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ANN HOOKER*

The International Law of Forests

ABSTRACT

Although forests are common property subject to open access, timber, land and other forest resources have been appropriated for various purposes. However, displaced forest dwelling and forest-dependent people, diminished wildlife and plant populations, damaged agricultural watersheds and fisheries, degraded air, and global climate change threaten long-term forest health and domestic well-being. A framework for an international law of forests is constructed from international agreements which address these problems, including the Forest Principles and other agreements signed at the 1992 U.N. Conference on Environment and Development. Improved methods and financial support are needed for forest restoration and conservation.

I. INTRODUCTION

The actions of every nation state, including the collective actions of its citizens, affect the physical environment. In affecting the physical environment, a state sometimes affects other states. Thus, even if a state has exclusive use of a particular resource in the physical environment, that state has a duty to other states not to misuse or overuse that resource in ways that will damage the physical environment for other states.¹

Forests are an integral part of the environment. For example, among the many functions and resources forests provide, forests regulate global climate, local air quality, water flow, and soil productivity. Forests provide wildlife and fish habitat and a place for indigenous populations to live. And forests provide numerous resources for indigenous people, forest-dependent villages, and nations. These resources include food, fuel, building materials, and a variety of chemicals including pharmaceuticals

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The opinions expressed in this paper are those of the author and not necessarily those of the Department of Transportation or the United States Department of Agriculture. This paper was first prepared while the author was a cooperative education intern for the USDA Forest Service Policy Analysis Staff.

1. E. Shirk, *New Dimensions in Ethics: Ethics and the Environment*, 22 J. Value Inquiry 77 (1988).

that are used for subsistence and in foreign and domestic trade. Cycles of economic, social, and environmental decline in a nation can begin with the overuse and misuse of forests.

The next section defines forests both as resources as global resources, sometimes improperly called common property,² and as bundles of resources which can be appropriated. This section also discusses how forests can be managed under either open access (non-property), common property, or private property regimes.³ It focuses on the particular problems that occur when forests are managed under an open access or poorly regulated common property regime.

The following section describes the two sets of competing norms—state sovereignty vs. state responsibility and free use vs. equitable use, and discusses how the tension between these norms has influenced the evolution of international environmental law. In particular, international environmental law now includes the *sic utero tuo* principle of not causing harm to another state through the use of one's own resources⁴ and the adoption of the "polluter pays" principle.⁵

Subsequent sections discuss the sources of an international law of forests, beginning with a review of international agreements on the biosphere in general, customary international practices, general municipal practices, judicial decisions, the writings of publicists, emerging fundamental norms that may be considered *jus cogens*, and regional treaties. The last section reviews international treaties, conventions, declarations, and resolutions on the atmosphere. These agreements conclude that global warming, in particular, is a matter of global concern which has been caused by misuse and overuse of forests and which can be controlled in part by reforestation. As a result of concern for global warming an international law of the atmosphere has evolved which in turn has acted as a catalyst for international agreement⁶ on the need to protect forests. As the consensus has grown that all nations in various ways contribute to global warming, the *sic utero tuo* principle has been expanded to explicitly include the requirement of due diligence. The

2. D. Bromley, *Environment and Economy: Property Rights & Public Policy* 2-3 (1991).

3. See generally *id.* at 1-40 (defining different property regimes).

4. M. Soroos, *The Evolution of Global Regulation of Atmospheric Pollution*, 19 *Pol'y Stud. J.* 115 (1991).

5. See, e.g., *Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment*, June 21, 1993, 32 I.L.M. 1228. This convention was adopted at a meeting of the Council of Europe in Lugano, Switzerland.

6. R. Hahn & K. Richards, *The Internationalization of Environmental Regulation*, 30 *Harv. Int'l L. J.* 421, 436-37 (1989). The factors that have been found to create a climate favorable to agreement on environmental issues include growing scientific consensus, public awareness and concern, perceptions of fairness, impact on a government's domestic political position, economic cost, number of participants, and previous agreements. *Id.*

evolving human right to the conditions of life and equitable access to resources⁷ and the growing concern for conserving biological diversity⁸ have supported this trend.

II. GLOBAL RESOURCES AND THEIR MANAGEMENT

A. *Open Access and Common Property Regimes Distinguished from "Common Property" Resources and Resources that can be Appropriated*

The two concepts of open access (*res nullius* or belonging to no one) and common property (*res communis* or belonging to a group) refer to management regimes. These concepts are sometimes confused with the term "common property resources."⁹ Common property refers to those resources, such as the atmosphere, that cannot be divided and appropriated by one state to the exclusion of other states.¹⁰ Thus, resources managed under a common property regime could include both "common property resources," and other resources, such as trees, which can be appropriated and have been, for example, by a corporation. Because no other word or words are available to substitute for "common property resource," this term will be retained and used with quotation marks to indicate property that cannot be appropriated.

Similarly, the concept of open access refers to an ownership regime where a resource is not owned or managed by anyone regardless of whether it can be appropriated or not. Access is unrestrained.¹¹ Until recently, resources have been managed under an open access or poorly regulated common property regime. One state's misuse or overuse of a resource can affect the well-being of another state.¹² For example,

7. W. Gormley, *The Legal Obligation of the International Community to Guarantee a Pure and Decent Environment: The Expansion of Human Rights Norms*, 3 *Geo. Int'l Envtl. L. Rev.* 85, 115 (1990) [hereinafter, Gormley, *Legal Obligation*], noting that "soft law" [in the area of human rights and the environment] is evolving into binding customary international norms." *Id.*; see also Vienna Declaration and Programme of Action, June 25, 1993, 32 *I.L.M.* 1661. The Vienna Declaration and Programme were adopted by acclamation of the representatives of 171 states who attended the United Nations World Conference on Human Rights in Vienna from June 14-25, 1993. Article I, para. 11 states that "illicit dumping of toxic and dangerous substances and waste potentially constitutes a serious threat to the human rights to life and health of everyone." Paragraph 31 recognizes "the rights of everyone to a standard of living adequate for their health and well-being, including food and medical care, housing and the necessary social services," but does not explicitly refer to the need for clean air and water.

8. Convention on Biological Diversity, June 5, 1992, 31 *I.L.M.* 818.

9. Bromley, *supra* note 2.

10. Soroos, *supra* note 4, at 115-16.

11. Bromley, *supra* note 2.

12. Soroos, *supra* note 4, at 115.

overuse and misuse of the atmosphere and oceans has resulted in dying forests and depleted ocean fisheries.¹³

Regardless of whether an open access or common property regime is followed, the free rider problem will occur where different users use the same resource simultaneously.¹⁴ Unless regulated, free riders can exploit the resource while benefiting from the conservation efforts of other users.¹⁵ Thus, without some regulation or agreement to refrain from over-exploitation, free riders have little incentive to conserve resources. As a consequence, resources are overused and misused.¹⁶

"Common property resources" are subject to international law for several reasons. First, by definition, a "common property resource" has the physical properties of indivisibility and nonexcludability and therefore cannot be subject to state sovereignty. Second, because some states are better able to exploit "common property resources" than other states, some mechanism is needed to equitably distribute the benefits among all states. Third, because threats to the continued function of certain "common property resources," such as the atmosphere, are of global concern, some mechanism is needed to equitably distribute the costs of maintaining these resources while avoiding the abuses of free riders.¹⁷

B. Forests as Both a Common Property Resource and a Resource that can be Appropriated

Forests, like the atmosphere which serves both as a layer of air that circulates over the surface of the planet and as "air space,"¹⁸ have characteristics both of "common property resources" and of resources that can be appropriated. Like the layer of air that circulates over the surface

13. Bromley, *supra* note 2.

14. Soroos, *supra* note 4, at 115.

15. Soroos, *supra* note 4, at 121.

16. Soroos, *supra* note 4, at 116.

17. Soroos, *supra* note 4, at 121.

18. For example, "the atmosphere is a global natural resource consisting of a layer of the substance known as air, which is comprised of gases—primarily nitrogen and oxygen, as well as suspended particles and liquids. In international law, the substance air is distinguished from 'air space,' which is the three-dimensional area above a given surface territory. As air circulates over the surface of the planet, it moves through the air spaces of nation-states, much as water passes through the territory of states as it flows down a river bed, although the routes of air movement are not as well defined as river bed. While portions of air space fall under the jurisdiction of the state beneath it for purposes such as regulating the overflight of foreign aircraft, it is physically impossible to place parts of the ever-moving atmosphere under the control of individual states. Thus, regulation of its use as a sink for pollutants must be accomplished on an international basis, if not a global one (citations omitted)." Soroos, *supra* note 4, at 115.

of the planet, forests are an integral component of the environment and provide many environmental services benefiting mankind:

Forests perform irreplaceable ecological services as well as provide economic products and recreation. They assist in the global cycling of water, oxygen, carbon, and nitrogen. They lend stability to hydrological systems, reducing the severity of floods and permitting the recharging of springs, streams, and underground waters. Trees keep soil from washing off mountainsides and sand from blowing off deserts; they keep sediment out of rivers and reservoirs and, properly placed, help hold topsoil on agricultural fields. Forests house millions of plant and animal species that will disappear if the woodlands are destroyed.¹⁹

Such environmental services would be prohibitively expensive if not impossible to replicate or replace with current technology.²⁰ Forest functions, such as global climate regulation, are not divisible and others cannot be excluded from their use. Because of their indivisibility and nonexcludability, forest functions are "common property resources," and like other "common property resources" are potentially subject to the rules of international law.²¹ However, like air space, forests are bundles of resources located within the sovereign territories of states. Under international law, states can apply their own domestic law to appropriate forests for certain purposes, such as timber and land, by dividing these resources and excluding others their use.²² Increased rates of clearing for agriculture, logging for export markets, and use for fuel, fiber and timber are threatening the ability of forests to perform their environmental functions.²³ Unless the international community lessens the economic stresses driving people to overuse and misuse forests, "people will cut the last tree."²⁴ In other words, people will live or die with the forest.²⁵

When evaluating the destruction of peoples, i.e., minority groups, because of the destruction of their natural ecology, a new lesson is to be learned: [humans have] become the endangered species.²⁶

19. E. Eckholm, *Planting for the Future: Forestry for Human Needs 1* (Worldwatch Paper 26, 1979).

20. *Id.*

21. See generally Soroos, *supra* note 4, at 116-17.

22. Soroos, *supra* note 4, at 115.

23. See, e.g., *Terrestrial Ecosystems (Budget line 61)*, in 2 *Annual Review of United Nations Affairs: 1988 786* (Kumiko Matsuura et al. eds., 1991) [hereinafter *Terrestrial Ecosystems*].

24. J. Rush, *The Last Tree* 28 (1991) (quoting George Verghese).

25. *Id.* at 9.

26. W. Gormley, *Human Rights and the Environment: The Need for International Cooperation* 19 (1976) [hereinafter Gormley, *Human Rights*].

Global environmental concern has thus focused on the conflict between appropriation of forest resource for private uses and protection of the forest for the survival of people.

C. *The Overuse and Misuse of Forests*

Today, three-quarters of the earth's surface is covered by water, one-quarter is exposed as land. In pre-agricultural times, approximately 5,000 million hectare (ha) of land were forested.²⁷ Since then, the earth's forest cover has been reduced by one billion ha due to clearing for agriculture, logging for export markets, flooding by hydroelectric dams, and removal for domestic fuel, fodder, and building materials.²⁸ The remainder of the earth's land area is covered by alpine, tundra, grassland, and desert ecosystems. Although human beings have adapted to these other ecosystems, for example, by living on the Tibetan Plateau and in the Kalihari Desert, most populations of people continue to live in or on the edge of forest ecosystems.²⁹

Forests are essential to the well-being of people. Forests provide fuel,³⁰ food,³¹ fodder,³² building materials,³³ and a wide variety of chemicals including pharmaceuticals.³⁴ Other goods and services are also provided by forests.³⁵

For example, "eighty percent of the wood *used in the Third World* is burned for fuel, and much of it never passes through a commercial market (emphasis added)."³⁶ When populations have exhausted their local forest resources, they must compete in commercial markets for food, fuel, and building materials, if they can, or find substitutes, if available.³⁷

27. World Resources Institute, *World Resources 1990-91* 7 (1991) [hereinafter WRI 1990-91].

28. *Id.* at 6-7.

29. Eckholm, *supra* note 19, at 5-6. For example, developing countries contain three-fourths of the world's population and more than half of its forests. World Resources Institute, *World Resources 1987* 9 (1987) [hereinafter WRI 1987].

30. Eckholm, *supra* note 19, at 18-20.

31. Eckholm, *supra* note 19, at 6.

32. Eckholm, *supra* note 19, at 6.

33. Eckholm, *supra* note 19, at 1, 19.

34. See, e.g., J. Wallace, *Rainforest Rx*, *Sierra*, July/August 1991, at 36; T. Eisner, *Chemical Prospecting: A Proposal for Action*, in *Ecology, Economics, Ethics: The Broken Circle* 196 (F. Bormann & S. Kellert eds., 1991).

35. *Terrestrial Ecosystems*, *supra* note 23, at 789.

36. Eckholm, *supra* note 19, at 6.

37. Eckholm, *supra* note 19, at 7.

Particularly in developing countries, when people attempt to obtain products in the commercial market that they used to obtain free from the forest, in many cases they are finding that their governments are in many cases liquidating forests. The world's population has increased dramatically from less than one billion in pre-industrial times to more than five billion people in the mid-1980s and is expected to more than double by 2100.³⁸ Ninety-five percent of the increase will occur in the developing countries, where one-half of the world's forests are located.³⁹ In these countries, the pressure on forests has been greatest, for governments often view the timber in their forests as their greatest asset. Governments can raise capital by selling timber in the export market as industrial wood in the form of raw logs, plywood, lumber, and pulp.⁴⁰ Further, domestic demand for industrial wood is expected to soar by 2000⁴¹ further restricting economic access to forest products for subsistence use.

As developing countries enter the world economy, governments appropriate formerly open forests and grant timber and land concessions at very low prices.⁴² The concessionaires sell lumber and pulp in foreign markets and bring in foreign currency. After receiving a profit, the concessionaires pay taxes which the governments use to pay international debts and import food, machinery and other goods and services needed for development.⁴³ Until recently, little attention has been given to the potential value of harvesting forest products, such as rubber, honey, nuts, fruits, without removing the forest itself.⁴⁴

Developed countries in North America, Europe and Japan now provide major markets for industrial wood—raw logs, lumber, and pulp, from the developing countries.⁴⁵ For example, European countries, which exhausted their wood supplies several centuries ago, have become major importers of foreign wood.⁴⁶ The United States, which supported its development by clearing large portions of its extensive forests for agriculture, fuel, and building supplies, has become a net importer of wood.⁴⁷ Japan, which never had substantial timber supplies but now has an enormous population, has also become a major importer of foreign

38. WRI 1987, *supra* note 29, at 9.

39. WRI 1987, *supra* note 29, at 9.

40. Eckholm, *supra* note 19.

41. Eckholm, *supra* note 19.

42. See, e.g., Rush, *supra* note 24, at 35-40; WRI 1990-91, *supra* note 27, at 7.

43. Rush, *supra* note 24, at 35.

44. WRI 1990-91, *supra* note 27, at 7.

45. WRI 1987, *supra* note 29, at 283.

46. WRI 1987, *supra* note 29, at 289.

47. WRI 1987, *supra* note 29, at 288.

wood.⁴⁸ Developing countries are expected to increase their consumption of industrial wood dramatically in the near future as they become more industrialized.⁴⁹ Thus, an increasing number of timber-short countries will place ever greater economic pressure on the world's remaining forests.

