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**The Effects of the GATT/WTO in World Resource Allocation:
A Case Study that Uses both Raw and Processed Timber Resources
-Conservation/Deforestation Explored**

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This paper will explore the possible effects of the General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO) in distributing the global supply of natural resources. As an exploratory topic, a case study will be developed using forest resources to demonstrate that the GATT "law" fails in protecting the global supply of forests from depletion and consequently degrades the stability of the environment. Generally, the relationship between GATT and deforestation is related to Third World economic development along with the role of global supply and demand. As overseen by the WTO, the GATT law plays a pivotal role in causing this resource depletion. Tree extraction processes do not fall under any GATT provisions that could protect the global forests from excessive market pressures. Therefore GATT exacerbates deforestation by increasing market access, while it allows high rates of tree extraction to occur and consequently increases global environmental damage. The key failure is associated with Article III that governs the Process and Production Methods (PPMs) and how they relate to trade policy.

By not providing necessary protections, GATT relies upon the domestic law of the country involved to protect the environment from market pressures and slow the alarming rate of increase in forest loss worldwide. This reliance on domestic law does produce consequences that the global community now is beginning to acknowledge as a problem. Under GATT, transnational corporations have no obligation to protect the environment ipso facto and, typically with the minimum investment allocated for investing in local communities, corporations will not volunteer. Furthermore, pressure from the home country of the corporation, encouraging corporate interests to adhere to the standards of their own country in off-shore enterprises is also absent or inadequate.

These issues are compounded by the fact that many countries have inadequate environmental laws and regulatory protection, coupled with lax enforcement. In fact, some countries have not incorporated even basic environmental laws into their legal system. The ultimate problem is that the developing country is enticed by foreign investment to improve extreme economic poverty in small increments with short-term monetary relief in exchange for the environmental damage. The corporate interests gain by "buying" cheap natural resource products, and the status quo in regulatory development and enforcement is maintained. The desire to live in better conditions will take priority, often at the expense of the environment. For the 21st century, understanding how short-term business transactions interrelate with the environment is a critical task confronting leaders and trade policy practitioners today.

Trade practices that "pillage and plunder" impact not only the local environment, but also, as will be seen, the global climatic stability. Simply stated, the dynamics between

developing and developed, debtor and creditor nations are enmeshed with restrictions and qualifications. This relationship has a nature, which imposes conditions that favor anti-development, anti-growth policies against the very countries that need help (Carlson, 1989, p. 778). Often the dynamic is simply a "beggar thy neighbor" mentality and results in disproportionate use of forest products by developed countries. In fact, the people of North America, Japan, and Europe consume 10 times as much industrial wood as the citizens of developing countries, and that is against the backdrop of global forest loss (WTO and forest loss, 2000, p. 5). The recasting of broader problems associated with globalization of trade into a narrow discussion involving only economic principles will have disastrous results (World Bank, 1991, p. 21). The goal of this research is to inform government leaders on how trade and the environment clash if appropriate action is not taken to minimize the conflict. Today the global community is at a crossroad in developing environmental policy and deciding the role that environmental policy will play in everyday activities. United Nations Secretary General Kofi Annan, in criticism of President Bush's recent decision to abandon the Kyoto Protocol, clearly states that the issue is at the crossroad, "We do not face a choice between economy and ecology. In fact, the opposite is true: Unless we protect resources and the earth's natural capital, we shall not be able to sustain economic growth." He says that the crisis is an immediate, not a distant, scenario (Bush urged to act on global warming, 2001). This research paper is intended to be a warning.

GATT Law and the Environment

The globalization of trade arose from the desire to build and improve national economies. During the early stages of building a country's economic foundation the focus is to convert the available natural resource base into exchangeable currency (World Bank, 1991, p. 31). Often the developing countries have limited capital and what available capital exists are human labor and the less exploited reserves of natural resources. The result in converting resources into currency provides several benefits to a developing economy. For example, a country can then import goods or buy goods more cheaply than its own domestic industry can produce. Forests are natural resources that are converted, and this process of conversion is inexplicably linked to economic development strategies. This relationship occurred in the Americas because the land was more valuable cleared for westward expansion. The secondary result of this expansion was townships and eventually industrial development through technology.

Consequently, global leaders can expect that deforestation rates will continue to rise due to two factors: developing nations will convert their forest resources to achieve economic development and the world population will swell to an estimated 10 billion by the year 2050 (World Bank, 2000). The first factor implicates a logical effort by developing countries to expand their economic power, while attempting to overcome poverty. The second factor implies that resource scarcity will be an increasing problem plaguing future generations. It is apparent that while the rate of population growth has slowed in certain countries, the absolute number of people continues to increase by about one billion every thirteen years, and the environment will continue to deteriorate

as demands made upon it increase from the growing human population (*Environment losing ground*, 2001).

Globalization of trade has been purportedly a means to achieve the improvement of economic conditions in developing countries. With increasing population, all else remaining the same, the demand for timber products will also increase as the standard of living improves. Suppliers (wholesalers) will meet the demand as long as it is economically feasible to do so, or until demand plateaus. During this time the forest resource itself is quite susceptible to depletion. This will cause substantial harm locally, where tree extraction occurs, and destabilize the global environment, as evidenced by climatic changes.

The Successful Management of International Forests

To have successful management governing international forestry issues, the resource must be designated as an exhaustible resource referred to as a "global common." The practices that degrade the regional environment also create the atmospheric changes that become weather pattern disturbances. To prevent further destruction, policies should be developed that will slow the high rate of deforestation occurring worldwide today. Global governments need to discuss how exploiting natural forest resources impacts regions beyond national borders. In accordance with the opinion of U.N. Secretary General Kofi Annan, "We must stop being so economically defensive, and start being more politically courageous" (Bush urged to act on global warming, 2001).

To negotiate a solution requires that the governments of the world consider the following factors unique to forestry: forest management practices reflect global interests and, by undervaluing the importance of forests in stabilizing global weather, deforestation continues at our own peril. Forests perform unique social and environmental functions, and without coordinated efforts to conserve them, forests, by their nature, are susceptible to quick depletion. There is a growing sense in the international community that the destruction of forests has disastrous effects on all ecosystems. It is necessary today to incorporate forest protection as a non-trade-related policy and, by doing so, admit it is a global problem.

Countries may have very different perspectives on what constitute global issues, but varying perspectives do not minimize the importance of an issue itself. Often these discussions break down because the scope of national sovereignty becomes the focus of debate and, as a thorny issue, is protected at all costs. The importance of forests in sustaining life is rarely discussed, reflecting the total ignorance about the biological role these systems play. As will be discussed later, the forests are vastly more important than the economic concerns that drive their destruction. An international body like the GATT/WTO should develop a forest conservation plan around the following two issues: how global climatic and biological stability is impacted by forest damage and how local and cross-border business activities advance forest damage (*State of the world's forests*, 1999). Once global leaders understand these issues, the GATT should not be

used to impede forest conservation efforts.

