy for Combating Global Warming*, ENVIRONMENT, Oct. 1997, at 14.

70. See FCCC, *supra* note 64, art. 3, para. 1.

disproportionate amount of the solution.⁷¹ The third principle has become known as the "precautionary principle."⁷² It warns against using the lack of scientific certainty as an excuse to avoid implementing precautionary or mitigating measures.⁷³ The fourth principle recognizes that every nation has a right to, and should promote, sustainable development.⁷⁴ Finally, the fifth principle stresses the need for an open and supportive international economic system to aid in addressing the problems of climate change.⁷⁵

The FCCC also creates responsibilities for the parties.⁷⁶ The responsibilities include very general commitments applicable to all parties, such as: (1) "inventories of anthropogenic emissions by sources and removals by sinks";⁷⁷ (2) implementation and publication of regional programs aimed at reducing or preventing greenhouse gas emissions;⁷⁸ (3) transfers of technologies aimed at reducing or preventing greenhouse gas emissions;⁷⁹ (4) promotion of sustainable development and conservation to control greenhouse gas emissions and the enhancement of sinks and reservoirs;⁸⁰ (5) preparation for the impacts of climate change, including plans for coastal zone management, water resources, and agriculture;⁸¹ and (6) promotion of education and training relating to climate change.⁸²

Additionally, the FCCC designates specific responsibilities for developed countries. Each developed country is responsible for adopting policies and implementing mitigating measures aimed at reducing emission levels by the year 2000 to levels predating the FCCC.⁸³ Developed countries are then required to submit detailed information regarding their climate change policies and results of anthropogenic emission projections through the year 2000 within six months after the FCCC enters into force.⁸⁴ Such emission projections are to be calculated and determined using the best scientific knowledge available.⁸⁵ Developed countries also are required to provide

71. See *id.* art. 3, para. 2.

72. See Bodansky, *supra* note 42, at 503.

73. See FCCC, *supra* note 64, art. 3, para. 3.

74. See *id.* art. 3, para. 4.

75. See *id.* art. 3, para. 5.

76. See *id.* art. 4.

77. *Id.* art. 4, para. 1(a).

78. See *id.* art. 4, para. 1(b).

79. See *id.* art. 4, para. 1(c).

80. See *id.* art. 4, para. 1(d).

81. See *id.* art. 4, para. 1(e).

82. See *id.* art. 4, para. 1(i).

83. See *id.* art. 4, para. 2(a).

84. See *id.* art. 4, para. 2(b).

85. See *id.* art. 4, para. 2(c).

assistance, financial and otherwise, to developing countries that are especially susceptible to the effects of climate change.⁸⁶

The FCCC creates five distinct institutions to help insure the objectives are met: (1) a Conference of the Parties (COP);⁸⁷ (2) a Secretariat;⁸⁸ (3) a Subsidiary Body for Scientific and Technological Advice;⁸⁹ (4) a Subsidiary Body for Implementation;⁹⁰ and (5) a Financial Mechanism.⁹¹ The COP is the "supreme body" of the FCCC and the driving force behind the climate change effort.⁹² The COP is responsible for reviewing the obligations of the parties, promoting the exchange of information relating to measures adopted to address climate change, and for reviewing the overall success of the FCCC.⁹³ The COP is required to meet on an annual basis and will play a crucial role in shaping the future of the FCCC.⁹⁴ The meeting in Kyoto was the third annual meeting of the parties to the FCCC.

B. The Berlin Mandate, The First Conference of the Parties to the United Nations

Framework Convention on Climate Change

In 1995, the First Conference of the Parties took place in Berlin, Germany.⁹⁵ The purpose of the conference was to assess and expand the original commitments made by the parties.⁹⁶ Several decisions were reached in an attempt to meet this goal.

The first decision was a mandate to negotiate and adopt a protocol by the end of 1997.⁹⁷ The result is the Kyoto Protocol.⁹⁸ The decision also stated that developing countries will not be required to commit to emission reductions, but will be required to meet the inventorying, mitigation, and reporting requirements contained in the FCCC.⁹⁹

86. See *id.* art. 4, paras. 3 & 4.

87. See *id.* art. 7.

88. See *id.* art. 8.

89. See *id.* art. 9.

90. See *id.* art. 10.

91. See *id.* art. 11.

92. See *id.* art. 7, para. 2.

93. See *id.* art. 7, paras. 2(a), (b) & (e).

94. See *id.* art. 7, para. 4; see also Bodansky, *supra* note 42, at 533.

95. See United Nations Framework Convention on Climate Change Conference of the Parties: Decisions Adopted by the First Session (Berlin), March 28 – April 7, 1995, 34 I.L.M. 1671, *Introductory Notes* 1672 [hereinafter Berlin Mandate].

96. See *id.*

97. See *id.* at 1678.

98. See discussion *infra* notes 85-149 and accompanying text.

99. See Berlin Mandate, *supra* note 95.

The conference also focused on the particulars of a pilot phase for a joint implementation program.¹⁰⁰ This decision paved the way for the joint implementation program envisioned by the FCCC.¹⁰¹ However, the conference recognized the uncertainties with this new program for reducing greenhouse gas emissions and mandated that any reduction in emissions achieved during the pilot program could not be used to satisfy any future emission reduction commitments.¹⁰²

Finally, the conference established two subsidiary bodies, the Subsidiary Body for Scientific and Technological Advice¹⁰³ and the Subsidiary Body for Implementation.¹⁰⁴ The two subsidiary bodies are assigned several responsibilities. First, the subsidiary bodies must relay the latest scientific information regarding climate change to the conference of the parties to the FCCC.¹⁰⁵ Second, the subsidiary bodies must perform scientific assessment of the activities taken by individual countries to meet any commitments made in the future.¹⁰⁶ Finally, they are required to facilitate the transfer of technological information useful to fight climate change among countries that have not yet developed these technologies.¹⁰⁷

C. The Geneva Ministerial Declaration, The Second Conference of the Parties to the United Nations Framework Convention on Climate Change

The second conference took place in Geneva, Switzerland, in July 1996.¹⁰⁸ The conference began on a serious note, as the IPCC had recently released its most current report on the status of climate change.¹⁰⁹ The report stated that there was clear evidence of the link

100. *See id.* at 1685.

101. *See id.* at 1672.

102. *See id.* at 1685.

103. *See id.* at 1687.

104. *See id.*

105. *See id.* at 1689.

106. *See id.*

107. *See id.*

108. For a complete discussion of the second session, see William C. Burns, *The Second Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change: More Heat than Light?*, COLO. J. INT'L ENVTL. L. & POL'Y, 1996 Y.B. 153, 153 (1997).

