HALTING NEOTROPICAL DEFORESTATION: DO THE FOREST PRINCIPLES HAVE WHAT IT TAKES?

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INTRODUCTION

I crashed into the thick secondary growth, stopping suddenly to duck a certain branch in my path: a fat black bullet ant crawled along it with indifference, an attitude that would have quickly changed had I brushed up against him. I headed toward the large patch of Heliconia *just to the right. We had earlier mapped out the clump, and finding it to contain seventeen flower clusters, it was one of the prize patches in the study plot. I took my spot ten paces from the outer clusters, started my stop watch, and waited with field book in hand. The Birds of Paradise were dripping nectar from their red fingertips.*

With such a gold mine, I did not have to wait long for a hummingbird. Like an Evinrude-powered flat bottom whizzing up a winding lagoon, the bird's sound reached me before I saw him. He appeared from the back of the patch, taking a drink here, then there, then here again, then at some other spot, then there again and back to here. He did not sit and sip for long at each spot, but he did pause long enough for me to see him gleam green and deep violet. He was a red-footed plumeleteer, emerald green on the head, changing to dark purple through his body and on to his tail. His feet and straight bill were distinctively red. Without a doubt he owned this lucrative Heliconia *patch.*

But then from my right came another whir. A tiny torpedo flashed in and stopped for a second at a flower clump and sipped a quick and meaningful draught. It was golden with a white face and black eyebar and had an unmistakable curved bill and long tail. A long-tailed hermit. The hermit moved on for another quick drink and then on to one more. By now, the plumeleteer spotted the intruder. I heard its whirring wings once more, this time with a greater sound of urgency. The plumeleteer was immediately on the hermit's tail, who hastily abandoned his drink and headed for the back of the patch. Doing an about face, the hermit whizzed back towards me with the plumeleteer following directly behind. The hermit stopped on a dime and turned to his right, but the pursuit could not be shaken. With a final whir of acceleration, the intruder ducked

around the last flower clump and headed out the opposite end of the patch from whence he came. The plumeleteer followed and the sound of their wings faded quickly away.

Seconds later, I heard the plumeleteer return, the whirring sound slower this time. I soon observed him feeding again, taking much deserved victory draughts from his precious Heliconia.[1]

Tropical forests hold a wealth of treasures and play roles of worldwide importance. They are key components in the global carbon cycle, help maintain regional air, water, and soil quality, and are the storehouses of half of the world's plants and animals. Yet, despite the fact that the benefits of tropical forests are enjoyed worldwide, they are not recognized as "global commons." Generally, forests are considered the property of the countries in which they grow, and the principles of national sovereignty ensure that each state has a "sovereign right to exploit their own resources pursuant to their own environmental policies."[2] Because of this striking mix of global and sovereign interests, the conservation of tropical forests presents an especially difficult set of issues.

Tropical forests are found primarily in the developing countries of the South, whose commitment to development means they have very different views about forest use and conservation than the developed North. In recent years, tropical deforestation has increased at alarming rates.[3] In response to this trend, there has been an increasing global awareness of the problems created by tropical deforestation and an increasing international effort to understand its causes. As a consequence, there also has been an

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1. I observed this Star Wars-like battle between these hummingbirds during a study of hummingbird feeding behavior conducted at La Selva Biological Study Reserve in Costa Rica in February, 1993. The entire area would be slashed and burned within two days. *See* Charles R. Preuss, Matthew B. Royer, & Marco Seandel, *Competitive Interactions Between Hermit and Non-Hermit Hummingbirds in Relation to Patch Size of Heliconia pogonantha Inflorescences, in* DARTMOUTH STUDIES IN TROPICAL ECOLOGY 121 (Thomas S. Bansak & Marco Seandel eds., 1993).

2. 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, 1420 [hereinafter Stockholm Declaration].

3. A survey completed for the Amazon using satellite imagery and a geographic information system (GIS) revealed that deforestation increased greatly from 1978 to 1988 (78,000 to 230,000 km^2), as did total affected habitat (208,000 to 588,000 km^2). David Skole & Compton Tucker, *Tropical Deforestation and Habitat Fragmentation in the Amazon: Satellite Data from 1978 to 1988*, 260 SCIENCE 1905, 1909 (1993). Total affected habitat includes not only habitats lost to deforestation but habitats affected by isolation and edge effect as well. *Id.* at 1906.

increasing effort to slow the pace of tropical deforestation. At the United Nations Conference on Environment and Development (UNCED) at Rio in 1992, all 172 countries in attendance signed a set of non-legally binding global "Forest Principles" that represent a consensus concerning the conservation, management, and sustainable development of all forests.

While tropical deforestation is a major threat to the world's forests, it remains unclear whether the Forest Principles offer any solutions to the problem. This paper attempts to explore that issue. Part I and II looks at tropical deforestation in detail, with Part I describing the local, regional, and global importance of tropical forests, and Part II exploring the causes of the present wave of deforestation in Latin America. Part III describes how international environmental law led to the adoption of the Forest Principles. A special emphasis is placed on explaining the political context in which the Principles were created: the deep North-South divide. It ends by summarizing the themes stemming from the Principles. Finally, Part IV analyzes whether the Forest Principles actually address the causes of neotropical deforestation or solve any of the problems identified in Parts I and II.

I. THE IMPORTANCE OF TROPICAL FORESTS AND THE EFFECTS OF TROPICAL DEFORESTATION

Tropical forests benefit both local populations and the entirety of mankind. Thus, tropical deforestation adversely affects local, regional, and global communities. The communities situated in tropical forests are the people most directly impacted by deforestation. Many indigenous groups live in the forests and rely upon the wealth of resources they supply. While Northerners hail the ecological and medicinal benefits of biodiversity, forest inhabitants use tropical forest products directly for food and other necessary supplies.[4] For example, the Aché of eastern Paraguay live in the small community of Chupa Pou.[5] The village of 800 individuals uses up to 12,000 km^2 for extensive hunting and gathering treks that supply the Aché with

4. David W. Pearce & Katrina Brown, *Saving the World's Tropical Forests*, *in* THE CAUSES OF TROPICAL DEFORESTATION 2, 3 (Katrina Brown & David W. Pearce eds., 1994).

5. Hillard Kaplan & Kate Kopischke, *Resource Use, Traditional Technology, and Change Among Native Peoples of Lowland South America*, *in* CONSERVATION OF NEOTROPICAL FORESTS 83, 85 (Kent H. Redford & Christine Padoch eds., 1992).

almost all of their daily calories.[6] The meat of peccary, monkey and deer is hunted and accounts for 60 percent of the Aché diet, while honey, palm, and various nuts and fruits gathered from the forest make up the other 40 percent.[7] For people such as the Aché, who rely solely on forest products for their food supply, deforestation and the resulting species scarcity and extinction would eliminate their means of sustenance.

The luxuriant plant life of the tropical rain forest also performs important regional functions. Tropical soils are generally low in fertility, and depend on thick plant growth for protection through the maintenance of moisture and prevention of nutrient loss. Mass deforestation exposes soils to sun and heavy rains, depleting them of essential nutrients, promoting soil erosion and compaction, and leading to weed infestation.[8] Tropical rain forests play a key role in maintaining regional weather patterns as well. Deforestation increases albedo, the reflectivity of the earth's surface. Modelling experiments conducted in Brazil and Zaire have shown that this increased albedo can lead to decreased evaporation and rainfall.[9] Direct loss of trees can have the same effect. For example, in Amazonia, one half of the yearly rainfall comes from water evapotranspiring from the forest itself.[10]

Furthermore, deforestation can lead to problems of a more global nature. Loss of forest species, both plant and animal, can endanger human beings worldwide. Between 50 and 90 percent of the world's species exist in tropical forests.[11] Although estimating extinction rates is difficult because of the lack of information on deforestation rates, the effects of forest fragmentation,[12] and even the total

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6. *Id.* at 87-88.

7. *Id.* at 88.

8. Anthony B. Anderson, *Deforestation in Amazonia: Dynamics, Causes, and Alternatives*, *in* ALTERNATIVES TO DEFORESTATION: STEPS TOWARD SUSTAINABLE USE OF THE AMAZON RAIN FOREST 3, 3 (Anthony B. Anderson ed., 1990).

9. M.F. Mylne & P.R. Rowntree, *Modelling the Effects of Albedo Change Associated with Tropical Deforestation*, 21 CLIMATIC CHANGE 317 (1992).

10. Anderson, *supra* note 8, at 4.

11. Andrew Hurrell, *Brazil and the International Politics of Amazonian Deforestation*, *in* THE INTERNATIONAL POLITICS OF THE ENVIRONMENT 398, 400 (Andrew Hurrell & Benedict Kingsbury eds., 1992).

12. *But see* Thomas E. Lovejoy et al., *Edge and Other Effects of Isolation on Amazon Forest Fragments*, *in* CONSERVATION BIOLOGY: THE SCIENCE OF SCARCITY AND DIVERSITY 257 (Michael E. Soulé ed., 1986). Lovejoy and his fellow researchers have been studying forest fragmentation in Amazonia for several years and have provided much valuable information on how fragmentation affects species not only through a loss of habitat but through disruption of

number of existing species, W.V. Reid estimates that over the next twenty years, 20-75 species will be lost per day due to tropical deforestation.[13] This prediction compares favorably with estimates made by other biologists. It may actually be a conservative estimate, since total area loss of habitat is used as the sole cause of extinction (meaning the effects of fragmentation are not considered). Moreover, it assumes that deforestation occurs randomly, when in reality, areas of extremely high species richness may be preferentially deforested.[14]

These mass extinctions of tropical species can adversely affect all human beings. For the entire world, the tropical forests' incredible wealth of biodiversity holds aesthetic and ecological value. Yet perhaps the most compelling global reason to slow species extinction is the fact that a full diversity of plants and animals ensures a healthy gene pool, which can be utilized to develop new agricultural crops, pharmaceuticals, and other consumptive materials such as pesticides, oils, and fibers.[15]

Currently, 85 percent of the world's food supply comes from twenty flowering plant species and two-thirds from just three: corn, wheat, and rice.[16] Tropical forests house an estimated 250,000 flowering species, the majority of which are undiscovered by agricultural scientists, much less cultivated.[17] Some of these plants may grow well in areas where problems of starvation persist, and where it has been difficult to grow corn, wheat, and rice. One such plant, the weedy tomato species *Lycopersicon chmielewskii*, was discovered inadvertently in the remote highlands of Peru.[18] Seeds from this tomato were used by plant geneticists to produce a much-valued larger fruit of higher sugar content, establishing an eight million dollar-a-year product.[19]

Tropical forests could also hold a wealth of untapped resources for the pharmaceutical industry. As of the mid 1980s, approximately

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predation and pollination patterns, increased exposure to wind and sun, and "edge" effects. *Id.*

13. W.V. Reid, *How Many Species Will There Be?*, *in* TROPICAL DEFORESTATION AND SPECIES EXTINCTION 55, 63 (T.C. Whitmore & J.A. Sayer eds., 1992).

14. *Id.* at 65.

15. *See generally* Mark J. Plotkin, *The Outlook for New Agricultural and Industrial Products from the Tropics*, *in* BIODIVERSITY 106 (E.O. Wilson ed., 1988).

16. Peter H. Raven, *Our Diminishing Tropical Forests*, *in* BIODIVERSITY 119, 121 (E.O. Wilson ed., 1988).

17. *Id.*

18. Hugh H. Iltis, *Serendipity in the Exploration of Biodiversity: What Good Are Weedy Tomatoes?*, *in* BIODIVERSITY 98, 99-101 (E.O. Wilson ed., 1988).

19. *Id.* at 102.

120 pure chemical substances extracted from plants were used in medicine throughout the world,[20] and since many tropical plant species have yet to be discovered, this number has the potential to skyrocket. One particularly well publicized venture was the recent one million dollar sum paid by Merck, the world's largest pharmaceutical company, to INBio, a Costa Rican biological organization, for the right to search Costa Rican forests for species that may contain undiscovered drugs.[21] The next tropical plant to go extinct may be the cure for cancer.

Deforestation not only results in extinction of genetically valuable species, it further deteriorates the gene pool by fragmenting species habitat. When extensive deforestation leaves only small, isolated islands of forest standing, equally small populations of species become trapped, unable to disperse from one forest remnant to another. These fragmented populations may represent only a small amount of the original genetic variation of the entire species. However, as the fragmented populations' inability to disperse to other areas forces them to interbreed, genetic drift can result in continued loss of genetic diversity.[22] Because it is the full genetic diversity of tropical rain forests and their species that allows for the development of genes that can be put to productive use by humans, the consequences of fragmenting habitat are also felt on a global level.

