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Tropical Timber Trade Policies

What Impact Will Eco-Labeling Have?

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Eco-labeling could be beneficial if pursued multilaterally and if used not as a “stick” but as a “carrot” to encourage proper environmental practices.

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This paper — a product of the International Trade Division, International Economics Department — is part of a larger effort in the department to evaluate the impact on world markets of environment-related trade policy instruments. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Dawn Gustafson, room S7-044, extension 33714 (July 1993, 31 pages).

About 20 percent of the total production of tropical timber is traded internationally. But for Indonesia, Malaysia, Papua New Guinea, and some countries in West-Central Africa, tropical timber trade accounts for more than 50 percent of production.

Although the tropical timber trade has often been blamed for deforestation, Varangis, Primo Braga, and Takeuchi find that it contributes much less to deforestation than do poor policies for the production of tropical timber. Lack of tenure rights, short and uncertain logging concessions, low stumpage values, and inadequate monitoring of logging activities are among the major policy failures that help deplete the tropical forests.

Trade policies, often identified as an instrument for enforcing environmental objectives internationally, are inefficient instruments for correcting domestic distortions, and in the case of tropical timber trade, may affect the environment perversely.

Export and import restrictions ultimately depress the value of an already underpriced resource — the forest. Restrictions on log exports, for example, encourage wasteful processing of logs. Unless sound forest management policies are enforced domestically, the net effect could even be an increase in the rate of deforestation.

Import restrictions may have a marginal impact, since trade accounts for less than 20

percent of production and most of the tropical timber is imported in Asia, where such restrictions currently do not exist. Even if import restrictions had a significant impact, it would be in a reduction in value of tropical logs that would make alternative uses of the forest lands more profitable — so the rate of deforestation might not be reduced.

Eco-labeling's main strength is its capacity to discriminate (through market signals) in favor of timber produced under sound environmental practices. By contrast, bans and boycotts have an indiscriminate, perverse impact.

But if eco-labeling is imposed unilaterally by a subset of countries, its effectiveness will be doubtful. It will lead to trade diversion and potentially perverse environmental results, not to mention an increase in GATT trade disputes. Even if eco-labeling is adopted by all importing countries, there could still be trade diversion in tropical timber products because some consumers may not prefer certified timber, given its higher price.

Eco-labeling programs should be designed so that producers see them not as a nontariff barrier but as an instrument for capturing the rents associated with prevailing environmental concerns in the developed world. Consumer education is important to the success of such programs, and eco-labeling programs should be designed accordingly.

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**TROPICAL TIMBER TRADE POLICIES:
WHAT IMPACT WILL ECO-LABELING HAVE?**

by Panayotis N. Varangis, C.A. Primo Braga, and Kenji Takeuchi

Introduction*

The protection of the physical environment is considered an essential component of economic development policies geared to fight poverty and promote economic growth. However, the impact of international trade on the environment remains one of the most divisive issues in the interaction between economics and ecology. One can rationalize the anti-trade bias of some environmentalists as one facet of their belief that economic growth sooner or later will bring environmental degradation. There are, of course, exceptions to this characterization. Some environmentalists, for example, have argued that international trade could help "extractivism" become a sound alternative to the exploitation of tropical forests, on both economic and ecological grounds. Analyses of the economic and ecological "advantages" of extractivism can be found, for example, in Peters, Gentry, and Mendelsohn (1989) and Fearnside (1990). We would note, however, that the economic feasibility of large-scale extractivism is difficult and may be, in some cases, questionable, given the limited size of markets for these products (mainly non-wood forest products, such as medicinal plants, latex, essences and oils and edible fruits).

Those environmentalists whose attitude towards international trade is dominated by the perception that it will lead to environmental degradation tend to support trade restrictions in the pursuit of environmental protection. By the same token, they tend to distrust the "neoliberal" trade system built around the General Agreement on Tariffs and Trade (GATT), which supports trade liberalization and market-oriented trade policies. The large potential for conflict between GATT's disciplines and environmental concerns is manifested by a number of trade policies that have an impact on tropical timber trade. Further, calls for limiting or banning tropical timber imports from countries that are deemed to have unsustainable forest management have multiplied in OECD countries lately.

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This paper focuses on the potential effects of various trade policies, and in particular eco-labeling, on the depletion of tropical moist forests. The paper is structured as follows: first, some statistics are provided to show the level of forest resources and the estimated rate of depletion of tropical moist forests. Second, a brief analysis follows on the causes of depletion. Given the large number of existing studies, these first two topics are discussed only briefly, sufficient to set the stage for the analysis that follows. Third, the importance of tropical timber trade in developing countries' exports, the ratio of exports to production, and recent trends in these are analyzed. Next, the environmental impact of trade policies affecting tropical timber is discussed. Eco-labeling practices with regard to tropical timber products receive special attention in this context. The paper ends with a summary of its conclusions and some policy recommendations.

Forest Resources and Rates of Depletion

Tropical moist forests cover an area of about 1.5 billion hectares, corresponding to approximately 42% of the world's forest area. Of these, 655 million hectares are tropical rain forest -- which is equivalent to over three times the size of the European Community (200 million ha.). Fifteen developing countries account for about 1.0 billion hectares of closed tropical forest. The largest tropical forests are located in Brazil, Indonesia, and West-Central Africa (Central African Republic, Congo, Gabon and Zaire). The last-mentioned area has the largest forest area (tropical and non-tropical) per capita in the world.

Estimates of the rates of tropical forest depletion are hotly debated. The estimates range from 14 to 20 million hectares of tropical forest per year (refer to World Resources Institute, 1990; Postel and Ryan, 1991). In 1992, FAO gave an estimate of 16.9 million hectares per year for the period 1981-90 - equivalent to 0.9% p.a. of the total tropical moist forest area. Analysts point to the fact that these rates have increased over time. For example, in 1988 FAO had estimated a rate of 11.4 million hectares per year for the early 1980s. As already mentioned, however, these rates are subject to controversy. One of the reasons for the controversy is the method most commonly used in obtaining these rates. This method relies on information provided by the thermal range of a high resolution radiometer in a meteorological satellite. The accuracy of this technique has been criticized because of the imprecise correlation between fire and new tropical forest clearing (most of the fires occur in regions where the forest is already cleared) and to the fact that the sensibility of the sensor tends to magnify the area under fire (Fearnside, 1989). Primo Braga (1992, p. 175) describes the debate over a high estimate for Brazil of 8 million ha/year obtained by this method in 1987; a more accurate figure would have been closer to 2.3-2.6 million hectares.