109. *See id.* The IPCC report comprises three massive volumes containing detailed information on the past, present, and future contributions to, and effects of, global warming. Although some volumes are cited in this article, the author wishes to provide the citations for all three volumes in an attempt to stress the importance these documents have played in developing international climate change policy:

WORKING GROUP I OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE—THE SCIENCE OF CLIMATE CHANGE 1995 (1996) (focusing on the science of climate change by discussing the normal operations of the climate system, the activities thought to have impacts on the climate, the anticipated impacts of these activities, and possible outcomes or effects of global warming based on extensive modeling and simulation);

between human activity and the changing climate.¹¹⁰ The report also predicted serious ramifications if countries were to pursue their normal courses.¹¹¹

The second conference recognized many problems that needed to be addressed. The first was the slow progress made in the transfer of "environmentally sound technologies," an original vision under the FCCC.¹¹² Also of concern was the lack of adherence to reporting requirements as established under the FCCC.¹¹³ The final shortcoming recognized was the complete lack of procedure under the FCCC. In particular, the FCCC did not establish either voting guidelines for the adoption of a protocol or procedures for electing the parties' conference officers.¹¹⁴

IV. THE KYOTO PROTOCOL, THE THIRD CONFERENCE OF THE PARTIES TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

In December 1997, the delegates of 159 nations descended upon Kyoto, Japan, seeking to establish binding limits for greenhouse gas emissions.¹¹⁵ The result was the Kyoto Protocol, which has a stated goal of "reducing . . . overall emissions of such gases by at least 5 per cent below 1990 levels [by a] . . . commitment period [of] 2008 to 2012."¹¹⁶

This part of the Paper discusses the targets for this lofty goal as well as the vehicles created to reach them. Section A discusses the

Working Group II of the Intergovernmental Panel on Climate Change, *Climate Change—Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analysis 1995 (1996)* (focusing on the anticipated impacts of global warming, the adaptation necessary in light of the damage already done and required should humans chose to further exploit the climate resource, and mitigation options to avoid future harm to the atmosphere);

Working Group III of the Intergovernmental Panel on Climate Change, *Climate Change—Economic and Social Dimensions of Climate Change 1995 (1996)* (focusing on the economic and social costs of global warming as applied in a wide array of scenarios, response options to reduce socio-economic costs, and an economic analysis of several policy options available to combat global warming).

110. See generally Intergovernmental Panel on Climate Change, *Climate Change 1995: IPCC Second Assessment Report*, (United Nations Environment Programme 1995) [hereinafter *Second Assessment Report*]; Intergovernmental Panel on Climate Change, *Contribution of Working Group I to the IPCC Second Assessment Report*, U.N. Environment Programme, at SPM.6, U.N. Doc. IPCC-XI/Doc.3 (6.XI.1995).

111. See *Second Assessment Report*, *supra* note 110, at 6-8.

112. See Burns, *supra* note 108, at 159.

113. See *id.* at 159-60.

114. See *id.* at 160.

115. See C.V. Mathai, *Global Climate Change: The Kyoto Protocol*, EM, Feb. 1998, at 14.

116. Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto, Japan, 1997, U.N. Doc. FCCC/CP/L.7/Add.1, art. 3 [hereinafter *Kyoto Protocol*].

gases that will be the targets of the Protocol, while section B discusses the "quantified emission limitations and reduction commitments." Section C surveys the criteria necessary for compliance, emission budgets and banking. Section D looks at the emissions trading scheme envisioned by the Protocol. Sections E and F explore the "joint implementation" and "clean development mechanism," respectively. Finally, section G lays out the requirements for the Protocol's entry into force and adoption of amendments.

A. Greenhouse Gases Included

The greenhouse gases regulated by the Protocol are listed in Annex A and include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.¹¹⁷ Annex A also lists the sectors and sources, fugitive emissions from fuels, industrial processes, solvent and other product use, and waste from which these gases commonly emanate.¹¹⁸

Proposals put on the table prior to the conference in Kyoto by the European Community called for reductions in only three greenhouse gases.¹¹⁹ The addition of three more gases was perceived as a success because it would prompt reduction of almost all known greenhouse gases.¹²⁰ Fortunately, the Protocol allows for the addition of more gases in the event other gases or compounds are determined to be harmful to the atmosphere.¹²¹

117. *See id.* annex A.

118. *See id.* "Sectors and sources" include energy, fuel combustion, energy industries, manufacturing industries and construction, transport, and other sectors. *See id.* The "fugitive emissions from fuels" section includes solid fuels and oil and natural gas. *See id.* "Industrial processes" include mineral products, chemical industry, metal production, other production, and production and consumption of halocarbons and sulphur hexafluoride. *See id.* "Solvent and other product use" includes agriculture, enteric fermentation, manure management, rice cultivation, agricultural soils, prescribed burning of savannas, and field burning of agricultural residues. *See id.* Finally, "waste" includes solid waste disposal, wastewater handling, and waste incineration. *See id.*

119. *See Climate Change: Second Rate Agreement on Greenhouse Gases in Kyoto*, EUROPE INFORMATION SERVICE: EUROPE ENERGY, Dec. 12, 1997, available in LEXIS, Nexis Library, Europe Information Service File.

120. *See id.* (stating the three other gases included are hydrofluorocarbons, polyfluorocarbons, and sulfur hexafluorides).

121. *See Kyoto Protocol*, *supra* note 116, art. 20. Nitrous oxide was only recently determined to be a real threat to the atmosphere. *See Climate Change V: N2O in Upper Air is No Laughing Matter*, GREENWIRE, Dec. 8, 1997, available in LEXIS, Nexis Library, Greenwire File. It has been known that nitrous oxide is two hundred times more efficient than carbon dioxide at bringing about climate change. *See id.* The scientific community originally thought that the amounts generated both naturally and by man were negligible. *See id.* However, this accepted hypothesis was recently rebutted by the discovery of an abundant, unknown source of nitrous oxide in the upper atmosphere. *See id.*

B. Emissions Limits

In an effort to assist countries with emissions reductions, the Protocol initially suggests general guidelines. To meet these reductions, signatories must establish policies and measures aimed at:

- (i) Enhancement of energy efficiency in relevant sectors of the national economy;
- (ii) Protection and enhancement of sinks and reservoirs of greenhouse gases not controlled by the Montreal Protocol ...;
- (iii) Promotion of sustainable forms of agriculture in light of climate change considerations;
- (iv) Research, and promotion development, and increased use of new and renewable forms of energy, of carbon dioxide sequestration technologies and of advanced and innovative environmentally sound technologies;
- (v) Progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse gas emitting sectors that run counter to the objectives of the [United Nations Framework Convention on Climate Change] and application of market instruments;
- (vi) Encouragement of appropriate reforms in relevant sectors aimed at promoting policies and measures which limit or reduce emissions of greenhouse gases not controlled by the Montreal Protocol;
- (vii) Measures to limit and/or reduce emissions of greenhouse gases not controlled by the Montreal Protocol in the transport sector;
- (viii) Limitation and/or reduction of methane emissions through recovery and use in waste management, as well as in the production, transport and distribution of energy.¹²²

Secondly, countries are urged to participate in information exchanges on policies and measures related to emission reductions and effectiveness.¹²³

In Article 3, the Protocol addresses the "quantified emission limitation and reduction" commitments listed in Annex B made by each of the parties to the Protocol, which are listed in Annex I of the

For example, methyl bromide has long been recognized as a major destroyer of the ozone, yet it still is widely used as an agricultural fumigant. See Soroos, *supra* note 8, at 12. Hopefully, future conferences will see fit to add this chemical to the list of greenhouse gases.

122. Kyoto Protocol, *supra* note 116, art. 2(a).

123. See *id.* art. 2(b).

United Nations Framework Convention on Climate Change.¹²⁴ The numbers listed in Annex B represent the percentage of emissions for a particular base year that parties have committed to reach by the year 2012.¹²⁵ For most parties, the base year is 1990. However, for countries in the process of transitioning to a market economy, the base year will be determined by the Conference of the Parties at its next session,¹²⁶ which is currently set to take place in November 1998, in Buenos Aires, Argentina.¹²⁷

For example, the United Kingdom has committed to a quantified emission limitation and reduction commitment of 92.¹²⁸ This means that by the year 2012, the United Kingdom plans to reduce emissions to ninety-two percent of its total emissions of 1990. Or stated another way, the United Kingdom has committed to reducing its total emissions by eight percent as compared to its 1990 levels by the first commitment period of 2008 to 2012.