GATT/WTO Historical Account

During the 1930s when international trade had come to a near halt through protectionism and high tariffs, 21 governments ushered in the agreement, then intended to be temporary, called the General Agreement on Tariffs and Trade (Jackson, 2000, p. 17). The Agreement was a political revolution to end the era known as The Great Depression. Intended as a jump-start mechanism for ending the global economic slump, GATT viewed the high tariffs as barriers to international trade and consequently the goal was to reduce and eventually eliminate the tariffs. Due to the assumed temporary status of the Agreement when it was adopted and the immediate need to alleviate human suffering, issues involving the environment were not a priority nor seen as particularly relevant. In fact, environmental issues were not part of government or academic thinking at the time. As of today, neither the GATT nor the WTO has been involved in the negotiation of any multilateral agreement for the protection of the environment (Gantz, 1995, p. 31).

The World Trade Organization was formed in 1995 to centralize the GATT provisions into one governing body. Its mission is to encourage the creation of a level playing field for trading partners by discouraging governments from treating imports less favorably (Strauss, 1998, p. 326). With a defined focus on liberal trade practices, domestic law aimed at environmental protection that impedes trade flow is frowned on. The preamble that established the WTO mentions the need to balance trade with *sustainable development*.

Recognizing that their relations in the field of trade and economic endeavor should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resource in accordance with the objective of *sustainable development*. (Raworth & Reif, 1995, p. 177)

The GATT system has been enormously successful, reducing tariff barriers and increasing international trade since World War II. The success was achieved even with an inadequate constitution; inadequate because it failed to address non-trade issues. As a consequence of not addressing these issues, GATT was not created to allow the adaptive change required for dealing with the global problems that face governments today. The multilateral trade negotiation (MTN) failed to design a better system for amending the GATT or for making new rules in the GATT (Jackson, 2000, p. 38).

In fact, today people who are pro-globalization and who also support the economic achievements of the GATT will often scoff at any attempt to discuss environmental concerns in the light of the impressive GATT accomplishments. Focusing only on the economic achievements attributable to the GATT is not a productive position if there is a genuine interest in finding solutions to the problems associated with the allocation of

global natural resources. Furthermore, it appears when an effort is made to discuss the issues, the discussion quickly becomes ineffective. The discussion breaks down due to two basic positions that result in a bi-polar argument between those who sit at the decision-making table and picture the GATT/WTO as an amoeba, engulfing powerless victims, or those that sanctify it because of its capitalistic goals and achievements.

It is important to realize that there is truth harbored in both arguments. However, the GATT/WTO represents national governments that should be accountable to their citizens. Likewise, the GATT/WTO is also accountable in determining how trade practices impact forest loss, and it is this aspect of decision-making that impacts the people of these nations. Governments should take appropriate action in consideration of their informed citizens who lobby that the impacts of trade on the environment be a factor in developing trade practices-whether or not the environment impacted is domestic or foreign. Without this type of pressure inducing government action, harm to the environment will continue. The result of non-action will be that governments will blame other governments for the inertia, which is, in fact, shared by all. To some extent, the mentality of blaming others is already apparent today.

As one commentator suggested, that while the Third World forests may have been cut down to feed global markets, the heedless direction of doing so was not attributable to the WTO. Furthermore, the author blamed the "land-hungry" locals for the forest fires that are associated with land clearing; and also hinted that the occurrence of "subsidized" destruction of Amazonian rain forests is the result of some Brazilian strategy of inward-looking development (Krugman, 1999). What this commentator failed to consider is that the economic pressures produced through the opening of markets may in turn generate these same behaviors. The views of this commentator and others that express similar opinions are only partially true.

When problems are global, linking their resolution to trade policies is generally an effective means of dealing with non-trade problems such as deforestation. It is difficult to protect the environment when disruption of trade is indirect or unnoticeable in the short-term. Under the current GATT the parameters of protection protects trade only, and non-trade issues go unresolved. In this instance, intervention of GATT is not even possible under the current trading policy. For example, deforestation acts as one combined force destroying the global environment, but the short-term trade flow is not impacted.

Under the suggested approach using a global commons philosophy, the provision that will protect against market pressures causing forest loss would be automatic and incorporated within the trade agreement. In fact, global leaders must remember that more than goods and services are traded across international borders. Scientists are aware of the long-term consequences of deforestation, and the magnitude of the consequences unquestionably increases. The position held by many scientists that deforestation can impact global climate has not been sufficiently considered nor incorporated in the current legal paradigm. Without such a provision to protect forest resources, deforestation, which is occurring at an alarming rate, can be expected to

increase.

Loopholes in the GATT Law

Despite the success in expanding global trade, the GATT has been justly criticized for failing to protect the environment (Meier, 1997, p. 241). The controversy over trade and environment revolves around the extent to which expanded trade is inherently in conflict with environmental quality (Lawrence, Rodrik, & Whalley, 1996, p. 15). I will demonstrate that trade practices are in conflict with forest protection and the environment. Both industry and non-industry timber resource specialists agree that timber extraction processes can be harmful to the environment. The amount of pollution depends on the climate, soil type, and other forestry practices that occur during or after unadulterated forest is cut and removed.

(Robert L. Edmonds, personal communication, February 12, 2001). The following GATT provisions create the loopholes, which act together to compound the problem of inadequate protection provided by domestic environmental laws:

1. Article III Process and Production Methods (PPMs)
2. National treatment and most favored nation requirements
3. Article XX general exceptions

As the GATT preamble suggests, all economic development should be balanced with sustainable development. Questions naturally arise about sustainable development, including what it is and how it can be balanced with the expectations of an expanding human population. For scientists, "sustainable development means raising current living standards without destroying the resource base required to meet future needs" (*Hopkins report*, 2001).

To foster compliance in forest conservation measures, governments should define international sustainable development, as a balance between improvements in global living standards with future resource needs. By focusing on conservation measures, enforcement will center more on the locus (where the activity is occurring and the activity itself) and less on the jurisdictional issue that has historically impeded the ability to actively address the problems (Stokke, 1995, p. 31). This encourages the governments to accept their responsibility and, hopefully, act in a responsible manner, enhancing cooperation between the parties involved. But as the discussion that follows will indicate, the concern over national sovereign rights is the dominant focus of international trade policy and, as a result, no environmental agreement could possibly be adopted under the current trading system.

Article III Standards Creating a Loophole in Forest Protection

In order to understand Article III, it must be read congruently with the Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures. Article III Process and Production Methods (PPMs) becomes the primary block to instituting an international

environmental standard overseeing timber extraction processes and protection of forests by failing to include the production or method of timber extraction under the SPS Agreement.

