

CHAPTER 12: DESERTIFICATION AND DEFORESTATION

Pages 297-308

Two important matters relating to biodiversity, which deserve independent treatment, are, first, the increase in the amount of desert areas and, second, the reduction in the number of oxygen-restoring trees. The essays in this Chapter deal with desertification and deforestation.

A. Desertification

1. A Transnational Problem¹

Desertification, the phenomenon of encroaching desert lands, is hardly a novel occurrence in the history of mankind. To be sure, it has played a salient role in hastening the decline of civilizations since ancient times. For example, both the Sumerian and Babylonian empires suffered telling blows when their agricultural productivity was destroyed, a gradual process principally attributable to improper drainage practices that allowed excessive salt concentrations to pollute their irrigated lands. Archaeologists also have suggested that prolonged desiccation undercut the agricultural basis of the Harappan culture, a people who lived in the third millennium B.C. in what is now Pakistan. Finally, there seems little question that the Mediterranean littoral of Africa was far more fertile and cultivatable in the Carthaginian era (600-200 B.C.) than it is today.

Nonetheless, while man's experience with desertification may not be new, realization of it and its far-reaching ecological impact is. Worldwide recognition of desertification as a transnational environmental problem did not come about until 1968, when a severe drought struck the Sahel, a region in western Africa lying along the southern margin of the Sahara. For six years, the countries of the Sahel--Mauritania, Senegal, Mali, Upper Volta, Niger, and Chad--were devastated by uninterrupted drought and resultant famine. The natural and human consequences were tragically catastrophic: Lake Chad shrunk to only one-third of its normal size; the Niger and Senegal river systems failed to flood, thus leaving barren much of the most productive croplands in the region; shallow wells dried up, seriously restricting the grazing range of pastoralists; vegetation was denuded as starving animals stripped the land; and splotches of new desert appeared and ultimately linked up with the great desert to the north. Reasonable rainfall did return to the Sahel in 1974, but not before drought, famine, and disease had killed an estimated 250,000 people and millions of domestic animals. As the tragedy and human suffering of people in the Sahel unfolded between 1968-1974, international attention became focused on their plight and the primary reason behind it: the inability of man to cope with spreading deserts in harsh climes.

Admittedly, while there is no reliable way to calculate precisely just how much land has been lost to or severely degraded by man's hand since agriculture began, there is widespread concurrence that the rate of land degradation through desertification has accelerated appreciably during the past five decades. Indeed, some experts have concluded that the rate is now exceeding 50,000 square kilometers (or 31,000 square miles) annually--a startling figure for a world with growing populations that already confront massive food shortages. Therefore, given the dire possibilities portended by such a situation, the purpose of this paper is three-fold: (1) to examine the nature and causes of the desertification process and its attendant ecological consequences; (2) to analyze and assess the international community's response to the problem of desertification since 1974; and (3) to evaluate the prospects for viable transnational solutions to combat desertification, particularly as set within the problematic political context of the disparate social and economic priorities that have estranged developed from less developed countries.

The popular notion of desertification seems to portray either the desert as spreading itself outward and engulfing green fields and pasturelands, or as a parching drought so severe that it transforms an ecosystem into a barren wasteland. In actuality, however, neither image is accurate and both are overly simplistic. In the first instance, human actions rather than the desert itself, are the initiatory agents, and they tend to pull the desert outward. In the second instance, the principal fallacy lies in the conceptualization of droughts; that is, droughts normally involve a short-term (i.e., one to five years) diminution in moisture and availability, whereas the physical conditions effecting desertification are long-term, chronic, and pervasive, including, inter alia, dune and sand encroachment, degradation of cover vegetation, soil erosion, and in areas where irrigation practices exist, waterlogging and often, salinization. In this connection, these chronically destructive conditions of desertification are greatly worsened and accelerated by hot winds, sandstorms, and periods of harsh drought. Nevertheless, the desertification process *per se* is far more complex.

During this century, the external force chiefly responsible for most frequently and most radically transgressing into the natural processes of dryland environments--and, hence, upsetting the delicate ecological equilibrium there--has been man. As man has made use of drylands for purposes of his own livelihood, the natural character of those ecosystems has been altered, and so too has their ecological balance. Consequently, as man denudes the land of

cover vegetation, soil humus is increasingly exposed to the elements and eventually it becomes mineralized, thereby damaging the entire soil structure. Subsequent rainfall is likely to batter the weakened topsoil and further disintegrate it, after which time the sun's intense rays bake a hard crustlike surface layer over the subsoil that effectively blocks later rainfed water from seeping in. The resulting decrease of water stored in the soil causes critical shortfalls in the level of wells, and that rainfall which would have been soaked in now is prone to overly rapid runoff. Furthermore, in areas where the soil has been loosened and crumbled by the feet of grazing animal herds, this water runoff usually washes away the remainder of the valuable nutrient layer of topsoil, or if not, windstorms are likely to blow it away. The subsoil left is essentially infertile, having poor morphology and degraded water relations. As a result, those plants that do survive must face a more hostile local environment and correspondingly, they respond poorly to rain and produce a reduced amount of biomass, which therefore renders them even less hearty to withstand the next drought. Such drastic shifts in the character and quality of dryland ecosystems typify the desertification process.