Within the developing countries, growing urban populations⁵⁰ compete with rural populations for local forest resources, including the land itself. Urban populations in these countries still require fuel and building materials from the remaining forests and can outbid rural populations. Thus, wood that would have been collected from the forest to cook meals and build and heat homes in rural communities is now sold in urban markets. To bring in foreign currency to pay for development, farmers plant the fields and forests that once sustained rural populations in cash crops, such as coffee, for sale in foreign markets.⁵¹ Or, they plant crops to feed growing urban populations. In addition to consuming fuel, food, and building materials, urban populations and industries also consume land.⁵² Expanding urban centers are converting arable land on the outskirts of cities to urban uses, such as housing and factories.⁵³ Coastal development is destroying mangrove forests and other coastal forests, which provide fish nurseries and protect shorelines from erosion.⁵⁴ Urban populations and industries also need electric energy⁵⁵ and hydroelectric projects are flooding once fertile valleys and forested hillsides.⁵⁶ Finally, by poisoning the air, land, and water, pollution from cities and industries is undermining the productive capacity of the remaining forest.⁵⁷

Despite losses of population to the cities, rural populations continue to grow in developing countries. However, since the fields and forests which once supported rural populations are no longer available or are degraded, expanding rural populations must move onto marginal and previously untouched areas of forest.⁵⁸ As human populations encroach on the forest, indigenous forest dwelling tribes and native plant and wildlife species are displaced.⁵⁹ Eventually, watersheds are eroded,

48. WRI 1987, *supra* note 29, at 288.

49. WRI 1987, *supra* note 29, at 288.

50. Rush, *supra* note 24, at 6-7.

51. Rush, *supra* note 24, at 2.

52. Rush, *supra* note 24, at 7.

53. Rush, *supra* note 24, at 7.

54. Rush, *supra* note 24, at 5-6.

55. Rush, *supra* note 24, at 8.

56. Rush, *supra* note 24, at 5.

57. Rush, *supra* note 24, at 8.

58. Rush, *supra* note 24, at 2, 9.

59. Rush, *supra* note 24, at 3.

shorelines are exposed, fisheries are polluted, and low-lying communities are flooded, visiting the mistakes of poor development practices on the country as a whole.⁶⁰

III. COMPETING NORMS OF CUSTOMARY LAW

A. Introduction

Two sets of competing norms constrain international strategies for regulating human activities that affect "common property resources."⁶¹ These sets of norms are: state sovereignty versus state responsibility and freedom of use versus equitable use.⁶² Where states have exploited their natural resources to benefit a few at the expense of their own people and other countries in the world community,⁶³ the limits of conceiving of international law as a law of nations rather than as a law of people are underscored.⁶⁴ The emerging body of law on human rights,⁶⁵ which includes the fundamental right to a healthy environment⁶⁶ and the right of indigenous populations to access natural resources,⁶⁷ therefore, is influencing the balancing of these norms.

60. Rush, *supra* note 24, at 3.

61. Soroos, *supra* note 4, at 116.

62. Soroos, *supra* note 4, at 116.

63. See generally Rush, *supra* note 24.

64. P. Sands, *The Environment, Community and International Law*, 30 Harv. Int'l L. J., 393, 399 (1989).

65. See, e.g., Gormley, *Legal Obligation*, *supra* note 7.

66. See, e.g., Declaration of the Hague, March 11, 1989, 28, I.L.M. 1308, reprinted in Sands, *supra* note 64, at 417-20. The opening paragraph of the Declaration states: "The right to live is the right from which all other rights stem. Guaranteeing this right is the paramount duty of those in charge of all States throughout the world." Sands, *supra* note 64, at 417. See also United Nations General Assembly Resolution on the Protection of the Global Climate, G.A. Res. 43/53, U.N. Doc. A/RES 43/53 (1989), reprinted in 28 I.L.M. 1326 (1989). "Although the Hague Declaration is not legally binding, it is important as a statement of intent from 24 states at various stages of industrial development and representing diverse political view." Sands, *supra* note 64, at 396. See also Gormley, *Human Rights*, *supra* note 26; Gormley, *Legal Obligation*, *supra* note 7.

67. See generally D. Cycon, *When Worlds Collide: Law, Development and Indigenous People*, 25 New Eng. L. Rev. 761 (1991); William A. Shutkin, *International Human Rights Law and the Earth: The Protection of Indigenous Peoples and the Environment*, 31 Va. J. Int'l L. 479 (1991).

B. State Sovereignty v. State Responsibility

International law is often discussed from the premise that each state is sovereign.⁶⁸ The concept of sovereignty over natural resources in modern international law developed during the period of decolonization as part of the right of self-determination.⁶⁹ Newly independent states wanted to avoid over-exploitation by the developed countries.⁷⁰

State sovereignty is not absolute, however. Though states have "the sovereign right to exploit their own resources pursuant to their own environmental policies," they also have "the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."⁷¹ This doctrine of "good neighborliness" . . . can be traced to the Roman law maxim of *sic utere tuo ut alienum non laedas* (use your own property so as not to injure that of another).⁷²

The *sic utero tuo* principle has been recognized by the International Court of Justice (ICJ). For example, in *Lake Lanau*,⁷³ the ICJ rejected the claim of one state to use a drainage basin to the detriment of another state.⁷⁴ Similarly, in *Corfu Channel*,⁷⁵ the ICJ recognized that each state has an obligation "not to allow its territory to be used for acts contrary to the rights of other states."⁷⁶

Despite rulings by the ICJ, determining liability for environmental damage under international law has proven to be difficult.⁷⁷ An offending state must have breached some duty,⁷⁸ that is, fallen below

68. U.N. Charter art. 2, para. 4.

69. Kamal Hossain, *Introduction to Permanent Sovereignty over Natural Resources in International Law: Principle and Practice* ix, xiii (Kamal Hossain & Subrata Roy Chowdhury eds., 1984).

70. *Id.* at x.

71. Declaration of the United Nations Conference on the Human Environment, Principle 21, June 16, 1972, U.N. Doc. A/CONF. 48/14 and Corr. 1, 11 I.L.M. 1416 [hereinafter *Stockholm Declaration*]; see also Charter of Economic Rights and Duties of States, art. 30, G.A. Res. 3281, U.N. GAOR, Supp. No. 31, at 55, U.N. Doc. A/9631, reprinted in 14 I.L.M. 251 (also cited in Brian Smith, *Book Review*, 16 Ecology L.Q. 857, 862-63 & n.30 (1989) (reviewing J. Brunnee, *Acid Rain and Ozone Layer Depletion: International Law and Regulation* (1988)). See also Sands, *supra* note 64, at 404.

72. Soroos, *supra* note 4, at 117 (quoting J. Schneider, *The World Public Order of the Environment: Towards an International Ecological Law and Organization* 142 (1979)).

73. *Lake Lanau* (Fr. v. Spain), 1957 I.L.R. 101 (Arbitration Decision of Nov. 16); 53 Am. J. Int'l L. 156 (1959).

74. *Id.*

75. *Corfu Channel* (Alb. v. U.K.), 1949 I.C.J. 22 (April 9).

76. *Id.*

77. Sands, *supra* note 64, at 404.

78. Sands, *supra* note 64, at 404.

some standard of care,⁷⁹ and in doing so caused some injury to persons or property.⁸⁰ Aside from the obvious difficulties in determining the appropriate standard of care, breach, and causation, the harm may be remote and contingent. International law has not treated the environment as a form of property.⁸¹ The environment "may even be deemed to be ownerless."⁸² Moreover, traditional international law has not recognized the "link between a healthy environment and healthy people."⁸³ Since harm to persons or property cannot be shown, "there is no general rule prohibiting acts that damage the environment."⁸⁴

International law, however, is based on the fundamental need "to ensure peaceful enjoyment. This function would be impossible without ensuring those conditions essential for preserving life."⁸⁵ Without continued cooperation by state in protecting environmental functions and equitably distributing resources or in addressing claims of environmental damage, the environment and its resources will become a source of international conflict.⁸⁶

"The environment does not exist as a sphere separate from human actions, ambitions, and needs [but] is where we all live."⁸⁷

79. Sands, *supra* note 64, at 405.

80. Sands, *supra* note 64, at 405.

81. Sands, *supra* note 64, at 405.

82. Sands, *supra* note 64, at 405.

83. Sands, *supra* note 64, at 405.

84. Sands, *supra* note 64, at 405.

85. A. Postiglione, *A More Efficient International Law on the Environment and Setting Up an International Court for the Environment Within the United Nations*, 20 *Env'tl. L.* 321, 324 (1990). Judge Postiglione was the Coordinator for the "Congress on a More Efficient International Law on the Environment and Setting Up an International Court for the Environment Within the United Nations" convened by the Italian Supreme Court. The Congress was held at the National Academy of Lincei, Rome, Italy, April 21-24, 1989, with twenty-seven countries from all continents participating. *Id.* at 321. The principle of peaceful enjoyment is articulated in the Preamble and article I of the United Nations Charter. The principle of peaceful enjoyment has been restated in numerous other treaties including, for example, the Preamble of the Vienna Convention on the Law of Treaties, May 23, 1969, U.N. Doc. A/CONF. 39/27, 8 *I.L.M.* 679 (entered into force January 27, 1980), reprinted in B. Carter & Phillip R. Trimble, *International Law: Selected Documents* 51 (1991). The United States has not ratified the convention.

86. Congress on a More Efficient International Law on the Environment and Setting Up an International Court for the Environment within the United Nations convened by the Italian Supreme Court and held at the National Academy of Lincei, Rome, Italy, April 21-24, 1989, cited in Postiglione, *supra* note 85, at 326-27. The Congress called for the "drafting of a universal International Convention proclaiming the duty of all States to conserve and protect the environment, both within and outside the limits of international jurisdiction . . . [and] the creation by the United Nations of an the (sic) International Court for the Environment, which will be accessible to States, United Nations organs, and private citizens." Postiglione, *supra* note 85, at 326-27.

87. World Commission on Environment and Development, *Our Common Future* xi (1987)

Thus, whether the global environment can be protected before conflict emerges will depend on whether each state can agree to "surrender a part of its sovereignty for the common good of all humanity."⁸⁸

The ICJ in *Barcelona Traction*⁸⁹ held that states have obligations to the international community as a whole.⁹⁰

"By their very nature [these rights and obligations] are the concern of all states. In view of the importance of the rights involved, all states can be held to have a legal interest in their protection; they are obligations *erga omnes*."⁹¹

"[T]he procedural question as to whether one state . . . could invoke such an obligation on behalf of the community to prevent or seek mitigation of harm to common resources—as an *actio popularis*" is unresolved, however.⁹²

Nonetheless, two recent treaties have been adopted suggesting that states are willing to prevent harm and impose liability. The Vienna Declaration and Programme of Action, adopted at the United Nations World Conference on Human Rights on June 25, 1993,⁹³ recognized the need to control toxic waste dumping to protect the human environment and human health.⁹⁴ The Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, adopted by the Council of Europe on June 21, 1993 in Lugano, Switzerland,⁹⁵ went further and adopted the "polluter pays" principle which imposes strict

[hereinafter *Brundtland Report*]. The World Commission on Environment and Development (WCED) was established by the United Nations in 1983 as an independent body. The Brundtland Report follows from the Brandt Commission of North-South Issues' *Programme for Survival and Common Crisis* and the Palme Commission on Security and Disarmament Issues' *Common Security*. *Id.* at x.

88. Sands, *supra* note 64, at 405 n.54.

89. *Barcelona Traction, Light and Power Company, Limited (Belg. v. Spain)*, 1970 I.C.J. 4 (Feb. 5).

90. Sands, *supra* note 64, at 397 n.17.

91. *Barcelona Traction*, 1970 I.C.J. at 32.

92. Smith, *supra* note 71, at 863 & n.32. In *Nuclear Tests*, Australia "relied on its right as a member of the international community to invoke an individual legal interest in safeguarding the freedom of the high seas from radioactive pollution," but the case was subsequently dismissed since France had ceased atmospheric nuclear testing. *Nuclear Tests (Austl. v. Fr.; N.Z. v. Fr.)* 1973 I.C.J. Pleadings at 387, *quoted in* Sands, *supra* note 64, at 397 n.17. The cases were later dismissed in one of the weakest votes of the ICJ. Five judges voted with the opinion, four judges concurred with the dismissal but not with the reasons, and six judges dissented. Carter & Trimble, *supra* note 85, at 45-46 (citing *Nuclear Tests*, 1974 I.C.J. 253, 457 (Judgments of Dec. 20) (Decision dismissing case because France had ceased atmospheric nuclear testing)).

93. 32 I.L.M. 1661.

94. *Id.* art. I, para. 11.

95. 32 I.L.M. 1228.

liability for certain activities that are dangerous to the environment and people.⁹⁶

C. *Freedom of Use vs. Equitable Use*

Despite ICJ rulings, "[s]tates have generally proved unwilling to exercise their right of "guardianship" over the global environment."⁹⁷ In many instances, environmental protection has been a "marginalized, residual or subsidiary objective"⁹⁸ of states. States have appropriated previously open forests, granted timber concessions, and exploited the land for the benefit of a few at the expense of present and future generations.⁹⁹ Thus, under the claim of sovereignty, these states have acted as "free riders";¹⁰⁰ that is, these states have benefited from the conservation actions of other states while allowing their own resources, including forests, to be exploited for the benefit of certain people and to the detriment of many.¹⁰¹

Since traditional international law is conceived of as a law of nations rather than as a law of individuals, the customary practices of states are an important source of law. In the area of environmental protection, however, official state practices do not necessarily reflect international consensus among people. Increasingly, non-governmental organizations (NGOs)¹⁰² and international governmental organizations (IGOs), such as the United Nations, are exerting pressure on states to protect forests and allocate forest resources in an equitable manner.¹⁰³

States are realizing that the consequences of overuse and misuse of domestic forests contribute to domestic problems as well as international problems. As officials learn that there are political rewards at home for protecting the environment, they are more inclined to act accordingly.¹⁰⁴ However, states are also realizing that environmental problems and their solutions are global in scope and that states, acting individually, cannot solve these problems. Thus, states have become increasingly concerned with equitably distributing the costs of environmental protection.¹⁰⁵

96. *Id.*

97. Sands, *supra* note 64, at 393.

98. Sands, *supra* note 64, at 405.

99. See generally Rush, *supra* note 24.

100. Soroos, *supra* note 4, at 121.

101. See generally Rush, *supra* note 24.

102. Sands, *supra* note 64, at 394.

103. Rush, *supra* note 24, at 55-96.

104. Hahn & Richards, *supra* note 6, at 426.

105. Hahn & Richards, *supra* note 6, at 421.

IV. INTERNATIONAL AGREEMENTS ON ENVIRONMENTAL LAW

A. *Changing Concepts of the Role of Forests*

Modern historians have found that "[a]ncient writers observed that forests always recede as civilizations develop and grow" and that "[c]onversely, when a society declines forests tend to regenerate."¹⁰⁶ Further, as forests decline, ancient writers observed that civilizations decline.¹⁰⁷ The Epic of Gilgamesh, for example, recounts the collapse of Uruk, a city-kingdom in Mesopotamia, 4,700 years ago.¹⁰⁸ Gilgamesh, the king of Uruk, wanted to "make for himself 'a name that endures' by building up his city."¹⁰⁹ To do this, he needed a large supply of timber.¹¹⁰ However, Enlil, the chief deity and guardian of the earth,¹¹¹ knew that humans would try to take the forest which was considered the gods' garden and he had appointed Humbaba to guard the forest. Humbaba's roar was the storm flood, his mouth was fire, and his breath was death.¹¹² When Gilgamesh began to cut the cedar trees, Humbaba became angry and fought with Gilgamesh but Gilgamesh eventually slew Humbaba.¹¹³ Once Humbaba was gone, Gilgamesh cut the forest. Enlil then sent "a series of ecological curses on the offenders."¹¹⁴ Subsequent rulers continued the cutting, baring the hills, impoverishing the once fertile valleys until the agricultural economy declined and civilizations collapsed.¹¹⁵

By the end of the seventeenth century, the idea that people, rather than gods, controlled nature had crystallized in Western thought.¹¹⁶ Acceptance of this belief increased dramatically in the eighteenth and nineteenth centuries. In the mid-1800s, George Perkins Marsh, a statesman from Vermont, was appointed ambassador to Italy.¹¹⁷ He compared the denuded and eroded slopes of the Mediter-

106. J. Perlin, *A Forest Journey: The Role of Wood in the Development of Civilization* 25 (1991).

107. *Id.*

108. *Id.* at 35.

109. *Id.* at 35.

110. *Id.*

111. *Id.* at 37-38.

112. *Id.*

113. *Id.* at 38.

114. *Id.* at 38.

115. *Id.*

116. C. Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought From Ancient Times to the End of the Eighteenth Century* 494-95 (1967).