An interesting point concerning emission reductions is that net changes in greenhouse gas emissions will be used to determine compliance with the commitments set forth in Annex B.¹²⁹ This means that natural changes since 1990 in greenhouse gas emissions due to natural sinks, afforestation, and reforestation may be used to offset human-induced changes, such as deforestation, land use changes, and source emissions.¹³⁰ When the calculations are complete, this could result in countries having to reduce their emissions by less than the quantified emission limitation and reduction commitments listed in Annex B.¹³¹ For example, the United Kingdom's human-induced emissions may only have to be reduced by two to three percent, rather than its commitment of eight percent if natural

124. *See id.* art. 3.

125. *See infra* note 128.

126. *See id.* art. 3, para. 5. The parties in the process of transitioning to a market economy are: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russian Federation, Slovakia, Slovenia, Ukraine. *See id.* annex B.

127. *See Mathai, supra* note 115, at 14.

128. Kyoto Protocol, *supra* note 116, annex B. The quantified emission limitation and reduction commitments for the remaining parties to the Protocol are as follows: Australia 108, Austria 92, Belgium 92, Bulgaria 92, Canada 94, Croatia 95, Czech Republic 92, Denmark 92, Estonia 92, European Community 92, Finland 92, France 92, Germany 92, Greece 92, Hungary 94, Iceland 110, Ireland 92, Italy 92, Japan 94, Latvia 92, Liechtenstein 92, Lithuania 92, Luxembourg 92, Monaco 92, Netherlands 92, New Zealand 100, Norway 101, Poland 94, Portugal 92, Romania 92, Russian Federation 100, Slovakia 92, Slovenia 92, Spain 92, Sweden 92, Switzerland 92, Ukraine 100, United States of America 93. *Id.*

129. *Id.* art. 3, para. 3.

130. *See id.* A sink is defined as "any process, activity or mechanism, which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere." *See FCCC, supra* note 64, art. 1, para. 8.

131. Mathai, *supra* note 115, at 13.

occurrences, such as sinks, happen to contribute significantly to the removal of greenhouse gases.

Unfortunately, the quantified emission limitation and reduction commitments avowed to by the developed countries are nothing more than slight-of-hand trickery.¹³² The presence of numerous loopholes in the Protocol creates a situation in which the world will be lucky to see a two to three percent reduction in human-induced emissions. One loophole in the Protocol is the credit received for the simple act of planting trees. The planting of trees in significant quantities would, in effect, create a "natural" sink. The greenhouse gases removed by this natural sink would function as a reduction in the emission of greenhouse gases with no actual reduction in human-induced emissions.

C. Compliance, Emission Budgets, and Banking

Countries are given generous flexibility when it comes to compliance. Countries may comply either individually or jointly.¹³³ Initially, countries must be able to show demonstrable progress by the year 2005.¹³⁴ What constitutes demonstrable progress has yet to be defined. Likewise, the Protocol makes no mention of the consequences should a country be unable to show demonstrable progress.

A country that decides to forge ahead on its own simply must show it has reduced its emissions by an amount equal to, or greater than, the percentage agreed to in Annex B during the commitment period of 2008 to 2012.¹³⁵ However, parties who decide to achieve their quantified emission limitation or reduction commitments jointly through some type of regional economic integration agreement are responsible for demonstrating a combined reduction in emissions by an amount equal to or greater than the sum of the parties' percentages listed in Annex B.¹³⁶

The Protocol also allows for a banking system.¹³⁷ If a nation is able to reduce its emissions below its commitment, as enumerated in the Protocol, the difference can be applied to subsequent commitment periods.¹³⁸ If, for example, the United Kingdom, with a

132. See Kyoto Protocol, *supra* note 116, annex B.

133. See Kyoto Protocol, *supra* note 116, art. 3, para. 1.

134. See *id.* art. 3, para. 2.

135. See *id.* art. 3, para. 7.

136. See *id.* art. 4, para. 1.

137. See *id.* art. 4, para. 13.

138. See *id.* Currently, the only commitment period under the Protocol is the 2008-2012 period. See *id.* art. 4, para. 7. The Protocol contemplates the addition of subsequent commitment periods by future conferences of the parties. See *id.*

commitment of 92,¹³⁹ is able to demonstrate a reduction level to ninety-one percent of its 1990 emissions, it may take the extra one percent and apply it to a future commitment period.

D. Emissions Trading

Regardless of whether parties chose to satisfy the quantified emission limitation or reduction commitments individually or jointly, all parties may participate in the exchange of emission reduction units.¹⁴⁰ An emission reduction unit is equal to one percent of the amount a country has committed to reducing its emissions. The transfer of emission reduction units is considered supplemental to any domestic actions a country takes in meeting its reduction commitments.¹⁴¹ For example, the United Kingdom may transfer one of its emission reduction units to the United States. The United Kingdom would be left with a more stringent emission reduction commitment of 91 while the United States would only have to satisfy a reduction of 94.

However, not just any emission reduction units may be traded. Only those reduction units "resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy" will qualify.¹⁴² Trading of such emission reduction units is allowed only when:

- (a) Any such project has the approval of the Parties involved;
- (b) Any such project provides a reduction in emissions by sources, or an enhancement of removals by sinks, that is additional to any that would otherwise occur;
- (c) It does not acquire any emission reduction units if it is not in compliance with its obligations under Articles 5 and 7; and
- (d) The acquisition of emission reduction units shall be supplemental to domestic actions for the purposes of meeting commitments under Article 3.¹⁴³

139. See *id.* annex B.

140. See *id.* art. 3, paras. 10 & 11. The ability to "buy" or "trade" the right to pollute is seen by some as immoral. See Michael J. Sandel, *It's Immoral to Buy the Right to Pollute*, NEW YORK TIMES, Dec. 15, 1997, at A23. Kyoto's emissions trading system is criticized for creating loopholes enabling developed countries to escape their obligations, removing the moral stigma placed on polluting, and undermining the idea that responsibility for climate change should be shared globally. See *id.*

141. See Kyoto Protocol, *supra* note 116, art. 16.

142. *Id.* art. 6, para. 1.

143. *Id.* art. 6, para. 1.

Unfortunately, the Protocol does not set forth specific guidelines or rules for emission reduction unit trading. The Fourth Conference of the Parties under the FCCC has been directed to "define the relevant principles, modalities, [and] rules . . . for emissions trading."¹⁴⁴ In particular, the Fourth Conference of the Parties is to focus on methods of "verification, reporting and accountability."¹⁴⁵

Another problem with the trading of emission reduction units is that there are no limits on how many units a country may give away, sell, acquire, or buy. This may have serious consequences for countries under circumstances requiring them to sell or give away large numbers of units. Several countries have made it clear that they plan to meet portions of their quantified emission limitation and reduction commitments by acquiring reduction units.¹⁴⁶

Likewise, several countries have made clear that they plan to sell them or give them away in exchange for much needed aid or technology.¹⁴⁷ Every reduction unit acquired by a country represents a reduction of one percent in the emissions a country is required to eliminate. By acquiring emission reduction units, a country can escape reducing human-induced emissions by an amount equal to the emission reduction units it acquires. On the other hand, a country that sells or otherwise transfers a significant portion of its emission reduction units may find itself unable to satisfy its commitment in the event of a sharp increase of human-induced emissions or a sudden, unexpected loss of a sink.

E. Joint Implementation

The Protocol allows parties to meet their quantified emission limitation and reduction commitments through joint implementation.¹⁴⁸ Joint implementation simply means that countries who are parties to the Protocol may enter into agreements to jointly satisfy their commitments.

Parties acting jointly must submit any joint agreements to the secretariat, which will then be forwarded to the parties to the FCCC for review.¹⁴⁹ Parties are given discretion in allocating their

144. *Id.* art. 17.