The U.N. Conference on Desertification convened in Nairobi, Kenya, August 29-September 9, 1977. The conference approved a rather lengthy plan of action, designed in the words of UNCOD Secretary-General Tolba, "to achieve zero desertification growth by the year 2000." The productive efforts at Nairobi culminated in twenty-eight substantive recommendations aimed at establishing anti-desertification guidelines for national governments and international organizations. These resultant remedial recommendations, which comprise the thrust of a "Plan of Action to Combat Desertification," present three fundamental objectives: (1) "to prevent and to arrest the advance of desertification"; (2) "to reclaim desertified land for productive use"; and, ultimately (3) "to sustain and promote, within ecological limits, the productivity of arid, semi-arid, subhumid and other areas vulnerable to desertification in order to improve the quality of life of their inhabitants." Important in this regard was that these recommendations intentionally took into account the Mar del Plata Plan of Action of the United Nations Water Conference, as well as the proposed strategies embodied in other U.N. conference action plans, including those relating to the Human Environment, Population, Food, Women, and Human Settlement.

On balance, the 1977 Nairobi U.N. Conference on Desertification can be generally lauded in that it reflected a more manageable mix of science and politics as compared with previous global conferences of the 1970s. UNCOD also underscored the realization that desertification is not merely a remote process affecting only the sandy expanses of the Sahara, but rather it is an insidious cancer-like growth that eats away vast areas of the planet's productive drylands.

Moreover, the Conference went far in highlighting the contention that it is man himself, not climatic change, which must bear the onus of responsibility in recent decades for spreading desertlike conditions throughout the world. In this connection, the poor nomad was found not to be the main culprit; instead, the greatest blame lies in the avarice with which man imposes intensive cultivation and excessive livestock grazing upon the fragile ecosystem in arid lands. In short, then, UNCOD served to crystallize these ideas and to consolidate them into an international intellectual consensus.

While some observers may have felt that the Action Plan placed too much faith in technological, rather than human solutions, the Desertification Conference nonetheless represented a milestone: for the first time the international community had committed itself to a large-scale campaign to halt the pernicious spread of desertlands. Admittedly, the Action Plan leaves the bulk of remedial responsibility up to individual national governments; even so, the incentive for transnational and regional collaboration remains great. As was evidenced in the Sahel calamity of 1968-1973, doing battle against the deserts for many afflicted countries is the only alternative to widespread poverty, starvation, and slow but certain death.

Seen from a vantage point in space, the earth appears to be a blue and green spherical oasis suspended in a black void. However, upon closer inspection, large portions of our planet's green area are all too quickly turning brown as desertification continues to deteriorate the composite ecology of land, water, and vegetative natural resources.

Desertification persists as a self-accelerating process, and with its advance, requisite rehabilitation costs rise exponentially. In many cases, technical solutions are now available, but their application remains impeded by social, legal, cultural and other institutional factors. Yet, in most less developed countries, a dearth of financial resources constitutes the most serious obstacle to more rapid implementation of local anti-desertification policies.

Desertification is manifestly a transnational problem, susceptible to neither easy nor near-term solutions, though the need for land restoration is already urgent and pressing in many arid areas. The 1977 U.N. Conference on Desertification furnished a timely forum wherein concerned nations and international organizations specifically addressed the worldwide threat of encroaching deserts. As such, this Conference became a valuable conduit for fostering constructive dialogue between prospective donor developed countries and the most seriously affected less

developed countries. Moreover, in the resultant Plan of Action, the UNCOD conferees clearly articulated what general strategy should be pursued by national governments for alleviating the spread of desertlike conditions in their countries: there must be constant governmental monitoring and assessment of the indigenous environment, complemented by prudent land use planning and management, and underpinned by the support of international collaboration and cooperation. Since the Desertification Conference, however, the task of expeditiously implementing this plan on a global scale has proven to be financially formidable and bureaucratically ensnaring. It seems safe to assume that the earth's desert regions will not bloom within a year, or in a decade, or very likely, even in a lifetime. Nevertheless, full commitment to a multidecade anti-desertification program by both developed and less developed countries is critical if arid regions ever are to be spared from the ravages of desert incursion.

2. The 1994 Desertification Convention: A Feminist Approach²

On October 14, 1994, a Convention To Combat Desertification In Those Countries Experiencing Serious Drought And/Or Desertification (Convention) was opened for signature in Paris.³ It seeks to impose binding obligations on state parties either to take measures to control and prevent the spread of desertification in their territories or to transfer appropriate technical support and funds to states that suffer from desertification.

The Convention is explicitly based on a theory linking desertification to the social conditions of the local communities that actually manage the land. For example, it stresses the importance of states taking measures to improve the socio-economic position of local peoples. For this reason, the Convention has important implications for contemporary international legal theory. The focus of this article is on exploring those implications from a feminist legal perspective. In particular, much feminist scholarship focuses on the various layers of the public/private distinction in international law. The segregation of activities between public and private realms has restricted the capacity of international environmental law to take account of the socio-economic factors which cause environmental degradation. Together with the insights generated by other disciplines, feminist scholarship illuminates why public/private distinctions have begun to collapse.

a. The Problem of Desertification

The United Nations system has long recognized desertification as a grave environmental problem. It is a very complex phenomenon that has proven difficult to define.⁴ The drafters of the Convention chose to address only land degradation in arid, semi-arid, and dry sub-humid areas. Land degradation is defined as the reduction or loss of the biological or economic productivity and complexity of lands. Although desertification is often misconceived as an expansion of desert areas outward, in reality it involves the conversion of useable drylands into land that cannot support agriculture or habitation.

The United Nations Environment Programme (UNEP) estimates that desertification currently affects approximately twenty-five percent of the world's land surface area. About 900 million people in at least 100 states are subject to the impact of desertification. Over \$42 billion in lost productivity or human support occurs each year on account of it. According to UNEP, the global rate of desertification is increasing, although the local rates vary by region. Africa, with around sixty-six percent of its land either desert or drylands, is particularly affected by desertification. Already, a number of large-scale famines have occurred in the Sahelian region, resulting in migration of people towards more hospitable lands.