117. G. Marsh, *Man and Nature: Or, Physical Geography as Modified by Human Action* (D. Lowenthal ed. 1967) (1864).

ranean region and decline of Greco-Roman civilization with the similarly degraded slopes of the Green Mountains and poverty of rural New England.¹¹⁸

Marsh concluded that deforestation adversely affected climate and fertility, and thus could lead to the collapse of agriculturally based civilizations.¹¹⁹ He published his findings in his book, *Man and Nature: Or, Physical Geography as Modified by Human Action*, in 1864. This book had a significant effect on the development of forest conservation in the United States and Europe.¹²⁰ At first, tree planting was favored. Soon, however, European concepts of scientific management were introduced.¹²¹ If forests and other natural resources could be managed scientifically, they could produce goods and services in perpetuity.¹²² This view was consistent with the belief that the earth was a machine and that people were managers of it.¹²³

Meanwhile, the science of ecology had begun to develop.¹²⁴ In 1869, a German biologist, Ernst Haeckel, introduced the term "ecology," which was derived from the Greek word "oikos," meaning house or place to live.¹²⁵ Ecology emphasized the flow of nutrients and energy through environmental systems and thus the interdependence of living organisms with each other.¹²⁶ At the same time the science of ecology was developing, the term "biosphere" was introduced as a concept describing the interrelationship of all living organisms on the earth.¹²⁷ These concepts of organic interdependence, coupled with increased stresses on global resources, such as the atmosphere, have helped shift the focus from norms of state sovereignty and free use of resources to those of state responsibility and equitable use. The change in focus is evident in the international agreements on the biosphere and the atmosphere that the international community has made since the 1970s.

118. D. Lowenthal, *Introduction to G. Marsh, Man and Nature: Or, Physical Geography as Modified by Human Action* xvii-xix (David Lowenthal ed. 1967) (1984).

119. Marsh, *supra* note 117, at 113-280.

120. Lowenthal, *supra* note 118, at xxi-xxvii.

121. G. Pinchot, *The Fight for Conservation* (1949); S. Dana & S. Fairfax, *Forest and Range Policy: Its Development in the United States* 34 (1980); *See generally* S. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement 1890-1920* (1980).

122. *Supra* note 121.

123. *See generally* C. Merchant, *The Death of Nature* (1980).

124. E. Odum, *Fundamentals of Ecology* 3 (3rd ed. 1971).

125. *Id.*

126. *Id.*

127. V.I. Vernadsky, *The Biosphere and the Noosphere*, 33 *American Scientist* 1, 4 (1945), *cited in* Shutkin, *supra* note 67, at 481 n.11.

B. General Agreements

The Charter of the United Nations does not refer specifically to environmental matters, and thus in the post-war years, the "U.N. Secretariat and major U.N. organs had little to do with the environment."¹²⁸ However, the United Nations Educational, Social, and Cultural Organization (UNESCO) began to work on conservation issues as soon as it was created in the 1940s,¹²⁹ and in 1968, UNESCO convened the first Biosphere Conference.¹³⁰

In 1970 at its General Conference, UNESCO established the Man and the Biosphere Program (MAB) as a "formal mechanism for bringing together and coordinating diffuse national and international research, conservation and training activities."¹³¹ Today, over 110 nations participate in the MAB program.¹³² The MAB program includes a network of biosphere reserves that are designed in cooperation with each state to protect characteristic ecosystems and provide resources for sustainable development.¹³³

After the Biosphere Conference, the United Nations sponsored the Conference on the Human Environment in Stockholm in 1972. This conference resulted in the Stockholm Action Plan,¹³⁴ also known as the Stockholm Declaration.¹³⁵ The Stockholm Declaration began by stating that "man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations."¹³⁶ The Declaration speaks of the solemn duty to safeguard the "air, water, land, flora and fauna"¹³⁷ and the "heritage of wildlife and its habitat."¹³⁸ The Declaration calls for international cooperation in maintain-

128. C. Tinker, *Environmental Planet Management by the United Nations: An Idea Whose Time Has Not Yet Come?* 22 N.Y.U. J. Int'l L. & Pol. 793, 798 (1990).

129. *Id.*

130. *Id.* at 798. See also Shutkin, *supra* note 67, at 481 n.11 (citing UNESCO, Final Report of the Intergovernmental Conference of Experts on the Scientific Basis for Rational Use and Conservation of the Resources of the Biosphere, held at UNESCO House, Paris, Sept. 4-13, 1968, UNESCO Doc. SC/MD/9 (Jan. 9, 1969), reprinted in UNESCO, *Use and Conservation of the Biosphere* 191 (1970)).

131. U.S. Dep't of State, *The United States Man and the Biosphere Program 2* (U.S. Dep't of State Publication 9798 1990).

132. *Id.* at 3.

133. *Id.* at 2; *Brundtland Report*, *supra* note 87, at 108.

134. Tinker, *supra* note 128, at 818.

135. Stockholm Declaration, *supra* note 71.

136. *Id.* at Principle 1.

137. *Id.* at Principle 2.

138. *Id.* at Principle 4.

ing the "capacity of the earth to produce vital renewable resources"¹³⁹ and preventing "serious or irreversible damage" to ecosystems.¹⁴⁰ After setting out the duties and responsibilities of mankind in general, the Stockholm Declaration stated that "economic and social development is essential for ensuring a favourable living and working environment for man and for creating conditions on earth that are necessary for the improvement of the quality of life."¹⁴¹ The effort to manage development in an environmentally sound manner has come to be known as "ecodevelopment,"¹⁴² or sustainable development, the latter being more difficult to define.¹⁴³

The Stockholm Declaration then stated the *sic utero tuo* principle in Article 21:

[S]tates have . . . the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the jurisdiction of national jurisdiction.¹⁴⁴

The Declaration also addressed the related problem of how to equitably distribute the costs of protecting the environment:

Resources should be made available to preserve and improve the environment, taking into account the circumstances and particular requirements of developing countries and any costs which may emanate from their incorporating environmental safeguards into their development planning and the need for making available to them, upon their request, additional international technical and financial assistance for this purpose.¹⁴⁵

Although subsequent agreements repeat these themes, these agreements begin to give greater attention to the need to protect the environment from the ills of development.

139. *Id.* at Principle 3.

140. *Id.* at Principle 6.

141. *Id.* at Principle 8.

142. "Ecodevelopment, the philosophy characterized by the possibility of conciliation between development, ecological preservation, and the quality of human life, is part of the new mentality which the current legal system seeks to promote." L. Chang, *The New Emerald Hunters: Brazilian Environmental Jurisprudence, 1988-1989*, 3 *Geo. Int'l Env'tl. L. Rev.* 395, 413-14.

143. See generally C. Tisdell, *Sustainable Development: Differing Perspectives of Ecologists and Economists, and Relevance to LDCs*, 15 *World Dev.* 373 (1988).

144. Stockholm Declaration, *supra* note 71, at Principle 21.

145. Stockholm Declaration, *supra* note 71, at Principle 12.

As a consequence of the Stockholm Conference, the United Nations formed the United Nations Environment Programme (UNEP)¹⁴⁶ to gather, monitor, assess, and exchange information on environmental concerns.¹⁴⁷ UNEP meets its watchdog and clearinghouse responsibilities through the Global Environmental Monitoring System (GEMS), Earth-watch and INFOTERRA.¹⁴⁸ The United Nations also intended UNEP to be "a central catalyst, coordinator, and stimulator in the field of the environment,"¹⁴⁹ and to that end, UNEP has worked closely with other United Nations organizations, international organizations (IGOs), and non-governmental organizations (NGOs) on various environmental issues, many of which concern forest conservation. However, UNEP does not have any enforcement powers.

On World Environment Day, June 5, 1975, more than one hundred environmental organizations from around the world sponsored a conference on "EARTHCARE: Global Protection of Natural Areas" at the United Nations.¹⁵⁰ Through UNEP, the conference organizers submitted "The Rights to Earthcare" petition, signed by 200,000 persons from around the world, to the U.N. Secretary-General.¹⁵¹ The petition urged the United Nations to take steps to protect the environment as a prerequisite to "the enjoyment of basic human rights—even the right to life itself,"¹⁵² noting that protecting the human environment is the "duty of all Governments."¹⁵³

In 1979, "[t]he U.N. adopted a set of principles, based on the Stockholm Conference, for the 'Conservation and Harmonious Utilization of Natural Resources Shared by Two or More States,' to be used in the formulation of bilateral and multilateral conventions on environmental subjects."¹⁵⁴ One year later, in 1980, the International Union for the Conservation of Nature and Natural Resources (IUCN), a group of experts, prepared the World Conservation Strategy.¹⁵⁵ The three principles of conservation outlined in the World Conservation Strategy include:

- (1) the maintenance of essential ecological processes and life-support

146. Tinker, *supra* note 128, at 794 n.7.

147. Tinker, *supra* note 128, at 795.

148. Tinker, *supra* note 128, at 798-99 nn.18-20.

149. Tinker, *supra* note 128, at 799 & nn.21-22 (quoting U.N. Environment Programme: Report of the Governing Council, Environmental Perspective to the Year 2000 and Beyond).

150. G. Ho, *U.N. Recognition of the Human Right to Environmental Protection*, 2 *Earth L.J.* 225 (1976).

151. *Id.*

152. *EARTHCARE: The Human Right to a Sound Environment*, 1 *Earth L.J.* 187 (1975).

153. *Id.* at 188.

154. Approved by Governing Council decision 6/14 of May 19, 1978, endorsed by U.N. General Assembly Resolution 34/186, December 18, 1979 ("co-operation in the field of the environment concerning natural resources shared by two or more states"), *quoted in WRI 1987, supra* note 29, at 182.

155. Tisdell, *supra* note 143 (referring to the World Conservation Strategy adopted by the IUCN in Gland, Switzerland in 1980).

systems;

- (2) the preservation of genetic diversity; and
- (3) sustainable utilization of species and ecosystems.¹⁵⁶

"In response to a suggestion made by President Mobutu Sese Seko of Zaire, a multinational task force began in 1975 to draft the World Charter for Nature as a guide for regulating international environmental development."¹⁵⁷ In 1975 at a meeting of the IUCN, President Mobutu laid the foundation for the World Charter by stating that:

The seas, the oceans, the upper atmosphere belong to the human community One cannot freely overuse [such] international resources People of good will . . . are looking to you for positive results from this Assembly That is why, if I had any advice for you, I would suggest the establishment of a Charter of Nature."¹⁵⁸

On October 29, 1982, the U.N. General Assembly adopted the World Charter for Nature, by a vote of 111 in favor to a single dissenting vote by the United States.¹⁵⁹ The Charter is important for several reasons. First, developing countries played a key role in its development.¹⁶⁰

Second, the Charter's preamble proclaims that "[m]ankind is a part of Nature,"¹⁶¹ and that "[l]asting benefits from nature depend upon the maintenance of essential ecological processes and life support systems, and upon the diversity of life forms, which are jeopardized through excessive exploitation and habitat destruction by man."¹⁶² "The preamble links this theme to the fundamental purpose of the United Nations—the maintenance of international peace and security—by declaring that 'conservation of nature and natural resources contributes to . . . the maintenance of peace.'¹⁶³ The Charter's first principle, therefore, is that "nature shall be respected and its essential processes shall not be impaired."¹⁶⁴

Third, the Charter specifically states that "[a]griculture, grazing, forestry and fishing practices shall be adapted to the natural characteristics and constraints of given areas . . . [and] [a]reas degraded by human activities shall be rehabilitated for purposes in accord with their natural

156. Tisdell, *supra* note 143.

157. H. Wood, Jr., *The United Nations World Charter for Nature: The Developing Nations' Initiative to Establish Protections for the Environment*, 12 *Ecology L.Q.* 977 (1985).

158. *Id.* at 978.

159. G.A. Res. 7, U.N. GAOR Supp. No. 51, U.N. Doc A/51 (1982), *cited in* Wood, *supra* note 157, at 979 & nn.17-18.

160. Wood, *supra* note 157, at 978.

161. Wood, *supra* note 157, at 978.

162. Wood, *supra* note 157, at 978.

163. Wood, *supra* note 157, at 980 (quoting the *Preamble of the World Charter for Nature*).

164. *The World Charter for Nature*, art. 1, *reprinted in* 2 *Earth Ethics* 11 (1991).

potential and compatible with the well-being of affected populations."¹⁶⁵ Although Brazil and other Amazonian countries criticized the Charter for being merely aspirational,¹⁶⁶ the very purpose of the Charter was to "set standards that many nations have not yet obtained but for which they should strive."¹⁶⁷

World concern over protecting the global environment widened and intensified during the 1980s. As the Stockholm Declaration, the EARTH-CARE Petition, the World Conservation Strategy, and the World Charter for Nature demonstrate, the debate over global environmental protection had already moved from issues of state sovereignty and free use to issues of state responsibility and equity. Subsequent reports and agreements helped articulate the linkage between economic pressures on forests and environmental deterioration.

In 1983, the U.N. established the World Commission on Environment and Development (WCED), with Gro Harlem Brundtland, Prime Minister of Norway, as the chairwoman.¹⁶⁸ The WCED published its report called *Our Common Future*, or the Brundtland Report, in 1987. The Brundtland Report called on the U.N. to sponsor preparation of a universal declaration or charter on environmental protection and sustainable development as a basis for a convention.¹⁶⁹

To facilitate that negotiation process, Annex 1 of the Brundtland Report was a Summary of Proposed Legal Principles on Environmental Protection and Sustainable Development Adopted by the WCED Experts Group on Environmental Law.¹⁷⁰ The WCED felt that "[h]uman laws must be reformulated to keep human activities in harmony with the unchanging and universal laws of nature."¹⁷¹ The first principle suggested by the WCED is that human beings have a fundamental right to a healthy environment. The third principle reiterates the principles of the World Conservation Strategy, namely that states shall protect ecological functions, preserve biodiversity, and develop resources on a sustainable basis for the benefit of present and future generations.¹⁷² Other principles suggested by the WCED create duties for all states to prevent or abate pollution, establish environmental protection standards, assess policies, practices and technologies as a baseline, and make public all relevant information without delay in the event of an emergency.¹⁷³

In 1987, UNEP published the U.N. Environment Programme: Report of the Governing Council, Environmental Perspective to the Year 2000

165. *Id.*

166. Wood, *supra* note 157, at 984.

167. Wood, *supra* note 157, at 984.

168. *Process of Preparation of the Environmental Perspective to the Year 2000 and Beyond*, U.N. GAOR, 38th Sess., Supp. No. 47, 102d plen. mtg., U.N. Doc. A/38/47 (1983).

169. *Brundtland Report*, *supra* note 87, at 21, 332-33.

170. *Brundtland Report*, *supra* note 87, at 348-51.

171. *Brundtland Report*, *supra* note 87, at 330.

172. *Brundtland Report*, *supra* note 87, at 348.

173. *Brundtland Report*, *supra* note 87, at 331.

and Beyond¹⁷⁴ and The System-Wide Medium-Term Environmental Programme: 1990-1995.¹⁷⁵ These two documents, along with the Brundtland Report, are the three major environmental documents currently accepted within the U.N. system.¹⁷⁶ The U.N. has since established the Brundtland Report and the Year 2000 Report as "a broad framework to guide national and international cooperation on policies and programmes aimed at achieving sustainable and environmentally sound development in all countries."¹⁷⁷ These documents explicitly recognize in detail the need to protect both the functions and resources of forests.¹⁷⁸

174. U.N. Environment Programme: Report of the Governing Council, Environmental Perspective to the Year 2000 and Beyond, U.N. GAOR Supp. No. 25, U.N. Doc. A/42/25 (1987), [hereinafter *Year 2000 Report*], cited in Tinker, *supra* note 128, at 818.

175. The System-Wide Medium-Term Environmental Programme: 1990-1995, U.N. Doc. UNEP/GCSS.1/2 (1987) cited in Tinker, *supra* note 128, at 818.