Forest depletion has already affected the economies of a number of developing countries involved in tropical timber trade. The Philippines, for example, shifted from being a large net exporter of tropical timber in the 1960s and 1970s to a net importer during the 1980s. While methods of national accounting for natural resources are still being refined and estimates are hard to come by, an estimate of almost US\$50 billion (in constant 1985 dollars) has been derived as the cost of forest depletion in Indonesia, Papua New Guinea, and the Philippines during the period 1980-85 (World Bank, 1992c); (for a discussion of the natural resource accounting methodology see Repetto, *et. al.*, 1989). There are estimates that if the tropical forest depletion rates of the mid-1980s are maintained in the 1990s, the number of net exporters of tropical timber will fall from 33 to less than 10 by the end of the century (World Resources Institute, 1985).

However, the arguments that tropical rain forests will be totally depleted in 20, 30, or even 40 years are farfetched. On the basis of a linear projection of the recent FAO estimates of depletion rates, it would take more than 100 years to clear the entire tropical rain forests, without allowing for protected or inaccessible forests. Environmentalists criticize such projections by pointing out that they do not take into account "forest degradation". This is said to follow from the conversion of closed to open forest, negatively affecting the site and lowering the production capacity of the forest (*Tropical Timbers*, 1992). Economists, in turn, are ready to argue that a "Malthusian" scenario is unlikely since signs of timber scarcity would foster better conservation practices.

Causes of Tropical Forest Depletion

The direct causes of tropical forest depletion are well analyzed and documented. Land clearing for agricultural production and cattle ranching, commercial logging, and demand for fuelwood are the main factors contributing to tropical forest depletion. Estimates of the contribution of each of these factors are very rough. Johnson (1991) suggests that 64% can be attributed to agriculture, 18% to commercial logging, 10% to fuelwood gatherers, and 8% to cattle ranching. The World Bank (1991) attributes 60% to agriculture with the balance split roughly between logging and other uses (road construction, urbanization, fuelwood, etc.). However, these shares do not capture well the dynamics of forest depletion, which usually involves the interaction of different economic activities. Logging operations, for example, tend to facilitate access to forest areas and this may foster agricultural uses.

Divergence between public and private costs and benefits is the central economic problem of forestry use. Virtually all environmental concerns can be thought of in the form of economic externalities. Erosion from cleared hillslopes, excessive releases of carbon dioxide from land-clearing fires, and losses of biodiversity result from undervaluation of the forest and its products. These cost

externalities exist because of inefficient markets resulting from imperfectly defined or non-existent property rights. The magnitude of these externalities varies from country to country and one should bear in mind the methodological difficulties in assessing such costs. Hodgson and Dixon (1988) estimated that in the Philippines uncontrolled logging of about 8,000 ha of watershed area resulted in social costs of more than US\$43 million, mainly because of damage caused to fishing and tourism activities. In Java, Indonesia, the cost of soil erosion from degraded upland forests and rainfed agricultural land, may amount to US\$75 million p.a. (World Bank, 1992c).

Perhaps the most pervasive reason for the divergence between private and social costs and benefits in forestry use is the absence of clear and enforceable property rights. When property rights are non-existent or unenforced, no individual bears the full costs of any environmental degradation and there is no mechanism for regulating the use of the resource. The result is over-exploitation, or what is generally known as the "tragedy of the commons." Clarifying rights of ownership and use generally improves environmental outcomes. For example, in Thailand, the recent assignment of ownership titles and tenurial rights to land has made it more profitable for farmers to invest in soil conservation and land improvement, thus reducing soil erosion (World Bank, 1992b). It is also worth noting that in most developing countries forest lands are under state ownership and control (notable exceptions are Papua New Guinea and the Pacific Island where clans hold forest ownership). Moreover, forestry agencies usually have not been mandated to involve local people in either the management of or the benefits flowing from the forest resources. In most cases, they attempt to administer forests as a raw material source for large industries. As a consequence, the rate of log extraction is rapidly increasing and log processing capacity expanding. Noteworthy is the manifestation of conflicts over the tenure rights and the involvement of local people in the benefits flowing from forest resources, as illustrated by the 1987 incident involving the Penan people of Sarawak who set up roadblocks and halted logging because their livelihood derived from the forest was threatened.

Central to the issue of diverging public and private cost is the issue of low rents from logging activities captured by the governments in tropical timber producing countries. Economists measure timber scarcity in terms of the rate of growth of the stumpage value, i.e., the difference between log prices and logging costs. In other words, the stumpage value is the market value of standing trees. Stumpage values have been rising in real terms (Vincent, 1992). However, the rate of increase has been steadily diminishing, indicating that scarcity is slackening (Sedjo and Lyon, 1990). Vincent (1992) reports that forecasting models predict that stumpage values and tropical timber prices will be increasing more slowly in the future. This implies that, from a purely financial point of view, tropical timber producing countries should increase the harvest rate, i.e., "cash in" the stumpage value and invest it in sectors or projects that earn higher rates of return.

This situation is made worse by government policies related to tropical timber concessions encountered in almost every tropical timber exporting country. As already noted, in most of these countries forests are government-owned. Harvesting of logs is carried out mostly by private parties receiving timber concessions. Generally, the fees the governments levy on timber extracted by concessions bear no relation to stumpage values. They are set arbitrarily and account for only a small fraction of stumpage values. By doing this, the social value of a forest is reduced, favoring its conversion to other uses that yield greater tax revenues for the government. In addition, low concession fees imply low levels of funding for forest management. Vincent (1992) points out that "the lack of funds for forest management in many tropical producing countries results not so much from low international timber prices as from the failure of governments to capture the existing stumpage value". Concessionaires also have little incentive to invest in forests or improve management practices, because the duration of their concession contracts is typically short and of uncertain duration. Other major consequences of low stumpage fees have been strong political pressure to open forests for logging, and areas and species have been logged which would have been ignored in a less profitable environment.