The causes of desertification are principally human in nature. Although some desertification occurs because of climatic variations, most analysts accept that the natural processes causing land degradation have been exacerbated by human factors. For example, Professor Piers Blaikie of the Australian National University asserts that land degradation must be seen in a social context.⁵ Desertification occurs mainly through over-cropping, over-grazing, improper irrigation practices, and deforestation. These activities arise from poor land management, which, in turn, stems from the socioeconomic conditions in which the managers live.

Blaikie stresses that the poverty of local communities may create pressures for the use of inappropriate agricultural techniques or excessive rates of exploitation in order to gain short-term income benefits or merely to survive.⁶ To control land degradation, land managers must invest in long-lasting protective works such as terracing. This investment may decline if the managers become less able to afford it due to their displacement from traditional lands to more marginal lands or to a lack of additional sources of income during periods of drought or declining yields. The land then becomes more vulnerable to degradation.

In many situations, the poverty of rural communities arises from extensive inequalities in social and economic power across a society. Those inequalities arise through historical circumstances such as the rise to social and political dominance of an elite that controls the major portion of the nation's wealth.⁷ The poverty of rural communities is also, in part, generated by international trade patterns that often disadvantage developing countries. The poverty may be intensified by the consequences of land degradation, thus producing a self-perpetuating cycle.

b. A Feminist Critique: The Public/Private Dichotomy

Traditional international law has proven inadequate to tackle the problems of desertification. I argue that the reasons for its failure relate to its inability to address private spheres of activity behind the public persona of the state. Feminist theory has criticized this deficiency, and the new Convention appears to take steps towards correcting it.

The many disparate strands of feminist legal theory contend that gender is not used as a category of analysis in international law and that traditional theorists assume that international law norms invariably treat women identically to men.⁸ In reality, however, women are frequently unequal and subordinate to men in their social and economic power. By failing to take account of the ways in which a society's structures and practices produce inequalities, traditional international law fails to recognize the possibility that its norms may affect men and women within a state unequally.

Of particular relevance to the desertification context, feminist legal theorists have identified strict doctrinal divisions between the "public" and the "private" lives of legal actors.⁹ Having divided life activities into separate public and private realms, legal practitioners have associated each realm with a complex array of particular social meanings. The public sphere relates to rational thought, participation in civic affairs, knowledge, and productive work. By contrast, the private space is concerned with family life, personal relationships and reproduction. The distinction is a gendered one because the public space is viewed as "male" while the private space is identified as "female." The public/private distinction is also value-weighted. Greater importance is ascribed to the public sphere than the private sphere. Those gendered oppositions, such as the ones between activity and passivity or between intellect and culture, reflect established beliefs about gender.

Feminist criticism shows how the public/private distinction operates, in part, to maintain the social and economic inequalities of women. This analysis was originally used to criticize both the myth that state intervention in the private sphere does not happen, and the failure of the state to take account of what happens within the private sphere. For example, the law may refuse to regulate the private sphere since it is the realm of personal choice, thereby allowing existing inequalities to continue. The analysis can be expanded to forcefully attack the ways in which structures and practices hidden within the private domain perpetuate inequalities. The law could be transformed to require a more equitable distribution of social resources to women. Further, the public/private analysis can go beyond a merely feminist application to a more systematic critique of how the structures of states and institutions resist and absorb change. It is in this sense that I use the analysis here.

c. Traditional International Legal Structures: An Impediment

While international environmental law is developing rapidly in the 1990s, it remains bound within older conceptions of how international law ought to operate. Yet desertification eludes solutions that originate from those traditional conceptions, and demands a more radical focus on the internal organization of states as a way to combat the poverty that causes desertification. A public/private analysis of two important norms highlights this disjuncture between desertification and traditional solutions.

The norms of legal personality and sovereignty pervasively shape international law. Identified by Antonio Cassese as "constitutional norms," they are fundamental to the operation of the international law framework¹⁰ and underpin the modern United Nations institutional system. As it is commonly understood, legal personality embodies the idea that states are identically equal in their legal character and rights and that they exist as subjective and morally equal persons. Sovereignty, as it is often defined, refers to the capacity of states to exert their own political and juridical power within their territories. Sovereignty implies that states are entitled to control freely their internal organization, such as the choice of political system or the distribution of societal wealth, as this is within their domestic jurisdiction. These norms encourage the liberal idea that a state exists as a singular, unified, bounded entity.

International legal scholarship has often attributed "personhood" to states. That is, states are generally perceived as actors in the international community, with other bodies or individuals within their structures being denied full participation in international law-making. Although there are also criticisms of the theoretical equation of states to persons, this equation remains influential in guiding national and international practices. Until recently, the international community has been reluctant to create norms directly interfering with national policies and practices. Despite the fact that some international legal instruments, such as conventions covering various aspects of international human rights, purport to intrude into the national sphere, the frequent inefficacy of such instruments demonstrates that national institutions and practices are still affected by the philosophical momentum of traditional international legal theory.

Traditionally, the concept of sovereignty precluded criticism or even investigation of a state's internal organization. The "interior" of a state is unknown and strange to international law; as a "private" zone, it transcends

rational legal analysis and intervention. In other words, the abstraction of a state creates a kind of corporate veil between international and internal activities. The lingering perception that the policy choices and structural arrangements which promote desertification are purely "private" matters impedes the prevention of desertification from the international level.

The idea that a state has a singular, abstract existence also implies that the interests of the peoples who live within the state necessarily coincide with those of the state. A state participates in international society through the agency of its government and representatives. Those agents are identified with the state which speaks through them as an unified entity. In reality, however, most states are governed by elite social groups who gain access to government precisely because they possess most of their society's socio-economic power. Inevitably, they will govern according to their own priorities.