Finally, tropical deforestation significantly contributes to another area of increasing global concern: climate change. The extensive vegetation of tropical forests takes in carbon dioxide from the atmosphere, making these forests huge carbon "sinks" that help to maintain the proper balance of atmospheric CO_2. These sinks are indeed extensive; tropical forests have been estimated to constitute 35 percent of the world's carbon pool.[23] Cutting down forests not only destroys these sinks, but leads to the release of carbon as well. When tropical vegetation is cut and left to decay, CO_2 is released into the atmosphere within 10-20 years of deforestation.[24] Under the more

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20. Norman R. Farnsworth, *Screening Plants for New Medicines*, *in* BIODIVERSITY 83, 83 (E.O. Wilson ed., 1988).

21. J. Robert Hunter, *Is Costa Rica Truly Conservation-Minded?*, 8 CONSERVATION BIOLOGY 592, 594 (1994). The deal also included a promise to pay INBio a portion of the royalties from any drugs that are found, patented, and sold by Merck. *Id.*

22. V.H. Heywood & S.N. Stuart, *Species Extinctions in Tropical Forests*, *in* TROPICAL DEFORESTATION AND SPECIES EXTINCTION 91, 111 (T.C. Whitmore & J.A. Sayer eds., 1992).

23. Anderson, *supra* note 8, at 4.

24. Pearce & Brown, *supra* note 4, at 4.

likely scenario, the slashing and burning of pasture and crop land leads to the immediate release of CO_2.[25] Thus, tropical deforestation contributes doubly to the greenhouse effect, by releasing a major greenhouse gas directly into the atmosphere through burning, and by obliterating the world's largest terrestrial carbon sink.

II. THE CAUSES OF TROPICAL DEFORESTATION

The causes of tropical deforestation are a complex and interrelated combination of social, economic, political, and ecological factors on both domestic and international levels. Furthermore, what contributes to tropical deforestation differs from state to state, as various factors and situations unique to each country or region come into play. This paper will focus on tropical deforestation in Latin America, where the causes of deforestation have been, perhaps, most widely discussed. And while the causes of neotropical deforestation are indeed difficult to pinpoint, some strong themes emerge. There is a set of proximate causes, derived from the need for alternative land uses, that require the clearing of tropical forests. Behind these proximate causes are fundamental ones that drive the movement toward these alternative land uses. The fundamental causes are much more difficult to address, and they come from an array of domestic and international economic, political, and social concerns. Interwoven into this complexity is what I will term "the ecological impediment:" the fact that tropical forests, especially humid forests, have special ecological characteristics that facilitate deforestation and species destruction in ways that temperate forests do not.

A. *The Proximate Causes of Tropical Deforestation: Alternative Land Uses*

Throughout the Amazon and other parts of Latin America, tropical forests are being cut down in order to make room for other land uses.[26] The following are the major alternative land uses that result in neotropical deforestation:

1. *Cattle Ranching.* Perhaps the land use that results in the most deforestation in Latin America is cattle ranching, as large tracts of forests are cleared for pastures. Recent agricultural censuses indicate that over 70 percent of Panama's deforested land is pasture

25. *Id.*

26. ALAN GRAINGER, CONTROLLING TROPICAL DEFORESTATION 49 (1993).

and similar numbers have been calculated for Costa Rica.[27] Between 1966 and 1983, cattle ranching accounted for two thirds of the Brazilian Amazon's entire deforested area.[28]

Conversion of tropical forests to pasture is a recent occurrence in Latin America, beginning during the last century and becoming a common phenomenon only within the last twenty years.[29] Like the more unsustainable shifting cultivation practices,[30] cattle ranching in the tropics occurs on lands that are of low productivity and often results in the abandonment of degraded pastures within four to eight years of initial use.[31] One estimate suggests that at least half of Latin America's pasture lands are in some form of degradation.[32] While studies have shown that abandoned pastures in the Amazon do recover forest structure, in the majority of cases regenerated forests are much sparser and less diverse.[33] As for highly degraded pasture lands, forest regeneration is uncertain.[34] A variety of social, economic, and political factors have contributed to the spread of cattle ranching in Latin America. These factors are discussed in detail in Part II(B).

2. *Shifting Cultivation.* Shifting cultivation, also known as "swidden" or "slash and burn" agriculture, is the predominant land use of small-scale farmers in Latin America. The technique involves the cutting and burning of mature primary or secondary forest and the planting of crops on the cleared plot. The farmer is able to utilize the ash to enrich the soil and increase short-term productivity. After two or three years, however, yields from the plot decline substantially as nutrients are lost and weeds and pests begin to predominate. Farmers

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27. George Ledec, *New Directions for Livestock Policy: an Environmental Perspective, in* DEVELOPMENT OR DESTRUCTION: THE CONVERSION OF TROPICAL FOREST TO PASTURE IN LATIN AMERICA 27, 28 (Theodore E. Downing et al. eds., 1992).

28. GRAINGER, *supra* note 26, at 59.

29. Christopher Uhl et al., *Studies of Ecosystem Response to Natural and Anthropogenic Disturbances Provide Guidelines for Designing Sustainable Land-Use Systems in Amazonia, in* ALTERNATIVES TO DEFORESTATION: STEPS TOWARD SUSTAINABLE USE OF THE AMAZON RAIN FOREST 24, 35 (Anthony B. Anderson ed., 1990).

30. *See infra* text accompanying notes 35-48.

31. Uhl et al., *supra* note 29, at 35.

32. E. Adilson Serrao & Jose M. Toledo, *Sustaining Pasture-Based Production Systems for the Humid Tropics, in* DEVELOPMENT OR DESTRUCTION: THE CONVERSION OF TROPICAL FOREST TO PASTURE IN LATIN AMERICA 257, 258 (Theodore E. Downing et al. eds., 1992).

33. Uhl et al., *supra* note 29, at 36.

34. *Id.*

typically abandon the site at this time to cut and burn another section of the forest.[35]

Shifting cultivation is a traditional land use of tropical forests. In many cases, it is done in a sustainable fashion by reusing abandoned plots after a lengthy fallow period or by managing fallows for various tree and plant crop species.[36] A fallow period of 15 to 20 years will allow for successful regeneration into a healthy secondary forest, restoring soil nutrients and making the plot productive again.[37] Many farmers practice methods of shifting cultivation that also allow plots to be utilized during the fallow period. For example, when initially cutting a plot, shifting cultivators in Mexico will leave certain tree species standing that are useful as sources of edible fruit or seeds, medicine, construction material, soil improvement, or shade.[38] These trees are also important in helping to regenerate the plot during the fallow period[39] by enriching the soil with nutrients from the trees' leaf litter and by providing a hedge against erosion.

In another example from Brazil, a Japanese settlement in Amazonia cultivates a selection of native and exotic species for subsistence and commercial use in a manner that mimics natural forest succession.[40] Farmers clear a plot of forest and plant short-lived perennials such as passion fruit and papaya, with annuals such as rice and beans often scattered in between.[41] Soon after, intermediate-lived perennials such as black pepper and fruit trees and long-lived plants like cacao and rubber are planted.[42] This intermixing of

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35. Jean C.L. DuBois, *Secondary Forests as a Land-Use Resource in Frontier Zones of Amazonia*, *in* ALTERNATIVES TO DEFORESTATION: STEPS TOWARD SUSTAINABLE USE OF THE AMAZON RAIN FOREST 183, 183-84 (Anthony B. Anderson ed., 1990).

36. GRAINGER, *supra* note 26, at 50. Sustainable shifting cultivation is practiced with success primarily by local communities and indigenous groups that have lived in or near the forest for generations. *See, e.g.*, DuBois, *supra* note 35, at 189 (describing how forests and agricultural management practices increase as the agriculture becomes more sedentary). This is logical, since such communities have a permanent stake in the land and thus an incentive to ensure that it remains productive.

37. GRAINGER, *supra* note 26, at 50.

38. Arturo Gomez-Pompa & Andrea Kaus, *Traditional Management of Tropical Forests in Mexico*, *in* ALTERNATIVES TO DEFORESTATION: STEPS TOWARD SUSTAINABLE USE OF THE AMAZON RAIN FOREST 45, 48 (Anthony B. Anderson ed., 1990).

39. *Id.*

40. Scott Subler & Christopher Uhl, *Japanese Agroforestry in Amazonia: A Case Study in Tome-Acu, Brazil*, *in* ALTERNATIVES TO DEFORESTATION: STEPS TOWARD THE SUSTAINABLE USE OF THE AMAZON RAIN FOREST 152 (Anthony B. Anderson ed., 1990).

41. *Id.* at 156-157.

42. *Id.* at 157.

crops of various life spans results in yields of many different cash crops as the plot changes from open field to closed forest. Farms in this area average 100-150 hectares, but only 20 hectares are actively cultivated at any given time, while the remaining area is left fallow long enough to enable it to regenerate into secondary forest.[43]

Not all shifting cultivation, however, utilizes such successful management techniques. Often land is cleared in order to raise single food crops for three to four years. When lack of nutrients and weed and pest infestation lead to a dramatic drop in yields, the plot is abandoned and a new section of the forest is cut.[44] Forest regeneration is extremely slow because the plot is farmed so intensively and so much is taken from the soil. These farmers will not return to the fallow plots, but instead continue to cut and burn new forest, thus contributing extensively to tropical deforestation.[45] Those that practice this form of shifting cultivation are often not traditional forest dwellers but landless peasants, driven into unoccupied forests because of poverty or overcrowding in their former homes.[46] Norman Myers, who has studied the causes of tropical deforestation extensively, has called these farmers "shifted cultivators."[47] He finds shifted cultivation to be the main cause of tropical deforestation, "accounting for as much deforestation as all . . . other factors together, and [its] forest destruction is expanding rapidly."[48] The underlying reasons for this unsustainable type of shifting cultivation are addressed in depth in Part II(B).

3. *Permanent Agriculture.* Forests are also cleared for large-scale agricultural practices, such as banana, sugar cane, or coffee plantations. Crops are often raised on such plantations for sale in international markets. Permanent agriculture requires large tracts of

43. *Id.* at 156. *See also* DuBois, *supra* note 35 (documenting that similar techniques are used by many traditional communities of the Amazon rain forest).

44. GRAINGER, *supra* note 26, at 52. *See also* Brent H. Millikan, *Tropical Deforestation, Land Degradation, and Society: Lessons from Rondonia, Brazil*, 19 LATIN AM. PERSP. 45, 56-57 (1992) (describing the lack of productivity in cleared forest plots in Rondonia, Brazil).

45. GRAINGER, *supra* note 26, at 51-52.

46. *Id.*

47. Norman Myers, *The Anatomy of Environmental Action: The Case of Tropical Deforestation*, *in* THE INTERNATIONAL POLITICS OF THE ENVIRONMENT 430, 444 (Andrew Hurrell & Benedict Kingsbury eds., 1992).

48. *Id.* at 432.

cleared forest land.[49] Because of the low fertility of the soils and the high vulnerability of tropical monocultures to pests and disease, permanent agriculture does require a large amount of chemical inputs in the form of fertilizers and pesticides. These chemicals can cause serious harm to the environment by running off fields during heavy tropical rains, polluting adjacent rivers and streams.[50]

4. *Logging.* One image many have of tropical deforestation is vast stretches of the Amazon rain forest clear cut to the bare earth. But logging in tropical forests seldom takes the form of clear cutting since relatively few tree species are of commercial use and those that are do not grow in uniform stands.[51] Commercial species are logged selectively, with only two to ten trees taken for every 350 found in a hectare.[52] Still, logging results in deforestation and forest degradation. Some forest areas are clear cut in order to build logging roads, tracks, and landings.[53] Careless logging techniques not only result in the taking of commercial species, but often harm noncommercial species and leave the forest severely degraded. Furthermore, the creation of logging roads can lead indirectly to deforestation by providing shifted cultivators and other settlers a pathway into an otherwise inaccessible forest.[54]

In reality, logging is not a major cause of deforestation in Latin America.[55] Statistics indicate that logging operations in Amazonian Brazil extract less than one hundredth of one percent of the forest's

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49. In the end, however, little of Latin America's forests are lost to plantations. Norman Myers estimates that plantations, together with developmental projects such as road building, dam construction, and mining, contribute less than 10% to worldwide tropical deforestation, while the "shifted cultivation" accounts for as much deforestation as all other factors combined, *Id.* at 432.

50. *See generally* AGRICULTURAL MANAGEMENT AND WATER QUALITY 5-8 (Frank W. Schaller & George W. Bailey eds., 1983).

51. GRAINGER, *supra* note 26, at 69.

52. *Id.*

53. *Id.* at 69-70.

54. *See infra* text accompanying notes 58-64.