176. Tinker, *supra* note 128, at 818.

177. Tinker, *supra* note 128, at 801 n.28 (quoting G.A. Res. 44/227 (1990)).

178. See, e.g., *Brundtland Report*, *supra* note 87.

First, environmental stresses are linked to one another. For example, deforestation, by increasing run-off, accelerates soil erosion and siltation of rivers and lakes. Air pollution and acidification play their part in killing forests and lakes. Such links mean that several different problems must be tackled simultaneously. And success in one area, such as forest protection, can improve chances of success in another area, such as soil conservation. Second, environmental stresses and patterns of economic development are linked one to another. Thus agricultural policies may lie at the root of land, water, and forest degradation. Energy policies are associated with the global greenhouse effect, with acidification, and with deforestation for fuelwood in many developing nations. These stresses all threaten economic development. Thus economics and ecology must be completely integrated in decision-making and lawmaking processes not just to protect the environment, but also to protect and promote development. Economy is not just about the production of wealth, and ecology is not just about the protection of nature; they are both equally relevant for improving the lot of humankind.

Third, environmental and economic problems are linked to many social and political factors. For example, the rapid population growth that has so profound an impact on the environment and on development in many regions is driven partly by such factors as the status of women in society and other cultural values. Also, environmental stress and uneven development can increase social tensions. It could be argued that the distribution of power and influence within society lies at the heart of most environment and development challenges. Hence new approaches must involve programmes of social development, particularly to improve the position of women in society, to protect vulnerable groups, and to promote local participation in decisionmaking.

Finally, the systemic features operate not merely within but also between nations. National boundaries have become so porous that traditional distinctions between matters of local, national, and international significance have become blurred. Ecosystems do not respect national boundaries. Water pollution moves through shared rivers, lakes, and seas. The

In 1989, the Italian Supreme Court convened an international meeting called the "Congress on A More Efficient International Law of the Environment and Establishing an International Court for the Environment Within the United Nations System."¹⁷⁹ Experts from twenty-seven countries and from all the continents attended.¹⁸⁰ The Congress agreed that "the environment, as one of the basic human rights, is a necessary legal reality at the international level . . . and that the environment with its resources must not be allowed to become a dangerous source of conflict."¹⁸¹ The Congress urged the international community to draft a universal International Convention on the Environment "proclaiming the duty of all States to conserve and protect the environment, both within and outside the limits of international jurisdiction."¹⁸² The Congress recommended the creation of an international agency within the United Nations to manage the world environment, the appointment of a United Nations High Commissioner for the Environment, and the creation by the United Nations of an International Court for the Environment, in which states, United Nations organs, and private citizens could file claims.¹⁸³

C. *Treaties and Conventions*

Unlike general agreements or declarations which are considered "soft" law, treaties and conventions are considered "hard" law.¹⁸⁴ Treaties and conventions codify agreements and thus are binding on the parties.¹⁸⁵ Although there is as yet no universal treaty on protecting the environment or on human rights to a healthy environment, there are several declarations on the environment and numerous international and regional treaties on subissues such as global climate change and biological diversity.¹⁸⁶ From these, general areas of consensus on forest protection emerge which will likely form the basis of an eventual treaty on forest protection.

From June 1-12, 1992, Brazil hosted the second United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro.¹⁸⁷ It was anticipated that "[t]he meeting [would] bring together

atmosphere carries air pollution over vast distances. Major accidents—particularly those at nuclear reactors or at plants or warehouses containing toxic materials—can have widespread regional effects.

Brundtland Report, *supra* note 87, at 37-38.

179. Postiglione, *supra* note 85.

180. Postiglione, *supra* note 85, at 321, 326.

181. Postiglione, *supra* note 85, at 327.

182. Postiglione, *supra* note 85, at 327.

183. Postiglione, *supra* note 85, at 327.

184. Tinker, *supra* note 128, at 802-3.

185. Tinker, *supra* note 128, at 802-03.

186. Tinker, *supra* note 128, at 803.

187. Tinker, *supra* note 128, at 793 n.4 (citing G.A. Res. 44/228 (1990) in which the United

representatives (perhaps heads of states) of about 150 countries, many of them with differing resources, needs, aspirations, and priorities.¹⁸⁸ It was also anticipated that the conference would create A Twenty-First Century Agenda,¹⁸⁹ a "Magna Carta for the Earth,"¹⁹⁰ a second World Charter for Nature,¹⁹¹ or an universal declaration on the environment, such as that suggested in the Brundtland Report.¹⁹²

One hundred seventy-two countries, including the United States, participated in the Rio Conference.¹⁹³

The scope of attendance at this historic meeting clearly defines the importance of its task. It was, very simply, the largest gathering of heads of state in the history of life on Earth. On June 13, 1992, nearly 100 world leaders met around a single table in Rio de Janeiro in the largest face-to-face meeting of national leaders in the history of international diplomacy.¹⁹⁴

Five major documents were negotiated. Only one was a treaty and this dealt with the specific issue problem of conserving biological diversity.¹⁹⁵ A Framework Convention on Climate Change¹⁹⁶ was also adopted. These two documents were adopted by 153 countries at UNCED. However, three documents were adopted unanimously.¹⁹⁷ These included the Rio Declaration,¹⁹⁸ the Forest Principles,¹⁹⁹ and Agenda 21.²⁰⁰ The entire body considered every point and every word (English) of these documents.²⁰¹

Nations authorized the conference).

188. P. Abelson, *Sustainable Future for Planet Earth*, 253 *Science* 117 (1991).

189. N. Alexander, *Healing Community: Restoring Creation*, 2 *Earth Ethics* 1, 3 (1991).

190. *Id.*

191. *World Charter for Nature*, *supra* note 164.

192. Tinker, *supra* note 128, at 805. *See also supra* notes 87, 150-157 and accompanying text.

193. D. Sitarz, *Editor's Note to Agenda 21: The Earth Summit Strategy to Save Our Planet* 24 (D. Sitarz ed., 1993).

194. *Id.* at 5.

195. *Convention on Biological Diversity*, June 5, 1992, 31 *I.L.M.* 818.

196. *Framework Convention on Climate Change*, May 9, 1992, 31 *I.L.M.* 849; *see also* M. Levy, *UNCED: Mileposts Along the Road from Rio*, 35 *Env't* 4, 5, 43-45 (1993).

197. Sitarz, *supra* note 193, at 24-26.

198. *Rio Declaration on Environment and Development*, June 14, 1992, 31 *I.L.M.* 874.

199. *A Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests*, June 13, 1992, 31 *I.L.M.* 881 [hereinafter *Forest Principles*].

200. *See*, E. Weiss, *Introductory Note: United Nations Conference on Environment and Development*, 31 *I.L.M.* 814 (1992) (referring to *United Nations Conference on Environment and Development*, Agenda Item 21, U.N. Doc. E-92-28252, A/CONF.151/26, Vols. I, II, and III (1992)). Agenda Item 21, known more commonly as Agenda 21, was adopted by the Plenary in Rio de Janeiro, June 14, 1992. An abridged version has been published as *Agenda 21: The Earth Summit Strategy to Save Our Planet* (D. Sitarz ed., 1993).

201. Interview with G. Larson, *International Forestry*, U.S.D.A. Forest Service, in Wash.,

The Rio Declaration, which began as the Earth Charter, is especially important because it represents a shift in the way the world does business: from emphasizing the military relationships between the East and the West to emphasizing the economic (have/have not) relationships between the North and the South.²⁰²

Agenda 21²⁰³ represents a blueprint for action.²⁰⁴ Its forty chapters containing 800 pages spell out specific objectives, activities, and the means for implementing those activities.²⁰⁵ Chapter 11 specifically addresses the need to combat deforestation. Sections 11.2 through 11.10 address the need to sustain the multiple roles and functions of forests.²⁰⁶

In the second program area of Agenda 21, UNCED specifically addressed restoration. For example, Section 11.12 mentions "greening" of suitable areas. Section 11.13(a) lists the various techniques often listed in treaties and other agreements: "conservation of natural forests, protection, forest rehabilitation, regeneration, afforestation, reforestation and tree planting." In contrast to prior agreements, Agenda 21 states that these tools will be used "with a view to maintaining or restoring the ecological balance and expanding the contribution of forests to human needs and welfare." Section 11.13(e) mentions again the tools of afforestation, reforestation, and rehabilitation.²⁰⁷

Similarly, Section 11.14(a) urges rehabilitating degraded forests in order to restore forest productivity:

Rehabilitation of degraded natural forests to restore productivity and environmental contributions, giving particular attention to human needs for economic and ecological services, wood-based energy, agroforestry, non-timber forest products and services, watershed and soil protection, wildlife management, and forest genetic resources.²⁰⁸;eb

The Forest Principles come closer to promoting restoration as a technique as well as an outcome. The Forest Principles include fifty-one topics. These are the same topics proposed at the first planning meeting where the countries, without narrow agendas, were able to take a comprehensive approach to forest management.²⁰⁹

D.C. (Nov. 1993) [hereinafter Interview with Larson].

202. *Id.*

203. *Supra* note 200.

204. Sitarz, *supra* note 193.

205. G. Larson, Summation and Outline of the United Nations Conference on Environment and Development, Agenda 21, Chapter 11: "Combating Deforestation" (1993) (unpublished manuscript, on file with author) [hereinafter Larson].

206. *Id.*

207. *Id.*

208. *Id.*

209. Larson, *supra* note 205.

Despite the broad goals of the Rio Declaration and Agenda 21, the Forest Principles indicate where the political will was in June 1992 with respect to the role of forests.²¹⁰ In 1990, the United States had proposed a convention on forests and the G-7, the leading industrial countries of the world, had placed forest conservation at the top of the international agenda.²¹¹ The developing countries, however, felt that the process was moving too quickly.²¹² The Secretariat initiated an assessment of forest conditions to prove that forest conservation was a major issue.²¹³ In the late spring of 1991, at the third preparatory meeting in Geneva, the participants accepted the final draft of the assessment as the basis for negotiating the Forest Principles. The Forest Principles, thus, represent the fallback position on which there was complete consensus.²¹⁴

The Forest Principles²¹⁵ reiterate many of the points discussed in this paper. For example, Section 1 of the Forest Principles discusses the *sic utero* principles. Section 8 discusses the concept of forests as a common resource.²¹⁶ Section 8(a) talks of "greening" the earth through reforestation, afforestation, and forest conservation.²¹⁷ Section 8(b) directs countries to maintain and increase forest cover through rehabilitation, reforestation, and re-establishment of forests.²¹⁸

In addition to the Forest Principles adopted in 1993, regional treaties and conventions signed through the early 1980s offer insights into the type and degree of consensus on forest conservation among the international community. Some of the major regional agreements include:

1933 Convention Relative to the Preservation of Fauna and Flora in Their Natural State (stating in art. 7 that "preservation of forest areas . . . should be encouraged").²¹⁹

210. Larson, *supra* note 205.

211. Larson, *supra* note 205.

212. Larson, *supra* note 205.

213. Larson, *supra* note 205; U.N. Preparatory Comm. for the United Nations Conference on Environment and Development, Working Group 1, 3d Sess., Agenda Item 3(a) (provisional)(Geneva, Aug. 12-Sept. 4, 1991); see generally *Preparations for the United Nations Conference on Environment and Development on the Basis of General Assembly Resolution 44/228 and Taking into Account Other Relevant General Assembly Resolutions: Conservation and Development of Forests, Report by the Secretary-General*, U.N. Doc. A/Conf.151/PC/64 (July 10, 1991).

214. Larson, *supra* note 205.

215. Forest Principles, *supra* note 119.

216. Forest Principles, *supra* note 119.

217. Forest Guardians, *supra* note 119.

218. 218 Forest Guardians, *supra* note 119.

219. U.N. Environmental Programme, Register of International Treaties and Other Agreements in the Field of the Environment 5 (1985).

1940 Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (agreeing in art. 2 to establish national parks, national reserves, nature monuments and strict wilderness reserves).²²⁰

1968 African Convention on the Conservation of Nature and Natural Resources (agreeing in art. IV to protect flora and ensure its best utilization, the management of forests and control of burning, land clearance and overgrazing).²²¹

1972-Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage) (establishing a List of World Heritage" and stating in art. 4 that the duty of identifying, protecting, conserving and transmitting to future generations of the cultural and natural heritage belongs primarily to the State in which sites of outstanding universal value are located).²²²

1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (attempts to protect endangered species from over-exploitation by regulating international trade in endangered species of flora and fauna, whether dead or alive).²²³

1974 Convention on the Protection of the Environment between Denmark, Finland, Norway, and Sweden (Nordic Convention) (establishing right of action for any person affected by environmentally harmful activities of a party state).²²⁴

1978 Treaty for Amazonian Co-operation (agreeing to encourage rational utilization of the human and natural resources and promote preservation of the environment).²²⁵

1979 Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention) (agreeing to conserve wild fauna and flora and their natural habitats).²²⁶

1982 Benelux Convention on Nature Conservation and Landscape Protection (Brussels) (agreeing to preserve transboundary natural areas).²²⁷

The goals of these early treaties and declarations are to protect ecological processes, preserve biodiversity, and promote sustainable development, similar to the three principles outlined in the various international agreements concerning the biosphere, as discussed earlier. Although each treaty and declaration tends to focus on one objective,

220. *Id.* at 6.

221. *Id.* at 72.

222. *Id.* at 109.

223. *Id.* at 115.

224. *Id.* at 125.

225. *Id.* at 160; *see also* 17 I.L.M. 1045.

226. U.N. Environmental Programme, Register of International Treaties and Other Agreements in the Field of the Environment 166 (1985).

227. *Id.* at 197.

protecting forests is a necessarily included step in implementing all three goals.

The International Tropical Timber Agreement was signed in 1983 at the United Nations Conference on Tropical Timber in Geneva.²²⁸ It is the only international convention focused exclusively on forests. Its primary purpose is to create a framework for cooperation between countries who produce and consume tropical timber to improve markets and to promote sustainable utilization.²²⁹ The agreement authorized the establishment of the International Tropical Timber Organization (ITTO) and three permanent committees: Economic Information and Market Intelligence; Reforestation and Forest Management; and Forest Industry.²³⁰ Although the focus of the ITTA was to improve the market in tropical timber, the signatory states agreed to encourage the development of national forest policies consistent with the three principles outlined above deemed necessary to sustain the tropical timber market. These principles include sustainable utilization and conservation of tropical forests, preservation of their genetic resources, and maintenance of the ecological balance in the regions concerned. Due to increased public pressure at home, Congress began negotiating a Global Forest Bill in 1989.²³¹ In 1990, the United States stated that it "supports the efforts of the ITTO to develop a plan for sustainable forest management and is interested in negotiating a global forestry agreement."²³² The Forest Principles adopted in 1992 at the Rio Conference, which apply to all forests, not just tropical forests, form the basis for a convention on global forest conservation.

D. Customary International Practices

The broad exhortations to protect ecological functions and foster sustainable development found in the Stockholm Declaration, the EARTHCARE Petition, the World Conservation Strategy, the World Charter for Nature, the Brundtland Report, Agenda 21 and the Rio Declaration are "soft law."²³³ Nonetheless, "[i]nternational practice is thought capable of creating binding rules of law known as 'customary international law.'"²³⁴ Repeated use of particular ideas in reports,

228. *Id.* at 208.

229. *Id.*

230. *Id.*

231. H.R. 3362, 101st Cong., 1st Sess. (1989).

232. U.S. Dep't of State, *GIST: Sub-Saharan Africa and US Policy*, 1 U.S. Dep't of State Dispatch 171, 172 (1990).

233. Tinker, *supra* note 128, at 800.

234. See generally M. Janis, *An Introduction to International Law* (1988). "International

resolutions, and other practices can create "justifiable expectations of future observance."²³⁵ For example, Art. 21 of the Stockholm Declaration acknowledges both the sovereign right of each state to exploit its own resources and the sovereign responsibility not to damage the environment of other states (*sic utero tuo* principle). This article is "often cited in U.N. documents, evidencing its emergence as customary law."²³⁶ Further, the countries represented at the Rio Conference strengthened and adopted it unanimously in the Rio Declaration.²³⁷

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.²³⁸

E. General Municipal Practices

Whereas treaties and custom are based on consent, international rules of law may be inferred from municipal practices that are merely common to a large number of states.²³⁹ Recently, various states have changed their municipal practices in order to protect their environment and foster sustainable development. For example, twenty-one states in the United States, eight countries, and the European Economic Community now address environmental protection in their constitutions.²⁴⁰ For example, Brazil's new constitution, signed in 1988,²⁴¹ includes an entire section devoted to environmental rights and responsibilities. The constitution specifically recognizes its forests as a national patrimony and provides for citizen suits.²⁴² The Charter of Paris for a New Europe states that "[p]reservation of the environment is a shared responsibility of all our nations We pledge to intensify our endeavours to protect

practice is thought capable of creating binding rules of law known as 'customary international law.'" *Id.* at 5.