The lack of participation of local communities in national and international policy-making leads to technocratic "public" solutions to "private" concerns. In yet another layer of the public/private distinction, governance occurs within the public realm, while the needs and experiences of many social groups exist in the private sphere. Their problems, such as a lack of access to healthcare or water, were formerly seen as matters of individual suffering, and not as widespread patterns of inequality affecting large numbers of people.

Urban centers, the loci of policy-making power, routinely discount the potential contributions of the rural communities. Seen as fragmented and provincial, rural communities are traditionally not considered by national authorities as participants in national policy-making processes.

Because of its reliance on traditional norms of sovereignty and legal personality, the international community has tended to adopt solutions that are state-centered and highly technocratic. These "top-down" solutions of international institutions and national governments determine how desertification will be tackled within their own framework of priorities. Traditionalist solutions would leave untouched concerns about the distribution of socio-economic power within a society. Moreover, as explored in Section II above, since the poverty of local peoples and the rise of desertification are strongly linked, the problem of desertification will not be adequately addressed as long as traditional international legal theories govern the scope of available remedies. If desertification is ever to be assailed, both the international community and the individual states must focus on the socio-economic conditions prevailing in local communities.

d. Evidence of a Public/Private Breakdown

As seen above, traditional normative structures in international law hinder a real resolution of the desertification problem. The public/private analysis suggests that there should be a breakdown of public/private layers in international law. The Convention, both in its negotiations and terms, evidences a beginning of such a breakdown.

During the 1970s, initial efforts at addressing the desertification problem were unsuccessful due to a combination of the inability of international actors to break out of the traditional ways of thinking about the role of international law and the unwillingness of developed nations to provide the necessary funds for an effective prevention program. In 1977, a conference entitled the United Nations Conference on Desertification (UNCOD) was held in Nairobi that resulted in the creation of a complicated Action Plan "based on the perspective that desertification could be halted everywhere by the year 2000." Delegates at UNCOD acknowledged that socio-economic dimensions played an integral role in desertification. They recommended that, among other initiatives, peoples affected by desertification should be given more adequate health services. Any national programs to combat desertification had to take local conditions, including cultural characteristics, into account in order to adapt science and technology to human needs. However, the underlying focus was still on scientific and technological solutions.

By 1990, it had become apparent to most states that efforts to control and prevent the spread of desertification had been largely ineffective. This failure was attributed by UNEP to insufficient financial and support resources, as well as to an excessive focus on scientific and technological solutions rather than on the knowledge and skills of local communities. However, it appears that inadequate land management, originating from socio-economic factors, may have been the real culprit.

The negotiations took place over a series of five meetings held by the Intergovernmental Negotiating Committee for a Convention to Combat Desertification (INCD). A variety of issues were debated intensely during the negotiations. As with past environmental conventions, developing countries expressed a concern that they should have access to "new and additional" funds to assist them in fulfilling their legal obligations. Some developed countries, including Sweden and the United States, resisted the suggestion of providing additional funds. They contended that existing international and national financial resources could be allocated more efficiently. Ultimately, a compromise of sorts was reached at the final meeting, by inserting a clause into the Convention which specifies that developed state parties will undertake to "mobilize substantial financial resources, including grants and

concessional loans" to support anti-desertification measures. Concerned about additional responsibilities, developed state parties promised only the diversion of existing funds from the Global Environmental Facility subject to certain conditions. In other words, the Convention leaves the issue of new and additional funding unresolved.

More importantly, debate centered around whether the Convention should cover socio-economic factors and require affected state parties to change their national practices and institutions to take account of those factors. There was extensive discussion of poverty and the roles of local communities during the negotiations. Even if most of the discussion is not necessarily reflected in the Convention, it will influence greatly its implementation and it will set a precedent for future environmental treaties. Although most developing countries agreed that poverty was implicated strongly as a cause of desertification, some countries resisted the suggestion that socio-economic considerations should be so explicitly integrated into the Convention. This integration was perceived as potentially resulting in a form of international pressure on states to change their practices and policies. Ultimately, however, in my view, most states were prepared to disregard the public/private distinction to some degree, in order to place socio-economic factors firmly on the agenda and consequently to attract assistance from developed countries.

The Convention contains many provisions that focus on the importance of incorporating socio-economic factors into anti-desertification efforts. The preamble affirms that "Desertification is caused by complex interactions among physical, biological, political, social, cultural and economic factors." Desertification in turn affects sustainable development through its interaction with social problems such as poverty, poor health, lack of food security, and population pressures.

Article 3 defines the principles which are to guide the activities of state parties. The Convention supports the participation of populations and local communities in the decision-making process, rather than merely formal, "top-down" institutional processes. It states that resources should be directed where they are needed most (i.e., to local peoples) and it suggests that cooperation between governments, communities, NGOs and landholders is also needed to understand better the nature of desertification and to work towards the sustainable use of resources.

Article 4, in turn, summarizes the general legal obligations which all state parties undertake under the Convention. In particular, states should adopt an integrated approach addressing the physical, biological, and socio-economic aspects of desertification. That approach should incorporate specific strategies for poverty eradication. Only developing state parties are eligible for assistance under the Convention.

Perhaps the most important provision is article 5, which sets out the legal obligations assumed by developing state parties. Those parties undertake to: give priority to combatting desertification and allocate sufficient resources to do so in light of their capabilities; address the underlying causes of desertification and give special attention to the socio-economic factors contributing to desertification; and facilitate the participation of local populations, particularly women and youth, with the support of NGOs, in efforts to combat desertification. This kind of provision appears to be almost unprecedented in international environmental law. Traditionally, states were reluctant to allow external pressures for internal change to impinge on their own national policies and practices. Article 5 is important precisely because it attempts to require countries to adapt their internal policies and practices in line with the new approach.