55. JACK WESTOBY, INTRODUCTION TO WORLD FORESTRY 111 (1989). This is not the case for other tropical areas, especially southeast Asia, where a system of corruption and concessions has led to extensive abuses in the logging industry. *See, e.g.*, Robin Broad & John Cavanagh, *Borneo on the Brink: Of Rainforests and Robber Barons*, 22 AMICUS J. 18 (1994); William Ascher, Political Economy and Problematic Forestry Policies in Indonesia: Obstacles to Incorporating Sound Economics and Science (1993) (unpublished manuscript, on file with the *Center for International Development, Sanford Institute of Public Policy, Duke University*).

total timber yearly.[56] This is partly because there are relatively few commercial species available in Latin America, and those that do have commercial potential are generally pioneer species. These tree species are not found in standing forests, but rather are the first that take hold in a disturbed area (i.e., an area where a natural treefall occurs, where a hurricane touches down, or where a chainsaw has done its work). Pioneer species, because they grow so quickly in response to the great increase in light, reach maturity and are harvested before young seedlings and saplings are established to take their place.[57] The structure and dynamics of these pioneer species dictate that little logging will occur, since special circumstances (i.e., a recent disturbance) must exist in order for the trees to grow and lack of a juvenile age class limits logging to one harvest.

5. *Road Building.* In the 1950s, Brazil began a road-building program to encourage development of remote areas of Amazonia.[58] The military, which came to power after a coup in 1964, expanded this program as part of the government's National Integration Plan (PIN).[59] Not only did the military government wish to integrate Amazonia into Brazilian society, but it also expressed national security concerns and wanted the "vast emptiness" of the Amazon to be occupied in order to protect distant border regions.[60] National security has historically been a concern of Brazilians, since the Amazon's sparse population makes Brazil's claim to it precarious.[61] The PIN addressed these concerns through the construction of the Transamazonica, an east-west highway that would penetrate the Amazon to the Peruvian border and encourage settlement and development along it.[62] The construction of this and other roads in the Amazon cut the costs of transportation and encouraged settlement and investment (especially in speculative cattle ranching). For example, the completion of highway BR-364 led to an explosive

56. *Id.* at 55.

57. Christopher Uhl et al., *Vegetation Dynamics in Amazonian Treefall Gaps*, 69 ECOLOGY 751, 756 (1988).

58. Hurrell, *supra* note 11, at 403.

59. *Id.*

60. Millikan, *supra* note 44, at 47.

61. Emilio F. Moran, *The Law, Politics, and Economics of Amazonian Deforestation*, 1 IND. J. GLOBAL LEGAL STUD. 397, 403 (1994).

62. Millikan, *supra* note 44, at 47.

migration to the Brazilian state of Rondonia in the 1970s.[63] Most Rondonian settlers cleared the land to plant crops, and the state soon became an agricultural center for the Amazonian frontier. Thus, road building not only results in direct deforestation from the actual construction process, it leads to indirect deforestation as new roads encourage settlement and shifting agriculture along the roadsides.[64]

6. *Other Developmental Uses: Mining, Dam Building, Industrial Development.* Mining, the construction of hydroelectric facilities, and general urban and industrial expansion also contribute to deforestation in Latin America. Mining for precious metals occurs extensively in several Latin American countries. Brazil, for instance, is the world's leading tin producer and a leader in the production of gold.[65] Other Latin American minerals of importance include copper, bauxite, and iron ore. While these operations result in localized deforestation, they also impact the tropics in other harmful ways, through air and water pollution.[66] Environmental harm remains an uncalculated externality for Brazilian mining companies since the Brazilian legal scheme contains no enforceable restoration or cleanup requirements.[67] Furthermore, mining operations can lead to increased settlement of the rain forest, as migrants move to these areas in search of employment.[68]

In the 1970s, the Brazilian government began to build several major hydroelectric facilities in the Amazon.[69] These projects required forest clearance and/or submersion to build dams and reservoirs and they altered aquatic forest ecosystems in many ways. Development of urban and industrial centers in Latin America also has resulted in deforestation. It is often seen as the price that must be paid for much-desired economic development. In reality, however, urban and industrial development do not result in the deforestation

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63. *Id.* at 48.

64. Private road building for logging and mining operations can also lead to deforestation and settlement in a corridor along the road. In this instance, peasants play the role of classic "free riders:" they use the collective good (i.e., the road) even though they incurred none of the costs of its construction. *See* THOMAS K. RUDEL, TROPICAL DEFORESTATION: SMALL FARMERS AND LAND CLEARING IN THE ECUADORIAN AMAZON 29-32 (1993).

65. GRAINGER, *supra* note 26, at 63.

66. *Id.* at 63-66.

67. Moran, *supra* note 61, at 402.

68. Millikan, *supra* note 44, at 53.

69. GRAINGER, *supra* note 26, at 66 (including sites at Paredao, Curua-Una, and the expansive Tucurui power plant on the Tocantis River).

of much total land area in Latin America. Agricultural practices remain the most significant proximate cause.

B. *The Fundamental Causes of Tropical Deforestation*

Forests are cleared so that cattle can graze, beans can grow, and roads can be built. The reasons that these things happen are a combination of many social, political, and economic factors, and are the underlying, fundamental causes of deforestation. Any scheme designed to address the problem of tropical deforestation should consider these root causes:

1. *Tropical Forest Development Policies.* Perhaps the most conspicuous underlying reason for neotropical deforestation, especially in the Amazon, is a policy agenda bent on increasing development of the forests. Beginning in the early 1960s, the Brazilian government played the major role in opening up Amazonia for development.[70] In addition to the road building programs that allowed landless settlers to reach previously impenetrable forest lands,[71] the Brazilian government also organized colonization schemes to promote development of unsettled areas of Amazonia. These colonization programs attracted many poor and landless peasants by providing basic services, building roads for transportation, subdividing the land, and providing housing.[72] The government also sponsored large-scale development projects such as the Tucurui hydroelectric facility on the Tocantins River and the Grand Carajas mining complex, which lured more people to Amazonia through promises of jobs and improved living conditions.[73] Finally, Brazil offered many economic incentives for developmental activities, thus encouraging investment in the Amazon.[74]

A classic case of governmental development policies leading to deforestation is Brazil's subsidy and incentive program for Amazonian cattle ranching. Only recently abandoned,[75] this program allowed an

70. Hurrell, *supra* note 11, at 403.

71. *Id.*

72. RUDEL, *supra* note 64, at 26-27.

73. GRAINGER, *supra* note 26, at 65.

74. *Id.* at 99-102.

75. The fiscal incentives and tax breaks for cattle ranchers were ended in the late 1980s. *See* Hurrell, *supra* note 11, at 409. Bankers and other creditors, however, continue to favor cattle ranchers over small-scale farmers and most subsidized credit that is still available in Brazil is given to large-scale operations. *See* Moran, *supra* note 61, at 398.

otherwise unproductive and economically disastrous land use practice to turn profits, at great environmental cost to tropical forests.[76] The Brazilian government's Superintendency for Amazon Development (SUDAM) sponsored hundreds of ranching projects in Amazonia through the 1980s.[77] The SUDAM ranches were generally held by large land owners and were highly subsidized. To encourage corporate investment in ranches, grants of up to 75 percent were given to offset development costs. Corporate tax breaks of up to 100 percent were given if capital was invested in the Amazon, and equipment used on Amazon ranches was not subject to import taxes. Subsidized credits were available at little or no interest rate, even in the face of overwhelming national inflation. Land concessions were also provided or land prices were kept artificially low in many areas.[78] With these kind of financial rewards to be gained in cattle ranching, it mattered little whether the decision to convert forest to pasture truly made economic or ecological sense.

As other developmental interests such as mining and hydropower were pushed by the government, Amazonian land prices began to rise. Because the Brazilian government gave ownership in remote forest lands (and the mineral extraction rights that went with them) to individuals that had cleared the forests,[79] speculators would enter unoccupied forests, quickly work to clear them, and gain title. Thus, the governmental policies that encouraged clearing forests for pasture paved the way for a land speculation industry that involved a vicious cycle of clearing pasture land cheaply, selling the land quickly for ever-rising prices, and moving on to another ranching investment in a new area of forest.[80]

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76. Some analysts have used the term "directly unproductive profit seeking activities" ("DUPs") to describe how profits are achieved through operations like Amazonian cattle ranching. The reason these ranches are successful has little to do with the land's suitability for production and more to do with the owners' ability to capture financial resources such as subsidies and tax breaks. *See* Susanna B. Hecht, *The Logics of Livestock and Deforestation: The Case of Amazonia, in* DEVELOPMENT OR DESTRUCTION: THE CONVERSION OF TROPICAL FOREST TO PASTURE IN LATIN AMERICA 7, 10-11 (Theodore E. Downing et al. eds., 1992) (citing D. Bhagwati, *Directly Unproductive, Profit Seeking Activities*, 90 J. ECON. 988, 988-1002 (1982)).

77. *Id.* at 11-12.

78. *Id.* at 12-13.

79. *See infra* text accompanying notes 100-102.

80. Hecht, *supra* note 76, at 14.

While this *industria de posse*[81] accelerated deforestation in the Amazon, ranches that were not sold to other investors remain highly unproductive. For ranches running at capacity, productivity was only 15 percent of projected efficiency.[82] A 1988 study found that cattle production repaid only a quarter of ranch production costs.[83] Yet ranches continue to generate revenue, the direct result of the extensive financial incentive and support system the Brazilian government put in place.

SUDAM has financed mainly large land owner operations, and these probably have had the largest impact on tropical forests. However, small land owners also turn to raising cattle since production of milk and calves and the value of the animal itself allow farmers with marginally productive cropland to diversify their income source.[84] Since colonization projects often extended credit lines to small scale cattle producers, even these small farmers were encouraged by national development policies.[85] Small farmers often prefer to convert unproductive plots that have been cultivated for one or two years into cattle pasture as opposed to leaving the plot fallow. In Amazonian Brazil, there is a cultural preference for clearing more primary forest as opposed to using secondary growth for a new cropping cycle.[86] Furthermore, while there is a stigma of laziness attached to being a *quicaceiro* (grower of secondary forest), the Latin American culture holds cattle ranchers in high esteem.[87]

It would be erroneous, however, to conclude that only domestic forces are responsible for development of tropical forests. International lending agencies such as the World Bank, the regional Interamerican Development Bank, and the United States Agency for International Development (USAID) have often funded development projects in Latin American countries.[88] Following World War II, these agencies turned their attention toward the development needs of the South. They raised money in capital markets of the North and loaned it to governments of the South for the building of dams, roads,

81. *Id.*
82. *Id.* at 15.
83. *Id.* at 15.
84. *Id.* at 16-18.
85. *Id.* at 17.
86. Millikan, *supra* note 44, at 61.
87. *Id.*
88. RUDEL, *supra* note 64, at 34-35.

bridges, and other infrastructure.[89] Surprisingly, they continue to do so. Commitment to remote lands such as rain forests is well within the lending institutions' definition of an "appropriate use of funds."[90]

2. *Poverty, Landlessness, and the Lack of Property Rights.* Norman Myers has said that "the shifted cultivator is no more to be 'blamed' for deforestation than a soldier is to be held responsible for fighting a war."[91] Shifted cultivation occurs because overwhelmingly poor conditions exist in both rural and urban areas of many tropical countries. In urban Brazil, for example, clean water and sanitation systems are lacking, industrial pollution is unchecked, and housing and basic amenities are sparse.[92] In rural areas, good farmland is unevenly distributed, with only 5 percent of farmers owning 70 percent of arable lands and 70 percent of the farmers attempting to farm only 5 percent of the land.[93] When poverty-stricken people can no longer live in the severe conditions of the city or can no longer eke out an existence on meager plots of degraded and overcrowded farmland, they are driven to the only unoccupied areas that hold hope: the forests.[94] The population boom in Brazil's Rondonia can be explained by tracing the path of the new settlers. Landless farmers land became increasingly poor as agricultural improvements were enjoyed exclusively by wealthy large land owners. The inability to compete on inadequate land led these people to urban centers, where unsanitary and overcrowded conditions finally forced them to head for the frontiers of the Amazon.[95]

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89. *Id.*

90. *Id.*

91. Myers, *supra* note 47, at 444.

92. Hurrell, *supra* note 11, at 412.

93. Myers, *supra* note 47, at 445.

94. Although the plight of the shifted cultivator is often viewed as one final and desperate dash into the virgin rain forest in order to survive, poverty and the need to subsist may only explain deforestation in small forests near existing settlements. RUDEL, *supra* note 64, at 24-25. Pioneering operations in large, heavily forested areas are risky and require a good many resources; thus the extremely poor are unlikely to migrate to the frontier without outside assistance. *Id.* at 22-24. Assistance will often come, however, in the form of "growth coalitions" that lend enough support to poor peasants to allow them to undertake a pioneering venture. *Id.* at 25. Such coalitions can be in the form of wealthy family members, urban investors, or governmental colonization agencies. *Id.* at 25. Rudel's case study describes in detail how poor small-scale farmers in Ecuador settled (and ultimately destroyed) a large forest with the help of a growth coalition headed by CREA, a regional development agency, and Carlos Duran, a successful pioneer. *Id.* at 89-108.