145. *Id.* art. 17.

146. See Mathai, *supra* note 115.

147. See *id.*

148. See Kyoto Protocol, *supra* note 116, art. 4, para. 1.

149. See *id.* art. 4, para. 2.

quantified emission limitation and reduction commitments amongst themselves.¹⁵⁰

For example, consider the commitments of Canada and the United States, which are 94 and 93, respectively.¹⁵¹ If these particular countries were to enter into an agreement to jointly implement the Protocol, the total of their commitment would be a thirteen percent reduction in 1990 levels of emissions. Under a joint implementation agreement, the parties could reallocate the commitments and deviate from the Protocol. The United States could agree to a zero percent reduction of 1990 levels, while Canada agrees to bear the entire burden of joint implementation, or thirteen percent.

This simple example should demonstrate a very real problem with joint implementation. Depending on the two countries bound by a joint implementation agreement, neither may have to reduce human-induced emissions. If a party that anticipates being unable to meet its commitment can find an party that will both meet and exceed its commitment, an eleventh-hour joint implementation agreement may prevent a country from violating the Protocol. Thus, the potential for abuse by heavily industrialized countries will be a main concern.

In the event such an agreement fails, for example, due to conflict, each party will be responsible for satisfying its individual quantified emission limitation or reduction commitments, as provided in Annex B.¹⁵² This creates a problem for heavily industrialized nations. Should a joint implementation agreement fail at the last moment, with one of the involved countries having not taken any steps to meet its commitment, compliance with the Protocol may be difficult, if not impossible.

F. *The Clean Development Mechanism*

The Protocol also provides a "clean development mechanism" which allows developed countries to finance emission reduction programs in developing programs.¹⁵³ Under the clean development mechanism, only developed countries, or those listed in Annex I of the FCCC, may assist developing or least developed countries, which are by default those not listed in Annex I.¹⁵⁴ Developed countries participating in clean development are allowed to use "certified

150. See *id.* art. 4, para. 1 (stating that "the respective emission level allocated to each of the Parties to the agreement shall be set out in that agreement"). *Id.*

151. See *id.* annex B.

152. See *id.* art. 4, para. 5.

153. See *id.* art. 12.

154. See *id.* art. 12, para. 3(a).

emissions reductions" to contribute to their own compliance with the quantified emission limitation and reduction commitments.¹⁵⁵

The Protocol grants the conference of the parties the authority to establish an operational entity whose sole purpose is to oversee and apply the clean development mechanism.¹⁵⁶ The nexus of the entity's focus will be certifying those emission reductions resulting from clean development projects.¹⁵⁷ The entity is required to take three things into consideration when deciding whether or not to certify a clean development program: (1) "[v]oluntary participation by each Party involved"; (2) "[r]eal, measurable, and long-term benefits related to the mitigation of climate change"; and (3) "[r]eductions in emissions that are additional to any that would occur in the absence of the certified project activity."¹⁵⁸

Participation in clean development is not restricted to governments. The Protocol expressly allows for private entities to fund clean development projects in undeveloped or least developed countries.¹⁵⁹ Also, a share of the proceeds generated by certified projects is to be used to cover administrative costs and aid for developing countries, which are particularly vulnerable to the effects of climate change.¹⁶⁰

Finally, developed countries are limited as to which clean development projects can be used to satisfy their own quantified emission limitation and reduction commitments.¹⁶¹ Only those certified emission reductions obtained after the year 2000 may be used to assist a developed country in obtaining compliance during the commitment period of 2008 to 2012.¹⁶²

G. Entry Into Force and Amendments

The Protocol will be made available for signature at the United Nations Headquarters in New York beginning March 16, 1998, and ending March 15, 1999.¹⁶³ Two criteria must be satisfied for the Protocol to be entered into force. First, at least fifty-five parties must ratify the Protocol.¹⁶⁴ Second, the sum of the 1990 emission levels of the fifty-five parties ratifying the Protocol must be at least fifty-five

155. *See id.* art. 12, para. 3(b).

156. *See id.* art. 12, para. 5.

157. *See id.* art. 12.

158. *See id.* art. 12, paras. 5(a)-(c).

159. *See id.* art. 12, para. 9.

160. *See id.* art. 12, para. 8.

161. *See id.* art. 12, para. 9.

162. *See id.* art. 12, para. 10.

163. *See id.* art. 24, para. 1.

164. *See id.* art. 25, para. 1.

percent of the total 1990 emissions.¹⁶⁵ Upon satisfying both criteria, the Protocol will enter into effect ninety days after the fifty-fifth party has deposited its instrument of ratification.¹⁶⁶

Article 20 provides for amendment of the Protocol.¹⁶⁷ Amendments may be proposed by any party during a conference of the parties to the FCCC.¹⁶⁸ Amendments are considered adopted upon a three-fourths majority vote of the parties present at a conference of the parties.¹⁶⁹

V. THE SHORTCOMINGS OF THE KYOTO PROTOCOL

Although the Protocol is regarded as a success because it is the first agreement since international recognition of the climate change dilemma to specify timetables and targets for the reduction of greenhouse gases, it still has several unresolved issues. First, it simply does not contain provisions relating to enforcement for non-compliance with the quantified emission limitation and reduction commitments. Second, it does not contain any specifics regarding the trading of emission reduction units, joint implementation, or clean development mechanisms. Finally, it is completely silent regarding quantified emission limitation and reduction commitments for developing and least developed countries.

A. Provisions Relating to Non-compliance and Enforcement

Although very straightforward in its description of what constitutes non-compliance, the Protocol is completely silent on enforcement. This is not surprising given the seemingly insurmountable barriers to enforcement of international environmental agreements. The first and foremost concern of most countries is that of national sovereignty.¹⁷⁰ Second, the lack of a major international governing body, such as the United Nations, to enforce international agreements plays a role.¹⁷¹ Finally, it goes without saying that only those signatories to an agreement can be bound.¹⁷²

165. *See id.*

166. *See id.*

167. *See id.* art. 20.

168. *See id.* art. 20, para. 2.

169. *See id.* art. 20, para. 3.

170. *See discussion infra* Part V.A.1.

171. *See discussion infra* Part V.A.2.

172. *See discussion infra* Part V.A.3.

1. National Sovereignty as a Barrier to Enforcement of an International Environmental Agreement

One of the harshest criticisms of the Kyoto Protocol by members of the United Nations is that the Protocol undermines national sovereignty.¹⁷³ National sovereignty involves a nation's ability to exercise control over its own territory and defend its borders. It was originally defined as recognition that "every country has a right to formulate, in accordance with its own particular situation and full enjoyment of its national sovereignty, its own natural policies on the human environment, including criteria for evaluation of projects."¹⁷⁴ However, the Rio Declaration revises this definition to acknowledge a country's responsibility toward the environment.

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.¹⁷⁵

The climate change dilemma has created unforeseen problems if a nation is to maintain national sovereignty. Due to the ability of greenhouse gases to migrate to the upper atmosphere, it is almost certain that gases emitted in one nation will have an impact in another. A nation may desire to protect its citizens from the harmful effects created by other nations, but realistic hopes to control offending nations are virtually nonexistent.

While the health of U.S. citizens is of great importance, there are also political and economic sides to the national sovereignty issue. The Protocol makes the very lifestyle to which U.S. citizens have become accustomed the object of world scrutiny. The Protocol requires changes in emissions that are likely to affect the standard of living in the United States, and this makes several politicians uneasy, and with good reason.¹⁷⁶

173. See *Climate Change II: Lott Talks Tough Against Treaty*, GREENWIRE, Dec. 10, 1997, available in LEXIS, Nexis Library, Greenwire File.