The usual policies recommended to address these problems are either: (i) to maintain government ownership and the existing system of concession contracts but increase concession fees to amounts sufficient for financing forest management, or (ii) allow concessionaires to continue paying the low fees but increase the length of the contracts, making them renewable and transferable and thus creating an asset value. In an extreme case, forests may be privatized (as has happened in Chile). Related to the second policy recommendation, Paris and Ruziska (1991) suggest that loggers should be given the rights to a specified area for a certain period of time in exchange for a forestry guarantee bond. This bond should be deposited for the lease period and forfeited to the government if the logger breaks the conditions of the lease, that would include an obligation to protect parts of the forest. These two sets of policies may have quite different implications for the distribution of wealth from harvesting a country's tropical forests. However, it is important to link timber scarcity signals with forest management responses and in the process assign the forests their true value. The role that trade policies may play in this process is discussed later.

Another issue contributing to the problem of tropical forest depletion is the lack of significant forestry research. Forestry research, the scientific basis for management of tropical forests is only beginning to be developed. It has lagged behind agricultural research and adoption of new management practices has been slow. Forestry research expenditure in tropical timber producing countries is only a very small fraction of the value of timber products (for India less than 0.01% according to the World Bank, 1992c).

Some Facts about Tropical Timber Trade

Production of tropical timber is roughly only 14-15% of the total production of timber (softwood and hardwood). Moreover, the growth rate of global production and consumption of tropical timber has been slowing. The rate of growth of production during the 1960-'70 period was 5.6% p.a. but it fell to 1.5% p.a. during the period 1980-90. Table 1 shows a rapid increase in production of industrial roundwood and processed wood products in almost every geographic region during the 1960s and 1970s and then a considerable reduction in production growth during the 1980s. A notable exception is the production of wood-based panels, in particular plywood manufactured in Asia, which continued to grow rapidly in the 1980s.

Trade in tropical timber products has frequently been blamed for the disappearance of tropical forests. However, this allegation does not hold up well when trade statistics are examined. Table 2 shows that in the case of industrial roundwood (logs and pulpwood) and sawnwood, exports account for about 11% of the production. There is a much higher percentage, 59%, for wood-based panels. For wood pulp and paper and paperboard, exports account for 23% and 13% respectively. All told, exports of tropical timber products account for, at most, 20% of tropical timber production. If one refers to values instead of volumes, the percentage of the value of trade in the value of production is somewhat higher than 20%, since the more valuable logs tend to be exported. Thus, most tropical timber is consumed in developing countries and not in developed countries. Developing countries also account for most of the increase in tropical timber consumption that has occurred recently and is forecasted in economic models (Vincent, 1992). Also noteworthy is the quantity of imports of temperate and softwood (coniferous) timber products by developing countries.

Table 1. Production of Wood Products, by Region, 1961 to 1990

	1961	1970	1980	1990
Product/Region	(in 1,000 cubic meters)			
Industrial Roundwood (NC)				
Africa	18,632	26,989	34,493	38,604
Latin America	20,995	28,457	54,735	63,771
Asia	21,606	47,690	101,617	118,459
Other Developing	7,113	8,970	9,953	11,407
Developing	68,346	112,106	200,798	232,241
World	264,168	365,887	459,517	516,025
Sawnwood (NC)				
Africa	1,816	2,612	5,169	5,780
Latin America	6,273	8,621	13,708	17,063
Asia	4,295	7,092	27,004	37,504
Other Developing	346	812	1,414	1,986
Developing	12,730	19,137	47,295	62,333
World	73,367	93,087	113,671	121,621
Wood-based Panels				
Africa	155	523	1,096	1,422
Latin America	648	2,056	4,221	5,034
Asia	104	1,079	5,678	14,461
Other Developing	80	358	684	1,259
Developing	987	4,016	11,679	22,176
World	31,539	69,763	101,030	124,939

Source: FAO, *Forest Products Yearbook* (various issues).

Notes: 1. Industrial roundwood and sawnwood refer to non-coniferous (NC) timbers. Non-coniferous timbers include temperate and tropical woods, however, the majority of developing countries are tropical timber producers. Wood-based panels are both coniferous and non-coniferous.

2. Asia, excludes China. China is included in the World total. China is excluded from Asia because it is a large producer and lies in the temperate zone.

3. Other Developing includes the Near East and Oceania.

Table 2: Production and Trade of Wood Products in Developing Countries, 1990.

Product	Production	Exports	Imports	Apparent Consumption
------(in 1,000 cubic meters)-----				
Industrial Roundwood	300,196	33,860	14,881	281,217
Sawnwood	89,603	10,758	11,163	90,008
Wood-based Panels	22,176	13,078	4,593	13,691
------(in 1,000 metric tons)-----				
Wool Pulp	8,977	2,020	2,908	9,865
Paper and Paperboard	22,036	2,865	7,891	27,062

Source: FAO, *Forest Products Yearbook* (various issues).

Notes: 1. Industrial roundwood consists of logs and pulpwood.

2. Wood-based panels are mainly veneer and plywood, but also include particle board and fiberboard.

3. China is excluded from the Developing Region because it is a large producer and lies in the temperate zone.

For the two major tropical timber exporters, Malaysia and Indonesia, trade accounts for a large part of their production. Data for 1990 show that in Malaysia exports of logs and timber products accounted for about 75% of timber production, while for Indonesia 60% of timber production was exported. Other countries with high export shares are: Congo (62%), Côte d'Ivoire (57%), Gabon (78%), Ghana (49%), Liberia (64%), and Papua New Guinea (83%). Thus, while in aggregate, trade in tropical timber cannot be held primarily responsible for the disappearance of tropical forests, for several countries it may be argued that it has been an important factor in the process.