95. Millikan, *supra* note 44, at 48-49.

Most large forest areas like the Amazon are owned by the state, but the lack of enforcement essentially renders them unowned. With a lack of enforced property rights to the forest, a classic tragedy of the commons takes place. Landless peasants, driven to the forest by poverty, clear a plot and plant the food that they need to survive. Since they do not own the land, there is no incentive to conserve the land or to manage crops in the manner of the Japanese farmers in Brazil. Production slows just a few years after initial clearing. In the words of a colonist of the Upano-Palora region of the Ecuadorian Amazon, "[b]y the time the road arrives in a place, the lands are tired."[96] Once the lands "tire," peasants simply move on and cut down another section of forest. Normally their abandoned plot would begin to regenerate into secondary forest after several years, but the problem of poverty and landlessness is often so pervasive that a second wave of shifted cultivators will come and use the plot.[97] Another possibility is that peasants will sell their unproductive plots at low prices to wealthy landlords, who convert the degraded lands into cattle pastures.[98] Either way, this intensive use and reuse of the land is especially devastating, and makes the possibility of forest regeneration uncertain.

Even when state ownership in tropical forests is enforced, deforestation and land degradation are often facilitated. For example, squatters faced with the threat of eviction will not reap the long-term benefits of sustainable land use practices. They will be motivated to squeeze as much production out the land as possible as quickly as possible, and thus will turn to the intensive slash and burn farming techniques that are so destructive of tropical forest lands. Even a very slight threat of eviction could lead to such land abuse. Many Latin American countries contribute further to deforestation by implementing a rights system based on a strict labor theory of property: those individuals that labor to cut the forest down can claim ownership. This theory is consistent with these countries' desire to develop remote rain forest areas by attracting settlers and investors who are willing to clear land and make improvements.[99] Because

96. RUDEL, *supra* note 64, at 133.

97. Myers, *supra* note 47, at 444.

98. RUDEL, *supra* note 64, at 18-22. This pattern of land exchange reportedly occurs throughout many Latin American countries, including Brazil, Columbia, and southern Mexico, and is known as the *colono* system. *Id.*

99. *Id.* at 751.

there is little economic value in standing forests, many will indeed clear forest land in order to receive more valuable mining rights that come along with ownership in the land. Many will waste resources by building fences and cabins and cutting and burning forests just to maintain title.[100] This perverse system means that, in some instances, land is cleared irrespective of its potential for sustainable farming. In Rondonia, for example, colonization projects sponsored by the National Institute for Colonization and Agrarian Reform (INCRA) recognize forest clearing as a way to legitimize land claims even if the soil is of poor fertility and unsuited for agricultural purposes.[101]

3. *Overpopulation.* Overpopulation drives people to the frontier of the tropical forest in much the same way poverty does. Overcrowding in rural and urban settlements leads to resource scarcity, pushing people into the resource-rich forests. Overpopulation creates further deforestation as the increasing demand for food and land on which to grow it requires that additional forests must be cleared for agriculture.[102] Many developing tropical countries are experiencing extensive population growth. For these countries, improvements in health care and quality of life lower mortality rates, but fertility rates do not decrease because few families in developing countries feel secure enough to reduce their number of dependents.[103]

Overpopulation in this strict Malthusian sense is not thought to be the sole cause of deforestation in Latin America: The population of lowland tropical forests in South America may be increasing,[104] but it is often landlessness and poverty in existing cities and settlements, not rising birth rates that lead to increased migration to the forests.[105] New economic opportunities such as illegal drug production and gold mining have also been described as reasons why more people are moving to the forests.[106] In seemingly direct contradiction to the overpopulation theory, the vast majority of Latin Ameri-

100. *Id.* at 752.
101. Millikan, *supra* note 44, at 51.
102. GRAINGER, *supra* note 26, at 94.
103. *Id.*
104. Hecht, *supra* note 76, at 8.
105. Millikan, *supra* note 44, at 64.
106. Hecht, *supra* note 76, at 9.

can forests are lost to cattle ranches—operations that are typically characterized by low population densities.[107]

4. *Absence of Domestic and International Markets That Capture Forest Values.* Several analysts have described the causes of deforestation in terms of "missing markets:" no markets exist for some of the most important values of tropical forests such as non-timber forest products, soil and water maintenance, biodiversity, and carbon fixation. Locally, forests are seldom managed for extraction of important forest products such as fibers, nuts, and fruits. Consumers in large Brazilian coastal cities such as Rio have never heard of, much less eaten, the most common Amazonian fruits.[108] Extraction of these fruits for sale in local markets would mean that the forests themselves would be valued, creating an incentive to preserve them. In some areas of Latin America, the potential for extractive reserves that market products both domestically and internationally has been demonstrated. The late Chico Mendes was successful in establishing extractive reserves in the Brazilian Amazon for rubber tapping and the harvesting of Brazil nuts.[109] A comprehensive study of a reserve in Petén, Guatemala indicates that species such as chicle, xate, and allspice can be harvested and sold for profit.[110] The study did caution that key ecological, socioeconomic, and political factors must be identified for each forest community, and that the importance of these factors will vary from site to site.[111] One non-governmental organization has done extensive research in an attempt to broaden international markets and has facilitated programs with Ben and Jerry's Homemade of the United States and the Body Shop of England.[112] These companies utilize rain forest nuts, fruits, and other products in their ice cream and cosmetics, respectively, and send

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107. Millikan, *supra* note 44, at 64.

108. Jason Clay, *Buying in the Forests: A New Program to Market Sustainably Collected Tropical Forest Products Protects Forests and Forest Residents*, *in* CONSERVATION OF NEOTROPICAL FORESTS 400, 406 (Kent H. Redford & Christine Padoch eds., 1992).

109. Nigel Sizer, Opportunities to Save and Sustainably use the World's Forests through International Cooperation 21-22 (1995) (unpublished manuscript, on file with the *World Resources Institute*).

110. Nick Salafsky, Barbara L. Dugelby, & John W. Terborgh, *Can Extractive Reserves Save the Rain Forest? An Ecological and Socioeconomic Comparison of Nontimber Forest Product Extraction Systems in Petén, Guatemala, and West Kalimantan, Indonesia*, 7 CONSERVATION BIOLOGY 39 (1993).

111. *Id.*

112. Clay, *supra* note 109, at 411-12.

a percentage of the profits back to the local communities.[113] Though international markets for nontimber forest products do not exist yet on a grand scale, there is great potential for tapping the North's interest in tropical rain forest conservation by creating other "green" product lines.[114]

Perhaps the most daunting "missing market" problem is that the most globally compelling reasons for saving the rain forest are not translated into an economic value to the countries that are cutting forests down. A Northerner may desire tropical carbon sinks to continue to offset global warming or may desire the continued existence of the myriad of tropical plants in hopes of a cure for cancer, but this matters little to the Brazilian land owner who is offered tax breaks and interest—free credit to make his forest into pasture. If global markets that place a value on functions such as carbon fixation and protection of biodiversity could be developed, the value added to the forests would give tropical land owners the incentive not to chop them down. Although several global market schemes have been posed, there has been little implemented in this area as of yet.[115]

Presently, the genetic material of tropical plants is in high demand in developed countries. Yet under current schemes, the developing countries in which these valuable plants are found do not own the property rights to these plants. Thus, multinational corporations freely prospect for these plants, discover their genetic value, and patent that discovery as an intellectual property right.[116] Because no compensation is paid to developing countries for the use of these resources, incentive to conserve tropical forests is lacking. Many commentators argue, and the Biodiversity Convention signed at Rio provides, that property rights in the genetic material utilized by Northern companies should be given to the countries in which it is found.[117] Vesting plant property rights in the developing countries

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113. *Id.*

114. *Id.* at 408 ("With the current all-time high level of interest in tropical forests, many companies are convinced that using rain forest products in existing product lines could be a wise marketing strategy .... There are many indications ... that 'green' consumerism is here to stay.").

115. Pearce & Brown, *supra* note 4, at 24.

116. James O. Odek, *Bio-Piracy: Creating Proprietary Rights in Plant Genetic Resources*, 2 J. INTELL. PROP. L. 141 (1994).

117. *See, e.g.*, Rebecca L. Margulies, Note, *Protecting Biodiversity: Recognizing International Intellectual Property Rights in Plant Genetic Resources*, 14 MICH. J. INT'L L. 322 (1993); Odek, *supra* note 116; United Nations Conference on Environment and Development: Convention on

of the tropics would allow them to participate in an international market where the genetic material of plants is in high demand and would encourage them to conserve and protect the forests in which such material can be found.[118]

5. *International Markets for Tropical Products.* There is an international demand for products grown in tropical countries such as timber, bananas, cassava, and coffee.[119] These products are typically grown in large plantations in the tropics, and thus require forested lands to be cleared. Demand for bananas has led fruit companies to expand operations in northeastern Costa Rica, where forests are being displaced by banana plantations in close proximity to national parks.[120] Planting has even occurred at the doorstep of La Selva,[121] the biological research station where some of the greatest advancements in tropical ecology have taken place. Because of the healthy international banana market and the investment opportunities it brings to the country, the Costa Rican government continues to approve of the fruit companies' expansion. This is so even though the practices used are unsustainable, require heavy pesticide application that threaten surrounding environments, and seldom result in job opportunities for locals.[122]

Moreover, international demand for tropical hardwood rose dramatically after World War II, especially in European and Japanese markets.[123] As of the late 1980s, Europe, Japan, and the United States imported nearly three-quarters of all forest products. Much of these products were from tropical hardwood.[124] With Japan and

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Biological Diversity, June 5, 1992, art. 1, 31 I.L.M. 822, 823 [hereinafter Biodiversity Convention] (providing that among objectives of the Convention is the "fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies.").

118. Odek, *supra* note 116, at 180. This last point is debated by some. If property rights are given to the entire sovereign, or to the groups or communities which live in forest areas, common ownership in the plants infers that there may be little incentive for *individuals* to incur the cost of conservation of unique or endangered plant species. *Id.*

119. *See* Norman Myers, *Economics and Ecology in the International Arena: The Phenomenon of "Linked Linkages,"* 15 AMBIO 296 (1986).

120. Hunter, *supra* note 21, at 592.

121. *Id.* at 593.

122. *Id.*

123. GRAINGER, *supra* note 26, at 71-73.

124. In 1987, tropical hardwood accounted for 25 percent of the world's log exports, 88 percent of all high-grade hardwood log exports, 11 per cent of all sawnwood exports, 65 percent of all hardwood sawnwood exports, 39 percent of all wood panel exports, and 70 percent of all

Europe being the greatest importers, the international timber market leads to greater deforestation in Asia and Africa due to proximity. Yet even in countries such as Indonesia and Malaysia, where the loss of tropical forests to the timber industry is well documented, some have argued that deforestation has less to do with the international demand for hardwood than with tropical countries' own policies, especially those related to timber concessions.[125] Still, demand for plywood and decorative woods such as mahogany leads to some amount of deforestation in Latin America.

Finally, much has been made of the "hamburger connection:" the demand of developed countries, especially the United States and Europe, for tropical beef. The work of two scientists in the early 1980s attempted to show how the international beef market, in the context of Latin American development schemes and land tenure patterns, led to the expansion of cattle ranches and tropical deforestation.[126] A 1981 article by Norman Myers popularized the theory. Myers stated: "The cattle raiser's activities are largely stimulated by consumerist lifestyles in affluent sectors of the global community. As beef produced in developed nations, and especially in North America, becomes more expensive, the rich-world consumer fosters the spread of cattle raising into forest zones of . . . Central American nations."[127] In reality, however, the "hamburger connection" may simply be a successful way to generate Northern interest in saving the rain forest rather than a fundamental cause of tropical deforestation. Tropical countries export very little beef, with livestock constituting less than 5 percent of all Latin American exports.[128]

C. *The Ecological Impediment: The Basic and Crucial Ecological Characteristics of Tropical Forests*

In the North, temperate forests have been successfully managed for single commercial species, and areas like New England that were deforested at the beginning of this century now have extensive and mature forest cover. It is unlikely that the same management and

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plywood and veneer exports. *Id.* at 76.

125. *See* Jeffrey R. Vincent, *The Tropical Timber Trade and Sustainable Development*, 256 SCIENCE 1651 (1992).

126. *See* James D. Nations & Daniel I. Komer, *Rainforests and the Hamburger Society*, 17 THE ECOLOGIST 161 (1987).

127. Norman Myers, *The Hamburger Connection: How Central America's Forests Become North America's Hamburgers*, 10 AMBIO 3, 3 (1981).

128. Hecht, *supra* note 76, at 8.

reforestation techniques that have worked so successfully in the United States and other temperate countries can be applied to tropical forests. This is because tropical forests, especially lowland rain forests, are vastly different from their temperate counterparts. First, tropical forests are infinitely more diverse than temperate forests. As naturalists Adrian Forsyth and the late Ken Miyata state in *Tropical Nature*, "[a] naturalist in New England can easily learn all the species of native trees in the region in a single summer, but there are few people who, even after a lifetime of study, can confidently identify most of the trees in a patch of tropical American rain forest."[129] Biologist Peter Ashton found 700 species of trees in a small rain forest plot of ten hectares, as many species as exist on the entire North American continent![130] The more uniform composition of temperate forests lends itself well to management for single commercial tree species. For instance, if a plot containing 700 individual trees were surveyed in old growth forest of West Virginia, 300 of those may be red maple, 125 may be white pine, and 80 may be white oak.[131] In the tropics, however, there are few if any tree species that grow in uniform stands. In Ashton's ten hectare plot, one of the 700 tree species may be the commercially valuable mahogany, but it may be the only individual mahogany tree in the whole area. It's simply a case of so many species, so little area. The diverse tree compositions makes single species management of natural forests very difficult in the tropics; this creates the incentive among tropical timber companies to cut down virgin forests and plant unnatural uniform stands of commercial species.