174. G.A. Res. 2849, U.N. GAOR, 26th Sess., U.N. Doc. A/RES/2849 (1972).

175. *Rio Declaration on Environment and Development*, United Nations Conference on Environment and Development, 4th Sess., Agenda Item 9, at 2, U.N. Doc. A/Conf.151/5 (1992).

176. See *Assistance Plan Needed to Help Those Hurt by Emission Cuts*, AFL-CEO Official Says, BNA INT'L ENV'T DAILY, Feb. 5, 1998, available in LEXIS, Nexis Library, BNA File; Melissa Montealegre, *62,000 State Jobs in Jeopardy*, Officials Say, MONTGOMERY ADVERTISER, Jan. 30, 1998, at 8B; Chad Calder, *Business Casts a Wary Eye on Global Treaty*, NEW ORLEANS CITY BUS., Dec. 29, 1997, at 1; *Losses of 3 Million Jobs Predicted From Kyoto Agreement by Industry Group*, BNA INT'L ENV'T DAILY, Dec 12, 1997, available in LEXIS, Nexis Library, BNA File.

2. *The Major Players Acting as Enforcers of International Environmental Agreements*

Presently, there are several international government organizations and privately sponsored groups concerned with resolving environmental issues and enforcing international environmental agreements. Currently, none of these groups has enforcement powers and must rely on political clout to persuade nations to comply with agreements and protocols.

The United Nations body primarily responsible for international environmental assessment and monitoring is the United Nations Environment Programme (UNEP).¹⁷⁷ "UNEP's purpose is to promote cooperation and coordination among nations, to recommend environmental policies and provide general policy guidelines in the international environmental arena" within the United Nations system.¹⁷⁸ Through the Earthwatch program, UNEP provides information exchange, monitoring, and research activities, which have been critical in the creation of protocols and agreements.¹⁷⁹ Unfortunately, UNEP lacks enforcement powers and must rely on member states to comply with relevant protocols, agreements, and conventions.¹⁸⁰

Likewise, the United Nations General Assembly plays a role in analyzing and resolving disputes, but lacks any real authority to enforce agreements.¹⁸¹ The General Assembly is not a legislative body, thereby limiting its ability to promulgate effective enforcement legislation.¹⁸² Neither does it have executive authority to enforce its own decisions.¹⁸³

There are also numerous private groups concerned about international environmental issues, who also lack enforcement authority. Among their ranks are the International Law Association, the International Union for Conservation of Nature and Natural Resources, the World Wide Fund for Nature, the World Meteorological Organization, and Greenpeace.¹⁸⁴ As the number of private organizations

177. See Harold K. Jacobson & David A. Kay, *A Framework for Analysis*, in ENVIRONMENTAL PROTECTION: THE INTERNATIONAL DIMENSION II 1, 11 (Allenheld, Osmun & Co., 1983).

178. Andrew Watson Samaan, *Enforcement of International Environmental Treaties: An Analysis*, 5 FORDHAM ENVTL. L.J. 261, 263 (1993).

179. See *id.*

180. See *id.*

181. See *id.* at 266.

182. See *id.*

183. See *id.*

184. See *id.* at 263.

increases, it is anticipated that their influence will become far reaching.¹⁸⁵

3. *The Kyoto Protocol in Light of Enforcement Barriers*

Given the above barriers to enforcement mechanisms, it is no surprise the Kyoto Protocol does not contain any provisions relating to enforcement. Although most nations recognize that climate change is a global problem, none are ready to throw open their borders to the economic and technological regulation of fellow nations that is likely to come.

As provided for by the Montreal Protocol, the Kyoto Protocol basically utilizes a peer review mechanism to ensure compliance.¹⁸⁶ This is favorable in that it allows for the development of international norms under the treaty over time. It is essentially a consensus-shaping process that allows for adjustment of the regime based on the needs of the member states.¹⁸⁷

However, such an approach contains fatal flaws that must be addressed at the Fourth Conference of the Parties if the reporting procedures are to be effective. Credible, verifiable, and relevant data must be made available to ensure an accurate assessment of a state's compliance with the Protocol.¹⁸⁸ Technological and financial assistance must be provided to developing and least developed countries to ensure they can meet the minimum reporting requirements.¹⁸⁹ Finally, confidentiality of information must be eliminated to allow for internal and external public scrutiny of a state's failure to comply.¹⁹⁰

B. *Joint Implementation and the Clean Development Mechanism*

As provided in Articles 6 and 12, procedures, rules and guidelines pertaining to joint implementation and the clean development mechanism will have to wait at least until the Fourth Conference of the Parties, which is currently scheduled to take place in November 1998, in Buenos Aires, Argentina.¹⁹¹ The Protocol simply allows the

185. *See id.*

186. *See* Bing Ling, *Developing Countries and Ozone Layer Protection: Issues, Principles and Implications*, 6 TUL. ENVTL. L.J. 91, 119 (1992).

187. *See id.*

188. *See id.* at 122.

189. *See id.*

190. *See id.* at 122-23.

191. *See* Kyoto Protocol, *supra* note 116, arts. 6 & 12; *see also* Mathai, *supra* note 115, at 14.

conference to set such guidelines and rules, rather than requiring it to.¹⁹²

Perhaps frustrating to member nations is the reality that the conferences of the parties continuously recognize the potential importance of both these programs in reducing the emission of greenhouse gases.¹⁹³ However, planning and implementation of both programs has always been postponed until later conferences.¹⁹⁴ Now that the once seemingly insurmountable hurdle of setting quantified emission limitation and reduction commitments has been conquered, hopefully the parties will turn their attention to these two programs at the Fourth Conference of the Parties.

When the time comes to establish guidelines and procedures for the joint implementation and clean development projects, great care should be taken by the Conference of the Parties. If at all possible, a pilot project should be implemented on a regional scale, at a minimum, to test the feasibility of the guidelines and procedures instituted. Unfortunately, a pilot project may not yield adequate results in time to allow member states to take advantage of joint implementation and clean development mechanisms in satisfying their quantified emission limitation and reduction commitments under the Protocol.

An equally viable option would be to examine in detail the successes and failures of similar programs already under way. One such joint implementation program yielding exciting results currently exists between the Baltic states of Lithuania, Latvia, and Estonia.¹⁹⁵ In analyzing these joint implementation programs, special attention should be given to certain key areas to insure success under the Protocol: (1) a project assessment process must be in place; (2) only those parties with clear emissions baselines should be studied; (3) the project should be designed to fully reveal transactional costs; (4) reporting requirements and mechanisms must be in place; (5) projects must be assessed based on analyses of environmental, social, developmental and economic impacts that were agreed upon before the project began; (6) a sufficient time period must have been allowed to pass before assessments were made; and (7) sink-creating approaches should be avoided.¹⁹⁶ Problems inherent in joint

192. See Kyoto Protocol, *supra* note 116, arts. 6 & 12.

193. See Paul E. Hagen et al., *International Legal Development in Review: 1996*, 31 INT'L LAW. 627, 629 (1997).

194. See *id.*

195. See Ragnar E. Lofstedt and Kalev Sepp, *Partnerships to Reduce Greenhouse Emissions in the Baltic*, ENVIRONMENT, July 17, 1998, at 16.