The SPS Agreement is part of the Agreement on Agriculture, which "primarily concerns measures to protect human, plant, or animal health related to agricultural products" (Sykes, 1999, p. 15). The SPS Agreement does not require governments to accept international standards; members can use stricter norms than the international standards, but stricter standards must be scientifically justified without acting as a barrier to trade (Stewart & Johnson, 1999, p. 57). The Process and Production Methods (PPMs) refer either to the way in which products are manufactured/produced or to the processes used in producing the product. When PPMs directly affect the characteristics of a product (or product-related PPMs) with a substance physically incorporated into the final product causing environmental damage, the SPS Agreement may apply under these circumstances (Ahn, 1999, p. 852). In contrast, if a non-product related PPM is the issue of debate, the application of the SPS Agreement no longer applies (Ahn, 1999, p. 827). Because of this, forest practices must then rely not on international governance in cases of abuses, but on the local government's provisions. These are the very same provisions that create the abuse in the first place. Enforcement is a common problem, especially in developing countries focused on economic development, allowing transnational corporate interests to generally pay less than the resource is actually worth. In other words, tree extraction process and associated environmental harm falls outside what limited protection the SPS Agreement offers.

In addition, Article II of the SPS Agreement creates another barrier: the SPS measures are not to be arbitrary or unjust by discriminating between members where identical or similar conditions prevail (Raworth & Reif, 1995, p. 269). With strong forest protection practices regulating its own forest industry, Article II theoretically allows the United States to have a defining role in setting a type of forest protection standard among GATT member nations.

However, the language of the provision that uses the key words "arbitrary or unjust discrimination" must temper the suggestion that actual leadership is possible. This means that any standard imposed may also be perceived as trade restrictive and/or a threat to national sovereign rights. It appears, also, that the United States has held back in taking a leadership role for two predominate reasons: American corporate interests are invested in global reserves of forest products and the under-valuing of forests in stabilizing the global climate is pervasive, even in the United States.

For example, Boise Cascade (now Boise) is a U.S. company (headquartered in Idaho) that had earnings in the forest product export/import trade of over 1 billion dollars (in 2000). The company owns and/or controls 2.3 million acres of timberland in the United States (Boise Cascade, 2000). Forest products are also purchased from the Amazon Basin, Southeast Asia, Russia, and elsewhere. According to Kurt Plagge (personal communication, January 10, 2000), a company representative, the numbers break down to the following corporate profile: 30% of the business is self-sufficient because of

domestic supply and 70% of the business must rely on other sources for the supply of its timber. In 2000, a new coalition of environmental groups in the United States was reformed to pressure Boise Cascade to innovate its forestry and wood fiber purchasing policies, purportedly because of the company's poor record in sensitivity to environmental concerns in its off-shore endeavors (Company case study, 2001). The role of NGOs (non-government organizations) is important to the development of environmental policy; however, the topic is worthy of a separate research proposal and will not be discussed in depth at this time.

Of course complacency creates difficulty in proposing any international standard and proves to be a significant barrier for adopting improved protection of forests. There is a way to get around complacency. Whether the SPS Agreement applies to forest issues depends entirely on whether processes involved in forest harvesting are defined as either natural resource extraction or production of agricultural products. As mentioned earlier, the SPS Agreement is part of the Agreement on Agriculture. In contrast, if the process of extracting forests is defined as the extraction of natural resources then the SPS Agreement is not the provision that should be applicable in protecting forests because a forest is not purely a trade commodity like an agricultural product would be. A timber product is undeniably a commodity of trade. On the other hand, if a forest is not just a trade commodity, removing it, in part, from a trading system, then it must be something else. In its place, a new paradigm can come into existence that relates global uses of forests to the many benefits forests provide and not solely as a source of timber. How forest extraction has been defined does not have to dictate how it is defined in the future.

Here is a potential argument mirrored after policy changes that occurred in the United States Forest Service during the spotted owl controversy in the 1980s. It was argued that public use of forests should be defined more broadly to include a list of process and production benefits beyond the value of timber production. In expanding the scope of benefits associated with forests as a basis of formulating forest policy, this step allowed for the higher standard embodied in U.S. forest protection today. By expanding the scope of benefits, the rigors of science were finally allowed to compete in the 9th Circuit Court directly with the same arguments based solely on economic theory that afforded much less protection than we enjoy now. This is a potential argument for GATT/WTO member nations to pursue if there is an interest in protecting and conserving forests and to narrow the gap in regulatory protection.

Another barrier to developing forest protection is under Article III subsection (4), which requires national treatment. National treatment requires that imported products be treated no less favorably than the treatment accorded to like products of national origin (Raworth & Reif, 1995, p. 836). Readers should remember that the purpose of GATT/WTO is to prevent distortions, which act to hinder the free flow of trade. By requiring equal treatment between imports and exports the trade related purpose is accomplished.

The problem in developing environmental protection measures is the presumption that

member nations are suspected of actual trade distortion anytime SPS measures are used. Ironically, the purpose of Sanitary and Phytosanitary Measures is to protect life within national territorial boundaries from standards not used by the nation imposing the restrictions. For example, SPS measures often are needed to prevent imports that have an associated non-trade related health concern from crossing international borders. If a trade dispute erupts, the uncertainty for any country imposing a SPS measure is whether the approval of the measure, as determined by a GATT dispute panel, rests on the intended purpose of protecting life or of hindering trade flow. By protecting trade flow the GATT/WTO has produced a high cost associated with blindly protecting trade at the expense of the environment. What this means is that the international trade system will yield to trade related issues, but the thought of yielding to a non-trade-issue is deemed unconscionable.

Under the Agreement on Technical Barriers to Trade (TBT), national laws cannot be more trade restrictive than necessary to fulfill a legitimate objective, but additional restrictions on imports may be permitted only if the restrictions are based on "international standards" (Miller & Croston, 1999, p. 89). If the SPS measure conforms to international standards (generally these are standards that offer minimum protection) then it is presumed consistent with GATT (Maruyama, 1998, p. 664).

Countries that determine what is in their best interest, such as implementing forest protection requiring a higher standard, have to prove that the adopted policy is consistent with international standards¹ (Maruyama, 1998, p. 664). However, the SPS Agreement cannot conform to international standards when protecting forests for two very obvious reasons: it does not apply to the tree extraction phase/deforestation, and in the context of forest protection there are no international standards. Within the GATT/WTO, this creates a huge gap in the protection of forests. To allow appropriate responses to the pressing forest protection problems, the GATT/WTO system needs to be more flexible.