Second, tropical forests, for all their natural wealth, suffer from soils that are far lower in nutrients than temperate forest soils. Forsyth and Miyata describe the startling difference in soils:

> [T]here is a striking difference in the way the tropical forest *feels*. The resilient spring of conifer duff and the deep layers of deciduous

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129. ADRIAN FORSYTH & KENNETH MIYATA, TROPICAL NATURE: LIFE AND DEATH IN THE RAIN FORESTS OF CENTRAL AND SOUTH AMERICA 2 (1984).

130. E.O. Wilson, *The Current State of Biological Diversity*, *in* BIODIVERSITY 3, 9 (E.O. Wilson ed., 1988).

131. *See, e.g.*, Marc D. Abrams, David A. Orwig, & Thomas E. Demeo, *Dendroecological Analysis of Successional Dynamics for a Presettlement-Origin White-Pine-Mixed-Oak Forest in the Southern Appalachians, USA*, 83 J. ECOLOGY 123, 125 (1995). In a study of an old growth forest in the Monongahela National Forest in southern West Virginia, Abrams, *et al.* found that 44.3 percent of the trees found on their study plot were red maple, 18.2 percent were white pine, and 11.7 percent were white oak. *Id.*

> leaf litter that characterize forests in the northern temperate zone are absent. The soft bed of loamy soil, fragrant with the rich smell of humus that tired hikers find so comforting, will not be found in the rain forests of the upper Amazon basin.
>
> The rain forest floor has litter, but it is often a thin layer, rarely more than a few centimeters deep. If you brush it aside with your boot, an intricately interwoven mass of white threads will be revealed just under the surface. This pallid, tangled mass consists of the rootlets of forest trees and strands of fungal mycelia. And if you carefully trace the wandering path of a fungal thread from a rotting fruit of a decomposing leaf, you will often find that it leads to the tiny rootlet of a large tree.[132]

All of the action in the tropics happens at the soil surface, the only place where nutrients can be found. However, they are not found there for long. Because the ecological processes of growth and decay are so accelerated in the tropics, nutrients are rapidly recycled into the luxuriant plant growth of the forest.[133] Thus, when a section of forest is cut down and burned, most of these nutrients don't get back to the soils. Nutrient-thin soils makes reforestation of degraded and deforested lands extremely difficult. Areas deforested by shifted cultivators and then converted to cattle pastures and overgrazed by cattle are denuded of nutrients, and the reforestation and recovery of such land is unlikely.[134] Reforestation and restoration programs, which have been successfully employed in temperate zones,[135] have a greatly reduced chance of succeeding in the tropics.

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132. FORSYTH & MIYATA, *supra* note 129, at 18.

133. Forsyth and Miyata explain that it is fungal mycorrhizae, which thrive in the humid tropics, that break down nutrients and return them "to the world of the living:"

> The fungi are particularly adept at recycling phosphorus and potassium, minerals that are often in short supply in rain forests yet are critical to tree growth . . . . The constant temperature and high humidity of the rain forest floor provides a perfect environment for fungi—one that allows particularly rapid growth. Fungi can invade new sources of fertility far more rapidly that a tree rootlet can, and this rapid capacity for growth and colonization lessens the loss of valuable nutrients from the forest ecosystem. Under the silent, relentless chemical jaws of the fungi, the debris of the forest quickly disappears. The leaves that constitute much of the litter vanish within a few weeks, and even the massive boles of fallen forest trees often erode away within a few years. This digestive process goes on much more rapidly in tropical rain forests than it does in temperate forests.

Id. at 18-19.

134. Uhl et al., *supra* note 57, at 36.

135. *See generally* John Cairns, Jr., *Increasing Diversity by Restoring Damaged Ecosystems*, *in* BIODIVERSITY 333, 333-337 (E.O. Wilson, ed., 1988).

III. RECOGNITION OF THE TROPICAL DEFORESTATION PROBLEM IN INTERNATIONAL ENVIRONMENTAL LAW

A. *The Road to the Forest Principles: Previous International Environmental Agreements Concerned With Forests*

While early international agreements on the environment did not address issues of forest conservation and problems of deforestation specifically, they did address the biosphere in general. The United Nations Educational, Social, and Cultural Organization (UNESCO) created the Man and the Biosphere Program in 1970. This program established a network of biosphere reserves in order to protect specific ecosystems like forests and to allow for sustainable use of the resources they contain.[136] The 1972 U.N. Conference on the Human Environment led to the adoption of the Stockholm Declaration,[137] which provided the first international consensus on environmental issues. The Declaration implicitly addresses the importance of forests, creating a duty to protect "air, water, land, flora, and fauna"[138] and the "heritage of wildlife and its habitat."[139]

The Declaration also stated two principles that are recurring themes in the problem of tropical deforestation. The first is Principle 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.[140]

It is beyond dispute that the forests growing within each country's border are their "own resources" and that they have the "sovereign right to exploit" them, including the right to cut them down. But Principle 21 also includes the obligation not to cause external environmental damage, and since tropical deforestation threatens the global environment by contributing to global warming and biodi-

136. Ann Hooker, *The International Law of Forests*, 34 NAT. RESOURCES J. 823, 838 (1994).
137. Stockholm Declaration, *supra* note 2.
138. *Id.* at Principle 2.
139. *Id.* at Principle 4.
140. *Id.* at Principle 21.

versity loss, it has become an extremely difficult international law issue.

Compounding the difficulty of this issue is the fact that tropical forests are located almost exclusively in developing countries, which lack the resources to improve the environment and which hold development as a much higher priority than conservation. Principle 12 of the Stockholm Declaration makes it clear that technical and financial aid should be given to developing countries so that they can combat problems like deforestation:

> 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.[141]

Over the two decades since Stockholm, several international environmental agreements followed in the same vein as the Stockholm Declaration. A set of principles for international conservation, termed the World Conservation Strategy, was established in 1980 by the International Union for the Conservation of Nature and Natural Resources (IUCN).[142] The Strategy principles relating to forests include: (1) the maintenance of essential ecological processes and life-support systems; (2) the preservation of genetic diversity; and (3) the sustainable utilization of species and ecosystems.[143] In 1982, the U.N. General Assembly adopted the World Charter for Nature,[144] an agreement that began to discuss in more specific terms the importance of forests and forest habitats. The Charter states 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."[145] Furthermore, "[a]griculture, grazing, *forestry* and fishing practices shall be adapted

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141. *Id.* at Principle 12.

142. C. Tisdell, *Sustainable Development: Differing Perspectives of Ecologists and Economists, and Relevance to LDCs*, 15 WORLD DEV. 373 (1988).

143. *Id.*

144. WORLD CHARTER FOR NATURE, U.N. GAOR, 37th Sess., Supp. No. 51, U.N. Doc. A/51 (1982).

145. *Id.*

to the natural characteristics and constraints of given areas . . . [and] [a]reas degraded by human activities shall be rehabilitated for purpose[s] in accord with their natural potential and compatible with the well-being of affected populations."[146] Significantly, many developing countries played major roles in the charter's development, though Brazil and other Amazonian countries criticized it as being "merely aspirational."[147]

Further U.N. environmental documents from the 1980s include the Brundtland Report,[148] published by the U.N. World Commission on Environment and Development (WCED), the U.N. Environment Programme: Report of the Governing Council, Environmental Perspective to the Year 2000 and Beyond,[149] and the System-Wide Medium Term Environmental Programme: 1990-1995.[150] These documents began to explicitly recognize the need to protect forest resources and processes.[151]

An excerpt from the Brundtland Report is typical:

> First, environmental stresses are linked to one another. For example, deforestation, by increasing run-off, accelerates soil erosion and siltation of rivers 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.[152]

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146. *Id.* (emphasis added).

147. Hooker, *supra* note 136, at 841-42.

148. 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) [hereinafter Brundtland Report].

149. U.N. GAOR, 42nd Sess., Supp. No. 25, U.N. Doc. A/42/25 (1987).

150. U.N. Doc. UNEP/GCSS.I/2 (1987).

151. Hooker, *supra* note 136, at 843.

152. Brundtland Report, *supra* note 148, at 37-38.

In order to deal with the rising international concern over tropical deforestation, the Tropical Forestry Action Program (TFAP) was formulated in 1985.[153] The TFAP was initiated by four international organizations: the U.N. Food and Agricultural Organization (FAO), the U.N. Development Program (UNDP), the World Bank, and the World Resources Institute.[154] The aim of the TFAP is to facilitate donor coordination and financing for tropical countries so that they would have the financial and technical resources needed to develop and implement National Forestry Action Plans (NFAPs).[155] To date, the TFAP has been ineffective in reaching these goals, and the FAO remains unwilling to expand the program's governance.[156] Despite being lauded as the "magic bullet" which would halt tropical deforestation,"[157] the TFAP has not been a major player in the conservation of tropical forests.

In 1983, the International Tropical Timber Agreement (ITTA), a binding trade agreement between consumers and producers of tropical timber, was signed.[158] Renegotiated in 1994, it deals with tropical forest conservation issues.[159] Through the years, the secretariat of this agreement, the International Tropical Timber Organization (ITTO), has initiated guidelines for sustainable management of natural tropical forests, plantation management, and biodiversity conservation in tropical production forests, as well as sponsoring a number of pilot management projects.[160] Despite these efforts, the ITTO has been criticized routinely by non-governmental organizations for its strong bias in favor of timber trade interests.[161]

Recognizing the growing threat of deforestation, the G-7, the world's seven leading economic powers, placed forest conservation at the top of their international agenda in the early 1990s.[162] The United States, in particular, proposed an international treaty on forest

153. Sizer, *supra* note 109, at 3.

154. *Id.*

155. *Id.*

156. *Id. See also* Myers, *supra* note 47, at 441 (describing the failures of the TFAP and placing blame on the FAO's indifference toward forestry issues).

157. Sizer, *supra* note 109, at 3.

158. *Id.* at 4.

159. *Id.*

160. *Id.*

161. *Id.*

162. Hooker, *supra* note 136, at 847.

conservation in 1990.[163] Developing countries, especially those of the tropical world, were not yet ready for such a binding treaty.[164] Issues of national sovereignty over environmental policies and concern that an international treaty would stifle desired development prevented countries like those of Amazonia from initiating treaty talks. The U.N. Secretariat, however, moved forward to assess forest conditions around the world, proving that forest conservation was a major issue.[165] Thus the stage was set for a discussion of forest issues at the Rio Conference.

In June of 1992, Rio de Janiero, Brazil played host to the second U.N. Conference on Environment and Development (UNCED), the greatest international environmental summit in history. Five major environmental documents were negotiated at Rio. First, the Biodiversity Convention,[166] a treaty that addressed the issue of biological diversity conservation, was developed and adopted. Second, the Framework Convention on Climate Change[167] was adopted. Third, the Rio Declaration[168] was unanimously agreed upon. It redefined international relationships on a North-South continuum, ideally paving the way for the North-South dialogue and cooperation that is integral to solving the problems of tropical deforestation. Fourth was the development and unanimous adoption of Agenda 21,[169] an 800-page blueprint for environmental action which specifies in great detail conservation techniques and methods for achieving sustainable development and use of resources. Chapter 11 of Agenda 21 details an international plan for combatting deforestation.[170] Finally, the attending countries adopted the Forest Principles,[171] representing a consensus on forest management, conservation, and sustainable development. However, getting all 172 participating countries to

163. *Id.*

164. *Id.*

165. *Id.*

166. Biodiversity Convention, *supra* note 117.

167. Framework Convention on Climate Change, May 9, 1992, 31 I.L.M. 849.

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

169. 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).

170. *Id.* at Chapter 11.

171. 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].

agree on principles for international conservation of forests was not the simplest of tasks.

B. *The Road Gets Bumpy: The Political Context of the Forest Principles' Development*

As stated at the outset of this paper, very difficult issues confront the development of an international consensus on forest policy. Forestry and other land use issues are widely recognized as specifically national concerns. Traditionally, each country has a property right in the forests that grow on their own land and a right to the benefits that are enjoyed from those forests. Yet as more is learned about forests and the benefits they provide, an interest in conserving forests has developed that goes beyond a country's border. This interest has become so widely held that forests can even be considered as "global commons" or a "common heritage of mankind." The differences between a state sovereignty view and a global commons view toward forests is perhaps most evident in the debate over tropical forest conservation. This debate is starkly drawn along North-South lines.