Table 3 shows that in 1990 most (82.2%) of the exports of tropical timber originated from Asia, particularly from Malaysia and Indonesia. These two countries account for about two-thirds of world

tropical timber exports. Using 1987 data (see Table 3), Asia is also the largest importer (54.3%), with China, Japan and South Korea accounting for a little less than half of total tropical timber imports. These statistics show that the dominant pattern in tropical timber trade is from Southeast Asian producing regions to East Asian import markets.

In terms of value, tropical timber trade accounted for 1.6% of the total value of non-oil merchandise exports of developing countries in 1990 (Table 4). This percentage is slightly lower than in 1980 (2%). However, while in the 1960s and 1970s processed products accounted for about 40% of the total value of timber exports, in the 1980s they accounted for about 80% (Table 4). The biggest increases have been registered in wood-based panels and paper and paperboard products. For some developing countries, timber exports are quite important. These countries are (inside parenthesis: tropical timber exports as a percent of total export revenues in 1990): Central African Republic (31%), Myanmar (28%), Côte d'Ivoire (15%), Malaysia (13%), Papua New Guinea (9%), Guinea-Bissau (9%), Gabon (9%), Cameroon (8%), Indonesia (7%), Liberia (7%), and Ghana (7%).

Another pattern that emerged in tropical timber trade in the 1980s was the reduction in imports of tropical logs and sawnwood by developed countries and, in parallel, an increase in the imports of temperate logs and sawnwood (World Bank, 1992a). Table 5 shows the trend in tropical and temperate logs and sawnwood timber imports in Europe (Western and Eastern). A similar trend is developing in Japan, where tropical log imports fell from 22,715 thousand cubic meters in 1979 to 9,600 thousand cubic meters in 1992. Tropical sawnwood imports by Japan, while increasing in the 1970s and early

Table 3: Shares of Major Exporters and Importers in Tropical Timber Trade

Major Exporters Countries/Region	Share of Exports (%) 1990	b/	Major Importers Countries/Regions	Share of Imports (%) 1987
Countries				
Malaysia	41.5	(19.6)	Japan	28.1
Indonesia	23.8	(13.8)	China	9.2
Singapore a/	4.6	-	USA	7.5
Brazil	3.3	(19.6)	South Korea	6.2
Côte d'Ivoire	2.1	(1.4)	Singapore a/	6.2
Congo	1.4	(0.8)	United Kingdom	4.7
Gabon	1.4	(0.6)	Hong Kong a/	4.2
Regions				
Asia	82.2	(52.6)	Asia	54.3
Latin America	5.4	(26.8)	EC	20.1
Africa	8.8	(17.9)		

Sources: World Bank, International Trade Division; German Bundestag (1990); Zarsky (1991).

Notes: Timber trade in sawnwood, wood-based panels, (converted in roundwood equivalent) and logs.
a/ Transit country.

b/ Inside the parentheses are the world production shares of each of the exporters, in 1990.

Table 4: Developing Countries' Export Revenues from Wood Products, 1961 to 1990 a/

	1961	1970	1980	1990
----- (in 1990 million constant US\$) -----				
Logs	1378	3186	5606	2,352
Sawnwood	774	1232	3045	2,406
Wood-based Panels	143	682	1775	4,175
Wood Pulp	33	203	889	1,169
Paper & Paperboard	100	132	696	1,969
Total Processed Products	1050	2249	6405	9719
Total Wood Products	2428	5435	12011	12,071
Share of Total non-oil Merchandise Exports (%)	NA	NA	2.0	1.6

Source: FAO, *Forest Products Yearbook* (various issues) and the World Bank, International Trade Division.

a/ China is excluded.

Table 5: European Imports of Tropical and Temperate Logs and Sawnwood; 1984-92a/

	1984	1985	1987	1989	1990	1991	1992
------(in 1,000 cubic meters)-----							
Tropical							
Logs	4012	3621	3244	3551	3558	3295	3196
Sawnwood	2837	2974	3841	3757	3166	2660	2610
Temperate							
Logs	2727	2803	2930	3385	4365	4195	4200
Sawnwood	2521	2412	2724	3001	4023	3884	3903

Source: *Timber Bulletin* (various issues), United Nations Economic Commission for Europe.
a/ Europe includes both Eastern and Western.

1980s, fell from 1,736 thousand cubic meters in 1989 to about 1,200 thousand cubic meters in 1992. Japan has been substituting temperate and even softwood logs for tropical logs. During the period 1987 to 1991, tropical log imports into Japan declined by 15% while imports of softwood and temperate logs (mainly from Chile, New Zealand and the United States) increased by 12%.

The Role of Trade Policies in Tropical Timber Trade

Export Bans, Other Restrictions, and Taxes. Such trade policies are imposed by producer countries to restrict or eliminate the export of logs (sometimes semi-processed products as well). Frequently, a primary objective of such policies is to stimulate value-added processing and increase foreign exchange earnings while reducing the log content of timber product exports, although recently conservation objectives seem to have increased in importance. Notable examples where such policies have been undertaken by governments, at various times and for various durations, include most Latin American countries, the state of British Columbia in Canada, the state of Washington in the United States, as well as several countries in southeast Asia such as Indonesia, Myanmar, Philippines, Peninsular Malaysia, Thailand and more recently Cambodia and the states of Sabah and Sarawak (this list is in no way intended to be exhaustive).

By and large, in most cases where promotion of value-added processing and exports has been the main objective, the objective has been achieved--albeit in varying degrees. However, an important question is whether the benefits of such policies have been more than enough to offset the costs involved. Studies of experience with export restrictions in Peninsular Malaysia and Indonesia suggest in fact that the cost of export restrictions has exceeded the benefits. For example, Wiens (1992) indicates that the effects in Peninsular Malaysia over a decade were as follows:

- "(a) sawnwood production was increased by 24% with the restrictions, employment by about the same amount, and log production reduced by 15%, but,
- (b) without the restrictions, export earnings (logs and sawnwood only) would have been 22% higher, economic value-added 34% higher, and resource rent (from harvested logs, and not necessarily captured by government) 49% higher than their actual historical values.