The African Annexure is, however, probably the most interesting part of the Convention. It contains a list of specific actions that African nations should take to address the social dimensions of desertification. Article 3 specifies that parties must take into account some particular conditions of Africa, including the widespread poverty prevalent in most African countries, the heavy reliance of populations on natural resources, and the difficult socio-economic conditions which induce internal or regional migrations. Under article 4, African parties agree to combat desertification "as a central strategy in their efforts to eradicate poverty." They also agree to strengthen reforms towards greater decentralization and participation of local communities. Article 6 requires African nations to use "a consultative and participatory process involving . . . local populations, communities and non-governmental organizations" to plan anti-desertification efforts. Importantly, article 8 requires states to adopt a national action program, which contains measures to improve the economic environment and eradicate poverty. Even though the contents of such programs are subject to qualifications, African states have explicitly committed themselves to socio-economic measures which will enhance the position of local peoples.

As far as the Convention takes into account the social dimensions of desertification, it is a promising development in international environmental law. But the apparent focus of the Convention on socio-economic factors and on the role of local communities is only a beginning. This focus is in no sense a direct intervention into the domestic jurisdiction of states but merely requires states to take notice of those considerations while formulating national plans. There is no firm obligation imposed on states to change their internal social organizations to give priority to the needs of local peoples. For example, much attention was devoted to the question of whether land tenure should be referred to specifically in the Convention. It seems that this question was ultimately rejected in

favor of the vague statements used in article 5 and in article 8(3)(2)(a)(ii) of the African Annexure.

e. The Continued Vitality of Traditional International Legal Structures

The trend towards recognizing the social and cultural dimensions of environmental degradation is only textual. As always, the difficult stage is the actual implementation of the Convention. It is possible that the trend merely masks an indifference among countries towards real change. Even as the language and discourse of international law may change, the underlying structures and internal cultures are likely to be far more resistant to change. Norms may undergo an outward transformation but their implementation through institutional and national practices can remain within older, more archaic assumptions about the ways in which international law operates.

It is at the domestic political level that the real difficulties will arise: states must change their national institutions and practices to incorporate the perspectives of local communities and to focus their policies on the needs of local peoples rather than those of elite groups. There will undoubtedly be significant inertia in national institutions and policies. For example, studies have shown that, even though the World Bank has begun to address the issue of equity for women in development, loan recipient governments still refuse to direct aid towards women because of their institutional and social biases. Governments still fail to implement sub-agreements to benefit women.

The Convention, however, also illustrates an erosion in support for the traditional concepts of sovereignty by developing countries. Until lately, developing countries have been supportive of the traditional concept of sovereignty, and have been hostile to perceived attacks on their sovereignty by attempts to extend, for example, international norms to cover natural resources. This can be attributed partly to the desire to assert their independent existence as newly established nations. A more complicated understanding of sovereignty is now emerging, as many developing countries become more willing to countenance the possibility of a more porous concept of sovereignty. This helps to explain the inclusion of socio-economic measures in the Convention.

The movement does not seem, however, to be evenly shared among developing countries. This is seen in the point that developing countries can control their obligations through creating annexures under the Convention that set out their own goals. The Convention also reaffirms that states retain a sovereign right to exploit their own resources pursuant to their own environmental and developmental policies. Thus, it seems that the public/private distinction in sovereignty will be extremely difficult to break down in practice because developing countries remain intent on their own images of development.

B. Tropical Deforestation¹¹

Since 1900, more than half of the world's tropical rain forests have been destroyed and the land converted to other uses. A 1990 United Nations (U.N.) study concluded that tropical rain forests are disappearing at a rate of seventeen million hectares per year,¹² and some scientists predict that the remaining tropical forests will be gone by the end of this century. Obviously, when deforestation occurs at such a rapid rate, it is bound to have serious environmental and social consequences, many of which are not yet fully understood. Others theorize that the indiscriminate exploitation of natural resources such as tropical rain forests could result in environmental conditions being modified dramatically enough to end human life on this planet.¹³

Deforestation can be defined as the process by which land is cleared of forests or trees. Deforestation, which is sometimes euphemistically called "timber extraction," occurs throughout the developed and developing world and can be seen as a by-product of industrialization and development programs. For purposes of this Article, the difference between tropical deforestation and non-tropical deforestation is crucial. At least in the developed world, many people tend to focus their attention primarily on deforestation occurring in tropical rain forests within the developing world, usually in Brazil's Amazonia.¹⁴ That perspective, however, is only partially accurate, for it fails to consider a second, equally controversial form of non-tropical deforestation that is occurring right in the developed world's own back yard. In the United States, for example, there is significant opposition to timber extraction of old-growth forests in the Pacific Northwest. Another example of rapid, non-tropical deforestation may be occurring in the Commonwealth of Independent States, most notably in Russia. In international discussions, the latter examples of non-tropical deforestation should not be so quickly dismissed, since they raise the same sustainable development concerns as tropical deforestation.

To date, however, tropical deforestation has received the lion's share of attention, even though it is clear that all deforestation, including that which takes place in tropical forests, has a significant adverse impact on the environment. The developed world's tendency toward ignoring its own serious deforestation problems causes great resentment on the part of governments in the undeveloped southern countries (South), which understandably feel that their forest policies are unfairly singled out for criticism at the international level.