196. See Bill Hare and Arjette Stevens, *Joint Implementation: A Critical Approach*, in THE FEASIBILITY OF JOINT IMPLEMENTATION 79, 84-85 (Catrinus J. Jepma ed., 1995).

implementation programs will need to be addressed in the guidelines and procedures, including specific response options to ensure violating countries do not gain from their inaction by becoming free-riders and over-reporting emissions reductions.¹⁹⁷

C. Emissions Limits for Developing Countries

Perhaps one of the strongest criticisms that threatened the acceptance of the Protocol was its failure to establish quantified emission limitation and reduction commitments for developing and least developed countries.¹⁹⁸ Among the 130 countries¹⁹⁹ that are not constrained by emission limitation and reduction commitments are China, India, Brazil, and Mexico.²⁰⁰ Cited for this shortcoming is the developing and least developed countries' strong belief that the developed world caused this problem, and the developed world should correct it.²⁰¹ Arguably, the developing countries have a point, but this failure on the part of the Protocol creates interesting problems.

The first dilemma is that developing and least developed countries are rapidly advancing towards development.²⁰² As the advance toward development proceeds, these countries will see an increase in greenhouse gas emissions due to an increase in the standard of living.²⁰³ More electricity will be consumed and more automobiles will be demanded.²⁰⁴ As these countries' populations continue to grow and the transition to a higher standard of living occurs, developing countries are expected to become the major emitters of greenhouse gases.²⁰⁵

The second problem is that many private entities are interested in the fact that developing and least developed countries are not constrained by quantified emission limitation and reduction commitments.²⁰⁶ Businesses may benefit from relocating to developing or least developed countries where they will be allowed to burn the fuel

197. See Kjell Roland and Torleif Haugland, *Joint Implementation: Difficult to Implement?*, in *THE FEASIBILITY OF JOINT IMPLEMENTATION* 359, 361-65 (Catrinus J. Jepma ed., 1995).

198. See *Kyoto Aftermath: Big Battles Still Ahead as U.S. Holds Treaty Key*, *OIL & GAS J.* 17, 19 Dec. 22, 1997; Tom Bethell, *Leading the Fanatics Fresh From Kyoto: Greenhouse Guru Al Gore Gasses On*, *THE AM. SPECTATOR*, Feb. 1998, at 18.

199. See Bethell, *supra* note 198, at 18.

200. See Jason Zengerle, *Hagelianism*, in *THE NEW REPUBLIC*, Feb. 9, 1998, at 10.

201. See Bodansky, *supra* note 42.

202. See Soroos, *supra* note 8, at 33.

203. See *id.*

204. See *id.*

205. See Soroos, *supra* note 8, at 33. Current estimates project developing countries to produce over half of the global emissions.

206. See Zengerle, *supra* note 200.

of choice and emit greenhouse gases as desired.²⁰⁷ Without quantified emission limitations and reduction commitments, human-induced greenhouse gas emissions created by developing and least developed countries are expected to grow unconstrained, further exacerbating the climate change problem.²⁰⁸

However, not every developing and least developed country is an India or China. Developing and least developed countries did not approach the talks in Kyoto, Japan without their own set of concerns. Desperately fighting for their existence, these countries approached climate change talks knowing two things are for certain. Should the problem be allowed to continue to grow, they will bear a disproportionate share of the cataclysmic effects, including the possibility that they may cease to exist sometime in the next one hundred years.²⁰⁹ In an ironic twist, these countries have contributed the least to the problem of global warming, yet are the least able to deal effectively with the problem.²¹⁰ Shortly after the negotiations leading up to the Montreal Protocol, developing and least developed countries began asserting their own special roles and needs.²¹¹

Perhaps the foremost concern for developing and least developed countries is their economic viability, whether it requires development or the control of poverty.²¹² Developing and least developed countries comprise three-fourths of the world's population, but only enjoy thirty percent of the world's income.²¹³ Concerns that much needed capital will be diverted away from more urgent problems, such as poverty, hunger, and development, to combat a problem caused in large part by developed countries, and that they have no hope of correcting unilaterally, dominate the thoughts of these countries.²¹⁴

The prospect that entire countries may be destroyed or lost also enters the negotiations on climate change.²¹⁵ If warming of the Earth's atmosphere continues and sea levels rise as expected over the next century, some small island nations will literally cease to exist.²¹⁶ Measures to avoid this level of catastrophe would exacerbate already

207. *See id.*

208. *See id.*

209. *See Burns, supra* note 16, at 147-149.

210. *See id.* at 148-150.

211. *See Ling, supra* note 186.

212. *See id.* at 99.

213. *See id.* at 98.

214. *See id.* at 99-100.

215. *See Burns, supra* note 16, at 166-68.

216. *See id.* A rise in sea level of only one meter would wipe out the Marshall Islands, located southwest of Hawaii, and the Maldives, located south of Sri Lanka. *See id.* at 167-168. Even a moderate rise of twenty centimeters in sea level would have devastating effects. *See id.*

strained economies, and would prove too cost-prohibitive for many small island nations.²¹⁷

Also of paramount concern to developing and least developed countries are food and water supplies.²¹⁸ A rise in sea level of only fifty centimeters, a conservative rise in comparison to most projections, would wipe out freshwater supplies in many countries.²¹⁹ Additionally, climate change is anticipated to have a severe impact on the food security of developing and least developed countries.²²⁰

Perhaps most important is that developed nations recognize the special concerns and fears faced by developing and least developed countries. More particularly, developed countries must acknowledge that developing and least developed countries have played only a small role in causing the climate change problem, and should be prepared to accept responsibility for developing and initiating effective solutions.²²¹ Additionally, developed countries must accept responsibility to assist developing and least developed countries, both financially and technologically, in creating sound environmental measures to minimize any future impact they may have on the climate.²²²

However, developing and least developed countries should not necessarily be permitted to proceed along a path of unrestrained growth, nor should they be given absolute freedom in the development of energy technologies.²²³ Developing and least developed countries must recognize the large role they will play in the future, should they be permitted to grow unrestrained.²²⁴ Developing and least developed countries must stay actively involved in climate change negotiations, rather than take the traditional approach that the developed countries caused the problem, and the developed countries should correct it.²²⁵ Additionally, developing and least developed countries should make every attempt to convince their

217. *See id.* at 167.

218. *See id.* at 168-169.

219. *See id.*

220. *See* JOYEETA GUPTA, THE CLIMATE CHANGE CONVENTION AND DEVELOPING COUNTRIES: FROM CONFLICT TO CONSENSUS? 46 (1997). Crops in India are expected to be adversely affected by coastal flooding and summer monsoon patterns. *See id.* In Indonesia, a sixty-centimeter rise in sea level will wipe out 800,000 hectares of rice fields, 300,000 coastal fish ponds, and twenty-five percent of mangrove forests. *See id.* at 47.

221. *See* Ling, *supra* note 186, at 103.

222. *See id.* at 104.

223. *See generally* GUPTA, *supra* note 220.

224. *See id.* at 191.

225. *See id.*

citizens and governments that global warming is a serious problem and that action must be taken to avert disaster.²²⁶

VI. WHAT NEEDS TO BE DONE IN THE FUTURE

In its current form, the Protocol is doomed to fail, as continuously demonstrated by simple mathematics.²²⁷ The Protocol slows the steady growth of emission levels instead of forcing them to recede.²²⁸ Without quantified emission limitation and reduction commitments from developing and least developed countries, the emission of greenhouse gases in these countries can grow unchecked. There are still several possibilities available to not only stop an increase in the amount of greenhouse gases emitted into the atmosphere, but to cause reversal and provide the Earth's atmosphere an opportunity to recover from some of the damage that has already been done.