Comparing benefits and costs, each sawmill job created by the log-export restrictions cost Peninsular Malaysia annually M\$16,000 in economic value-added, M\$44,800 in export earnings, and M\$92,000 in resource rent. In contrast, the average annual wage in sawmills in 1989 was around M\$6,000" (Wiens 1992, p. 8).

Similar results are reported by Vincent (1992), again for Peninsular Malaysia.

In Indonesia, in the early 1980s the government decided to phase out log exports by 1985. One objective of this policy was to stimulate the growth of export-oriented processing. As a result, total export earnings from timber and processed timber exports (including secondary processed timber products) rose from \$1.2 billion in 1980 to over \$3.6 billion in 1991 (all values in current dollars). Indonesia has established itself as a major exporter of processed timber products. In terms of effects on its balance of trade, the policy appears to have had a net "benefit". However, the log export ban policy had the effect of depressing domestic log prices compared with international prices. For example, as of August 1992, plywood grade logs in local market (log pond in Samarinda) were being priced at around \$90-100 per cubic meters, as compared with the export log price (FOB Sabah) of about \$180. This price differential in effect amounted to a subsidy to local processing industries, and should be counted on the cost side in any comprehensive cost-benefit analysis of the policy. It was estimated that the underpricing of timber to local processors, and the inefficiency it condones, amounts to nearly US \$ 500 million

annually (World Bank, 1992c). The relatively low levels of local prices also may have encouraged wasteful use of logs in local processing (e.g., an average wood recovery rate of 50-54% is achieved in Indonesian plywood mills compared with a rate of close to 70% in Japan; Constantino, 1990).

An important difficulty with all the studies is that some of the effects due to trade restrictions are hard to quantify for the calculation of costs and benefits. Another problem inherent in such studies is the difficulty of making counterfactual projections. In other words, what would have happened in the absence of such policy actions? This is particularly a problem when dealing with suppliers large enough to affect the market, such as Indonesia and Malaysia.

If we were to summarize the experience from the majority of the studies, the main effect of trade restrictions is the undervaluing of logs in producing countries. This leads to losses in the value-added, in export earnings, and in resource rents, and to excess capacity and inefficient production practices. With regards to the environmental impact, export bans and restrictions lower domestic log prices, giving the signal of non-scarcity and treating tropical forests as inferior land uses. The end result could be greater exploitation of the forests.

More specifically, the export ban on logs would not decrease the total demand for timber products; instead, the flow of logs would now be diverted from processors abroad to domestic processors, lowering the domestic price of logs, giving domestic producers a windfall gain and probably increasing waste and inefficiency. In such a case, the rate of deforestation could increase if the elasticity of demand

for logs domestically is higher than the elasticity of demand for logs abroad.¹ (In addition, the capacity for domestic processing should equal the capacity of the earlier users of logs.²) The rate of deforestation will also be affected positively if the waste coefficients in log processing are higher domestically compared to earlier users of logs.

Tropical timber countries have also experimented with logging bans. Examples can be found in Thailand in 1989, the Philippines since the 1970s, and recently in the northern part of Guatemala; while in 1989 Papua New Guinea put a ban on issuing new logging concessions. The bans have not curbed deforestation significantly. Thailand's logging ban has increased the pressure on forests in neighboring Myanmar and Laos (Litner, 1992). In the Philippines, the illegal timber trade has effectively canceled out the effects of the ban; and in northern Guatemala logs are smuggled across the border into Mexico. Also, because restrictions on exports of finished wood products are limited, illegally felled timber is still exported. What makes logging bans ineffective is the difficulty of enforcement that under the current tenure systems falls under the responsibility of the government. The ineffectiveness of such government action may be reflected in efforts to shift enforcement of illegal logging to importers, as manifested by the vice-president of the Philippines recently urging Japan and Taiwan (China) to stop buying illegally-felled timber from the Philippines (see *Asian Timber*, 1992a, p. 6). The problems associated with logging

¹Dean (1992) developed a model which showed that, in principle, log export bans would result in less harvest of logs than free trade conditions. But, the more elastic the demand for logs as domestic inputs, the more likely the ban on log exports leads to overharvesting, ie., underachieving the environmental target level of harvesting. Also, a high demand elasticity reduces the likelihood that the ban is welfare improving. However, regarding the impact of a ban on log harvest, Dean's model does not account for the increase in local processing capacity and wasteful use of logs in local processing.

²Capacity may be a constraint in the short-run and, if it is binding, the rate of deforestation will probably be reduced for a period of time following the adoption of an export ban on logs. However, as the ban on log exports increases the profitability of local processing, in the medium to long-run domestic processing capacity will be built to replace or even exceed the capacity of the processors abroad that it displaced.

bans indicate that in developing countries there is a need to find policy instruments that do not require sophisticated policing but are largely self-regulating (Cairncross, 1993). Restrictions on logging to reduce the rate of deforestation may serve only as a short-term measure. Their effectiveness is likely to weaken over time if measures to address production distortions, mainly land tenure and pricing, are not implemented.

Import Bans and Boycotts. Bans and boycotts on tropical timber imports have become a political reality in both Europe and the United States. While their benefits in terms of environmental protection are hotly debated, they appeal to consumers frustrated by government inaction and convinced that through their buying habits they can discourage tropical deforestation. Polls show that both in Europe and the United States, consumers would purchase environmentally-friendly products at even greater cost.³ However, consumers are not willing to pay more than 15% for environmentally friendly products. Johnson and Cabarle (1993) report that some 200 city councils in Germany and 51% of Dutch municipalities have banned the use of tropical timber. It is also reported that the Netherlands proposes to ban imports of tropical timber as of 1995 (*Economist*, 1993). In the United States, a number of states and cities have banned or proposed a ban on the use of tropical timbers in public construction projects. Among them are the states of Arizona, California, and New York and the city of Minneapolis.