The primary causes of tropical deforestation are well known. Extreme poverty and population growth are

among the principal causes. Conversion of forests to alternative uses, including agricultural production, cattle ranching, and commercial logging, and the demand for fuelwood are additional leading factors that directly contribute to the environmental losses. The precise contribution of each of these activities to forest depletion is unknown, but one study suggests that sixty-four percent of tropical forest depletion can be attributed to agricultural conversion, eighteen percent to commercial logging, ten percent to the actions of fuel gatherers, and eight percent to cattle ranching. Significantly, tropical timber exports, either as logs or processed timber, account for only one percent of all trees felled in developing countries.¹⁵ United Nations and World Bank estimates lend additional support to these figures.

These activities and various other human activities will be considered in the order of their relative contribution to tropical deforestation. Although outlined separately for ease of discussion, it is important to remember that these factors do not exist independently in the real world; they interact within a single dynamic relationship. Thus, while timber extraction itself accounts for a certain amount of forest depletion, it also fosters agricultural use by providing greater access (that is, logging roads) to the forest's interior.

The principal causes underlying tropical forest destruction are extreme poverty and population growth. In the last fifty years, the world's population has grown from two billion to five billion, and population experts predict that there will be 7.5 billion people worldwide by 2035. The overwhelming majority of this growth is occurring in the developing world, which leads to Malthusian predictions about land and natural resource scarcity. Likewise, poverty, malnutrition, disease, and early death can be expected to increase exponentially.

Excluding China, approximately three billion people currently live in the world's tropics and subtropics, and 750 million of these people live in absolute poverty in the tropics. Given these figures, tropical forest land is often perceived by governments in the developing world as a "safety valve" for population increases and as a "cushion" against domestic political pressure for land reform. Since these governments control seventy-five percent of the world's tropical forests, landless forest colonists in search of empty terrain will probably continue to put the most significant pressure on rain forest preservation efforts. Moreover, as the world's population continues to rise, migration pressures on the tropical forests can be expected to continue growing massively in the coming decades.

"Slash and burn" agricultural techniques and ranching practices are the two leading causes of direct tropical forest destruction. For example, after loggers and road builders clear trails into a rain forest's vast interior, farmers and cattle ranchers typically clear surrounding forests with chain saws and, more devastatingly, with fire.

The soil in tropical forests possesses few minerals and nutrients. As a result, most tropical forest vegetation feeds and grows on other dying vegetation in an efficient growth-from-decomposition cycle that takes place almost entirely above ground. After large areas of a tropical forest have been cleared, however, the soil in tropical forests varies from fair to poor quality and erodes easily. Because of the soil's increasing infertility after a tropical forest has been cleared, the cattle ranchers' grazing activities and the farmers' food crops generally dwindle or are exhausted after two or three seasons. Once the land is no longer profitable, the cattle ranchers and farmers are forced to move on, and the cleared land remains a virtual wasteland.

It is difficult to separate the removal of wood for commercial purposes from the removal of timber for firewood. A recent U.N. study, conducted by the FAO, found that seventeen percent of all wood removals in this category of wood and timber extraction were for commercial purposes, ranging from the construction of furniture and houses to shipbuilding and joinery. The remaining eighty-three percent of wood and timber extraction resulted from domestic firewood collection. In countries of the South, wood is frequently seen as an inexpensive source of energy, needed to fulfill heating and cooking needs.

Government schemes to promote development are as varied as they are destructive. Although virgin forest land has little economic value for a developing country, once such land is cleared and occupied, it has great political value. Governments recognize that shantytown slums, which have sprung up around many cities as a by-product of rapid industrialization and modernization efforts, represent potential flashpoints of civil unrest. By opening up "land without people for people without land," it is hoped that resettlement programs will discourage anti-government sentiment by spreading the poor inhabitants out over a greater, more diffuse area. Such government "development" programs will likely continue as long as tropical forests have a greater political value than economic value.

Compounding the problem are more conventional government development programs initiated to encourage the construction of large industrial projects, which include ports, bridges, highways, mines, and dams. The purpose of these industrial projects is to enhance the country's infrastructure and to provide raw materials or energy for industrial processes located elsewhere. Such programs not only destroy thousands of hectares of tropical forest directly, but also contribute to the indirect loss of tens of thousands more hectares of tropical forest due to the landless settlers, forest colonizers, and ranchers that soon follow.

Until very recently, the most important misconception about the underlying causes of tropical deforestation

was the perception that tropical timber extraction for export was mainly to blame for tropical deforestation. In fact, timber extraction for export is less responsible for tropical deforestation than are all of the above-outlined activities. This fact cannot be overlooked in the debate on whether the international trade in tropical timber should be restricted for environmental purposes. It sheds light on how relatively insignificant an effect such environmental restrictions in the developed northern countries (North) have on the South's conduct.

For example, according to a recent study prepared by the FAO, developing states produced 1.92 billion square meters of tropical timber in 1989. Of this area, only eighty million square cubic meters of tropical timber were exported. According to these same FAO statistics, of the eighty million square meters of tropical timber exported, forty percent of the timber went to other developing countries (mostly in Asia), thirty-two percent went to Japan, twenty-four percent went to Europe and other industrialized countries, and four percent went to the United States and Canada. Because only about one to four percent of all timber removed from tropical forests is exported, the World Bank has concluded that "[timber extraction] activities geared to the domestic market. . . are the main players in the deforestation process."

Without more, however, this one to four percent figure is somewhat misleading, for it fails to disclose the relative economic value of tropical timber exports as sources of foreign exchange earnings, especially in Southeast Asia. In 1992 Indonesia's tropical forests yielded US \$4.2 billion in total revenues, second only to oil and gas in terms of export earnings. In 1991 Malaysia, the largest exporter of tropical timber in the world, exported more than twenty million cubic meters of logs, sawnwood, and veneer products worth an estimated US \$1.5 billion. None of these official figures include revenue derived from the illegal trade in tropical timber, which is worth an additional US \$8 billion worldwide.