Many developing countries, including those in Latin America, react strongly when the tropical forest resources located within their borders are considered a "common heritage of mankind." Mexico stated during biodiversity protection negotiations: "This is not a common heritage of mankind; it is a heritage of Mexicans—Mexican generations, present and future. We are not ready to give away these resources, which, according to the principle of sovereignty over natural resources, belong to the Mexican nation."[172] When the Amazon is referred to as a "global commons," Brazil has reacted in similar fashion. In response to the suggestion that a U.N. ecological police force be formed to enforce conservation programs in ecologically valuable areas such as the Amazon, Brazilian military commander General Sotero Vaz stated, "I will tell you, and tell you clearly: if those *babacas* try to come here, we will hit them like guerrillas."[173]

Yet many Northern factions are taken aback by the South's claims to sovereignty in forests. Former EPA Administrator William Reilly, seemingly surprised at the stance taken by the South in negotiating the Forest Principles, was "struck by how offensive

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172. *International Land Use Law*, 1993 ASIL Proceedings 488, 496, remarks by Diana Ponce Nava (1993).

173. Peter H. Sand, *UNCED and the Development of International Environmental Law*, C795 ALI-ABA 747, 758-59 (1993).

developing countries find concepts like 'global forest values,' 'carbon sinks,' and 'international concern.' Genuine fear of 'globalization' of their resources explains the opposition of forested, developing countries to a forest convention."[174] In the same breath, Administrator Reilly recognized that the role of the United States and other Northern states is to provide assistance to developing countries by "continu[ing] to make forests a priority and commit[ting] substantial funds for their protection. Specifically, the United States will continue to push the 'Forests for the Future Initiative.' This initiative proposes to double forest assistance worldwide as it promotes forest conservation."[175] However, even the promise of cooperation from the international community poses a threat to the sovereignty of developing countries, especially when cooperation is termed more as "joint responsibility for areas whose ecological significance far surpasses that of the countries in which they are situated geographically."[176] The South views Northern attempts to internationalize forest issues with great suspicion, and for several understandable reasons. First, the South is deeply committed to development, and forest conservation initiatives are seemingly in contradict with economic and industrial progress. Brazil's foreign minister has stated that "Brazil does not want to transform itself into an ecological reserve for humanity. Our greatest duty is with our economic development."[177] Second, many in the South see Northern interest in tropical conservation as a conscious attempt by the North to stifle the South's much desired and much needed development.[178] Third, the South, with a long history of having their resources being exploited by the North during colonial times, views Northern interest in tropical ecology as just another form of exploitation.[179] Finally, the South sees hypocrisy in the North's sudden interest: having exploited and damaged its own environment in the name of progress

174. William K. Reilly, *Reflections on Rio*, 8 J. NAT. RESOURCES & ENVTL. L. 353, 354 (1992-93).

175. *Id.*

176. Sand, *supra* note 173, at 758 (quoting J. Pronk, *A New International Ecological Order*, 14 INTERNATIONALE SPECTATOR 728, 729-30 (1991)). Mr. Pronk is the Netherlands Minister for Development Cooperation and was one of the chief negotiators at Rio.

177. Hurrell, *supra* note 11, at 405.

178. *Id.* (quoting Sarney, former president of Brazil: "We cannot accept the developed world's manipulation of the ecology issue to restrict Latin America's autonomy and progress.").

179. *Id.* at 405-06.

and industrial wealth, the North is now "singling out [the South] as a particularly guilty environmental villain."[180]

Against this contentious backdrop, the issue of forests and the problem of deforestation was thrust to the forefront at UNCED in June of 1992. The North could not have been entirely satisfied when the non-binding Forest Principles were finally agreed upon, for they represented the North's "fallback position" from a full-fledged convention.[181] Southern states negotiated the terms of the Principles cautiously in order to insure sovereignty over forests and development of forest management practices. The Forest Principles recognized the "sovereign right to exploit their own resources"[182] and "the sovereign and inalienable right to utilize, manage and develop their forests in accordance with these development needs."[183] And while language such as "the common heritage of mankind" or "global commons" was missing, the agreement says that costs of conserving forests are still to be "equitably shared by the international community."[184] Specific Principles also provided that financial support[185] and technology transfer[186] should be given to the South by the North in order to combat deforestation in developing countries. These and other elements of the Forest Principles indicate that the South was able to use the North's interest in tropical forest preservation for their own benefit by bargaining for economic and technical assistance in exchange for forest conservation efforts.[187]

The South not only negotiated for support from the North by using the environment as leverage, they also insured that the Principles themselves did not come close to having the binding effect that a treaty would. The Forest Principles are clearly a form of "soft law," i.e., a set of international standards with no legal effect, but which, potentially, can influence member countries and others to reevaluate their own domestic policies and programs with these

180. *Id.* at 406 (focusing on Brazil's nationalistic approach to environmental issues).

181. Hooker, *supra* note 136, at 847.

182. Forest Principles, *supra* note 171, at Principle 1(a).

183. *Id.* at Principle 2(a).

184. *Id.* at Principle 1(b).

185. *Id.* at Principle 10.

186. *Id.* at Principle 11.

187. *See also* Hurrell, *supra* note 11, at 418-420. Hurrell does not discuss the Forest Principles negotiations specifically, but rather describes more generally how Brazil came to the realization that it could use environmental issues as leverage to get what they wanted in terms of international financial and technological assistance. *Id.*

standards in mind. The South did not want the Principles to harden over time. They were concerned about the possibility of "hard" legal principles couched in non-mandatory language, and thus added the caveat "non-legally binding" to the title of the Forest Principles.[188] The non-binding nature of the Principles means they are little more than a global consensus on the issues of forest conservation, and partly explains why no implementation of these principles or future treaty negotiation has occurred to date.[189]

C. *The Forest Principles*

Despite the political turmoil surrounding the issue of international forest management and conservation, some consensus was reached in June of 1992. The Forest Principles represent a global accord on what must be done to combat deforestation and to manage and conserve forests so that the resources they provide can be used sustainably. The Preamble states that the Principles do not apply just to tropical forests but "to all types of forests, both natural and planted, in all geographical regions and climatic zones, including austral, boreal, subtemperate, temperate, subtropical, and tropical."[190] The Principles recognize the relationship between environmental and socio-economic issues and that the objective should be to achieve a level of forest use that allows for conservation and sustainable development of forest resources at the same time.[191] They explicitly acknowledge the value of forests to local communities[192] and encourage the implementation of these Principles at the appropriate domestic level.[193]

There are forty-three separate elements or principles contained in the Forest Principles, and they are not organized into any discernable sections. Nonetheless, certain themes that run through the Principles can be identified:

1. *National sovereignty in forest conservation planning should be maintained.* A country's "sovereign right to exploit [its] own

188. Sand, *supra* note 173, at 757-58.

189. However, a seminar on implementing the Forest Principles, to be hosted by Germany, has been tentatively set for June of 1996.

190. Forest Principles, *supra* note 171, at Preamble (e).

191. *Id.* at Preamble (b), (c).

192. *Id.* at Preamble (f).

193. *Id.* at Preamble (h).

resources pursuant to [its] own environmental policies,"[194] provided it does not cause external environmental damage, has been a basic tenet of international environmental law since Principle 21 of the Stockholm Declaration. Forest Principle 1(a) reiterates it verbatim.[195] Principle 2(a) specifically addresses the right of countries to use forests for development, stating that "[s]tates have the sovereign and inalienable right to utilize, manage and develop their forests in accordance with their development needs."[196] Any access to a forest's biological resources for genetic or biotechnology purposes is to be done with "due regard to the sovereign rights of the countries where the forests are located."[197] And when it comes to solving deforestation problems, the Forest Principles state that "*[n]ational* policies and strategies" should "provide a framework for . . . the management, conservation and sustainable development of forests and forest lands."[198]

2. *The international community must help to combat deforestation, especially in developing countries.* Several of the Forest Principles reiterate the theme that if the benefits of forests are to be enjoyed globally there must be global action to ensure that they are conserved. Principle 1(b) states matter-of-factly that "[t]he agreed full incremental cost of achieving benefits associated with forest conservation and sustainable development requires increased international cooperation and should be equitably shared by the international community."[199] Building upon this theme of unified international effort, "[i]nternational institutional arrangements . . . should facilitate international cooperation in the field of forests."[200] According to Principle 8(c), national implementation of forest conservation policies "should be supported by international financial and technical cooperation."[201] The facilitation of an international exchange in forest information[202] and international cooperation in allowing for the free

194. *Id.* at Principle 1(a).
195. *See Id.*
196. *Id.* at Principle 2(a).
197. *Id.* at Principle 8(g).
198. *Id.* at Principle 3(a) (emphasis added). *See also id.* at Principles 6(b), 8(d), 9(a).
199. *Id.* at Principle 1(b).
200. *Id.* at Principle 3(b).
201. *Id.* at Principle 8(c).
202. *Id.* at Principle 12(c).

trade of forest products[203] are other areas touched upon by the Forest Principles.

In several other parts of the agreement, the international aid to be given for forest conservation is specifically directed toward developing countries. Principle 9(a) states that "the international community" should support "[t]he efforts of developing countries to strengthen the management, conservation and sustainable development of their forest resources."[204] Furthermore, Principle 7(b) suggests that "[s]pecific financial resources should be provided to developing countries with significant forest areas which establish programmes for the conservation of forests."[205] Guidance for financial resources and technical support for developing countries is contained in Principles 10 and 11, respectively.[206]

3. *An integrated approach to forest conservation and management should be taken.* As this Note has attempted to show, deforestation involves a myriad of interconnected factors. Principle 3(c) recognizes this complexity, stating that "[a]ll aspects of environmental protection and social and economic development as they relate to forests and forest lands should be integrated and comprehensive."[207] Any forest conservation plans that are developed should consider the relationship between the "conservation, management and sustainable development of forests" and aspects of "production, consumption, recycling and/or final disposal of forest products."[208] Furthermore, any conservation and management decisions made should take place only after "a comprehensive assessment of economic and non-economic values of forest goods and services and of the environmental costs and benefits."[209] Realizing that conservation is related to international concerns as well, Principle 13(d) provides that "[f]orest conservation and sustainable development policies should be integrated with economic, trade and other relevant policies."[210] Several principles even go as far as specifying outside policies that can be integrated within a forest conservation plan.

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203. *Id.* at Principles 13(a), 13(b), 14.
204. *Id.* at Principle 9(a).
205. *Id.* at Principle 7(b).
206. *Id.* at Principles 10, 11.
207. *Id.* at Principle 3(c).
208. *Id.* at Principle 6(b).
209. *Id.* at Principle 6(c).
210. *Id.* at Principle 13(d).

Conditions of urban and rural poverty that offer people no alternative but to turn to the forests should be addressed,[211] pressures outside the forest sector should be considered,[212] environmental costs and benefits should be incorporated into the market,[213] and "[f]iscal, trade, industrial, transportation, and other policies and practices that may lead to forest degradation should be avoided."[214] To this end, use of incentives for conservation and sustainable development are encouraged.[215]

4. *Forests provide a multitude of local and global benefits that must be conserved.* According to Principle 2(a), forests should be managed to meet the needs of present and future generations.[216] The Principles elaborate on the wealth of forest benefits that serve to meet these needs, including "wood and wood products, water, food, fodder, medicine, fuel, shelter, employment, recreation, habitats for wildlife, landscape diversity, carbon sinks and reservoirs, and . . . other forest products."[217] The Forest Principles extol the "vital role" that forests play in ecological processes such as watershed maintenance and biodiversity protection on "local, national, regional and global levels."[218] Separate principles also point out that forests are important energy sources, especially in developing countries,[219] and that they contain "unique and valued" segments, such as old growth stands or areas that may hold special religious significance to indigenous groups.[220]

5. *Informational databases on forests should be created and expanded.* Principle 2(c) states that information on forests is "essential" to developing conservation and management schemes and that such information should be provided.[221] Principle 12 discusses the strengthening of informational bases in greater detail, with separate provisions addressing scientific research and forest inventory

211. *Id.* at Principle 9(b).
212. *Id.* at Principle 9(c).
213. *Id.* at Principle 13(c).
214. *Id.* at Principle 13(e).
215. *Id.*
216. *Id.* at Principle 2(b).
217. *Id.*
218. *Id.* at Principle 4.
219. *Id.* at Principle 6(a).
220. *Id.* at Principle 8(f).
221. *Id.* at Principle 2(c).

and assessment,[222] socio-economic aspects of forests,[223] international exchange of information,[224] and indigenous and local knowledge of forests.[225]

6. *Local communities and indigenous populations should play a crucial role in developing conservation strategies.* Since they are the most direct users of forests, local communities and indigenous populations are often those most intimately affected by deforestation. The Forest Principles recognize this relationship and provide that "[g]overnments should promote and provide opportunities for the participation of interested parties, including local communities and indigenous people . . . in the development, implementation and planning of national forest policies."[226] Principle 5(a) states that forest policies "should recognize and duly support the identity, culture and the rights of indigenous people, their communities and other communities and forest dwellers," and give them the opportunity to make a living from the forest.[227] Women play a crucial role in forest use and conservation for many indigenous cultures, and thus Principle 5(b) promotes the "full participation of women" in devising conservation strategies.[228]

The Principles also attempt to tap the knowledge of the indigenous people. Tropical ecologists and naturalists from developed countries often point out that relatively little is known about the interactions of tropical plants and animals, and indeed many species remain undiscovered. Since indigenous peoples live directly in the forests and use the forests for all basic needs, they often know more about tropical forest systems than do Northern biologists. Principle 12(d) therefore states that "[a]ppropriate indigenous capacity and local knowledge regarding the conservation and sustainable development of forest should . . . be recognized, respected, recorded,

222. *Id.* at Principle 12(a).