The effectiveness of import bans and boycotts to reduce tropical deforestation is questionable, however. First, they could depress the already undervalued tropical forests making them less competitive against alternative uses, such as agriculture. Second, import bans and boycotts influence only a small part, at most 20%, of the world's tropical timber production. As mentioned in the previous section, 80%

³In the United States, a cabinet maker is reportedly charging an "ecology surcharge" on tropical wood products. The surcharge aims to increase customers' awareness and to support sustainable-yield projects.

of tropical timber production is consumed in the producing countries. Third, if the Asian importers (accounting for over 50% of tropical timber imports) do not adopt similar policies, the influence of any import bans and boycotts will be greatly reduced. It is noteworthy that the chairman of the Indonesian Wood Panel Association has reportedly said that Indonesia will not be affected by the anti-tropical timber campaigns in Europe and the United States, as it has been expanding its tropical timber exports to Asian and Middle-Eastern countries (*Asian Timber*, 1993, p.4). Fourth, bans and boycotts fail to address the main causes of deforestation. Moreover, the legal basis for one country imposing import bans on products from another based on differences in environmental standards has been successfully challenged under international trade agreements. The recent GATT decision overruling the US ban on imports of Mexican tuna has established an important precedent in this context (Kulesa, 1992).

Export bans on logs and import bans and boycotts on tropical timber products, including logs, have different effects. As noted earlier, export bans on logs do not reduce the overall demand for tropical timber; they shift the location of log processing. Thus, with elastic internal demand for logs as inputs and wasteful processing, increases in the rate of deforestation are possible. Import bans on tropical timber products, including logs, do reduce the overall demand for tropical timber. Thus, the rate of deforestation is expected to be reduced, at least in the short-run. In the long-run, however, to the extent import bans and boycotts contribute in lowering the value of the standing forest making alternative uses more profitable, and to the extent Asian importers do not adopt these restrictions and new markets in Asia and the Middle East replace the ones imposing the import restrictions, the impact of import bans and boycotts on the rate of deforestation could range from a marginal reduction to an increase.

Primo Braga (1992) presented an analytical framework in which he evaluated trade policies in tropical hardwood and the environment. His results suggest that the use of trade instruments to pursue

environmental objectives may increase domestic resistance to external pressures devoted to fostering global environmental concerns. Furthermore, his analysis points out that a free trade policy cum production tax should provide the optimal policy mix, not only in terms of efficiency considerations but also with respect to the pursuit of environmental objectives.

Eco-labeling or Certification Programs. Given the questionable effectiveness of bans and boycotts, there is a growing movement to use eco-labeling programs to promote tropical timbers produced from sustainably-managed forests. Eco-labeling refers to certification programs designed to evaluate the performance of particular forestry operations. They usually involve a label accompanying a timber product, stating whether the timber product comes from a sustainable or well-managed forest. Eco-labeling programs have been fostered mainly by European consumers' concerns about tropical deforestation, but are now expanding into the United States. The European Community has been developing an eco-labeling program and supporting legislation for four years. The intention is to establish uniform criteria for a number of products and a single label which can be applied throughout Europe, replacing nationally developed labels. In the United Kingdom, the World Wildlife Fund has started the "1995 Club" to which 24 retailers have committed so far, with the objective that all their timber products will be from sustainable sources. In Japan, demand for wood from sustainable sources presently barely influences the local market (Johnson and Cabarle, 1993). All of these efforts emanate from consuming countries. However, recently the African Timber Organization (ATO) has proposed a regional eco-labeling program for West and Central Africa. This is an important example, because politically it is important that tropical timber producers develop their own strategies with regards to eco-labeling. The ATO aims at the evolution of a common label to be used by all its members under the description "Bois Africain d'origine controlee". The label will indicate the forest category, the country of origin and the

company's name.⁴

Eco-labeling programs such as Rainforest Alliance's "Smart Wood", Scientific Certification System's "Green Cross" and the Institute of Sustainable Forestry's "Pacific Certified Ecological Forest Products" have the objective of promoting good forest practices and sustainable timber production. The main criteria for these programs deal with the concept of "sustained yield", meaning that harvesting should not exceed the forest's growth rate.⁵ Often these programs set timber production levels in order to protect water quality, biodiversity and non-wood forest products. Certain indicators are chosen and when a critical level is reached, timber production should be significantly reduced or stopped until the indicators show a recuperation in the ecosystem. In addition, eco-labeling programs are concerned with social issues in relation to forest management. Most specify criteria for local participation in project planning, employment generation and profit sharing. After a forest is certified as sustainable, regular inspections by the certifying organizations follow, usually in association with a local research entity.

Eco-labeling programs are new and rather limited in terms of their coverage of world timber production. Among the problems faced by eco-labeling programs, issues of financing, coverage and compliance merit special attention. Eco-labeling involves costs and foregone short-run revenues for producers. So far, philanthropic organizations and grants have paid for most of the costs of eco-labeling

⁴ATO defines three categories of forests: (a) plantations and managed forests; (b) forests lacking management; and (c) forests under controlled regeneration.

⁵The definition of sustainability is hotly debated. Of issue is how much intervention a forest can support without significantly disturbing the biodiversity. A workable approach is proposed by the "Smart Wood" program. Two classifications of forest management are proposed: sustainably managed (rarely achieved) or well-managed (more commonly achieved). The latter is easier to define and certificates can be awarded to companies that pursue good forest management and are working towards sustainable management. In this way certification can begin without waiting to resolve the debate over sustainability. As companies achieve sustainably managed criteria, they can be re-evaluated. Over time the criteria can be strengthened on the basis of the experience gained.

programs. If these programs proliferate, the current sources of funding may not be sufficient to cover these costs. Timber prices will have to increase and it remains to be seen how much extra consumers are willing to pay for timber products from sustainable sources. Costs and foregone short-run revenues due to eco-labeling could be of particular concern to African tropical timber exporters which have relatively few export alternatives.