Article XX-General Exceptions

GATT is not an international agreement that specifically addresses environmental issues, but as an international dispute settlement mechanism GATT panels use Article XX (b) and (g) when members are in dispute over environmental standards of other member nations (Ahn, 1999, p. 824). The preamble to Article XX states that the exceptions will not apply if the measure is arbitrary or unjustifiable when the same conditions prevail domestically or the measure adopted is a "disguised restriction on international trade" (Raworth & Reif, 1995, p. 875). This initial hurdle was essentially reduced in importance over time, following six pre-GATT 1994 cases that had been brought before dispute panels and failed to pass the literal interpretation of the preamble. The issue of whether an exception applied in those six cases was never addressed (Ahn, 1999, p. 827).

GATT Exceptions

Article XX (b) Standard

Subsection (b) of Article XX states the measure adopted must be "necessary" to protect human, animal, or plant life or health (Raworth & Reif, 1995, p. 875). The panel decided in the case entitled Thailand-Cigarettes that the term "necessary" means there is no alternative measure consistent with or less inconsistent with the GATT (Ahn, 1999, p. 827). As a benchmark ruling this is still a legitimate meaning in defining the term. When establishing a standard of protection under Article XX (b) the consistency problem can be avoided if the provision is incorporated in GATT.

Article XX (g) Standard

Generally, subsection (g) allows conservation of an exhaustible natural resource if "such measures are made effective in conjunction with restrictions on domestic production or consumption" (Raworth & Reif, 1995, p. 875). The interpretation of Article XX (g) has been broad (Ahn, 1999, p. 829). In the US-Shrimp case the appellate body held that the distinction between "living" and "non-living" natural resources is not relevant when determining what is an exhaustible natural resource² (Ahn, 1999, p. 829). Under this interpretation, trees and/or forests could be defined as an exhaustible natural resource. A provision such as this seems to encourage global conservation because domestic consumption must be reduced in conjunction with any restrictions imposed. The only question that remains to be answered is whether consumption could be reduced in the face of complacency. The answer is not promising.

GATT Panel Decisions Relevant To Forest Protection

In US-Tuna II, the dispute panel concluded that the provisions of Article XX (g) applied to conservation policies of exhaustible natural resources located outside the territory of the contracting party that invoked the provision (Ahn, 1999, p. 829). This applies where the natural resource is found, but limited to the contracting party and its own fleets (Ahn, 1999, p. 831). According to GATT panel decisions, Article XX cannot be used to achieve the environmental goals of one nation over other GATT/WTO members. Generally, consensus between member nations on a standard for resource protection is required to gain panel approval. The requirement of consensus arises from the multilateral trade agreement (MTA) mechanism incorporated in GATT/WTO, which requires uniform agreement among all member nations. Whether members can agree that forests are a natural resource deserving of multilateral protection will depend on the member governments understanding the role that forests play and a willingness to forsake short-term goals. This task of educating has inspired this author and it is desired that the governments' response will consider the following suggestions.

GATT And The Environment

A fundamental issue that needs to be answered regarding the GATT/WTO is whether increasing market access will increase consumption of both raw and processed timber resources. If the answer is yes then will damage to the environment accelerate? These

questions require background information to answer.

As agreed by most scientists, two main environmental problems facing the 21st century are global warming and overpopulation (Earth Island Institute, 2000, p. 3). Even the United Nations, in their recent report titled *Climate Change 2001: Impacts, Adaptation and Vulnerability*, warns that the global warming threat is intensifying (Warming threat intensifies, 2001). Both are complex problems caused by many factors, but deforestation can be considered the third most important problem today and has added to the complexity. To find solutions requires a good faith effort on the part of governments to achieve the result desired.

How natural resources will be shared and allocated is the source of future global conflict. Unfortunately, the lack of government cooperation is a major impediment to future discussions regarding how forest resources will be allocated. One common viewpoint held by many developed, industrial countries is to blame developing nations for the deforestation because developing nations have the highest rate of population growth. The term "developed" is used to compare the status of economic development between countries as either "developed" or "developing." This argument proposed by developed countries suggests that consumption of resources is a function of population density. For example, 64 of 105 developing countries had populations that grew faster than the ability to cultivate food (*Environment losing ground*, 2001). The fact that these countries have subsistence agricultural practices is undeniable. However, the developed nations equally share in the problem because of wasteful practices that misuse resources often without thought or concern. If population estimates are relatively accurate then 10 billion people will be competing for limited resources, and all striving for a living standard comparable to industrial nations. The finite amount of natural resources cannot sustain 10 billion people that have such prosperity in mind. This means that industrial nations will have to share or face large-scale conflicts for these limited resources.

Calculating the impacts of resource scarcity is difficult and made more difficult because traditional economic theory does not adequately describe the complex economic relationships seen today. With the dramatic shift towards direct foreign investment (DFI) and international trade, causation and any resulting impacts on the environment are not so easily determined.

A typical problem related to forest conservation is the failure to adequately consider how much forest loss has already occurred and whether the current rate of deforestation will cause the depletion that renders the process and production associated with forests non-functional.

To see the full picture requires knowing who all the trading partners involved are and where the forest resource is located. This knowledge will help interested parties in determining where hot spots or pressure points related to business and trade impact global forest resources most intensely. This awareness will allow efficient conservation efforts to intervene, thereby preserving the remaining intact forests. For the global

community to successfully intervene it must be prepared to use monetary means to prevent further forest loss in all regions, and monetary responses are especially needed in areas where economic poverty is most intense. To be effective, responses must be quick, and an effort should be made to ensure that the local communities get the assistance rather than corrupt governments. Furthermore, long-term success requires the adoption of a uniform agreement. This agreement will cover forest conservation and incorporate an enforcement mechanism that can be imposed against governments that fail to adhere or to make the necessary policy changes implementing forest conservation measures.

One potential agreement mentioned earlier is a codified version of the global commons approach or a uniform body of policy that addresses conservation of forest resources. The purpose in using the global commons ideology is to psychologically encourage global conservation of forest resources by all member governments of the GATT. The provision will have a psychological aspect by formalizing the importance in conserving through group recognition. Several steps are required to implement this approach: 1) label forests as an exhaustible resource, 2) periodic monitoring to record ongoing losses, and 3) a mandatory enforcement mechanism.

More than ever, forests are an exhaustible resource. Depletion can occur under increasing demand for timber products causing a harmful reduction in total forest cover that will affect global cycles and change weather patterns. The changes in climatic stability reduce the ability to regenerate forests and hinder the efforts to meet consumer demand.