235. *Id.* at 5.

236. Tinker, *supra* note 128, at 802 & nn.32-34.

237. Larson, *supra* note 205.

238. Rio Declaration, *supra* note 198.

239. Janis, *supra* note 234, at 5.

240. *An Environmental Bill of Rights*, 1 Earth Ethics 13 (1990) [hereinafter *An Environmental Bill of Rights*].

241. Constituicao Federal (Federal Constitution) (Brazil), *cited in* Chang, *supra* note 142, at 395 & n.3.

242. Constituicao Federal (Federal Constitution), ch. VI, art. 225, para. 4 (Brazil), *cited in* Chang, *supra* note 142, at 396-97 & n.5 (1990).

and improve our environment in order to restore and maintain a sound ecological balance in the air, water and soil."²⁴³

In the United States, various groups have developed drafts of an environmental rights amendment to the United States Constitution.²⁴⁴ Eight prior attempts were made between 1968 and 1972 to add an environmental rights amendment but each failed in committee in Congress.²⁴⁵ The National Wildlife Federation has stated that the amendment should be treated as a civil right rather than an economic right.²⁴⁶

In the meantime, as a result of worldwide political pressure, the United States passed the Tongass Timber Reform Act of 1990.²⁴⁷ The Tongass National Forest includes a major portion of the world's largest temperate rainforest.²⁴⁸ As a result of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), 5.4 million acres in the Tongass were set aside as wilderness.²⁴⁹ To offset potential losses to local economies, Congress agreed to maintain the flow of timber from the national forest by 1) entering into binding contracts with a few companies to sell timber for a fraction of their value,²⁵⁰ 2) exempting the forest from the National Forest Management Act's requirements for determining land suitability and allowable cuts, and 3) exempting the forest from the annual congressional appropriations process.²⁵¹ Although Congress intended these provisions to create jobs and stabilize communities, these goals were never met.²⁵² Meanwhile "[a]s much as fifty percent of the Tongass' productive forestland has been logged since 1950, yet reforestation requires over one hundred years."²⁵³

The United States has sharply criticized the forest practices of other countries.²⁵⁴ However, the abuse of the Tongass has "impeded

243. Charter of Paris for a New Europe, Nov. 21, 1990, U.S. Dep't of State Dispatch 171 (Supp. Mar. 1991). Thirty-four countries, including the United States and the U.S.S.R., signed the charter at the Conference on Security and Cooperation in Europe (CSCE).

244. *An Environmental Bill of Rights*, *supra* note 240 (discussing efforts of the National Wildlife Federation and The Comprehensive Environmental Amendment Project).

245. *An Environmental Bill of Rights*, *supra* note 240.

246. *An Environmental Bill of Rights*, *supra* note 240, at 14.

247. J. Levin, *A Comparison of Forestry Laws in the United States and Brazil as They Promote Deforestation in Southeastern Alaska and the Amazon Basin*, 14 *Hastings Int'l & Comp. L. Rev.* 1017, 1031-34 (1991) (citing the Tongass Timber Reform Act, Pub. L. No. 101-626, 104 Stat. 4426 (1990)).

248. *Id.*

249. *Id.* at 1024-25.

250. *Id.* at 1023-24.

251. *Id.* at 1025.

252. *Id.*

253. *Id.* at 1026.

254. *See, e.g., id.* at 1019.

efforts [of the United States] to reform other rain forest countries' polices."²⁵⁵ Nonetheless, some countries have begun to reform their policies as discussed above. As a result of these reforms, coupled with the approach of United Nations Conference on the Environment and Development in 1992, other countries began to attack the United States' own irresponsible forest practices.²⁵⁶

Several countries have passed legislation, and the international community has adopted numerous resolutions, to stem forest destruction in South America and Southeast Asia. At the same time, the United States has permitted the destruction of the world's largest temperate rain forest, the Tongass National Forest in Alaska, at an equally alarming rate.²⁵⁷

As evidence of the effect of this pressure, Congress, in to addition passing the Tongass Timber Reform Act, began to negotiate the Global Forest Bill discussed earlier. The Global Forest Bill would establish a policy in the United States of no net loss of domestic forests and would declare a "State of Emergency for Global Forests."²⁵⁸

F. *Opinio juris*

Another source of international law is *opinio juris*. *Opinio juris* is best reflected in judicial decisions and scholarly writings. These writings apply rules of customary international law to current problems. They, in effect, help determine when an international practice has become customary law.²⁵⁹ Reports by legal experts, such as the Brundtland Report discussed earlier,²⁶⁰ are especially significant because the members of commissions often represent countries from all regions of the world and at all stages of development. The broad representation on the WCED, for example, suggests that its recommendations are based on a growing international consensus among states, as well as NGOs, concerning which legal principles must be applied to present environmental problems, including problems of forest protection and use.²⁶¹ The Rio Conference grew out of the WCED and the broad representation obtained at the Rio Conference suggests that international consensus has strengthened.²⁶²

255. *Id.*

256. *Id.*

257. *Id.* at 1018 (citing 136 Cong. Rec. S7741-42 (daily ed. June 12, 1990) (statement of Sen. Wirth)).

258. H.R. 3362, 101st Cong., 1st Sess. (1989).

259. Tinker, *supra* note 128, at 803 n.41.

260. Brundtland Report, *supra* note 87.

261. Brundtland Report, *supra* note 87.

262. Interview with Larson, *supra* note 201.

G. *Jus cogens*

Fundamental ideas, which were characterized initially as soft law, may be characterized as general principles of law.²⁶³ Some rules of law are so fundamental that they prohibit acts by states even if such conduct is expressly sanctioned by state consent or custom.²⁶⁴ These rules of law are known as *jus cogens* or peremptory norms of general international law.²⁶⁵ *Jus cogens* may include affirmative duties and prohibitions. It has been argued that the right to life is non-derogable and universally regarded as *jus cogens*, and "the right to living is evolving from the right to life. As such, environmental protection becomes mandatory to the quality of life on this planet."²⁶⁶ Thus, the principle that states have an affirmative duty to preserve conditions necessary to life may become a general principle of international law.

In addition, some scholars think that certain acts against humanity, including terrorism and harm to the global environment, should be codified as international crimes.²⁶⁷ Regardless of whether the prohibition against intentionally harming the global environment is codified in a treaty on environmental protection, it could become a *jus cogens* norm. Maurice Strong, when he submitted the EARTHCARE petition to the United Nations as Executive Director of the United Nations Environmental Programme, stated that "[t]hose who, by their acts, endanger the environment on which life depends, clearly are committing an act of aggression against human rights, an act of aggression against the right to life itself."²⁶⁸

263. Tinker, *supra* note 128, at 803 n.41.

264. Janis, *supra* note 234, at 31, 53.

265. *Jus cogens* has been recognized in the Vienna Convention on the Law of Treaties, May 23, 1969, U.N. Doc. A/CONF. 39/27, 8 I.L.M. 679.

266. Gormley, *Human Rights*, *supra* note 26, at 111; Shutkin, *supra* note 67, at 489. "The right to life is protected under the Universal Declaration of Human Rights in its Preamble and in article 3. Furthermore, the right to life is protected by customary international law. However, the main source . . . is to be found in article 6 of the International Covenant on Civil and Political Rights . . . in which . . . the right to life is *jus cogens* and may not be derogated by any state party even during periods of emergency. . . Similar provisions are found in regional conventions." Gormley, *Human Rights*, *supra* note 26, 111.

267. Tinker, *supra* note 128, at 804 n.44.

268. Ho, *supra* note 150, at 225-26.

V. INTERNATIONAL AGREEMENTS ON COMMON PROPERTY RESOURCES

A. Introduction

Scholars disagree about the use of the term common property. According to Sorros, the atmosphere, the oceans and regional seas are common property resources for three reasons.²⁶⁹ First, the seas and the atmosphere are subject to joint use by numerous actors from different countries simultaneously and for a variety of purposes.²⁷⁰ Second, the seas and the atmosphere are physically indivisible because of their constant movement and mixing.²⁷¹ Third, because the atmosphere is "omnipresent over the surface of the earth" and the seas cover three-fourths of the earth, "it is impracticable to exclude unauthorized users." Because of these characteristics, the seas and the atmosphere are governed by the legal doctrine of *res communis*, meaning that individual actors are not permitted to stake exclusive claims to any part of the resource, but nevertheless may simultaneously exploit it for their private gain.²⁷² However, as community resources, the sea and the atmosphere are subject to free rider problems of overuse and misuse discussed in the first section of this paper.²⁷³ These characteristics, according to Bromley, are also features of open access resources subject to the legal doctrine of *res nullius*, owned by no one.²⁷⁴ According to Bromley, true common property exists where the resource is controlled by a community or corporate body.

Regardless of whether scholars have correctly or incorrectly described the property regime governing the sea and the atmosphere, the international community, in its collective or corporate form, has given these resources more protection through treaties, declarations, and other forms of international law. These agreements have made the sea and the atmosphere more truly common property resources as defined by Bromley. Treaties governing the use of the atmosphere and the oceans are thus the most significant recent examples of treaties relating to use of common property resources. Changes in the atmosphere, such as global climate change, have been acknowledged as a "common concern of mankind."²⁷⁵ Similarly, resources including the mineral and other

269. Sorros, *supra* note 4.

270. Sorros, *supra* note 4.

271. Sorros, *supra* note 4.

272. Sorros, *supra* note 4, at 116.

273. Sorros, *supra* note 4, at 116.

274. See *supra* notes 1-17 and accompanying text.

275. Sands, *supra* note 64, at 393 (citing Resolution on the Protection of Global Climate,

resources of the seas have been recognized as part of the "common heritage of mankind."²⁷⁶ As the international community begins to recognize forest functions and some forest resources as common property resources, international agreements may follow to protect forests similar to those intended to protect and regulate the use of the atmosphere and hydrosphere.

These earth systems are interrelated. In the Law of the Sea Convention,²⁷⁷ Article 212 deals explicitly with protecting the marine environment from pollution from or through the atmosphere.²⁷⁸ To protect the seas, or hydrosphere, and the atmosphere, the forest must be protected also. As discussed earlier, forests have characteristics of both common property resources and resources that can be appropriated. As a consequence, a tension exists between users of the forest resources that can be appropriated, e.g., land and timber, and users of the forest for environmental functions, e.g., cleansing the atmosphere and maintaining watersheds. Because states have favored the benefits of exploiting forest resources, the international community has not yet given forests explicit international legal protection as common property resources. However, the nature of existing international legal protection of forests can be inferred by looking at agreements on the atmosphere. In these agreements, a law of the forest is emerging which requires protecting forests from air and water pollution and other forms of degradation.

A. *International Agreements on the Atmosphere*

International agreements on the atmosphere are especially relevant in determining the nature of international agreement on forests. Atmospheric functions are integrally related to forest function. Compared to the general agreements on the biosphere, the major agreements on the atmosphere, discussed below, address in some detail the cycle of decline. The cycle of decline as described earlier begins when increasing economic and environmental pressures on forests adversely affect the atmosphere and, in turn, forest functions and resources. As forest functions and resources decline, economic pressures on the remaining forests intensify and the cycle worsens. The agreements on the atmosphere indicate a trend toward recognizing that 1) a grave threat to human life presently exists; 2) human beings have a right to the conditions necessary for life, as discussed earlier; 3) states have a responsibility to protect the

G.A. Res. 43/53, U.N. Doc. A/RES/43/53 (Jan. 27, 1989), 28 I.L.M. 1326).

276. Tinker, *supra* note 128, at 826 n.122.

277. United Nations Convention on the Law of the Sea, Dec. 10, 1982, U.N. Doc. A/CONF. 62/122, 21 I.L.M. 1261.

278. Carter & Trimble, *supra* note 85, at 614-15.

atmosphere; and 4) deforestation is one cause of atmospheric degradation and one source of economic pressure. Thus, these principles necessarily include protecting forest ecosystems and resources.

B. Threats to the Atmosphere

1. Air Pollution, including Acid Precipitation and Ozone

a. Acid Rain. Forests are important to the global cycling of sulfur and nitrogen.²⁷⁹ Trees withdraw sulfur and nitrogen from the air, water, and soil and use these nutrients to form living tissues. Thus, trees act as a sink for sulfur and nitrogen, releasing sulfur and nitrogen during the process of decay.

Sulfur oxides and nitrogen oxides are released into the atmosphere by burning fossil fuels and through other industrial processes. Grassland burning in Africa and forest burning in the tropics also release large amounts of sulfur oxides and nitrogen oxides. These gases are oxidized in the atmosphere and then dissolved in water to form acids²⁸⁰ which are then deposited by rain, fog, dew, and snow.²⁸¹ This is called "wet deposition."²⁸² Sulfur oxides and nitrogen oxides, however, may be deposited directly as particulates and gases.²⁸³ This process is known as "dry deposition."²⁸⁴ In the soil, these gases combine with water to form acids.²⁸⁵ Dry deposition is thought to be most significant near sources of nitrogen oxides and sulfur oxides (within 300 km).²⁸⁶ Wet deposition is thought to be most significant at greater distances (500-2,000 km).²⁸⁷ Both types of deposition are popularly known as "acid rain."²⁸⁸

The acids created by "acid rain" can directly damage living tissue if the acidity is strong enough.²⁸⁹ The acids can also increase soil

279. Penelope Revelle & Charles Revelle, *The Environment: Issues and Choices for Society* 34-36 (2d ed. 1984) [hereinafter Revelle & Revelle].

280. *Id.* at 402.

281. WRI 1987, *supra* note 29, 151-52.

282. WRI 1987, *supra* note 29, at 152.

283. WRI 1987, *supra* note 29, at 151-52.

284. WRI 1987, *supra* note 29, at 152.

285. Revelle & Revelle, *supra* note 279, at 402.

286. WRI 1987, *supra* note 29, at 152.

287. WRI 1987, *supra* note 29, at 152.

288. WRI 1987, *supra* note 29, at 151.

289. Revelle & Revelle, *supra* note 279, at 404; see generally J. Schwartz, *On Doubting Thomas: Judicial Compulsion and Other Controls of Transboundary Acid Rain*, 2 Am. U. J. Int'l L. & Pol'y 361 (1987).

acidity, adversely affecting plant growth,²⁹⁰ and increase water acidity, damaging animal life in lakes, ponds and rivers.²⁹¹ Acid rain is thought to be responsible for widespread forest decline in the Northeastern United States, Canada, and Europe.²⁹² Germany, for example, has suffered massive forest decline, which it calls "Waldsterben (forest death),²⁹³ with fifty percent of its forests damaged.²⁹⁴ Forty-three percent of Switzerland's forests, twenty-nine percent of Austria's forests, and seventy percent of Czechoslovakia's forests have been damaged.²⁹⁵

b. *Ozone.* Oxygen is important to plant growth. However, numerous studies have shown that oxygen, in the form of ozone (O₃) in the lower atmosphere (troposphere), causes damage to living plant tissue, impairs plant reproduction, and predisposes plants to root rot and other pathogens.²⁹⁶ Ozone is created when its precursors, nitrogen dioxide and volatile organic hydrocarbons, released primarily by automobiles²⁹⁷ and also by forest burning, are exposed to sunlight.²⁹⁸ The energy of the sunlight causes these precursors to dissociate and, through complex chemical processes, release one free atom of oxygen.²⁹⁹ The free atom of oxygen quickly reacts with oxygen (O₂) to form ozone.³⁰⁰ At night, ozone typically dissipates.³⁰¹

2. *Ozone Depletion*

Over hundreds of millions of years, ozone has accumulated in the upper atmosphere, called the stratosphere.³⁰² There, the ozone layer absorbs over ninety-nine percent of the ultraviolet radiation that comes from the sun.³⁰³ Large amounts of ultraviolet radiation are harmful to plant and animal life.³⁰⁴ "Scientists believe that life on land did not develop until the earth's protective ozone layer formed."³⁰⁵