A. *An International Approach to Reducing Greenhouse Gas Emissions: A Pollution Tax.*

One such solution is to institute an international pollution or carbon tax. A pollution tax would apply to all pollution, while a carbon tax would only apply to sources that emit large quantities of carbon dioxide. Making industrialized users pay for the right and convenience to pollute may achieve the same, if not a better, result.²²⁹

Such a tax would have two advantages. First, it would encourage a reduction in pollution at the source, or by those who would incur the least cost.²³⁰ There are two options for a pollution tax, both of which achieve the desired effect: tax the polluter or tax the person deriving a benefit from the polluter. To avoid high tax payments, polluters or their beneficiaries would reduce emissions by becoming more efficient and cutting back on demand.²³¹ Experts predict such a tax would force a shift from using coal, which is considered a dirty

226. See *id.* at 192. By linking the adverse effects of global warming to issues such as poverty, desertification, and food security—issues central to the citizens of developing and least developed countries—an increased awareness of the climate change problem is likely. See *id.*

227. See generally Soroos, *supra* note 8.

228. See *id.*

229. See Cooper, *supra* note 7, at 66, 74. Estimates of the revenue generated by an international tax are staggering. Current models suggest that a tax on emissions in the year 2020 will garner approximately 750 billion dollars in annual revenue. See *id.* at 77.

230. See *id.* at 74.

231. See *id.*

fuel, to using alternative fuels, such as natural gas, which burn much cleaner and produce far less greenhouse gases.²³²

Second, a tax would generate revenue that can then be used to fund research and development of "greener" technology.²³³ "Green" technology or power often refers to solar, wind, and renewable sources of power.²³⁴ It can also be used to provide economic incentives to polluters to engage in research and development.²³⁵

Unfortunately, such a tax contains many problems that will need to be addressed before it is widely accepted, much less instituted. First, a tax will be seen as an invasion of a country's ability to legislate. Typically, the taxing power rests with a country's government. To allow an international tax would be to take away a nation's authority to determine what should be taxed and at what level.²³⁶

Second, fuel costs for specific fuels vary from country to country.²³⁷ It is highly likely that countries will push for a uniform tax.²³⁸ With varying fuel costs, it will be difficult to establish such uniformity.²³⁹ This also brings with it a unique problem—monitoring countries to ensure that a tax is not being undermined by nationally created tax breaks or subsidies.²⁴⁰

A third and final barrier is to whom should tax revenues accrue.²⁴¹ If tax revenues would be substantial, there are arguably several entities that would be interested in them.²⁴² Such entities include oil-producing countries, which stand to lose sales if a tax is implemented.²⁴³ Also included are oil-consuming countries, which stand to lose if required to implement, collect, and monitor a tax program without any benefit.²⁴⁴ Finally, the international community may seek some of the tax revenues based on the argument that the climate change problem is global in scope and the benefits of a tax should be spread globally.²⁴⁵

232. *See id.*

233. *See id.*

234. *See discussion infra notes 246-252 and accompanying text.*

235. *See Cooper, supra note 7, at 74.*

236. *See id.* at 75.

237. *See id.* at 76.

238. *See id.*

239. *See id.*

240. *See id.*

241. *See id.*

242. *See id.*

243. *See id.*

244. *See id.*

245. *See id.*

B. Possible National Programs to Reduce Greenhouse Gas Emissions

Whether or not the Kyoto Protocol is ratified, there are several steps the United States government can and should take to reduce greenhouse emissions. Although all of the options discussed appear relatively benign, care should be taken in attempting to implement them. Currently, the United States Congress has voiced strong opposition, not only to ratification of the Kyoto Protocol,²⁴⁶ but also to any attempts by the President or any executive agency to unilaterally implement the Protocol.²⁴⁷

1. Alternative Energy Sources—Wind, Solar and Renewable Power

Alternative energy providers stand poised to take full advantage of not only the requirements of the Protocol, but the residual benefits created by many of the national approaches to global warming discussed above.²⁴⁸ Sources of alternative energy range from "fuel cells to photovoltaic panels to wind power."²⁴⁹

An excellent example of an alternative energy source that will assist in the reduction of greenhouse gas emissions is wind power.²⁵⁰ By the year 2010, the expected total combined capability of wind power in the United States will be able to meet the electricity demands of ten million American households.²⁵¹ If the full capacity of wind power is used at that time, estimates are that carbon dioxide emissions will be reduced by one hundred million metric tons a year.²⁵²

246. See H.R. Res. 211, 105th Cong. (1997); S. Res. 98, 105th Cong. (1997); S. Res. Rep. No. 105-54 (1997); H.R. Res. 268, 105th Cong. (1997); H.R.J. Res. 157, 105th Cong. (1997).

247. See H. Josef Hebert, *Lawmakers Try to Limit Discussions of Proposed Global Warming Treaty*, TALLAHASSEE DEMOCRAT, July 7, 1998, at 3A; see also George Lobsenz, *Energy R&D Budget Eyed for Kyoto Connection*, THE ENERGY DAILY, Feb. 6, 1998, at 1, 3; *House Commerce Committee to Monitor Attempts to Regulate Greenhouse Gases*, BNA INT. ENVTL. DAILY, Jan. 27, 1998, available in LEXIS, Nexis Library, BNA File.

Some lawmakers in Congress have also gone as far as cutting funding to stop agencies from even talking about climate change. See Hebert, *supra* note 247. Nearly 200 million dollars earmarked for research into energy efficiency and renewable energy was cut. See *id.*

248. See John Carey and Catherine Arnst, *Greenhouse Gases: The Cost of Cutting Back*, BUS. WK., Dec. 8, 1997, at 64.

249. See *id.*

250. See Tom Gray, *Wind Gets Competitive in the U.S.*, SOLAR TODAY, Mar.-Apr. 1998, at 18, 19.

251. See *id.*

252. See *id.*

2. Deregulation and Restructuring of Utilities

The looming deregulation and restructuring of the utility industry²⁵³ holds many promises for the reduction of greenhouse gas emissions.²⁵⁴ Two potential options for utilities have been advanced to aid in such reductions: tax incentives, and consumer choice.²⁵⁵

Tax incentives can come in two forms. The first would reward utilities for switching from dirtier fossil fuels to cleaner alternatives.²⁵⁶ To accomplish this, subsidies currently made to utilities for the use of coal would have to be eliminated and incentives for the implementation and use of cleaner options would have to be instituted.²⁵⁷

Another suggestion is that of requiring utilities to disclose to their customers how they generate power.²⁵⁸ Such an approach would allow consumers to decide which types of energy production they would like to support: wind, solar, or hydroelectric, for example.²⁵⁹

Also, deregulation and restructuring will create incentives inherent in market-based economies for utilities to reduce greenhouse gas emissions. Those industries that can operate more efficiently through generation, transmission, and distribution are expected to cut costs and attract more customers.²⁶⁰ The natural effect of a competitive market will drive utilities to become more efficient, and, therefore, more competitive.

2. Sustainable Development

Sustainable development is "premised on the assumption that human economic needs and environmental protection can be accommodated—that environmental and economic goals do not

253. See *Kyoto Warming Treaty Hands Utilities a Heavy, but Still Undefined Mandate*, ELECTRIC UTIL. WK., Dec. 15, 1997, at 1 [hereinafter *Kyoto Warming*].

254. In a recent unveiling of a federal restructuring plan for the electric utilities, predictions were that the plan would result in a reduction of twenty-four to forty million metric tons of carbon dioxide emissions per year. See *Administration Restructures with Hoopla*, THE ELECTRICITY DAILY, Mar. 27, 1998.

255. See *Kyoto Warming*, *supra* note 253, at 1, 6.

256. See James Kennedy, *Invest in Alternative Energy Technologies, Abolish Fossil Fuel 'Subsidies,' Group Says*, BNA INT. ENVTL. DAILY, Dec 12, 1997, available in LEXIS, Nexis Library, BNA File.