To successfully use the global commons approach requires periodic monitoring of the ongoing losses in total forest cover. Unlike other natural resources, such as oil reserves, forest cover can be inventoried and monitored. This unique attribute enhances the argument that forests are an optimal subject in the application of a global common paradigm. Enforcement is enhanced because trees are stationary, unlike global supplies of ocean fish, which swim in and out of territorial boundaries. The conservation measure is qualified for enforcement under GATT Article XX (g) because restrictions on domestic production or consumption should concurrently occur with all member nations. Once conservation efforts are in place, the tragedy of the commons is prevented because the success of the approach relies upon each country enforcing the conservation measures against each other.

Forest Cover and a Global Home

Of the world's remaining forests, it is estimated that developing nations house 55% and the remaining 45% are in developed countries (*State of the world's forests*, 1999, p. 1). An inventory of global forests clearly indicates the location of these forests. As an example, roughly 75% of forests are found in just 16 countries, including Russia, Brazil and Indonesia (Sandalow, 2000).

Indonesia-An Example of Deforestation Trends

About one tenth of the world's rain forests are located in Indonesia. These forests are important to Indonesia's economy, where wood products account for the second largest export, generating over \$5 billion. The problem is that wood exportation is a significant source of income for the Indonesian economy, almost too significant. At the current rate of deforestation, the economic benefits supported by rainforests will be short lived. For example, the Tanjung Puting National Park, south of Central Borneo, will be gone in five years (Indonesia, 2000, p. 16). Without protection mechanisms in place, such losses can occur at any time or anywhere. It is estimated that almost half of the natural forest worldwide is available for wood supply under current legal and market conditions (*State of the world's forests*, 1999, p. 12). Another study suggests that, of the forests most highly threatened, an estimated 72% will be threatened by logging operations and the associated impacts (Sizer, Downes, & Kaimowitz, 1999, p. 1). This percentage does not consider the unknown losses associated with illegal logging that will typically occur more often in areas of depressed economic conditions and in developing countries.

Forest And Global Trade

It appears that intact, minimally disturbed forests have been depleted by wholesale clearance, which arise only when investor costs are kept artificially low. The forest industry in many parts of the world, including the United States, is subsidized with scarce state financial resources and fueled further by local needs for quick infusion of foreign capital. When these companies enter offshore markets, the unfairness in using subsidies becomes more obvious.

It also appears that the competitiveness of a company is dependent less on their comparative advantage in producing a product and more on whether their domestic subsidy exceeds the subsidy of their competitors. Furthermore, if resource prices are excessively low either to encourage domestic production or foreign investment, this also encourages excessive removal and discourages the development of environmental protection such as requiring tree replanting (Ragosta, 1990, p. 273). Often the priority of a developing country is not in expending funds to replant the forests, if a tree farm is even equivalent to an unadulterated forest, but rather the priority is to reduce poverty. This principle clearly would be applicable to any private landholders that sell to foreign investors.

As an example, Chile's economy has developed rapidly over the past twelve years, averaging 6.3% annual increase in gross domestic product. This economic development has occurred during a time when its environmental standards, as imposed by constitutional authority, were generally not enforced (*Chile*, 1994). Investor costs are kept low by the following factors: environmental regulations are kept at a minimum or not enforced, subsidy programs breath artificial support into an inefficient industry, or total costs associated with environmental harm get passed off from industry to the public.

Enforcement of Environmental Laws

The most obvious threat to the environment is the lack of adequate environmental laws or failure to enforce the existing laws. All developed, industrial nations have environmental protection in place. It is not difficult to see that industry has and will cut corners if doing so places greater profit in the pockets of shareholders or the business owner. Contrary to what many industry representatives may claim, regulations have been imposed to enforce a duty that otherwise was not voluntarily taken.

Subsidies and the Countervailing Duty Effect

Under GATT, subsidies are frowned on, but are not restricted in theory (Anderson & Fried, 1989, p. 135). The definition of subsidy, which the U.S. government uses, is found in Section 303 of the Tariff Act of 1930 (Anderson & Fried, 1989, p. 137). It states in part "a subsidy is directly or indirectly, any bounty or grant upon the manufacture or production or export of any article or merchandise into the United States." As a result of imposing a subsidy, countervailing duties may be imposed against the nation disputing the use of the subsidy. To impose a countervailing duty, there must be *material injury* and a causal link between the subsidized imports and the injury (Anderson & Fried, 1989, p. 136). Countervailing duties in theory eliminate the practices that distort the flow of trade, such as subsidies.

Negative Externalities-More Than Mere Theory

Another way that an industry investor can reduce costs associated with day-to-day business activities is to pass off the costs, either directly or indirectly, to the public. In economic theory the concept of negative externalities describes the adverse costs associated with environmental degradation, which are "magically" passed off to the public, rather than paid by the responsible entity (Kibel, 1999, p. 10411). Logging operations are a threat to the environment because, among other things, the environmental regulatory schemes in many countries are not generally enforced. Who pays for the damage done by logging in foreign countries? Surely the most obvious answer is the local communities pay, probably indirectly, and the not so obvious answer is we all do.

These operations can be run "clean," given corporate willingness to pay the real costs of production. But without this willingness, which will be absent in a marketplace where some companies are able to avoid it, environmental protection comes from the enforcement of strong regulations guiding industry practices. The failure of governments, through lax regulatory enforcement, to charge industry for the real costs of logging encourages the use of harmful forest practices. On a global scale, the destabilizing effect on the environment will increase with increasing forest loss. Between 1970 and 1996, global wood consumption increased 40% (Brazier, 2000, p. 5). Consumer use is also measured by supply, which is demonstrated by the steady growth in total global forest trade³ (Sizer, Downes, & Kaimowitz, 1999, p. 3). Current demand for forest products may exceed the limits of sustainable consumption by 25% (*State of*

the world's forests, 1999). The lack of sustainable consumption means that a decline in forest cover will continue into the future.

With increasing trade in forest commodities, the trend requires global leaders to question whether the required long-term supply can be assured for the future. One estimate predicts demand for industrial round wood is to increase by 1.7% annually up to year 2010. Other studies indicate that sufficient supplies are available to meet the world demand with variable availability occurring by location depending on market conditions, government policies, technology, and human resource development (*State of the world's forests*, 1999, p. 10). Traditional macroeconomic theory would predict that demand is supplied until increases in price act to decrease market consumption. This assumes, however, that market complexity is a simple model of supply and demand.

As a market influence, price impacts consumer behavior sometimes in a non-intuitive way. For example, when industrial technology is not used to produce cheaper or alternate consumer products, which would replace or reduce the consumption of tree-based products, then the increases in price will not reduce consumer uses related to wood-based products. The relationship between consumer demand and price depends on what is being consumed, either a necessity or a luxury item. Items of necessity, like many consumer wood related products, are elastic to market changes because an increase in price may not be reflected in the market immediately through decreased consumption (John Perez-Garcia⁴, personal communication, June 19, 2000). This is especially true when individual wealth increases. In fact, consumption of timber products diversifies when the standard of living increases. As the standard of living rises, the market demand for choice timber increases. This relentless demand in consumption is the primary cause of deforestation in some areas, such as Southeast Asia, where logging is based largely on the size of export markets (Wolf, 1996, p. 429).