223. *Id.* at Principle 12(b).

224. *Id.* at Principle 12(c).

225. *Id.* at Principle 12(d).

226. *Id.* at Principle 2(d). Principle 2(d) also lists "industries, labour, non-governmental organizations and individuals, forest dwellers and women" as interested parties that should have a hand in the process. *Id.*

227. *Id.* at Principle 5(a).

228. *Id.* at Principle 5(b).

developed and, as appropriate, introduced in the implementation of programmes."[229]

7. *Specific conservation strategies should be implemented.* The Forest Principles also specify several strategies for forest conservation that should be undertaken. In order to relieve pressure on primary forests, Principle 6(d) promotes the use of planted forests and permanent agricultural crops to meet demands for energy, food, employment, and industrial raw materials.[230] Principles 8(a) and 8(b) take steps toward "the greening of the world"[231] through reforestation, afforestation, and restoration of degraded and deforested areas.[232] In order to "maintain ecological balance and sustainable productivity," Principle 8(e) states that areas adjacent to forests should be managed together with forests in an integrative approach.[233] Finally, protected areas should be established for forests that represent unique, ecological viable communities or are of unique "national, cultural, spiritual, historical, and religious importance."[234]

8. *Activities that pollute or abuse forest resources should be curbed.* Two of the Forest Principles address forest pollutants directly. Principle 2(b) asserts that "[a]ppropriate measures should be taken to protect forests against harmful effects for pollution,"[235] and Principle 15 reiterates that "[p]ollutants, particularly airborne pollutants, including those responsible for acidic deposition, that are harmful to the health of forest ecosystems at the local, national, regional and global levels should be controlled."[236] A further provision states that national activities "likely to have significant adverse impacts on important forest resources" should be subject to environmental impact assessments.[237]

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229. *Id.* at Principle 12(d).

230. *Id.* at Principle 6(d). Underscoring the need for fuelwood in many developing countries, Principle 6(a) reiterates that use of tree plantations as an energy source should be recognized. *Id.* at Principle 6(a).

231. *Id.* at Principle 8(a).

232. *Id.* at Principles 8(a), 8(b).

233. *Id.* at Principle 8(e).

234. *Id.* at Principle 8(f).

235. *Id.* at Principle 2(b).

236. *Id.* at Principle 15.

237. *Id.* at Principle 8(h).

IV. ADDRESSING THE CAUSES OF TROPICAL DEFORESTATION IN LATIN AMERICA: DO THE FOREST PRINCIPLES HAVE WHAT IT TAKES?

A. *Analysis of Specific Forest Principles: Do They Address Specific Causes?*

In Part II of this paper, specific causes of deforestation in Latin America were identified on both proximate and fundamental levels. This section examines whether any of the specific Forest Principles will be able to address the specific causes.

1. *Development Policies and the Ranches, Roads, Mines, and Dams They Spawn.* Policies meant to facilitate development of remote and extensive tropical forests like the Amazon have been perhaps the most devastating Latin American forest killers. Ranches are established when under "normal" conditions they would be economic disasters for the investors, and roads carved into the forest attract shifted cultivators by the thousands. Principle 13(e) addresses these kind of deforestation-encouraging policies directly. It states that "[f]iscal, trade, industrial, transportation and other policies and practices that may lead to forest degradation should be avoided."[238] It seems to be aimed squarely at development policies like SUDAM's subsidized cattle ranches and the Brazilian military's involvement in road building programs.

Yet one of the central themes of the Forest Principles, the sovereign right of States to use their own resources, potentially contradicts Principle 13(e). Principle 2(a) clearly states that "States have the sovereign and inalienable right to utilize, manage and develop their forest *in accordance with their development needs and level of socio-economic development.*"[239] The language suggests that developing countries like those of Latin America would have a pronounced right to use forests for development, since their "level of socio-economic development" is low and their "development needs" are great. Principle 2(a) further clarifies that such use of forests can include clearing pastureland and building roads, since forest development includes "the conversion of such areas for other uses within the

238. *Id.* at Principle 13(e).

239. *Id.* at Principle 2(a) (emphasis added).

overall socio-economic development plan."[240] Principle 2(a) does provide that a State's development policies should be "consistent with sustainable development and legislation" and that forest conversion be "based on rational land-use policies."[241] It is doubtful, however, that this language is strong enough to thwart a country's "sovereign and inalienable right"[242] to development.

2. *Poverty, Landlessness, Overpopulation, and the Spread of the Shifted Cultivator.* The shifted cultivator's contribution to deforestation in Latin American countries is often a result of living in unbearable poverty and heading to the forest in order to subsist. Principle 9(b) recognizes that this situation hinders forest conservation. It states that the problem of a "lack of alternative options available to local communities, in particular the urban poor and poor rural populations who are economically and socially dependent on forests and forest resources, should be addressed."[243] In more general terms Principle 9(c) urges States to "take account of" the pressures on forests that come from "outside the forest sector,"[244] presumably referring to pressures like overpopulation and conditions of poverty in urban centers far removed from the rain forest. This approach to slowing the rate of deforestation is progressive and is to be commended. Socio-economic problems such as poverty are steps removed from hands-on forest conservation, yet they are key underlying reasons for tropical deforestation. It is encouraging to see that the global consensus on forest conservation includes agreement on the need to tackle these types of problems.

Another crucial link in the problem of the shifted cultivator, however, is not adequately addressed by the Forest Principles. Landless peasants, driven out of urban and rural settlements by poverty and overcrowding, move into the rain forest to slash and burn only because no one owns the forests (or, where property rights may exist, they remain unenforced). No principle addresses the lack of property rights in forests or the importance of land ownership in providing incentive to conserve forest land. Nor does the agreement

240. *Id.*
241. *Id.*
242. *Id.*
243. *Id.* at Principle 9(b).
244. *Id.* at Principle 9(c).

provide suggestions on how better to enforce a State's property claim against landless squatters.

3. *"Missing Markets" for Forest Values and the Incentive to Cut Down Forests.* Several of the Forest Principles do a good job in stating the many important ways in which forests are valued on local, regional, and global levels. Principle 2(b) underscores the need for a multitude of "forest products and services," including medicine, wildlife habitat, and carbon fixation.[245] Principle 4 states that forests are important in "protecting fragile ecosystems, watersheds and freshwater resources and as rich storehouses of biodiversity and biological resources and sources of genetic material for biotechnology products, as well as photosynthesis."[246]

Yet the Forest Principles' treatment of the "missing market" problem is inadequate. The only provision that would allow for the development of markets to capture the forest values that Principles 2(b) and 4 emphasize is Principle 8(g), which provides that rights to biotechnology and genetic material will belong to the country where the forest is located.[247] Such material could be priced and sold by the owning country to Northern pharmaceutical and biotechnology companies, creating a financial incentive to leave forests standing. Techniques for developing other markets, such as creating a tradeable permit system for carbon emissions and carbon fixation or capitalizing on ecotourism and Northern demand for "green" products, are not discussed at all in the Forest Principles.

4. *The Role of International Markets in Encouraging Logging and Permanent Agriculture.* Though the "hamburger connection" has been debunked by some as myth, international demand for timber, bananas, coffee, and other tropical products has contributed to deforestation in Latin America. The Forest Principles attempt to emphasize the importance of forest conservation while maintaining open markets for such products. Principle 13(d) underscores this theme by stating that "[f]orest conservation and sustainable development policies should be integrated with economic, trade and other relevant policies."[248] Principle 13(a) advocates free international

245. *Id.* at Principle 2(b).
246. *Id.* at Principle 4.
247. *Id.* at Principle 8(g).
248. *Id.* at Principle 13(d).

trade in forest products;[249] Principle 13(b) urges that tariff barriers be removed and that local processing be encouraged, thus "enabl[ing] producer countries to better conserve and manage their renewable forest resources."[250] In similar fashion, unilateral trade restrictions "should be removed or avoided, in order to attain long-term sustainable forest management."[251]

The Forest Principles that address issues of international trade in forest products represent a sensible approach to the issue. International demand for hardwoods and tropical cash crops like bananas and coffee provides excellent economic opportunities for developing Latin American countries. Trade barriers and unilateral actions such as tropical hardwood boycotts take away these opportunities, potentially aggravating an already deep North-South political divide over tropical deforestation issues. International markets should remain open, and the North should work with tropical countries to encourage forest conservation by creating a market demand for "ecologically friendly" tropical products.[252] The potential for international markets to serve both Southern development and Northern conservation interests is recognized in the Forest Principles by concentrating on both the maintenance of healthy markets and the supplying of forest products in a sustainable fashion.

5. *The Uniqueness of Rain Forest Ecology and the Difficulty It Poses to Forest Managers.* Foresters who have spent their entire life managing the spruce forests of northern Minnesota or the hardwood forests of central Pennsylvania would not be able to contribute much to the development of a conservation and forest management plan for the rain forest of Brazil. For the ecological reasons discussed in Part II(C), the management techniques that have worked so successfully in temperate regions would not result in sustainably managed forests in the tropics. Thus, the knowledge of those local communities and indigenous groups who live in and earn their living from tropical

249. *Id.* at Principle 13(a).

250. *Id.* at Principle 13(b).

251. *Id.* at Principle 14.

252. Such ideas are often proposed as "ecolabeling" schemes, whereby products that were produced in a sustainable fashion would come with a "green" seal of approval. Canada has been at the forefront of the development of ecolabeling schemes. The Forest Stewardship Council and U.N. bodies such as the Food and Agriculture Organization and the Commission on Sustainable Development have also discussed ways to recognize environmentally— friendly forest products through the harmonization of forest product certification programs and the development of criteria and indicators for sustainable development. *See infra* Appendix.

forests would be most beneficial in creating conservation plans. They are the ones who know the most about how tropical forests work.

To their credit, the Forest Principles recognize the importance of local and indigenous knowledge and participation. One of the themes of the Forest Principles identified above is the need for participation by local communities and indigenous peoples in forest conservation planning. As stated above, Principle 12(d) specifically provides for the integration of indigenous knowledge into forest conservation programs.[253] While these principles are laudable on paper, indigenous peoples of Latin America and the world over have endured a history of discrimination, exploitation, and lack of political power. Given this, it remains to be seen whether Southern governments will do anything more than give lip service to indigenous groups.

B. *Weaknesses of the Forest Principles: The Realities of a Non-Binding Agreement*

While not all the causes of tropical deforestation in Latin America identified by this paper are addressed adequately by the Forest Principles, there are specific provisions that generate hope and excitement. However, as a non-binding agreement, the Forest Principles lack the teeth necessary to insure that member countries will proceed forward with implementation. There is no enforcement mechanism in the way of either incentives or sanctions that would force implementation. As Nigel Sizer explains, "mechanisms for enforcing implementation [within the Forest Principles] are . . . extremely weak and ultimately depend upon political will at the national level among the signatories."[254]

There are several reasons that this particular agreement may be more difficult to implement in tropical countries than ordinary "soft law" documents. First, the sovereign right to use the forests and resources located within one's country is extremely strong. Trees are tangibly within a country's border, and the country traditionally has had a right to do what it wants with them. As has been explained throughout this paper, the issue of sovereignty was a contentious one during the negotiations of the Principles[255] and will continue to be so during the implementation process. Second, many developing

253. Forest Principles, *supra* note 171, at Principle 12(d).

254. Sizer, *supra* note 109, at 9.

255. *See supra* part III(B).

countries that have tropical forests believe that international attempts to halt tropical deforestation represent a threat to their own economic and industrial development. This nationalistic attitude develops for the reasons highlighted in Part III(B).[256] Third, the Forest Principles generally do not provide for an international implementation scheme to solve the deforestation problem, but instead rely on development and implementation of *national* programs and policies for the conservation, management and sustainable development of forests. This is logical, since many of the causes of deforestation come from factors and problems on the domestic level. Unfortunately, in many tropical countries the national programs and policies are not in place, or, more realistically, are the root of the problem themselves.