257. See *id.* Current estimates put subsidies to utilities at five billion dollars annually for depreciation allowances, accelerated depreciation, and other tax incentives for fossil fuel industries. See *id.*

258. See Sharon Begley, *Wake Up Call*, NEWSWEEK, Dec. 22, 1997, at 10, 12.

259. See *id.*

260. See *Kyoto Warming*, *supra* note 253, at 6. Optimistic predictions envision a reduction of utility emissions by ten to twenty percent. See *id.*

have to be mutually exclusive."²⁶¹ Evidence of such a premise can most readily be seen in the pollution control laws utilized in the United States, particularly in the successes of the Clean Water Act.²⁶² However, acquiring sustainable development, will require commitment on the part of both government and industry.²⁶³

There are several ways the United States government can facilitate a move toward sustainable development that will have a positive impact on climate change. Some of them not only embrace the concepts outlined above, but also introduce new possibilities. They include encouraging technology transfers to, and utilization in, developing countries; encouraging energy efficiency improvements; encouraging technologies that will lead to long-term environmental improvements; restoring productivity of arid lands through reforestation programs; encouraging the improvement of forest and watershed management and agricultural practices; and encouraging biodiversity conservation.²⁶⁴

Industries must also recognize the need for their assistance in eliminating and reversing the harm done to the atmosphere. Better and more advanced methods of resource management, extraction, and replacement will have to be developed for industries such as mining and fishing.²⁶⁵ Additionally, industry must learn to become more innovative in its production processes to reduce the emission of greenhouse gases, despite the rigid nature of current regulatory schemes.²⁶⁶ Finally, industry must find ways to create products that are no longer threats to the atmosphere both during use and after they are discarded.²⁶⁷

261. Laura H. Kosloff, *Climate Change Mitigation and Sustainable Development*, 12 NAT. RESOURCES & ENV'T 93, 95 (1997); see also Donald A. Brown, *Thinking Globally and Acting Locally: the Emergence of Global Environmental Problems and the Critical Need to Develop Sustainable Development Programs at State and Local Levels in the United States*, 5 DICK. J. ENVTL. L. & POL'Y 175, 197-214 (1996) (discussing the concept of sustainable development and its implementation internationally).

262. See John C. Dernbach, *Pollution Control and Sustainable Industry*, 12 NAT. RESOURCES & ENV'T 101, 101-104 (1997).

263. See *id.*; see also Nicholas A. Robinson, *Attaining Systems for Sustainability Through Environmental Law*, 12 NAT. RESOURCES & ENV'T 86, 86-88 (1997) (discussing how the recent enactment and enforcement of environmental laws in many nations are growing with the aid of economic incentives concerning sustainability).

264. See Kosloff, *supra* note 261, at 95.

265. See Dernbach, *supra* note 262, at 102. For example, criticisms abound regarding current forestry practices. The method of replacing only one species of tree after a forest has been gutted has come under scrutiny. See *id.*

266. See *id.*

267. See *id.* at 104. Oddly enough, although manufacturing processes are heavily regulated, the use or disposal of the products themselves are not, with a few notable exceptions. See *id.* An excellent example of products that are regulated during production, but not so during use and disposal, are household items such as pesticides and cleaning agents.

4. Education

Perhaps the most important step every nation must take is to become educated in the extent and severity of the climate change problem. A recent study indicates an overall lack of an understanding of global warming.²⁶⁸ This lack of understanding encompasses not only the human activities that affect the atmosphere, but also the potentially devastating effects.²⁶⁹ Greater emphasis should be placed on the basic science of the atmosphere, the human activities that adversely impact the atmosphere, the effects of those activities, and the ways that the impacts can be minimized. The study indicates that, while heightened concern based on accurate or inaccurate information may increase support for environmentally friendly policies, accurate information may increase an individual's willingness to accept personal sacrifice.²⁷⁰

VII. CONCLUSION

The problem of global climate change has been equated with a very well known doctrine, the tragedy of the commons, which holds that overexploitation of resources, natural or otherwise, occurs when an individual enjoys the benefit of maximizing exploitation while the costs of utilization are spread out over all of its users rather than shouldered totally by the individual. Our treatment of the atmosphere is similar to that of other resources, such as the ocean and the continent of Antarctica, that are also susceptible to the tragedy of the commons.²⁷¹ The very nature of our atmosphere makes it nearly impossible to control, occupy or lay claim to. It also provides a seemingly limitless capacity for providing the benefits we derive from it, while sustaining the damage we inflict.

268. See generally Richard J. Bord et al., *Is Accurate Understanding of Global Warming Necessary to Promote willingness to Sacrifice?*, 8 RISK: HEALTH, SAFETY AND ENV'T 339 (1997) (discussing the results of a variety of opinion polls and surveys about environmental issues).

269. See *id.* at 347-49. For example, although a majority of the respondents to the survey correctly identified emissions from business, industry, and automobiles and destruction of tropical forests as major causes, most respondents were unaware that the burning of fossil fuels to heat and cool homes were also major contributors. See *id.* at 347.

270. See *id.* at 354. However, some individuals' understanding of the scope and magnitude of global warming should be viewed with heightened skepticism. See *The Kicker*, GREENWIRE, Jan. 5, 1998, available in LEXIS, Nexis Library, Greenwire File. John Kelso, a restaurant owner in Austin, Texas, urges Texans to cut back on the number of legumes they ingest to help cut back on involuntary releases of methane gas. See *id.*

271. See generally Carol M. Rose, *Rethinking Environmental Controls: Management Strategies for Common Resources*, 1991 DUKE L.J. 1 (1991); Joseph Ward, *Black Gold in a White Wilderness—Antarctic Oil: The Past, Present and Potential of a Region in Need of Sovereign Environmental Stewardship*, 13 J. LAND USE & ENVTL. L. 363 (1998).

Some perceive the damage we do to the atmosphere as inconsequential because of its vast size and what appears to be its great capacity to absorb injury. Such perceptions have long made our atmosphere susceptible to abuse and misuse. The costs of emitting greenhouse gases are spread around the globe. The economic and health impacts appear to be small and in a localized areas. Therefore, we continue to emit with the knowledge that we are not bearing the brunt of the consequences, while we reap the benefits in the meantime.

However, we are now beginning to realize that this approach can no longer be justified.²⁷² With any luck, we will not be too late in responding to the problem. To insure against this possibility, stronger action must be taken.

With the creation of the FCCC, we have seen a shift in international attitudes and approaches to climate change. Through the Kyoto Protocol, we have seen a commitment, although somewhat obligatory and tenuous, to curbing emissions. Although the Kyoto Protocol is to be hailed as an achievement for what it does—establishing binding reduction levels for developed countries—it is rightfully criticized for what it does not do—turn the tide of greenhouse gas emissions.

In its current form, the Protocol is best viewed as a partial solution and the first step in a long journey to reversing atmospheric damage. While its quantified emission limitation and reduction commitments will result in a deceleration of greenhouse gas emissions, they do not result in a decline of emissions. More is needed to achieve this end. Programs such as an international tax, tax incentives for the development and use of green technology, utility restructuring and deregulation, serious sustainable development policy, and education may supplement the Kyoto Protocol in a meaningful way. The options are numerous and none should be discarded out of concerns with political or economic security. With sufficient effort and determination, solutions can be found, and agreements can be reached, that will make the commitments set forth in the Kyoto Protocol more than hot air.

272. See generally Carol M. Browner, *Global Climate Change: Threats and Solutions*, 13 J. LAND USE & ENVTL L. 273 (1997).