290. WRI 1987, *supra* note 29, at 333.

291. WRI 1987, *supra* note 29, at 333.

292. WRI 1987, *supra* note 29, at 152, 154-56.

293. WRI 1987, *supra* note 29, at 155.

294. WRI 1990-91, *supra* note 27, at 205.

295. WRI 1990-91, *supra* note 27, at 202.

296. WRI 1987, *supra* note 29, at 154; Revelle & Revelle, *supra* note 279, at 421.

297. WRI 1987, *supra* note 29, at 193.

298. WRI 1987, *supra* note 29, at 147; Revelle & Revelle, *supra* note 279, at 431-32.

299. Revelle & Revelle, *supra* note 279, at 431-32.

300. Revelle & Revelle, *supra* note 279, at 431-32.

301. Revelle & Revelle, *supra* note 279, at 431-32.

302. Revelle & Revelle, *supra* note 279, at 580.

303. Revelle & Revelle, *supra* note 279, at 431-32.

304. Revelle & Revelle, *supra* note 279, at 431-32.

305. Revelle & Revelle, *supra* note 279, at 431-32.

Various chemicals, including chlorofluorocarbons (CFCs), are now known to breakdown ozone in the upper atmosphere.³⁰⁶ Recently, scientists have observed large holes in the ozone layer.³⁰⁷ Consequently, scientists have become alarmed about the increased risk of damage to plant and animal life, including an increased risk of skin cancer in humans, from increases in ultraviolet radiation.³⁰⁸

Because of the scientific consensus and recent startling evidence, states have agreed to specific regulatory obligations.³⁰⁹ However, conflict remains over how to reduce the release of ozone-depleting substances. Developed countries in the West, which produce and consume seventy percent of CFCs, have called for prohibitions against CFC production, while the less developed, non-Western countries have "shun[ned] international mandates for percentage emission reductions on grounds of equity and the legitimacy of their aspirations for development."³¹⁰

3. Global Warming

The atmosphere is slowly warming, a result of an intensification in the greenhouse effect.³¹¹ The greenhouse effect is "one of the most well-established theories in atmospheric science."³¹² The greenhouse effect occurs as greenhouse gases, such as carbon dioxide, methane, chlorofluorocarbons, and ozone, and nitrogen oxides,³¹³ build up in the atmosphere. Ultraviolet or short-wave light from the sun can continue to pass through the greenhouse gases and be absorbed by the earth's surface. However, infrared or long-wave radiation, which is radiated back from the earth, cannot escape through these gases. Because the infrared radiation is trapped near the earth's surface, the earth's surface begins to heat up.³¹⁴ Although carbon dioxide makes up fifty percent of the greenhouse gases in the atmosphere, the other greenhouse gases can have a greater effect on the atmosphere. For example, one molecule of methane absorbs 20-30 times as much heat as one molecule of carbon

306. Revelle & Revelle, *supra* note 279, at 431-32.

307. Revelle & Revelle, *supra* note 279, at 431-32; WRI 1987, *supra* note 29, at 156, 159.

308. WRI 1987, *supra* note 29, at 156.

309. Soroos, *supra* note 4, at 120.

310. Soroos, *supra* note 4, at 121.

311. See generally R. Houghton, *The Role of Forests in Affecting the Greenhouse Gas Composition of the Atmosphere*, in *Global Climate Change and Life on Earth* 43-55 (R. Wyman ed., 1990).

312. *Id.* at 43 (quoting S.H. Schneider).

313. *Id.* at 43; WRI 1990-91, *supra* note 27, at 11.

314. Revelle & Revelle, *supra* note 279, at 385.

dioxide. One molecule of chlorofluorocarbon absorbs 20,000 times as much heat.³¹⁵

The greenhouse effect is essential for life on earth. Without it, the Earth's average temperature would be about -18°C, 33°C cooler than it is presently.³¹⁶ However, because of an increase in the relative proportion of greenhouse gases to other gases in the atmosphere, the greenhouse effect has intensified and may threaten life on the planet as it exists today.³¹⁷

Forests are essential to the global cycling of carbon dioxide.³¹⁸ Growing forests are sinks for carbon dioxide (CO₂).³¹⁹ As forests grow, they withdraw carbon dioxide from the atmosphere and fix or store the carbon as living tissue.³²⁰ Once trees have matured, they no longer fix additional carbon dioxide, i.e., there is an equilibrium in the amount of carbon fixed by photosynthesis and released by respiration.³²¹ As trees begin to die, they release carbon into the atmosphere as carbon dioxide.³²²

Under anaerobic conditions, some organic material may form peat, coal, and oil deposits.³²³ In this process, carbon becomes concentrated as oxygen is released.³²⁴ Over hundreds of millions of years, this process, which began with primitive organisms, resulted in a net excess of oxygen in the atmosphere and allowed the evolution and survival of higher life forms.³²⁵

Relatively recently, the rate of release of carbon dioxide and methane to the atmosphere has increased.³²⁶ For example, by the beginning of the industrial revolution, carbon dioxide concentrations were two-thirds of the concentrations recorded for the last very warm interglacial period, 130,000 years ago.³²⁷ By 2075, the concentrations will have doubled from pre-industrial values and have surpassed those found 130,000 years ago.³²⁸ The concentration of methane has doubled

315. WRI 1990-91, *supra* note 27, at 12.

316. Houghton, *supra* note 311, at 43.

317. The Changing Atmosphere: Implications for Global Security (Toronto Conference Statement), June 27-30, 1988, reprinted in *Selected Materials*, 5 Am. U.J. Int'l L. & Pol'y 513, 515 (1990) [Selected Materials].

318. Revelle & Revelle, *supra* note 279, at 33.

319. WRI 1990-91, *supra* note 27, at 110.

320. Houghton, *supra* note 311, at 47.

321. Houghton, *supra* note 311, at 51.

322. Revelle & Revelle, *supra* note 279, at 33.

323. Odum, *supra* note 124, at 24.

324. Odum, *supra* note 121, at 24.

325. Odum, *supra* note 121, at 24.

326. Houghton, *supra* note 311, at 46-47.

327. WRI 1990-91, *supra* note 27, at 12.

328. WRI 1990-91, *supra* note 27, at 12.

since pre-industrial levels³²⁹ and is expected to become the major greenhouse gas within fifty years.³³⁰ Methane is released in a variety of ways, including burning organic matter.³³¹

Atmospheric concentrations of the other greenhouse gases are also increasing.³³² Chlorofluorocarbons are produced by human activity and there are no known natural sinks for them.³³³ Tropospheric (surface) ozone and nitrogen oxides are produced primarily by combustion of fossil fuels, including oil, natural gas, and coal, and by combustion of grasslands, forests, and other types of biomass. The primary source is from automobile exhaust.³³⁴ Developed nations, which have been the primary consumers of fossil fuels and of cars, now have relatively strict emissions control standards. Developing nations, which do not have emissions standards, are rapidly increasing their consumption of fossil fuels and buying cars.³³⁵

The major causes of increased concentrations of carbon dioxide in the atmosphere are emissions of carbon dioxide from burning fossil fuels (70 percent) and release of carbon dioxide from deforestation (30 percent).³³⁶ These activities also release the other greenhouse gases.³³⁷ "In the nineteenth century, the major regions of deforestation were the regions now industrialized, North America, Europe and the Soviet Union."³³⁸ The ratio of deforestation to reforestation has since stabilized in these regions.³³⁹ Rapid deforestation is occurring, however, in the tropics.³⁴⁰ In 1980, the ratio of deforestation to reforestation was 10:1 in the tropics.³⁴¹ Between 1980 and 1989, the rate of deforestation doubled.³⁴² The primary causes of deforestation in the tropics were discussed earlier.

329. WRI 1990-91, *supra* note 27, at 12.

330. WRI 1990-91, *supra* note 27, at 23.

331. WRI 1990-91, *supra* note 12, at 23, 354.

332. WRI 1990-91, *supra* note 27, at 12.

333. WRI 1990-91, *supra* note 27, at 16. "100 percent of the CFCs represent net additions to the atmosphere . . . CFCs, industrial products, . . . obviously did not exist in the atmosphere until they were created 60 years ago. They are the most potent greenhouse gases." WRI 1990-91, *supra* note 27, at 16.

334. Revelle & Revelle, *supra* note 279, at 419.

335. WRI 1990-91, *supra* note 27, at 212.

336. Houghton, *supra* note 311, at 46, 53.

337. WRI 1990-91, *supra* note 27, at 28.

338. Houghton, *supra* note 311, at 47.

339. Houghton, *supra* note 311, at 47.

340. Houghton, *supra* note 311, at 47.

341. Houghton, *supra* note 311, at 47.

342. Houghton, *supra* note 311, at 49.

Efforts to halt deforestation have been focused on the tropics. However, the Rio Conference demonstrated that north-south³⁴³ and east-west³⁴⁴ conflicts³⁴⁵ must be resolved before an international convention on forests can be adopted. Northern and western hemisphere countries cleared their forests in previous centuries for many of the same reasons that southern hemisphere countries with tropical forests want to exploit their forests now.³⁴⁶ Undeveloped and developing countries in the southern and eastern hemispheres are reluctant to forego the benefits that developed countries in the northern and western hemisphere have already reaped. Further, the more developed countries are the largest consumers of industrial wood worldwide. Even as they continue to harvest their own forests, they are also the largest importers of industrial wood from the tropical and less-developed countries. Thus, by being dependent on the undeveloped and developing countries for wood, the developed countries contribute to the present cycle of deforestation in developing and undeveloped countries.³⁴⁷ The pressure on the world's forests will be exacerbated as the demand for industrial wood increases in the developing and undeveloped countries. As the world's forests shrink, so does their capacity to absorb carbon from the atmosphere.

Further, the developed countries contribute disproportionately high amounts of carbon dioxide to the atmosphere. Six countries—the United States, the U.S.S.R., Brazil, China, India, and Japan—now contribute more than fifty percent of the warming potential added to the atmosphere each year by developed and developing countries from all parts of the world.³⁴⁸ For example, the United States contributes the most carbon dioxide, the U.S.S.R. the second most, and Brazil, the third most.³⁴⁹ This situation will be exacerbated as developing and undeveloped countries become more industrialized and urbanized, consume greater amounts of fossil fuel, and release more carbon dioxide to the atmosphere.

C. Trends in Agreements on the Atmosphere

Despite conflicts over equity issues, the mounting scientific evidence has convinced states that the atmosphere must be protected.³⁵⁰

343. Alexander, *supra* note 189, at 3-4.

344. WRI 1990-91, *supra* note 27, at 29.

345. WRI 1990-91, *supra* note 27, at 29.

346. WRI 1990-91, *supra* note 27, at 105-06.

347. WRI 1987, *supra* note 29, at 291.

348. WRI 1990-91, *supra* note 27, at 15.

349. WRI 1990-91, *supra* note 27, at 345.

350. WRI 1990-91, *supra* note 27, at 18-20.

Consequently, states have agreed to protect the atmosphere in the three areas of concern just described: acid precipitation, ozone depletion, and global warming. The major agreements are discussed below.

1. Acid Rain

The first multilateral accord on air pollution and the first environmental agreement involving all the nations of Eastern and Western Europe and North America was the Convention on Long-Range Transboundary Air Pollution (LRTAP) of 1979 signed in Geneva.³⁵¹ The LRTAP was a general agreement to cooperate in research and monitoring of air quality.³⁵² The thirty-four countries, including the United States and Canada, which form the Economic Commission for Europe (ECE), signed it.³⁵³

The next agreement was the Protocol on Long-Term Financing of Monitoring and Evaluation of Long-Range Transmission of Air Pollutants in Europe (EMEP), with Annex, which was signed in Geneva in 1984.³⁵⁴ It was soon followed by a second protocol, the Protocol on the Reduction of Sulfur Emissions or Their Transboundary Fluxes by at least 30 Percent, 1985.³⁵⁵ This protocol is also known as the Helsinki Protocol, the Sulfur Protocol, and the Thirty Percent Protocol. The Thirty Percent Protocol gave some teeth to the LRTAP by agreeing to reduce sulfur emissions at the source at least thirty percent over their 1980 levels as soon as possible, and no later than 1993.³⁵⁶

The Thirty Percent Protocol was remarkable because it represented an agreement by the polluting countries of Eastern Europe, West Germany, and Canada to reduce emissions.³⁵⁷ These countries had strongly resisted the LRTAP.³⁵⁸ But by 1985, West Germany and Canada had realized, based on forest decline in their own countries, that it was in their own best interests to control air pollution originating in their own

351. Convention on Long-Range Transboundary Air Pollution, Nov. 13, 1979, 18 I.L.M. 1442 (entered into force Mar. 16, 1983) [hereinafter LRTAP]; see also WRI 1987, *supra* note 29, at 192.

352. WRI 1987, *supra* note 29, at 192.

353. WRI 1987, *supra* note 29, at 192.

354. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Long-Term Financing of Monitoring and Evaluation of Long-Range Transmission of Air Pollutants in Europe (EMEP), with Annex., Sept. 28, 1984, 24 I.L.M. 484 (entered into force Jan. 28, 1988).

355. Protocol on the Reduction of Sulfur Emissions or Their Transboundary Fluxes by at least 30 Percent, 1985, to the Convention on Long-Range Transboundary Air Pollution, 1979, July 8, 1985, 26 I.L.M. 707 (entered into force Jan. 28, 1988).

356. WRI 1987, *supra* note 29, at 192.

357. WRI 1987, *supra* note 29, at 192.

358. WRI 1987, *supra* note 29, at 192-93.

countries.³⁵⁹ Consequently, despite their early resistance, all of the other countries with the exception of the United States, United Kingdom, and Poland, quickly agreed to sign the Thirty Percent Protocol.³⁶⁰

In 1988, a third protocol, the Protocol on the 1979 Convention on Long-Range Transboundary Air Pollution Concerning the Control of Emissions of Nitrogen Oxides or Their Transboundary Fluxes (Nitrogen Oxides, NO_x, or Sofia Protocol) was signed in Sofia.³⁶¹ The purpose of the NO_x Protocol is to "limit[] emissions of nitrogen oxide to 1987 levels after 1994."³⁶² The NO_x Protocol entered into force in 1991.

In 1991, a fourth protocol, the VOC Protocol, was negotiated in Geneva to limit emissions of volatile organic compounds (VOC). As discussed earlier, nitrogen oxides, already implicated in acid rain, and volatile organic compounds contribute to the formation of tropospheric ozone. "Perhaps the most significant aspect of the VOC Protocol is that it allows countries with different economic circumstances and varying potential to cause transboundary pollution to meet their emissions reduction requirement in alternative ways. It is the first agreement under LRTAP to provide this flexibility.³⁶³ Although the scope of the LRTAP and its Protocols is limited to the European countries, the United States, and Canada, these agreements set a precedent for regional agreement on air pollution regulations.

2. Ozone Depletion

In the meantime, the Vienna Convention for the Protection of the Ozone Layer³⁶⁴ was opened for signature in 1985 and entered into force in 1988 after twenty countries had signed it.³⁶⁵ Fifty-eight countries ratified, accepted, approved or acceded to the Vienna Convention.³⁶⁶ "The purpose of this agreement is to protect human health and the

359. WRI 1987, *supra* note 29, at 192-93.

360. WRI 1987, *supra* note 29, at 193.

361. Protocol on the 1979 Convention on Long-Range Transboundary Air Pollution Concerning the Control of Emissions of Nitrogen Oxides or Their Transboundary Fluxes (Nitrogen Oxides or Sofia Protocol), Oct. 31, 1988, 27 I.L.M. 698 (entered into force Feb. 14, 1991); WRI 1990-91, *supra* note 27, at 21.

362. Soroos, *supra* note 4, at 118.

363. D. Novello, *Introductory Note to United Nations: Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution Concerning the Control of Emissions of Volatile Organic Compounds or Their Transboundary Fluxes*, 31 I.L.M. 568.

364. Vienna Convention for the Protection of the Ozone Layer, Mar. 22, 1985, 26 I.L.M. 1516 (entered into force Sept. 22, 1988).