Up to the point where market conditions act to decrease consumption, the global forests are highly susceptible to depletion. It is necessary that timber prices reflect the true costs associated with process and production methods in forest practices, including the costs associated with environmental harm that causes problems to human health or decreases the quality of living conditions. As discussed earlier, the use of subsidies, along with passing off costs to society as a whole, artificially maintains low consumer prices, and consequently demand may not reflect the actual ability to supply timber products.

Who Uses What Kind of Wood

It is true that production and consumption of round wood is greatest in developed countries. Domestic markets in developed countries have the greatest demand for processed timber products and, due to the more advanced economic status; greater amounts of money can be allocated towards technology. This technology improves production methods, and allows a country to produce more than it consumes creating a product available for export. This technology indirectly makes trade possible for

available offshore markets.

This economic rationale worked prior to globalization of trade, and it is still taught at university-level economic classes. But applying these archetype principles to the different economic relationships that impose unique market conditions is questionable. As an illustration, wood consumption by an average citizen in economically developed countries is about 10 times more than that of the average citizen in undeveloped countries. In fact, developed nations are consuming the greater amount of timber products produced. This means that an imbalance in demand favoring countries that characteristically have greater forest resource protection may cause the overall depletion of global forest reserves to occur at a faster rate. Without technology being used to find substitutes, the long-term prognosis does not really reflect traditional economic theory.

Old technology contrasts with the notion of conserving resources and, generally, it is wasteful. Many developing countries that lack advancements in technology still use timber extracting process and production methods that rely on old technology. For example, many hectares of forest have been destroyed for the few trees worth more to export markets. Dilapidated mills are often wasteful during the processing of logs. For many in developing countries the use of wood has been limited to mostly fuel and charcoal needs. The pattern of wood use has been limited by the lack of economic wealth and power. But even this model of consumption will change with the increase in population growth expected to occur in countries, such as China, India, Indonesia, and Brazil. Changes in consumption in these countries is linked to improving economic conditions, which is expected to double or triple demand for wood products within the next few decades (Sizer, Downes, & Kaimowitz, 1999, p. 3). With the globalization of trade and the consequential increase in market access, all market consumers must acknowledge their role as agents of deforestation.

The most important point to note here is that the forest resource base is not infinite. It takes eighty years on average for an evergreen tree typically grown for U.S. wood production to grow large enough to make harvest economically feasible. The time necessary to produce a tree for market consumption in other parts of the world obviously varies. There are many factors that determine market stability, such as price and factors associated with supply. However, we can only speculate how these variables will impact the openness of markets in forest products during a time when consumer demand is expected to increase; therefore, governments should error on the side of conservatism today. In other words, if the disproportionate use of forest resources by developed countries is unresponsive to the changing market pressure, the natural resource base will unwisely be expected to absorb the total increase in demand.

Conservationists concerned about forest loss have reason to be concerned. The international community has inadequately addressed the environment or has demonstrated unwillingness to act responsibly. With this knowledge, players are forewarned and should be forearmed. Currently GATT has not successfully addressed forest loss that is partly caused by trade practices. The global community should

become the watchdog rather than the pit bull trained to attack any domestic law that protects natural resources, like forests. There is no doubt that transnational corporations will play an extremely important role in how these scenarios will play out in the future.

The Investor and the Pollution Tradeoffs

In many developing nations the investor is either the state, acting as manager, or transcontinental corporations, poised as direct foreign investors. Overall, many countries are privatizing industries. For example, Mexico has paved the road to economic development through privatizing industries such as power and phone utilities. Generally, state-owned enterprises are heavy polluters, so privatization can contribute to cleaner production (World Bank, 2000, p. 3). With economic development, total pollution will continue to increase if industrial output grows faster than pollution intensity declines. A factor used in determining the pollution intensity is the type of industries that predominately play a role as economic forces in an economy. A heavy reliance on food and paper production, for example, poses more of a threat to water pollution than one based on metals (World Bank, 2000, p. 4). On the other hand, a study conducted by the 1992 United Nations Conference on Environment and Development (UNCED) found that rising per capita income did lead to more environmental regulation against water pollution (World Bank, 2000, p. 6). As per capita income rose in the more developed nations, the dominate polluting industries were noticeably shifted to developing nations with less pollution controls, namely in five polluting sectors: iron and steel, nonferrous metals, industrial chemicals, pulp and paper, and nonmetallic mineral products (World Bank, 2000, p. 8).

In recent times, developing countries have become more dependent on external sources to achieve the growth rates necessary to overcome poverty and underdevelopment. Those developing nations that did so experienced higher than expected growth rates and also deteriorating trade in-balances brought about by the in-flowing private capital. Open economies have also obtained more technology, which has caused significant environmental benefits. This means the transcontinental corporate interests and associated foreign investment are critical to economic development trends in Third World countries. In fact, transcontinental corporations dominate some industries, especially the business of extracting natural resources. This having been said does not suggest that willy-nilly development is advantageous or preferred. It is important that a developing country have the infrastructure to support growth and development, creating long term regional and global stability.

Deforestation-Past and Future

It has been estimated that four-fifths of the original forest cover that covered the earth's surface 8,000 years ago has been lost or significantly degraded by human activity (World Resources Institute, 2000). This is only an estimate of how much human activity has impacted the earth. We know for sure that the total land base has shrunk to meet the housing and living needs that a growing population demands. In fact, saving the remaining intact forest ecosystems from land conversion, land that will be lost to asphalt

and houses may be the most critical task facing the human species today. The United Nations estimates that the equivalent of two football fields, or two acres, of intact forest is lost every second (World Resources Institute, 2000). Primary forested areas that remain are located mostly in the Amazon Basin, Central Africa, Canada, and Russia (*Global Forest Watch, n.d.*). Today global leaders must decide whether forest protection is important. What kind of forest must governments protect? Conservation biologists and other members of the scientific community are most concerned about forests that have the characteristic qualities of multi-dimensional complexity of an old growth forest with direct human intervention held at a minimum. Forest ecosystems provide many global benefits as a direct corollary of the process and production associated with these biological systems.