At issue is whether eco-labeling (certifying) should cover an individual producing firm or a producing country as a whole. Despite the complexity and considerable effort associated with certifying an individual producing firm, certification should be on an individual firm basis. By doing so, the sovereignty issue is avoided. Furthermore, certification standards should be developed for local conditions; that is, for different sociological and biophysical conditions. This is because different producers within the same country may face different conditions. The issue of eco-labeling should be seen more as a business-driven decision. Guaranteeing validation and overseeing country-based certification standards by governments in the producing countries would likely undermine the credibility of eco-labeling programs for consumers in importing countries.

We turn now to the question of compliance. Eco-labeling programs in tropical timber should be consumer-driven, market-based schemes. Thus, participation should be on a voluntary basis. If incentives to subscribe to these schemes are strong enough, importing countries should not need to introduce unilateral legislation discriminating against imports of tropical timber from unsustainable resources. Government legislation would be very resource and time consuming and probably unnecessary. Moreover, unilateral legislative imposition of eco-labeling programs could be GATT-illegal--an issue that is examined later in the paper--and could lead to trade frictions between importing and exporting countries. Austria, for example, proposed legislation making compulsory the adoption of eco-

labeling in tropical timber products but as a result of protests the proposed legislation was modified to make eco-labeling voluntary and to include not only tropical but all timber products.

The success of eco-labeling programs introduced on a voluntary basis will depend on how consumers react to them.⁶ In particular, whether consumers are willing to pay more for the sustainably produced timber products. Consumer surveys in Europe have indicated that consumers are willing to pay more for environmental-friendly products. For timber, the so-called "green premium" is in the order of 5-15%. However, even if consumers in Europe and the United States were to show their preference for timbers coming from sustainably-managed resources, the impact of eco-labeling may not be significant. Earlier we saw (Table 3) that China, Japan, and South Korea account for a little less than half of the world's tropical timber imports. Thus, only if Asian consumers are willing to show their preference for timber products from sustainably managed sources by paying more for them will the market for tropical timber be significantly affected.

If consumers in major Asian importing countries do not show a preference for certified timber products, while consumers in Europe and North America do, large-scale trade diversion in tropical timber trade is likely to take place. Tropical timber from what are deemed to be unsustainable sources will flow to Asia while timber from sustainable sources will be diverted into the United States and Europe. This assumes that not all tropical timber comes from unsustainable sources. Even in the extreme case where all tropical timber comes from unsustainable sources, trade diversion is still likely to take place in the event that Asian importers do not express their preference for certified timber products. In this extreme case, the United States and Europe will probably consume very little or no tropical timber, while Asian

⁶This holds whether eco-labeling is introduced on a voluntary basis or imposed by unilateral legislation.

importers may substitute tropical for temperate timber, absorbing almost all tropical timber exports. The statement made earlier that Indonesia can substitute Asian and Middle-Eastern markets for European and American markets is illustrative of this point. The rejection of tropical timber products due to eco-labeling in Europe and the United States would reduce the value of these products and make them more attractive for Asian importers.⁷ It is true that the adoption of eco-labeling programs in European countries is more likely to affect timber exports from African producers since Europe is the major timber trading partner of Africa. However, Japan has been increasing imports of African timber, particularly from Gabon. So significant trade diversion could take place even for African timber.

Skepticism about the effective contribution of eco-labeling also reflects the fact that most tropical timber is consumed locally. Thus, a significant share of tropical timber production would not be directly affected by eco-labeling in importing countries (even if all major importing countries, including Japan and other Asian importers, adopt eco-labeling and consumers in these countries show their preferences for certified timber). Once again, the impact of eco-labeling may be a perverse one. As the value of timber from unsustainably-managed forests in producer countries is reduced, the value of the forest decreases, making alternative uses of the forest, such as agriculture, more profitable and thus may contribute to deforestation along the lines of the argument developed for import bans and boycotts earlier.

An additional problem regarding eco-labeling for tropical timber products can be that of false or misleading claims. Cairncross (1993) reports a number of cases where the consumers' awareness of environmental-friendly products is exploited. She states that "environmental marketing has rapidly turned

⁷The assumption here is that tropical, temperate and softwood timber products have a high elasticity of substitution, at least in the long-run, and that there is a low elasticity of substitution between timber products and non-timber products. In such a scenario, the rejection of tropical timber in Europe and the United States will increase prices of temperate and softwood timber products, in which case Asian importers will substitute the latter for tropical timber products.

out to be a morass" (Cairncross, 1993, p. 196). Cairncross (1993) also reports that in 1991 Environmental Research Associates of Princeton, New Jersey, found that nearly 47% of consumers dismissed environmental claims as "mere gimmickry". What is important also to recognize is that reported false or misleading claims regarding products seem to be relatively much easier to disprove than claims regarding the sustainability or not of a particular forest or the forestry management of a particular country or region. This puts a heavy weight in the design of eco-labeling programs on gaining consumers' confidence in their claims. This will be particularly important in voluntary eco-labeling schemes.

In short, the effectiveness of eco-labeling programs is likely to depend on the following factors. First, such programs should provide incentives for compliance by producing countries. Such incentives could be better prices and improved markets for timber products from sustainable sources. At present the "green premium" is only at the order of 5-15%, but producers will have also the incentive to gain market share. In addition, sales could increase as tropical timber wins back some of the markets taken over by other timbers or timber substitutes. Also, some tropical timber bans imposed by local authorities in European countries and in the United States may be lifted. Few producing countries will make investments to achieve sustainability if the benefits associated with competing land uses or financial investments are greater than those associated with sustainable forestry. Second, credible (and manageable) systems would have to be developed to track timber from the source to the market. Currently, logs from different sources are mixed in ports for exports and in sawmills for processing. Third, widely acceptable standards would have to be developed for eco-labeling.⁸ The current proliferation of eco-labeling programs based upon varying standards and verification techniques seems

⁸At present there is no agreed upon definition of sustainable forest management which is the basis of eco-labeling programs.

unworkable. Programs should provide evidence in ways that are credible, acceptable, affordable and practical. Environmentalists tend to be suspicious of judgements other than their own and producing countries tend to be suspicious about attempts by outsiders to impose standards. It would appear sensible therefore to have representatives from consuming and producing countries represented within the institution setting the eco-labeling standards.⁹ Fourth, on the producers side effective land tenure systems seem to be required. Without them, verifying sustainability will be very difficult. Moreover, without legal titles and demarcated boundaries, log producers will not likely be able to justify the investments necessary to be certified as a sustainable source. Fifth, public education campaigns could be launched both by governments and NGOs to present the issues to the public and allay fears of false claims. Education campaigns could also target timber production and local people in timber producing regions. The success of eco-labeling programs will depend crucially upon the level of involvement of producers at all levels.