365. WRI 1990-91, *supra* note 27, at 364.

366. WRI 1990-91, *supra* note 27, at 257.

environment by taking measures to control activities that produce adverse effects."³⁶⁷

The Montreal Protocol on Substances that Deplete the Ozone Layer, amending the Vienna Convention, was opened for signature in 1987 and entered into force in 1989³⁶⁸ when at least eleven countries, accounting for two-thirds of the CFC production, had signed it.³⁶⁹ By January 22, 1990, fifty-four countries had ratified the Montreal Protocol.³⁷⁰ The Montreal Protocol originally called for a:

20 percent reduction, from 1986 levels, in the consumption and production of certain CFCs by 1993, and a further 30 percent cutback by 1998. Amendments to the Montreal Protocol that were adopted in London in June 1990 require a complete phasing out of most ozone-depleting substances by the year 2000, except by less developed states, which are allowed a further 10-year grace period."³⁷¹

Subsequently, in 1989, the Helsinki Declaration on the Protection of the Ozone Layer was signed.³⁷² It urged the complete phasing out of CFCs by 2000.³⁷³

Ninety-three states, including numerous developing nations such as China and India, later signed the London Amendment to the Montreal Protocol adopted at the Second Meeting of the Parties on June 29, 1990.³⁷⁴ The London Amendment was entered into force in 1992. "Ultimately, the acceptance of the 1990 London Amendments by [developing nations] came only after hard negotiations resulted in a commitment by the developed countries to establish . . . funding mechanisms that would assist poorer countries make the transition to technologies free of CFCs."³⁷⁵

As mentioned, at the Rio Conference in June 1992, the Framework Convention on Global Climate Change was adopted. Later in 1992, a

367. WRI 1990-91, *supra* note 27, at 257.

368. Montreal Protocol on Substances that Deplete the Ozone Layer, amending the Vienna Convention, Sept. 16, 1987, 26 I.L.M. 1541 (entered into force Jan. 1, 1989) [hereinafter Montreal Protocol].

369. WRI 1990-91, *supra* note 27, at 364.

370. WRI 1990-91, *supra* note 27, at 357.

371. Soroos, *supra* note 4, at 118; see also WRI 1990-91, *supra* note 27, at 363.

372. Helsinki Declaration on the Protection of the Ozone Layer, May 2, 1989, 28 I.L.M. 1335.

373. *Id.*

374. Soroos, *supra* note 4, at 119; Montreal Protocol on Substances that Deplete the Ozone Layer—Adjustments and Amendment, Nov. 23-25, 1992, 32 I.L.M. 874 (footnote to I.L.M. Content Summary and Article 2: Relationship to the 1990 Amendment). As of May 21, 1993, the United States, EEC, United Kingdom, the Russian Federation, Japan, Germany, Canada and Brazil, among other countries, had signed the amendment. *Id.*

375. *Id.* at 122.

Fourth Meeting of the Parties to the Montreal Protocol was held in Copenhagen on November 23-25, 1992.³⁷⁶ At this meeting, further Adjustments and Amendment to the Montreal Protocol were adopted. The Copenhagen Adjustments and Amendment set forth accelerated deadlines for reducing the rate of production of ozone-depleting substances with exceptions for certain chemicals to meet domestic needs of particular countries. Article 4 was amended to include a deadline for determining the feasibility of banning imports from nonsignatory countries of products containing controlled substances.³⁷⁷ The VOC Protocol to the LRTAP and the Copenhagen Amendment to the Montreal Protocol suggest movement in the international community toward greater flexibility and thus greater agreement in managing the atmosphere as common property.

3. Global Warming

The treaties on acid rain and ozone depletion were adopted as a result of growing scientific consensus and public awareness of how certain pollutants affect the atmosphere. This heightened awareness was brought on in part by publicity about the "forest death syndrome" or Waldsterben in the Black Forest of West Germany and the growth of the "ozone hole" over the Antarctic.³⁷⁸ By the late 1980s, however, scientific consensus and public awareness had widened to include concern about potential global climate change, especially warming, due to the greenhouse effect.

The potential impacts of global warming have been likened to those of a nuclear winter.³⁷⁹ For example, any change in global climate distribution would affect the distribution of forest types.³⁸⁰ If the change were to occur relatively abruptly, forest species would be unable to adapt or migrate.³⁸¹ In this scenario, trees would die out in parts of their range and be replaced by other biomes, such as grassland and desert.³⁸² Forest resources would become increasingly scarce.³⁸³ Floods and famine would increase. At the same time, the importance of forests as important sinks for excess atmospheric carbon became generally recognized.

376. Montreal Protocol on Substances that Deplete the Ozone Layer—Adjustments and Amendment, Nov. 23-25, 1992, 32 I.L.M. 874 (1993).

377. *Id.*

378. Soroos, *supra* note 4, at 120.

379. *Selected Materials*, *supra* note 317 (citing Toronto Conference Statement).

380. Lewis D. Solomon & Bradley S. Freedberg, *The Greenhouse Effect: A Legal and Policy Analysis*, 20 *Env'tl. L.* 83, 94 (1990).

381. *Id.*

382. *Id.*

383. *Id.*

Because the potential consequences of global climate change were perceived to be severe and widespread, movement towards a convention on global climate change has been rapid since the United Nations convened the first World Climate Conference in 1978.³⁸⁴ In January 1988, the United Nations adopted the Resolution on the Protection of the Global Climate, which stated that "the duty of the community of nations vis-a-vis present and future generations is to do all that can be done to preserve the quality of the atmosphere."³⁸⁵ The World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) created the Intergovernmental Panel on Climate Change (IPCC) to facilitate an international scientific consensus.³⁸⁶ "Two years later, after drawing on the expertise of more than 1,000 experts from 60 countries, the IPCC released reports from its three working groups that will inform negotiations on the climate change negotiations"³⁸⁷ to have begun in Washington in February 1991 to prepare a treaty for adoption at the 1992 U.N. Conference on Environment and Development.³⁸⁸

In June 1988, more than three hundred scientists and policy makers from forty-eight countries, U.N. organizations, other international bodies, and non-governmental organizations met in Toronto, Canada, and issued *The Changing Atmosphere: Implications for Global Security Conference Statement (Toronto Conference Statement)*.³⁸⁹ The Toronto Conference Statement called attention to global climate change, noting that "unanticipated and unplanned change may well become the major non-military threat to international security and the future of the global economy."³⁹⁰ The Statement expressed great concern over global climate change as a threat to food security.³⁹¹ The Statement called for an Action Plan for the Protection of the Atmosphere.³⁹² It specifically recognized deforestation as a major factor to be addressed. It suggested using the framework outlined in the Brundtland Report, which includes establishment of a Trust Fund to provide adequate incentives to developing nations to sustainably manage their forests.³⁹³

384. Tinker, *supra* note 128, at 809 & n.67.

385. Resolution on the Protection of the Global Climate, *supra* note 66.

386. Soroos, *supra* note 4, at 122.

387. Soroos, *supra* note 4, at 122.

388. Soroos, *supra* note 4, at 122.

389. Selected Materials, *supra* note 317 (citing Toronto Conference Statement).

390. Selected Materials, *supra* note 317 (citing Toronto Conference Statement, para. 11).

391. Selected Materials, *supra* note 317, at 519 (citing Toronto Conference Statement, para. 12).

392. Selected Materials, *supra* note 317, at 515 (citing Toronto Conference Statement, para. 5).

393. Selected Materials, *supra* note 317, at 523 (citing Toronto Conference Statement, para. 35).

In January 1989, the United Nations adopted a resolution on Protection of Global Climate for Present and Future Generations of Mankind.³⁹⁴ This resolution recognized that "climate change is a common concern of mankind, since climate is an essential condition which sustains life."³⁹⁵ It stated further that climate change "should be confronted within a global framework so as to take into account the vital interests of all mankind."³⁹⁶ It called on both governments and NGOs to "collaborate in making every effort to prevent detrimental effects on climate and activities which affect the ecological balance, and also calls upon non-governmental organizations, industry and other productive sectors to play their role."³⁹⁷ From this call for cooperation by all sectors of the world economy, the resolution requested the IPCC to review and make recommendations in particular on the possible strengthening of relevant existing international legal instruments having a bearing on climate and on the elements for an international convention on climate.³⁹⁸

A month later, in February, a meeting of eighty legal and policy experts met in Ottawa, Ontario, Canada. This meeting resulted in the Protection of the Atmosphere: Statement of the Meeting of Legal and Policy Experts. The Ottawa Statement called the atmosphere "a common resource of vital interest to mankind."³⁹⁹ The Statement concluded that States have an obligation to protect and preserve the atmosphere.⁴⁰⁰ In addition, it concluded that "[t]he sovereign right of States to permit in their territories or under their jurisdiction or control all human activities that they consider appropriate must be compatible (must conform) with their obligations to protect and preserve the atmosphere."⁴⁰¹ The Statement supported establishing a World Atmosphere Trust Fund to benefit developing countries⁴⁰² and suggested that deforestation/reforestation should be subject of a protocol to a climate change convention.⁴⁰³

394. Selected Materials, *supra* 317, at 525 (citing Protection of Global Climate for Present and Future Generations of Mankind, U.N. DOC. A/RES/43/53 (June 27, 1989) [hereinafter Malta Statement]).

395. Selected Materials, *supra* note 317, at 526 (citing Malta Statement, *supra* note 394, para. 1).

396. Selected Materials, *supra* note 317, (citing Malta Statement, *supra* note 394, Preamble).

397. Selected Materials, *supra* note 317, at 527 (citing Malta Statement, *supra* note 394, para. 9).

398. Selected Materials, *supra* note 317, (citing Malta Statement, *supra* note 394, para. 10).

399. Selected Materials, *supra* note 317, at 531 (citing Ottawa Statement, para. 3).

400. Selected Materials, *supra* note 389 (citing Ottawa Statement, para. 4).

401. Selected Materials, *supra* note 389 (citing Ottawa Statement, para. 5).

402. Selected Materials, *supra* note 389, at 536 (citing Ottawa Statement, para. 21).

403. Selected Materials, *supra* note 389, at 537-39 (citing Ottawa Statement, para. 24(B)(2)).

At the same time the Ottawa Conference was preparing its statement, the Tata Energy Research Institute in New Delhi, India, hosted a conference on "Global Warming and Climate Change: Perspectives from Developing Countries."⁴⁰⁴ The Tata Statement emphasized that four billion of the present human population of five billion people live in developing countries.⁴⁰⁵ It argued that "[d]eveloping countries will need assistance in the transition phase from traditional fossil fuels to more appropriate energy forms, and in promoting the preservation of forests and reforestation."⁴⁰⁶

The Tata Statement detailed the interrelated stresses of "the growth of population, industrial development, and the need for agricultural land use, and unsuccessful exploitation of natural resources . . . which result in air and water pollution, deforestation, soil erosion and salination, among others."⁴⁰⁷ The Statement noted that "canopy forests may suffer substantial declines" due to global warming.⁴⁰⁸ The Tata Statement paid particular attention to effects of wood combustion on global warming⁴⁰⁹ and to effects on people due to the shortage of fuelwood that may result.⁴¹⁰ The Statement emphasized the need to improve energy efficiency, use renewable energy sources, move to net forest growth from deforestation, and slow population growth.⁴¹¹

The Tata Statement is important because it devoted an entire paragraph to outlining a detailed afforestation program for developing countries.⁴¹² Within this program, it emphasized the need for more efficient grazing of animal populations, the need to promote agroforestry, and the need to include farmers in program development.⁴¹³ In a separate paragraph, the Tata Statement discussed the need to help women who are responsible for gathering increasingly scarce wood for home heating and cooking.⁴¹⁴

Within weeks, the Declaration of the Hague was issued.⁴¹⁵ Like the 1988 U.N. Resolution, the Hague Declaration recognized global

404. Selected Materials, *supra* note 389, at 546 (citing Tata Statement, para. 1.10).

405. Selected Materials, *supra* note 389, at 546.

406. Selected Materials, *supra* note 389, at 543 (citing Tata Statement, para. 1.1).

407. Selected Materials, *supra* note 389, at 548 (citing Tata Statement, para. 3.1).

408. Selected Materials, *supra* note 389, at 551 (citing Tata Statement, para. 3.5.3).

409. Selected Materials, *supra* note 389, at 543 (citing Tata Statement, para. 1.2).

410. Selected Materials, *supra* note 389, at 551 (citing Tata Statement, para. 3.6.1).

411. Selected Materials, *supra* note 389, at 556 (citing Tata Statement, para. 4.3 and 4.12).

412. Selected Materials, *supra* note 389, at 562 (citing Tata Statement, para. 6.2.3).

413. Selected Materials, *supra* note 389, at 562.

414. Selected Materials, *supra* note 389, at 558 (citing Tata Statement, para. 5.7).

415. Selected Materials, *supra* note 389, at 567-69 (citing Declaration of the Hague, March 11, 1989, 28 I.L.M. 1308).

climate change as "a common concern of mankind."⁴¹⁶ Most importantly, the opening paragraph stated that "[t]he right to live is the right from which all other rights stem. Guaranteeing this right is the paramount duty of those in charge of all States of throughout the world."⁴¹⁷ In making this statement, "[t]he Declaration . . . move[d] away from the primacy of the 'community of nations'"⁴¹⁸ to express concern for the rights of individuals in the global community. The Declaration called for "new principles of international law including new and more effective decision-making and enforcement mechanisms"⁴¹⁹ and invited other nations and the international organizations "to join in developing framework conventions and other legal instruments necessary to establish institutional authority and to implement the other principles."⁴²⁰ The Hague Declaration did not specify the details of these instruments or institutions, however.

In the summer of 1989, the 15th Annual Economic Summit (Summit of the Arch) of the heads of state of the seven European Communities was held in Paris, France. The Summit acknowledged "with great concern . . . deforestation" and stated that environmental degradation endangers the earth's ecological balance.⁴²¹ In the Summit statement, the nations agreed to "work together to achieve the common goals of preserving a healthy and balanced global environment in order to meet shared economic and social objectives and to carry out obligations to future generations."⁴²² The Summit statement argued for strengthening existing environmental institutions within the United Nations and took note of an international meeting on bioethics held in Brussels "which examined the elaboration of a universal code of environmental ethics based upon the concept of the 'human stewardship of nature.'"⁴²³ The Summit specifically stated that temperate forests must be protected from acid rain and air pollution.⁴²⁴ It also agreed that tropical forests must be protected⁴²⁵ and pledged assistance to the developing countries in the tropics.⁴²⁶

416. Selected Materials, *supra* note 389, at 567 (citing Hague Declaration, para. 3).

417. Selected Materials, *supra* note 389, at 567 (citing Hague Declaration, para. 1).

418. Sands, *supra* note 64, at 401.

419. Selected Materials, *supra* note 317, at 567 (citing Hague Declaration, para. 5).

420. Selected Materials, *supra* note 317, at 569 (citing Hague Declaration, para. 17).

421. Selected Materials, *supra* note 317, at 571 (citing Summit of the Arch, para. 33).

422. Selected Materials, *supra* note 317, at 571.

423. Selected Materials, *supra* note 317, at 575 (citing Summit of the Arch, para. 49).

424. Selected Materials, *supra* note 317, at 574 (citing Summit of the Arch, para. 44).

425. Selected Materials, *supra* note 317, at 574 (citing Summit of the Arch, para. 42 and 43).

426. Selected Materials, *supra* note 317, at 573 (citing Summit of the Arch, para. 38).

In September 1989, Japan hosted the Tokyo Conference on the Global Environment and Human Response Toward Sustainable Development (Tokyo Statement).⁴²⁷ Japan is timber poor and thus depends heavily on imports of wood from both tropical and temperate forests. The Tokyo Statement began with the premise that "[n]o one nation can, alone, mitigate the extent or consequences [of global warming]. It is a truly global problem; it will require a truly global solution."⁴²⁸ The Tokyo Statement summarized the problem of tropical deforestation in terms of the factors described earlier in this paper.