1. Ecological Impact of Tropical Deforestation

Tropical deforestation has a devastating effect on local tropical plant and animal life, which in turn affects the lives of the indigenous people who rely on the rain forests' natural ecosystem for their food, housing, clothing, and medicine. In a tropical ecosystem, the "above-ground" plant and animal growth-from-decomposition cycle is so efficient that soil functions largely as an inert platform. As noted previously, the soil of a tropical rain forest is largely infertile; consequently, when the rain forest is removed, the underlying soil becomes incapable of supporting any significant plant life. Moreover, when the rain forests are destroyed, indigenous human groups are forced to relocate, a "social cost" that is often ignored by the forest inhabitants' governments who control seventy-five percent of the world's tropical forests.

In addition to its effect on the indigenous population, rain forest destruction alters the local climate and weather patterns. Because the absorptive capacity of the area is reduced, drastic changes in precipitation are direct and immediate. The result is that rivers that normally rise and fall during the wet and dry seasons are instead likely to flood surrounding areas. Dislodged silt from these floods not only raises river beds, but also disturbs fishing and agricultural production.

Similarly, tropical deforestation has a host of downstream consequences for the surrounding region. The effect of flooding and siltation on irrigated agriculture, hydroelectric schemes, transport links, and riverine and coastal fishing, for instance, may be particularly acute for a tropical country's neighbors.

Downstream flooding also results in the erosion of fertile top soil, which in turn leads to regional desertification. In the last twenty years, for example, farmers worldwide have lost an estimated 480 billion tons of topsoil, an area roughly equivalent to the amount covering all of India's cropland.

Tropical deforestation has a dual negative effect on the global environment. The first negative consequence is global warming, which affects the global commons, the climate; the second negative consequence involves the loss of biological diversity, which affects the level of plant and animal life within individual sovereigns.¹⁶ The differing treatment afforded to the atmosphere and tropical forests under international law makes the solution of these two separate, but related, problems infinitely more complex.¹⁷

Almost all human activity either releases or removes greenhouse gases from the atmosphere. These greenhouse gases contribute to the phenomenon of global warming. For example, conserving tropical forests removes carbon dioxide from the atmosphere, but burning wood for heat and cooking releases it. Given the existing state of scientific knowledge, it is not possible to trace the source of specific carbon dioxide emissions because carbon dioxide, like other greenhouse gases, disperses quickly into the global atmosphere. Nevertheless, estimates can be made.

The majority of greenhouse emissions come from the developed North. Industrial activities, such as the burning of fossil fuels for electricity and transportation, account for about seventy-five percent of total emissions. The United States is undoubtedly the world's largest single contributor to these greenhouse emissions.

In contrast, the South's precise contribution of greenhouse gases is in dispute, but by all accounts it is

increasing. Current estimates range from twenty-five percent to about thirty percent of total carbon dioxide emissions from energy use. When the effects of deforestation are factored in, however, some analysts argue that this proportion reaches as high as forty percent.

Tropical deforestation increases the South's contribution of greenhouse gases because trees, as the primary filters of carbon gases, remove carbon dioxide from the air, thereby reducing the greenhouse effect which is causing global warming. Thus, the destruction of forests by burning not only releases carbon dioxide into the atmosphere, but diminishes an important sink for absorbing carbon dioxide created from other sources.

Admittedly, the North emits the majority of greenhouse gases, yet argues that the developing world's tropical forests must be preserved because they function like gigantic "lungs" that assist in filtering out impurities caused by human activity. Since the relatively rich northern countries are unwilling to contribute their fair portion of funds for conserving this global benefit, the South at least to date has been largely unwilling or unable to subsidize the North's prolific carbon production. As the constructive debate surrounding this issue breaks down, environmental non-governmental organizations (NGOs) and governments in the developed world exchange accusations of degradation of the global commons with governments in the South, who in turn label demands that they subsidize their rich northern neighbors as "eco-imperialist."

Tropical forest areas are the most biologically rich on earth. Although tropical forests cover a mere thirteen percent of the earth's surface, they contain sixty percent of the world's plant species and most of its animal life. But deforestation is currently causing more species of animals and plants to become extinct than at any other time since the Cretaceous era, which occurred approximately 135 million years ago. The result is that many species are becoming extinct before they can even be identified, let alone analyzed.

Aside from their importance as a global "storehouse" of genetic diversity, tropical forests also contain many potential "miracle drugs" that may lead to important discoveries in the fields of cancer and AIDS research. The 1992 U.N. Earth Summit, held in Rio de Janeiro, attempted to capitalize on the growing awareness of tropical forests as an important source of biological diversity, but, unfortunately, had little success.

2. Multilateral Efforts to Regulate the Tropical Timber Trade

Because of the severe ecological implications associated with tropical deforestation, multilateral efforts to regulate the tropical timber trade are not new. However, in recent years, there has been an increasing demand to apply the theory of sustainable development to the way in which all forests--primarily those found in the tropics--are harvested.¹⁸ The origins of these multilateral efforts can be found within meetings of the U.N. and the Group of Seven (G-7), but the International Tropical Timber Agreement (ITTA) represents the single most important multilateral effort to date. The ITTA was the first international commodity agreement that specifically included provisions for the protection of the environment.

As the negotiations became more narrowly focused, an environmental policy and advocacy group, the International Institute for Environment and Development (IIED), became involved. One author has succinctly observed that the IIED forcefully argued its case that any resulting commodity agreement could not limit itself merely to the technical and commercial aspects of timber extraction and trade, but also had to provide for the other crucial ecological and genetic services supplied by forests. Because of intense pressure imposed by domestic environmental groups, the industrialized countries, in particular, could no longer afford to ignore the IIED's arguments. In late 1983, after six years of multilateral negotiation, the ITTA was finally signed by the individual members of the International Tropical Timber Organization (ITTO).