GATT and Eco-Labeling. Trade policies are "second-best" instruments for advancing environmental objectives in forestry. As discussed in the previous section, use of trade policies may even generate perverse results from an environmental perspective in addition to their negative economic implications. It is also worth noting that at present there is limited scope for GATT-consistent trade restrictions to advance environmental objectives.

GATT-legality is not necessarily a good indicator of the economic soundness of any given trade policy. Yet, to the extent that the GATT provides the obvious forum for the debate of trade-related environmental measures, it is worth analyzing the GATT-legality of eco-labeling.

⁹There is also the need for creating an inspection entity and a forest audit system that can be seen as impartial by all parties involved.

Under the GATT, consumption-related standards are not prohibited as long as they are applied in a non-discriminatory fashion between domestic goods and imports. For example, a country may restrict imports of fruits that do not comply with the standards for pesticide residuals applied domestically. However, differences in production and process methods (PPMs) are not usually considered justification for deviating from GATT obligations. As noted by Sorsa (1992, p. 119), to allow trade restrictions based on differences in PPMs "would undermine the capacity of countries to benefit from their comparative advantage."

The debate about eco-labeling is in essence a debate about how to address an issue of PPMs. Compliance with eco-labeling standards as a condition for market access is clearly a non-tariff barrier (NTB) and, as such, GATT-illegal. Environmentalists have argued that such trade restrictions should be allowed under a broad interpretation of Article XX (the General Exceptions to the GATT). Article XX(g), for example, establishes that measures designed to foster the conservation of exhaustible natural resources may be exempted from GATT disciplines.

The outcome of the US-Mexico tuna dispute indicated that this broad interpretation of Article XX will not be easily accepted as a defense in the case of countries trying to enforce their preferred PPMs at an extraterritorial level. Furthermore, the fact that Mexico also invoked Article IX (Marks of Origin) in its successful challenge of the US import ban has been interpreted as a sign that unilateral attempts to impose eco-labeling by developed countries will be contested at GATT level by the affected parties.

Eco-labeling, even when imposed unilaterally by importing countries simply as an instrument to foster consumer awareness, will probably be challenged in the context of a strict interpretation of GATT principles. If restricted to tropical wood, for example, it can be argued that such practices will

discriminate in favor of temperate wood producers. Furthermore, the extraterritorial application of standards will revive the debate about the treatment of PPMs in the GATT (not to mention the usual claims of eco-imperialism). It can be argued that if eco-labeling is introduced on a voluntary basis by importing countries, GATT-legality may not be an issue. Still, the question of the effectiveness of such a measure remains, as noted in the previous section.

Summing up, even though the GATT-legality of eco-labeling practices in the case of tropical wood has not yet been formally tested, one can expect that they will generate additional trade disputes at the multilateral level. The challenge for those in favor of such practices is to devise labeling programs that are both nondiscriminatory and manageable.

Final Remarks

Trade policies have often been identified as an instrument/vehicle for promoting environmental objectives in tropical forestry. The environmental problems in tropical forest use which have given rise to concern arise mainly because of inadequate property rights. Government policies, especially the low rents collected, are also to blame. It is argued by environmentalists that the denial of market access (in the case of import bans) or unilateral discrimination (in the case of eco-labeling) will induce "positive" changes in the behavior of governments and economic agents. Environmentalists also tend to support export restrictions (e.g., log export bans) imposed by producer countries as a way to foster better conservation practices. As discussed in this paper, all of these trade restrictions tend to depress the perceived value of tropical timber and consequently may have a perverse environmental impact.

It is well known that trade policies are inefficient instruments for correcting domestic distortions. In other words, they are poor instruments with which to pursue environmental goals. Yet, if one were constrained to choosing among trade policies to advance these goals, it seems that eco-labeling holds more promise for promoting sustainable forestry than either bans imposed by exporters or importers.

Eco-labeling's main strength lies in its capacity to discriminate (through market signals) in favor of timber produced under sound environmental practices, in contrast to the indiscriminate and perverse impacts of bans and boycotts. However, if imposed unilaterally, even by all importing countries, its effectiveness will be, to say the least, doubtful, as Asian consumers may continue to consider lower prices more important than sustainable tropical timber production. It would lead to trade diversion and potentially perverse environmental results, not to mention an increase in trade disputes at GATT level. Thus, eco-labeling should be introduced on a voluntary basis. If incentives to subscribe are strong enough, importing countries should not need to introduce unilateral legislation to discriminate against tropical timber from unsustainable sources.

Accordingly, eco-labeling should be pursued at a multilateral level (e.g., through discussions in the context of the International Tropical Timber Organization), and "fairness" considerations dictate that eco-labeling should also incorporate temperate timber products.¹⁰ Moreover, it should be used not as a "stick" but as a "carrot" to entice proper environmental practices. By addressing the issue at a multilateral level, countries would be able to minimize the problem of trade diversion. At the same time, standards would be determined in a cooperative manner, diminishing the risk of trade conflicts.

¹⁰NGOs in Europe start recognizing this latter point and begin lobbying for sustainable management of non-tropical timber.

The multilateral solution is particularly appealing because producers as co-participants in the process would more likely approach eco-labeling not as a non-tariff barrier but as an instrument by which to capture the rents associated with prevailing environmental concerns in the developed world. Accordingly, the main challenge for those who support eco-labeling is the design of programs that can be financed and managed at a multilateral level and that entice signatories to enter into commitments which will indeed lead to sustainable forest use.

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