Natural forests within the tropics are being destroyed and seriously degraded every year at an unprecedented rate, the principle causes being pressure of population, economic imperatives and land hunger. Only a small proportion of this forest is removed for well planned and executed development by the majority (sic) is the victim of unwise conversion to agriculture, excessive shifting cultivation, badly executed timber exploitation, over-grazing and over-collection of fuelwood, many of these factors being closely linked to each other. In general the real goods and services which could be provided by the forests are undervalued and the benefits of conversion to other uses are overestimated.⁴²⁹

The Tokyo Statement then outlined action plans for both developing and developed countries. It urged developing countries to promote sustainable management of forests at the local level,⁴³⁰ in part by increasing the stumpage price of the timber⁴³¹ and using "large-scale sustainable management of natural forests for timber production according to scientific management plans with logging under adequate control."⁴³² Despite emphasis on large-scale management, the Statement gave priority to local communities and indigenous "forest dwellers."⁴³³ It urged developed countries to provide financial assistance to the developing countries and to stabilize tropical timber markets to support developing countries' efforts.⁴³⁴ The Tokyo Statement reflects the growing tension felt by both exporting and importing countries between the use of forests for industrial wood and the use of forests for the necessities of life, such as fuel, fiber, food, and building materials.

427. Selected Materials, *supra* note 317, at 577.

428. Selected Materials, *supra* note 317, at 577 (citing Tokyo Statement, para. 1).

429. Selected Materials, *supra* note 317, at 578 (citing Tokyo Statement, para. 2).

430. Selected Materials, *supra* note 317, at 578 (citing Tokyo Statement, para. IV(A)(b)).

431. Selected Materials, *supra* note 317, at 578 (citing Tokyo Statement, para. IV(A)(g)).

432. Selected Materials, *supra* note 317, at 578 (citing Tokyo Statement, para. IV(A)(f)).

433. Selected Materials, *supra* note 317, at 578 (citing Tokyo Statement, para. IV(A)(b)).

434. Selected Materials, *supra* note 317, at 578.

A month later, on October 21, 1989, "the Heads of Government of the Commonwealth, representing a quarter of the world's population and a broad cross-section of global interests" met in Langkawi, Malaysia and issued The Langkawi Declaration on Environment.⁴³⁵ Tropical forests in Malaysia have been under great pressure in recent years.⁴³⁶ The Langkawi Declaration argued that "[t]he success of global and national environmental programmes requires mutually reinforcing strategies and the participation and commitment of all levels of society—government, individuals and organizations, industry and the scientific community."⁴³⁷ The Declaration supported sustainable forest management and the efforts of the ITTO and the FAO's Tropical Forestry Action Plan.⁴³⁸

On November 7, 1989, at a conference in The Netherlands, the participants issued the Noordwijk Declaration on Atmospheric Pollution and Climatic Change. The Netherlands would be subject to flooding if sea levels rise as a result of global warming. The Noordwijk Declaration stated that "society is being threatened by man-made changes to the global climate."⁴³⁹ "Predictions available today indicate potentially severe economic and social dislocations for future generations. Delay in action may endanger the future of the planet as we know it."⁴⁴⁰ It stated further that "[t]he basic principle of ecologically sustainable development has gained wide currency . . . [and] should be fundamental to efforts to tackle the problem of climate change and atmospheric pollution."⁴⁴¹

The Noordwijk Declaration reiterated the principle of the sovereign right of States to manage their natural resources independently and therefore urged international cooperation between developed and developing nations.⁴⁴² The Declaration specifically referred to the need articulated in previous declarations for developing nations to sustainably manage their forests. It suggested the ultimate goal of "a global balance between deforestation on the one hand and sound forest management and afforestation on the other."⁴⁴³ It also suggested aiming for "a world net forest growth of 12 million hectares a year in the beginning of [the] next century."⁴⁴⁴ This is the first declaration to suggest a specific goal

435. Selected Materials, *supra* note 317, at 589 (citing Langkawi Declaration).

436. Rush, *supra* note 24, at 40-42.

437. Selected Materials, *supra* note 317, at 590 (citing Langkawi Declaration, para. 7).

438. Selected Materials, *supra* note 317, at 590.

439. Selected Materials, *supra* note 317, at 592 (citing Noordwijk Declaration, para. 1).

440. Selected Materials, *supra* note 317, at 592 (citing Noordwijk Declaration, para. 2).

441. Selected Materials, *supra* note 317, at 592 (citing Noordwijk Declaration, para. 2).

442. Selected Materials, *supra* note 317, at 593-94 (citing Noordwijk Declaration, para. 6).

443. Selected Materials, *supra* note 317, at 597 (citing Noordwijk Declaration, para. 21).

444. Selected Materials, *supra* note 317, at 597.

for afforestation. To accomplish this goal, the Noordwijk Declaration favored a two prong approach: suppressing environmental stresses, such as acid rain, on forests and encouraging sustainable forest management practices.⁴⁴⁵

On November 18, 1989, the low-lying, small coastal and island states met in Male, Republic of Maldives and issued the Male Declaration on Global Warming and Sea Level Rise.⁴⁴⁶ The Declaration urged international cooperation in reducing greenhouse gases and called for negotiations on a framework convention on climate change to start as soon as possible.⁴⁴⁷ In particular, the Declaration appealed to "all States to embark on intensive afforestation and/or revegetation programmes."⁴⁴⁸

The Male Declaration is one of the first statements to recognize the value of mangrove forests by recommending "that small coastal and island States take adequate measures to maintain aquifers and protect vulnerable natural ecosystems such as coral reefs and mangroves [forests] which may already be at risk, as they can provide natural protection against the adverse effects of climate change, global warming and sea level rise."⁴⁴⁹ In recent years, mangrove forests, which protect shorelines and provide nurseries for fish, have been severely threatened by coastal development.⁴⁵⁰

By the end of the year, on December 19, 1989, the United Nations adopted the Resolution for the Protection of Global Climate for Present and Future Generations of Mankind.⁴⁵¹ The 1989 Resolution began by citing the various declarations, including those discussed above, that it had received from countries around the world. The Resolution

[R]eaffirm[ed] that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right of states to exploit their own resources pursuant to their environmental policies, and also reaffirm[ed] their 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 and the need to play their due role in preserving and protecting the global and regional environment in

445. Selected Materials, *supra* note 317, at 598 (citing Noordwijk Declaration, para. 21).

446. Selected Materials, *supra* note 317, at 604.

447. Selected Materials, *supra* note 317, at 604-05 (citing Male Declaration, para. 2 and 11).

448. Selected Materials, *supra* note 317, at 604-05 (citing Male Declaration, para. 7).

449. Selected Materials, *supra* note 317, at 604-05 (citing Male Declaration, para. 6).

450. Rush, *supra* note 24, at 6.

451. Selected Materials, *supra* note 317, at 606 (citing U.N. Doc. G.A. A/44/862).

accordance with their capacities and specific responsibilities.⁴⁵²

In the portion of the 1989 Resolution just quoted, the U.N. General Assembly added the provision for due diligence in the third clause, thereby explicitly modifying the *sic utero tuo* doctrine discussed earlier. The U.N. implicitly recognized that global climate change is caused by and will affect all states. It also reiterated the need for cooperation and in particular for the developed countries to assist the developing countries.

In October 1990, the report of the Intergovernmental Panel on Climate Change was completed, and in November, the Second World Climate Conference was convened.⁴⁵³ In December 1990, the United Nations General Assembly passed a resolution establishing an Intergovernmental Negotiating Committee to negotiate an international convention on climate change.⁴⁵⁴ The World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) drafted the outline of the convention⁴⁵⁵ which was presented at the United Nations Conference on Environment and Development in Brazil in June 1992.⁴⁵⁶

VI. 1992 UNCED AND RESTORATION

Global climate change, brought on in part and aggravated by deforestation, may result in a modern Gilgamesh. Global warming may result in desertification in places which are not now deserts. If this occurs, it would threaten human survival and increase conflict as resources become scarcer. These and other threats posed by global climate change and other types of atmospheric change have caused the international law of the atmosphere to evolve quickly, and with it an international law of forest conservation. Similarly, concern over the loss of biological diversity and the consequent adverse impacts on human welfare has led to an emergent law of biological conservation.

The Forest Principles adopted at the 1992 UNCED in Rio are necessary to fully implementing recent agreements on protecting the atmosphere and biological diversity. More importantly, the Forest Principles explicitly recognize that forests contribute directly to the survival of people, domestic productivity, and internal security. Government heads, under pressure to maintain domestic economies and internal security, may become more willing to conserve rather than

452. Selected Materials, *supra* note 317, at 618 (citing the 1989 Resolution, Draft Resolution II, para. 4).

453. Soroos, *supra* note 4, at 122.

454. Darmstadter, *Reviews/Essays*, 19 *Pol'y Stud. J.* 180 (1991).

455. Soroos, *supra* note 4, at 122.

456. Soroos, *supra* note 4, at 122.

liquidate the forests in their countries once the link between economic and social well-being and forest conservation becomes more evident. While the benefits of forest conservation may spill over onto other states, the costs are borne differentially. Equitable distribution of the costs continues to be an issue.⁴⁵⁷

There is a broad base of international consensus on global climate change. Countries, which were initially prompted by internal concerns, such as coastal flooding of island states or Waldsterben in the Black Forest, to support forest conservation have more recently begun to agree that forests should be protected to slow global climate change generally. Other countries have joined in the effort. Thus, the countries who adopted the Convention on Global Climate represent all parts of the world and all stages of development.⁴⁵⁸

In the process of reaching agreement on global climate change, states have come to recognize the interrelationship between development, deforestation, global warming, and the collapse of civilization. The Forest Principles, by supporting sustainable development, have extended the general principles of sovereign authority to use natural resources subject to the *sic utero tuo* principle of good neighborliness,⁴⁵⁹ found in earlier agreements, including the 1972 Stockholm Declaration.⁴⁶⁰ Sustainable development is commonly defined as the use of natural resources for the benefit of present generations without impairment for future generations. Forests are now seen in terms of the environmental functions they provide which are necessary to sustain societies.

International agreements and declarations often mention preservation, replanting, reforestation, rehabilitation, and afforestation (forestation of areas which were not previously forested). Little has been said so far, however, about forest restoration. Restoration commonly means making whole or recovering what has been lost. De Montalembert and Schmithusen, for example, define sustainable development in the context of forest conservation as "securing improved livelihoods for present generations while maintaining the forest heritage and its future potential."⁴⁶¹ Thus, restoration is consistent with sustainable development.⁴⁶² And, it may be undertaken to rectify damage from past actions or to mitigate damage as part of present development activities and is

457. See *supra* notes 54-60, 92-93 and accompanying text.

458. Interview with Larson, *supra* note 201.

459. See *supra* notes 72-76 and accompanying text.

460. *Brundtland Report*, *supra* note 87.

461. M. de Montalembert & Franz Schmithusen, *Policy and Legal Aspects of Sustainable Forest Management*, 44 *Unasylva* 3, 3-4 (1993).

462. N. Robinson, *Ecosystem Rehabilitation: The Environmental Law Framework*, in 1 *Ecosystem Rehabilitation* 129, 134-38 (Mohan K. Wali ed. 1992).

more than replanting trees for future timber supplies or establishing ground cover for erosion control. Forest restoration suggests the importance of restoring both the structure and the function of forests as natural systems.

Restoration is a relatively new concept in the history of forest conservation. The history of forest conservation in a particular area often includes the practice of excluding people and livestock from natural forests or otherwise restricting forest resource use. Outside of these protected areas, forests began to grow back if the land had not become too degraded. Only in the last century have people begun to plant cutover watersheds with trees to control flooding and soil erosion and to improve timber and fuelwood supplies.

Soon, silvicultural practices, including regeneration practices, became more sophisticated and widespread. Techniques for creating plantation and agroforestry systems, sometimes called forest analogs,⁴⁶³ were developed. The current trend of creating plantations or agroforestry systems may not be sufficient to restore the forest functions.⁴⁶⁴ Although an area may have forest cover, the structure and function of the forest analog is simplified compared to a forest such that while it provides certain resources it does not provide the full range of environmental benefits.

More recently, nongovernmental organizations, sometimes with the support of state governments, have funded projects to restore fully functioning forests and thereby protect biological diversity and improve human welfare.⁴⁶⁵ These restoration efforts, however, have been defeated in many instances by pilfering, invading grasses, overgrazing, setting fires to clear the forest, farming, and constructing roads to bring in more people.⁴⁶⁶ Countries have had limited success in controlling these incursions sufficiently so that young trees can even survive. In Southeast Asia, for example, all countries have laws that require maintenance, but most countries do not effectively enforce these laws. At the same time, however, countries can use restoration as an additional reason for excluding forest-dependent people from the forest.⁴⁶⁷

Another alternative is to allow forests to regenerate naturally as a means of restoration. However, in some cases, intervention may be needed to reestablish trees. For example, where forest cover has been

463. J. Alper, *Forest Analogs: A Good Half-Measure?* 260 *Science* 1896 (1993).

464. Interview with P. Durst, International Forestry, U.S.D.A. Forest Service, in Arlington, Va. (Nov. 4, 1993) [hereinafter Durst].

465. *Id.*; Telephone Interview with Nora Devoe, International Forestry, U.S.D.A. Forest Service, in Honolulu, Haw. (Dec. 15, 1993) [hereinafter Devoe].

466. Durst, *supra* note 464.

467. Durst, *supra* note 464.

removed and grasses, such as *imperata* have become established, more intensive methods may be required to reestablish trees. *Imperata* is not valued for pasture and is commonly burned to allow other, more desirable grasses to grow. Tree seedlings must be planted, and until they become established, must be protected from fire, livestock, and people.⁴⁶⁸

Forests are more than storehouses of products, such as timber. Forests provide multiple benefits for many groups of people.⁴⁶⁹ Many of these benefits flow to people without necessarily removing large areas of forest vegetation. To be fully successful in practice, however, new social institutions are needed.⁴⁷⁰ New laws and social arrangements within each country must recognize the long-term role of forests in meeting the basic and immediate needs of resident populations for survival, in participating effectively in the global economy, and in maintaining atmospheric and biological functions.⁴⁷¹

The five agreements, the Rio Declaration,⁴⁷² Agenda 21,⁴⁷³ the Forest Principles,⁴⁷⁴ coupled with the Convention on Biodiversity⁴⁷⁵ and the Convention on Climate Change,⁴⁷⁶ lay the foundation for the world community to move beyond promoting forest^o protection to promoting forest restoration and sustainable development.⁴⁷⁷ Since UNCED, more than one hundred multinational meetings have been held to develop action plans for implementing the goals of Agenda 21. For example, negotiations have proceeded to create a high-level Commission on Sustainable Development to monitor implementation of Agenda 21⁴⁷⁸ and strengthen the Global Environment Facility (GEF).⁴⁷⁹

468. Durst, *supra* note 464.

469. De Montalembert & Schmithusen, *supra* note 461, at 3.

470. M. Cirelli, *Forestry Legislation Revision and the Role of International Assistance*, 44 *Unasylya* 10, 10-15 (1993); de Montalembert & Schmithusen, *supra* note 461.

471. Cirelli, *supra* note 470. Cirelli cites examples of the changes needed to make existing forestry legislation in many countries consistent with the broader concerns and customary practices of forest-dependent populations. Cirelli, *supra* note 470.

472. *Supra* note 198.

473. *Supra* note 200.

474. *Supra* note 199.

475. *Supra* note 195.

476. *Supra* note 196.

477. Larson, *supra* note 205.

478. Levy, *supra* note 196, at 4.

479. Levy, *supra* note 419, at 43. The GEF was established by the World Bank, UNEP and the UN Development Programme within the World Bank in 1990 as a "three-year pilot program and given the job of allocating \$1.3 billion for projects related to global warming, biodiversity, international waters, and stratospheric ozone depletion." *Id.* See also World Bank: Documents Concerning the Establishment of the Global Environmental Facility [Mar.-Oct., 1991], 30 I.L.M. 1735.

Much of the groundwork for agreement on global forest conservation was laid by groups of countries with common concerns for avoiding the effects of global climate change, ozone depletion, and air pollution; conserving regional biological diversity; and resolving internal conflicts over use of forest resources. As general principles and international institutions to support them have emerged, states have begun to take the next step of reflecting these principles of sustainable forest management in municipal legislation. However, comprehensive legislative change may be needed in some cases to make land use and tenure, as well as environmental, wildlife, parks, watershed management, rural fire control, mining, criminal, customs, tax, and transportation laws consistent with sustainable forest management concepts.⁴⁸⁰ Further, the more difficult challenge will be for states to implement these new laws and practices in the face of ever-increasing pressures on forests worldwide.

480. Cirelli, *supra* note 470, at 14.