Examples of Forest Products and Processes *Biodiversity*

There are many examples of direct and indirect benefits that forests provide to stabilize both the local and global environment. One of these benefits is biodiversity. A helpful example for understanding what the term biodiversity means starts by describing the complex forest canopy itself. From the forest floor to the tops of the trees, forest species benefit from the multi-layer complex canopy present in matured forest ecosystems. This multi-layer complexity provides the multitude of space that can support many different kinds of plants and animals. Often is the case whereby plethoras of species utilize the space available in a co-dependent role, increasing the complexity of the inter-relationships found. As a result of the spaces available, generally, space allows a greater number of species to simultaneously exist. These concepts describe the concept often called biodiversity. This complex pattern that exists between species allows broader adaptive capabilities against environmental changes (Nowlin, n.d.a) and in many cases the ability to adapt is linked to the health of the global system.

Other Environmental Benefits

Mountains occupy one-fifth of the world's land surface and are home to one-tenth of the world's population. Forests are associated with these same mountain and upland areas. These forested regions have local, regional, and in some cases, global value for water supply and rainfall (*State of the world's forests, 1999, p. 24*). There is a known link between forest zones and rainfall. A tree is a conduit between soil moisture and the atmosphere by an expansive root system and leaf structure. This moisture collects, forming a cloud with the aid of the sun's warmth, and eventually falls as rain someplace else. Deforestation of these mountainous regions has created soil erosion, water quality issues, and destabilization of the climate (for example, rainfall and temperature) (World Bank, 1991).

A cause and effect relationship exists between deforestation and the cyclic nature of drought. It is predicted that by the year 2025, one-third of the world's population may be suffering from water shortages (*State of the world's forests, 1999, p. 25*). At the current time, the Pacific Northwest region of the United States, a place where rain is generally

plentiful, is experiencing a drought. As deforestation occurs at an unprecedented rate, the relationship between deforestation and drought is more apparent. At the base of the relationship is the disruption of two great biological cycles: the carbon cycle and the water cycle.

Biological Cycles: Carbon and Hydrological *Carbon Cycle*

Carbon dioxide and other trace gases, known as greenhouse gases, can synergistically act to increase the earth's global temperature (Toasty '99, 2000). Atmospheric carbon dioxide, a common form of carbon, is a molecule that absorbs radiation from the sun. As the atmospheric concentration of the greenhouse gases increases, the amounts of radiation absorbed and the retention of heat increases. Carbon dioxide is responsible for about 60% of the greenhouse gas effect, primarily because carbon dioxide has experienced a high rate of increase, which is more important to global warming than its total atmospheric concentration (Gates, 1993, p. 9). Increases in carbon dioxide and other trace gases have occurred at an unprecedented rate within the last 75 years (Nowlin, n.d.b, p. 1). Using the estimated rates of increase of carbon dioxide gas during the 1970s, it is expected that the pre-industrial level of carbon dioxide will approximately double by the year 2053 (Gates, 1993, p. 12). Carbon input will continue to increase from human activity. Decomposition and generally any degrading process, such as fire, increase the amount of atmospheric carbon. How to store the increasing carbon in a system possibly near its maximum storage capacity is not known. Storage of carbon is associated with forests, oceans, and soils. Further decreasing the global forest cover will enhance global warming in ways that are not fully understood. It appears that the key to reducing the greenhouse gas effect is to drastically reduce the current input of atmospheric carbon dioxide.

However, even with immediate action taken to reduce carbon dioxide levels, the atmospheric system would respond slowly. What is not intuitive to many is that carbon dioxide levels would still continue to rise even with decreasing carbon dioxide input. It would do so until such time that the atmosphere reaches its new concentration equilibrium. Without this action taken to reduce greenhouse gases though, the inevitable result will likely be greater increases in global temperature. This non-intuitive response of the atmospheric system is called the *system dynamic theory* by Prigogine and Stengers (1984).

The level of atmospheric carbon is affected in several ways by deforestation. First, carbon is removed from the atmosphere by the process and production associated with forests. Secondly, burning of wood and other fossil fuels increases the input of carbon. Carbon is an essential element to growth and a basic building block of all life forms. Trees take in carbon dioxide during the growing season and release carbon dioxide during the winter (Gates, 1993, p. 10). The growth potential of a tree varies by age; the tree has varying needs for carbon dioxide that change with age and specific growth potential. This means that carbon dioxide uptake varies with the age of the tree (Nowlin, n.d.b). Younger trees take in more atmospheric carbon, but older trees store the carbon

within their relative size and density. In contrast, when a tree is burned, the carbon held within the wood is released. Any age benefit associated with younger trees is proportional to the benefits of carbon storage by older trees. Deforestation impacts both of these processes, increasing atmospheric carbon dioxide levels in both a direct and indirect fashion. In fact, as global temperatures continue to rise, tree growth is expected to slow and any positive effect attributable to younger forests related to carbon uptake will decrease. Likewise, when temperatures increase, a physiological process called respiration increases.

Respiration as a Response to Stress

Respiration is a process that indicates tree stress under conditions of higher than normal temperatures. As an approximation, increases in temperature by 10°C will double the rate of respiration (Gates, 1993, p. 69). Respiration is a process that adds more carbon dioxide in the atmosphere. By definition, this is a positive feedback loop that describes the situation where increases in respiration increase the global temperatures and compounds the global warming problem. Furthermore, when older forests are cut down, the role they would have continued to play as carbon storage is potentially eliminated. This loss in carbon storage will result in more carbon release if the wood is used as fuel, which will not likely be offset by tree growth under conditions where tree growth is expected to decline. The result is that the carbon budget is out of balance, creating conditions where imbalance worsens and unpredictability becomes the norm.

Hydrological Cycle Causes Global Rain

The hydrological, or water, cycle describes the manner in which global water is recycled. As a complex system, vegetation and trees begin the cycle. By removing soil moisture through the root structure, moisture is released into the atmosphere from the leaves of the tree. A tree with its large root system and large leaves is the most efficient vegetation in driving the hydrological cycle.

If the hydrological cycle is disrupted, creating drought, tree and vegetation growth will decrease. To grow, trees require energy from the sun, nutrients from the soil, and water (Gates, 1993, p. 66). A pattern of re-occurring drought will slow forest re-generation and tree growth. By slowing tree growth, drought will increase the time necessary for the tree to grow to marketable size, if it is able to grow at all. Ultimately, the ability to regenerate forests under drought conditions will create greater friction between the demand of consumers and the suppliers' ability to meet the demand. In other words, global forest resources are more subject to depletion when drought conditions exist because time between harvests will increase and regenerating forests will be more difficult. As a result of hydrological cycle disruption, a state of forest decline is inevitable, particularly where the impact of drought is most severe. What is not known is how much hydrological disruption is necessary to cause forest decline and whether humans can intervene once drought conditions have been initiated.

To summarize, water shortages along with increasing temperatures act to increase tree stress, reduce tree growth, and causing increased respiration, leading to the release of more than normal quantities of carbon. These all act to amplify global climatic changes.