Under the ITTA's complicated formula, votes are divided equally between consumers in the developed world and exporters of tropical wood in the developing world. The net result of this weighted voting system is that "the more a country contributes to the destruction of tropical forests, the more votes with which it is rewarded." The ITTA's voting structure thereby ensures that the goal of promoting the international trade in tropical timber outweighs its secondary conservation role. Viewed from this perspective, the ITTO-created voting system can be seen as a serious structural impediment to promoting sustainable timber harvesting at the multilateral level.

During its 1990 annual meeting in Bali, the ITTC announced "Target 2000," the year by which all tropical timber is to be derived from sustainable logging practices. The problem is that there is no single definition of what constitutes sustainable logging of tropical timber. So-called "deep" ecologists argue that there is no such thing as sustainable timber extraction, while tropical exporting countries counter that they are already practicing sustainable logging. To date, the ITTC has not agreed on any single definition of what constitutes "sustainable management and use of tropical rainforests." The absence of a working definition of sustainable logging further contributes to the ITTC's perceived weakness.

¹ Christopher C. Joyner, *Towards Transnational Management of Desertification: The Eco-Politics of Global Concern*, 16 INT'L LAW. 67-73, 80-82, 87, 92-93 (1982). Copyright 1982. Reprinted by permission.

² Alastair Iles, *The Desertification Convention: A Deeper Focus on Social Aspects of Environmental Degradation?*, 36 HARV. INT'L L.J. 207, 207-19 (1995). Copyright 1995. Reprinted by permission.

³ United Nations Convention To Combat Desertification In Those Countries Experiencing Serious Drought And/Or Desertification, Particularly in Africa, *opened for signature*, Oct. 14, 1994, 33 I.L.M. 1328 (1994).

⁴ WILLIAM ADAMS, GREEN DEVELOPMENT: ENVIRONMENT AND SUSTAINABILITY IN THE THIRD WORLD 88-92 (1990).

⁵ PIERS BLAIKIE & HAROLD BROOKFIELD, LAND DEGRADATION AND SOCIETY 2 (1987).

⁶ See PIERS BLAIKIE, THE POLITICAL ECONOMY OF SOIL EROSION IN DEVELOPING COUNTRIES 138 (1985). The poverty of local communities is only part of the story. Commonly, large landholdings in many developing countries are concentrated among small, elite groups that use the land for grazing, logging, or farming to earn export income. This use of the land may strain its productivity as well as force local peoples onto marginal lands.

⁷ D.K. FORBES, THE GEOGRAPHY OF UNDERDEVELOPMENT 17 (1984). In the early 1980s, for example, income distribution in Brazil was characterized by the top 20% of the population controlling at least 66% of the national income while the bottom 20% controlled only 2% of that income.

⁸ See, e.g., Hilary Charlesworth et al., *Feminist Approaches to International Law*, 85 AM. J. INT'L L. 613, 614 (1991) (hereinafter *Feminist Approaches*).

⁹ See, e.g., Hilary Charlesworth, *The Public/Private Distinction and the Right to Development in International Law*, 12 AUSTL. Y.B. INT'L. 190, 192 (1992).

¹⁰ ANTONIO CASSESE, INTERNATIONAL LAW IN A DIVIDED WORLD 395 (1986).

¹¹ Brian Chase, *Tropical Forests and Trade Policy: The Legality of Unilateral Attempts to Promote Sustainable Development Under GATT*, 17 HASTINGS INT'L & COMP. L. REV. 349, 352-54, 356-69, 371 (1994). Copyright 1995. Reprinted by permission.

¹² Brian Johnson, *Responding to Tropical Deforestation: An Eruption of Crises--An Array of Solutions 7* (1991) (World Wildlife Fund & Conservation Found., Osborn Ctr. Research Paper).

¹³ See, e.g., *Report of the United Nations Conference on the Human Environment*, U.N.Doc. A/CONF.48/14 & Corr. 1, 11 I.L.M. 1416 (1972).

¹⁴ Brazil's Amazonian forests contain nearly 31% of the world's rain forest and cover an area half as large as the United States. Roseann Eshbach, Comment, *A Global Approach to the Protection of the Environment: Balancing State Sovereignty and Global Interests*, 4 TEMP. INT'L L.J. 271, 273 (1990).

¹⁵ OFFICE OF TECHNOLOGY ASSESSMENT, TRADE AND ENVIRONMENT: CONFLICTS AND OPPORTUNITIES 43 (1992).

¹⁶ See Edith Brown Weiss, *International Environmental Law: Contemporary Issues and The Emergence of a New World Order*, 81 GEO.L.J. 675, 706-7 (1993) (observing that "developing countries have control over resources that are important to the industrialized world, just as the industrialized world has always had control over resources needed by the developing world").

¹⁷ For one unrealistic and somewhat radical solution to this problem, see Roseann Eshbach, Comment, *A Global Approach to the Protection of the Environment: Balancing State Sovereignty and Global Interests*, 4 TEMP. INT'L L.J. 271, 276 (1990) (arguing generally that although tropical forests lie within the territory of individual developing states, they are such an important resource that they should be treated as part of the global commons and subject to regulation by the developed world).

¹⁸ See, e.g., *United Nations Conference on Environment and Development: Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests*, June 13, 1992, A/CONF.151/6/Rev.1, 31 I.L.M. 881, 882 ("[t]hese principles should apply to all types of forests . . . in all geographic regions and climatic zones").