C. *Strengths of the Forest Principles: A Framework for International and Domestic Action*

Even though non-binding, the Forest Principles should contribute to the conservation and sustainable management of tropical forests. The negotiations that led to their agreement and adoption brought international attention to the issue of forest conservation and the need for the sustainable development of forests. In this way, the Principles will hopefully have an influencing effect on tropical countries as they formulate national policies concerning the use and protection of forests.[257] By stressing the importance of international cooperation, the Principles create an international network that should be able to provide financial and technical support for developing countries. Because of the global benefits that derive from forests, especially tropical forests, there is great international interest in conserving tropical forests. The Forest Principles are quite successful in capitalizing on this interest, stating unequivocally that the "agreed full incremental cost" of ensuring that forest benefits are maintained "should be shared equitably by the international community."[258] The Principles provide that both financial[259] and technological[260] sup-

256. *See supra* text accompanying notes 183-189.

257. Sizer, *supra* note 109, at 9.

258. Forest Principles, *supra* note 171, at Principle 1(b).

259. *Id.* at Principle 10. Further financial incentives to conserve forests are provided by Principle 7(b), which states that "[s]pecific financial resources should be provided to developing countries with significant forest areas which establish programmes for the conservation of forests." *Id.* at Principle 7(b).

260. *Id.* at Principle 11.

port should be given to developing countries that are attempting to combat the problem of deforestation, and that information on forests and forest management should be shared internationally.[261] With these and other provisions, the Forest Principles represent a strong commitment towards an international approach to developing conservation schemes for all forests, and especially the tropical forests of the developing world.

The Forest Principles also provide the international community with the opportunity to place external pressure on tropical countries to change policies and improve domestic conditions that contribute to deforestation. In an analysis of deforestation in Brazilian Amazonia, Andrew Hurrell discussed how such international pressure, though not without its limitations, can lead to desired policy changes.[262] Hurrell explains how international action contributed to a change of attitude and policy toward development of the Amazon by assisting in an environmental learning process, raising the costs of existing policies, and creating an international environment that promises benefits to Brazil if existing policies are abandoned.[263] Policies that were ended as a result of these pressures included the infamous subsidies for Amazonian cattle ranches. Forest Principle 2(d) provides a framework for this kind of external action by stating that "[g]overnments should promote and provide opportunities for the participation of interested parties, including local communities and indigenous peoples, industries, labour, [and] non-governmental organizations."[264] As Hurrell has explained, victims of tropical deforestation such as indigenous tribes and rubber tappers have surprisingly strong links with international NGOs and thus can be extremely effective in drumming up external pressure.[265]

Another strength of the Forest Principles is their commitment to an integrated approach to forest conservation. Such an approach is essential since the fundamental causes of tropical deforestation are based, not only on ecology, but in economics, politics, and sociology as well. The Principles stress that "[a]ll aspects of environmental protection and social and economic development as they relate to

261. *Id.* at Principle 12(c).
262. Hurrell, *supra* note 11.
263. *Id.* at 411-420.
264. Forest Principles, *supra* note 171, at Principle 2(d).
265. Hurrell, *supra* note 11, at 414.

forests and forest lands should be integrated and comprehensive,"[266] and that comprehensive cost-benefit analyses that consider all these factors should be conducted whenever forest conservation and management decisions are made.[267] The Forest Principles' contribution in regard to this theme cannot be overstated, since ending certain subsidies or developing urban infrastructure may do more to slow tropical deforestation than planting trees or creating a nature preserve.

Finally, though not clearly organized, the Forest Principles do provide what could be termed as an "international blueprint for forest conservation programs." The Principles are explicit in explaining that policies and strategies for conservation, management, and the sustainable development of forests should be developed on a national level. They then provide a solid set of standards for countries to follow. Based on the Principles' blueprint for action, national forest conservation schemes should contain the following items:

* A commitment to the sustainable use of planted forests and permanent agricultural crops in order to relieve pressure on primary/old growth forest areas (Principles 6(a), 6(c)).
* An effort to "green the world" by developing reforestation and afforestation programs that restore deforested and degraded areas[268] (Principles 8(a), 8(b)).
* Establishment of protected areas for unique ecologically viable forests (e.g., old growth forests) and forests that are of national, cultural, spiritual, historical, or religious importance (Principle 8(f)).
* Opportunities for local communities and indigenous peoples to participate in and contribute to forest conservation and management planning (Principles 2(d), 5(a), 5(b), 12(d)).
* Schemes to ensure that rights to the biotechnology products and genetic material of forests belong to the countries in which those forests are located (Principle 8(g)).
* Methods to control pollutants that threaten forests (Principles 2(b), 15).
* A requirement that environmental impact statements be conducted for those national actions that significantly threaten forests and forest resources (Principle 8(h)).

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266. Forest Principles, *supra* note 171, at Principle 3(c).

267. *Id.* at Principle 6(c).

268. Although the ecology of the tropics makes forest restoration difficult, *see supra* part 11(c), prominent tropical ecologists such as Dan Janzen and Christopher Uhl have demonstrated that reforestation can be successfully conducted in degraded pasture areas. *See* Robert J.A. Goodland, *Neotropical Moist Forests: Priorities for the Next Two Decades*, *in* CONSERVATION OF NEOTROPICAL FORESTS 416, 422-23 (Kent H. Redford & Christine Padoch eds., 1992).

CONCLUSION

Tropical deforestation is a problem of international concern. Yet, in most cases the causes of deforestation stem from within national borders. As this paper has shown, the causes of deforestation in Latin America alone are an incredibly complex mix of economic, political, social, and ecological factors. However, they can be parsed out into several fundamental causes that lead to specific alternative land uses ending in a single result: the loss or degradation of forests. The hummingbirds I studied in Costa Rica were gone days after we completed our field tests. Their territories were located in an experimental plot where the effects of slash and burn agriculture were being studied, and the entire plot, *Heliconia* and all, was scheduled to be slashed and burned to the ground two days after our experiment. The result was that the hummers were displaced, forced to find new territorial holdings, if indeed any could be found. Witnessing habitat destruction first hand brought home the adverse effects of deforestation.

The Forest Principles agreed upon at Rio should provide ways to stem the tide of tropical deforestation. When it comes to offering specific solutions to the particular causes outlined in this paper, the Principles hit occasionally (i.e. they address issues of urban and rural poverty and promote the use local and indigenous knowledge of forests), but more often miss (i.e. they do not encourage the establishment of property rights in forests or develop "missing markets"). This is to be expected since nations value their "sovereign right to exploit their own resources," especially when those resources are so tangibly within their own borders. When one considers how politically contentious the issue of tropical forest conservation is between North and South, the reasons for the Principles' shortcomings become even clearer. The Forest Principles' effectiveness in combatting tropical deforestation is further limited by the fact that it is a non-legally binding instrument, lacking implementation and enforcement provisions. Yet despite political and legal limitations, the Forest Principles do hold promise as influential guidelines for forest conservation, management, and sustainable development. There has already been increased international attention to issues surrounding the use and conservation of forests, as illustrated by the recent efforts

of the U.N. Committee on Sustainable Development and establishment of the Intergovernmental Panel on Forests.[269]

Two of the most important themes in the document, the need for international cooperation and the importance of integrated approaches to problem-solving, are crucial to the formulation of successful conservation schemes in the neotropics. In many instances, the Principles offer specific plans for action that will be effective if implemented. An international convention on forests remains an unrealistic short-term goal, mainly because of deep disparities between the developed North and the developing South. However, the Forest Principles do have the potential to evolve into a respected and influential set of international standards and regimes for forest conservation, perhaps pioneering the way toward "The Treaty on Forests."

APPENDIX
BEYOND RIO: WHAT HAS HAPPENED SINCE THE SIGNING OF THE FOREST PRINCIPLES?

While the Forest Principles as such have not yet been implemented on a national level in any country, the focus on forest conservation issues provided by the Principles and other Rio agreements such as the Biodiversity Convention and Agenda 21 has led to an increasing amount of international attention and effort in the area of forests. In fact, a seminar on implementing the Forest Principles into national forest and land use programs is scheduled for June of 1996 in Germany. Other international work that has been done since UNCED includes the following:

A. *The Forest Stewardship Council*

Founded by assembly in Toronto in 1993, the Forest Stewardship Council (FSC) seeks to harmonize the world's forest product certification programs.[270] It was facilitated by NGO participation and includes organizations and individuals from the forest products industry as well as environmental NGOs, indigenous groups, and social organizations interested in forest management. The FSC plans to evaluate the management practices of forest product producers using established principles and criteria. The FSC Principles state that

269. *See infra* Appendix.

270. *Forest Stewardship Council*: 16 October 1995, *available on* INTERNET at http://www.iisd.ca/linkages/vol13/1301015e.html.

forest management shall: (1) legally establish long-term tenure and user rights to forests and forest resources; (2) respect the user rights of indigenous peoples; (3) enhance the long-term social and economic well-being of forest workers and local communities; (4) conserve biodiversity and maintain the ecological functions of forests; and (5) conserve primary and well-developed secondary forests and sites of major environmental, social, and cultural significance. As can be seen, several of the Forest Principles themselves have shown up here in the FSC evaluation criteria. The results of the initial evaluation of producers' management techniques is expected in the near future.

B. *The 12th Session of the FAO's Committee on Forestry*

From March 13-16, 1995, the U.N. Food and Agriculture Organization's (FAO) Committee on Forestry (COFO) met at FAO headquarters in Rome.[271] Members discussed the role of the FAO in forestry, concentrating on the development of criteria and indicators for sustainable forest management, issues of trade and the environment, and possible participation in the intergovernmental panel on forests proposed by the U.N. Committee on Sustainable Development.

The majority of countries that participated in the COFO meeting agreed that strong scientific information and full international participation were needed to develop criteria and indicators for sustainable management of forests. However, debate over whether a binding agreement on forests should be negotiated continued to be split along North-South lines. The European Union, the United States, Canada, and Austria all stressed the need for a legally binding treaty on all forests and forest values. Tropical countries such as Brazil and Malaysia argued that talk of a treaty was premature since the Forest Principles have not yet been implemented and, thus, their ability to serve as a catalyst for forest conservation is still unknown.

C. *The Third Session of the U.N. Commission on Sustainable Development and the CSD Intergovernmental Panel on Forests*

The U.N. Committee on Sustainable Development (CSD) has taken on the role of facilitating sustainable development at the international, national, and local levels by implementing Agenda 21.

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271. *Report of the 12th Session of the FAO Committee on Forestry*: 13-15 March 1995, *available on* INTERNET at http://www.iisd.ca/linkages/vol13/1302001e.html.

The CSD held their Third Session from April 11-28, 1995, and focused on, among other issues, the conservation, management, and sustainable development of the world's forests.[272] The CSD established an International Panel on Forests (IPF) in order to better address implementation of the Forest Principles and Agenda 21's chapter on combatting deforestation. A large number of countries supported this proposal, but there was a legitimate concern that international efforts on forests had "been the subject of more talk than action" to date.[273] Other skeptics feared that controversial issues such as trade in forest products, farmers' rights, and rights to biotechnology could stall any efforts the IPF might make. Yet the Third Session was able to put together the Panel, negotiate a text for it, and outline a tentative set of focus issues for the IPF.

IPF held their first session from September 11-15, 1995 in New York.[274] In this inaugural meeting, the IPF elected its officers, adopted its work program, and attempted to set dates and venues for future meetings. The issues to be dealt with in its work program over the next few sessions include: (1) national forest and land-use planning; (2) underlying causes of deforestation; (3) protection and use of traditional forest-related knowledge; (4) coordination of bilateral and multilateral assistance; (5) valuing the multiple benefits of forests; and (6) criteria and indicators of sustainable forest practices. Many of the key concerns identified in this paper are on the Panel's table.

However, the first session also revealed a continuation of the stark disagreement between North and South. Developing countries resisted any proposals that could lead to a loss of national sovereignty over forests and forest products. The South was also skeptical of sustainable development criteria and indicators since most criteria proposed to date had been developed by Northern countries. Some Southern countries felt that criteria and indicators should vary regionally, nationally or locally since forest management practices which are considered to be sustainable in one area may not be in another. Northern countries were more willing to consider the proposed IPF workshops as official parts of the Panel process in order

272. *Summary of the Third Session of the U.N. Commission on Sustainable Development*: 11-28 April 1995, *available on* INTERNET at http://www.iisd.ca/linkages/vol05/0542001e.html.

273. *Id.*

274. *Report of the First Session of the CSD Intergovernmental Panel on Forests*: 11-15 September 1995, *available on* INTERNET at http://www.iisd.ca/linkages/vol13/1303001e.html.

to make real and binding progress in combatting deforestation. Yet despite the North's desire to "get it done," they did not embrace the South's passionate proposal to mandate financial assistance and technology transfer to developing countries. The first session of the IPF makes it apparent that international agreement on how to stop deforestation is far from a reality. As one commentator has said, the Panel "seem[ed] to have reawakened the longstanding distrust between Northern and Southern countries."[275] Whether this distrust was ever sleeping is debatable. Still, the very fact that a course has been charted for intergovernmental cooperation on the issue of forests is encouraging.

275. *A Brief Analysis of the IPF*, 16 October 1995, *available on* INTERNET at http://www.iisd.ca/linkages/vol13/1303021e.html.