A Trend In Global Warming

Global warming is a complex phenomenon resulting from a set of factors, primarily the extraordinary rapid release of fossil carbon into the atmosphere as fossil fuels, such as coal and oil, are exploited for industrial growth. Carbon dioxide together with a wide variety of other anthropogenic gases act as an atmospheric thermal blanket for the earth, reducing the escape of heat out to space, hence causing a warming of the atmosphere. There are undeniable facts that suggest an era of climatic change is under way. Since 1880 global temperatures have been monitored. The year 1998 was reported as the second hottest ever recorded in the United States, despite a La Nina weather phenomenon that was supposed to cool off the earth. Globally the 1990s are the hottest decade ever recorded (Toasty '99, 2000). How these factors behave together to increase global warming is not known. Another factor that causes global warming is deforestation in addition to the burning of fossil fuels.

Many climate models attempt to predict the future using current global practices that involve various factors, but due to the complex nature of global warming the models can consider only one factor at a time. One model looked at fossil fuel burning only and estimated that unless fossil fuel use slows dramatically the earth's temperature could rise as much as six degrees above the 1990 level by 2100 (WorldWatch Institute, 2001). Worse, the stability of the *climatic engines* that control our major weather patterns and sea currents may fail, and major climatic shifts will result. These predictions may be worse case scenarios, but without government action taken today to lessen the risks, the future will certainly include global warming and other associated effects that impact all natural systems, including ecological and biological relationships.

A Symptom of Global Environmental Damage-Extreme Weather Events

In fact, *Extreme Weather Event* is becoming a new term used within the global community. The term describes the increasing frequency of extreme weather patterns that include higher and lower temperatures, fiercer winds, and deadlier floods along with longer droughts (Smith, 2000). These conditions are occurring with greater frequency worldwide. Public opinion now suggests what the evidence has shown. The growing consensus is that climate changes are happening. For example, American Indian leaders were polled and an overwhelming majority of those (73%) felt the climate is drastically changing (Time to heal, 2000). Some leading corporations have stopped affiliating with the U.S.-based lobby group called the Global Climate Coalition reportedly because it refuses to acknowledge the evidence that global warming is a real threat. Texaco Inc became the first major US oil company to break its ties with the Global Climate Coalition. Other corporate defectors include General Motors, Ford Motor Co., Dow Chemical, British Petroleum and Shell Oil. Undeniably, the year 1998 had extreme weather events that caused the death of 32,000 people, left 300 million homeless, and

cost insurers a record US\$92 billion (Smith, 2000, p. 37).

There are specific examples of extreme weather events worldwide. In 1999, five northwest Mexican states were declared disaster zones after a long period of drought killed valuable crops and cattle. Torrential rains, unleashing floods that killed at least 400 people and left 300,000 homeless, followed the drought in Mexico (Smith, 2000, p. 37). Last year, Chile experienced torrential rains that produced the normal amount of rainfall for one month in one night (Juan Victor Oltramari Arregui, personal communication, June 15, 2000). Drought impacts forest health not only by retarding the growth of trees, but also by creating fire hazards.

The Occurrence of Forest Fires Will Increase With Global Warming

The weather changes that are related to global warming will cause more droughts and consequently increase the occurrence of forest fires. For instance, forest fires were at an all-time high frequency during 1997-1998. All regions of the world were affected and nearly all types of forests burned. The Food and Agriculture Organization of the United Nations concluded that the increased number, size, intensity, and duration of fires during 1997-1998 were clearly linked to land use practices, including agriculture and forestry (*State of the world's forests*, 1999, p. viii).

As drought conditions become an increasing problem, human-caused forest fires will also increase. However, using management practices to prevent fire in all forests would be an unwise response. The decline in forest health creating the potential for catastrophic fires is a process that took years to create. Human activities that are attributable to global warming are the problem. Blindly imposing disruptive forest management practices rather than addressing the problems and, consequently, finding real solutions to those problems will only create greater global environmental chaos.

The Human Population Link

Human population on a global scale has a critical function in the outcome of the deforestation debate. Generally, an increasing population means a greater overall impact on forest resources because of expanding needs and improving economic conditions. Other factors include air pollution and acid rain that increase due to human activities. Most population increases will occur in developing nations and the rate of increase in population will increase wood consumption for items like fuel wood; whereas developed nations, with a relatively stable birth rate, will experience consumption changes for social, economic, and technical reasons (J. D. Brazier, personal communication, June 21, 2000). To reduce their poverty, the developing nations will sacrifice the environment, both regionally and globally, for economic growth. On the other hand, their sacrifices may improve their economic power, creating lucrative import markets for global market expansion. The question that needs an answer is what cost are we willing to pay? In spite of huge technological progress, it is unlikely that these advances will lead to an absolute decline in resource use in developed countries. If we

are not careful, the crossroad may become a clash.

Conclusion

The GATT/WTO's intent was never meant to cause the negative effects of deforestation that it has clearly produced. As a matter of fact, GATT had in its beginning the best of intentions during the era it was created. At the time it was created a great economic downturn had retained its grip on the global nations, and later World War II had broken down what had remained. We have entered the 21st century and times have changed. However, it does not matter whether the negative effects were intended or not if the result is the same, causing the unintended.

Now humanity is facing a different kind of problem that economic principles alone cannot address. Market pressures increase deforestation. The structure of GATT exacerbates the market pressure by increasing market access, thereby arbitrarily including the global supply of forests as only a market commodity, unworthy of any protection. If predictions are accurate and forest loss accelerates, an incredible amount of forest species will go extinct and the climatic engines that control our major weather patterns and sea currents may fail.

Endnotes

¹ This is a difficult burden to overcome. If the measure leads to constraint on trade, an exporting member may question the scientific justification used for the level of protection the measure allows. If there are alternatives available that would be less trade restrictive, the SPS measure will be invalidated.

² If the focus on forest issues is that of a "natural resource" rather than agriculture related then an argument under Article XX is possible. However, the problem is that extrajurisdictional effect is limited.

³ The evidence that international trade accounts for most of the increase of resource use (rather than domestic consumption) is as follows: international trade accounts for 25% of produced wood-based panels and paper; about 20% of sawn-wood and wood pulp and about 7% of industrial round wood. Since 1970, round-wood export volumes have increased by 22%. Roundwood refers to all wood in the rough, whether destined for industrial or fuelwood uses. In the same period, sawn-wood and wood pulp had almost doubled with trade in paperboard tripling. The greatest increase was in wood-based panel trade, which quadrupled.

⁴ Mr. Perez-Garcia is a professor of forest economics at the University of Washington, Seattle Washington. He affirms the notion that price elasticity refers to the percent change in quantity for a 1% increase in price. When the increase in price results in an increase in quantity, the item is referred to as highly elastic. A high elastic response implies that product substitution is not fully utilized or perhaps technology has in fact

lapsed.

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