

Trade Policy in Indonesia: Implications for Deforestation

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Introduction

The issues of world trade and environment have been discussed and debated for generations, but the interplay of these fields has begun to receive more intense scrutiny over the past decade with the increase in international trade liberalization. Following the Uruguay round of the GATT/WTO trade negotiations, barriers to trade were greatly reduced in many sectors, including the forest products sector. The prospect of freer and more widespread international trade led some observers to try to understand the direct linkages and conflicts between international trade and environmental issues. In its October 2001 report on the state of the world's forests, the United Nation's Food and Agriculture Organization describes the status of the trade-environment nexus: "Issues concerning trade and the environment continue to be important and to receive widespread attention. Concerns about environmental issues are now being taken more seriously than previously...Views continue to differ on how far trade and environmental issues could, or should, be mutually supportive; how their linkages could be encouraged; and whether trade or environmental bodies should predominate in situations where conflicts arise."¹ As increasing attention is paid to the issues of trade and environment, it is becoming more apparent that the interactions between the two are complex and varied, and in most cases, not easily explained or understood.

Nowhere is the complexity of these issues more apparent than Indonesia. The country is biologically, culturally, and geographically diverse and unique, and controls a wealth of natural resources, particularly oil, gas, and timber. Indonesia faces many challenges however; political turmoil in recent years has left the government weak, corrupt and disorganized. The lack of effective government regulation has translated into unchecked exploitation and destruction of Indonesia's natural resources, particularly in the forest products sector. In the wake of the Asian financial crisis of 1997-98, Indonesia has struggled to regain its formidable economic growth of the early 1990s. In the coming years, as the government works toward financial stability, the contribution of Indonesia's forest resources to its expanding exports will be critical to the re-establishment of a healthy economic framework. In the period from 1989 to 1999 Indonesian trade grew 2.5 percent faster than real GDP, and trade in goods as a percentage of GDP was 81 percent in 1999.² These figures reflect the importance of trade to Indonesia's economy, with forest products contributing heavily. Indeed, before the economic crisis, forest-based exports brought over \$9 billion per year to Indonesia's economy, having increased from \$200 million in the early 1980s.³

The need to understand the relationship between trade and environmental resources becomes even more urgent when one considers the rate and extent of forest resource depletion in Indonesia. The World Bank estimates that harvestable forests on Indonesia's two largest land masses, Sumatra and Kalimantan, will be completely gone by 2015.⁴ The current rate of deforestation in Indonesia could be as great as 2.4 million hectares per year,⁵ though the prevalence of illegal logging makes accurate estimates difficult. With as little as 53 million hectares of original forest cover remaining in the entire country (out of an estimated 144 million hectares in 1966),⁶ it is clear that Indonesia's current resource use patterns cannot be sustained for long. These statistics hold dire implications for Indonesia's economic development, and beyond that immediate concern lies the fact that Indonesia is considered a "mega-diversity" country, with over 10 percent of the world's biological diversity. Containing this biodiversity is 10 percent of the world's remaining tropical rainforest, which helps soak up the fossil fuel emissions that many hold responsible for the specter of global climate change.⁷ In addition to the people of Indonesia, the global community has a strong interest in the maintenance of Indonesia's forest resources, and governments or societies often act to support this interest.

Given that such a large percentage of Indonesia's economic output comes from its wealth of natural resources, the question of how current and future trade patterns affect these resources is crucial. The topics addressed in this paper have far reaching implications for the long-term sustainability and development of Indonesia's economy. The effect of international trade policies on deforestation in Indonesia must be considered, but the primary issue explored in the following pages is to what extent and in what way Indonesia's own trade policies have affected economic activity that contributes to the depletion or maintenance of its forest resources. Before the 1997-98 financial crisis, Indonesia's forest products sector made up 10 percent of the country's GDP,⁸ indicating that the future relationship between economic and environmental policies will be critical to Indonesia's return to sustained long-term economic development.

Trade Patterns in Indonesia's Forest Products Sector

An important factor to keep in mind when examining trade in the Asian market during the 1990s, is the effect of the 1997-98 financial crisis, which had a dynamic impact on all sectors of economic activity. The effects of this crisis distort trade data when one looks for patterns or evidence of other trade-policy related factors. For example, between 1997 and 1999 Indonesian production of roundwood, sawn timber and plywood^A all dropped between 26 to 35 percent.⁹ The net production decrease in these products was due to a combination of factors, but as the decrease can be seen across a range of product sectors, the broad impact of the financial crisis that struck the country and the region is unmistakable. It is likely that trade-specific factors played a role in dampening or amplifying certain economic effects during the financial crisis, but extrapolating these effects is beyond the scope of this paper.

The timber trade is extremely important to Indonesia's economy. As previously mentioned, it is estimated that forest products were recently responsible for up to 10 percent of Indonesia's GDP,¹⁰ although that figure is not necessarily representative of the degree of importance of the country's trade in forest products, as the contribution of forest products to the economy extends

^A Throughout this paper the terms "plywood" and "wood-based panels" are used interchangeably, as are the terms "roundwood" and "logs."

beyond trade in those products. The growth in the importance of forest products in Indonesia's economy can be attributed to its aggressive export restriction policies (export quotas, tariffs, and bans) designed to promote Indonesian sources of processed timber. However, although Indonesia was responsible for as much as 70 percent of the world plywood market in the mid-1980s,¹¹ and for as much as 41 percent as recently as 1997,¹² the revenue from plywood exports has been declining since 1993 (See Figure 1). This figure dropped from \$3.6 billion in 1996 to \$2.0 billion in 2000, and the volume of plywood exports has simultaneously dropped by 22.5 percent.¹³ Other forest product sectors, however, have remained constant or expanded during this period (See Table 1), except for some immediate declines following the financial crisis. The decline seen in plywood exports can partially be attributed to the relaxing of export tariffs on roundwood in 1998, as discussed below. In 2000, plywood, sawnwood, and paper and paper products accounted for 7.4 percent of Indonesia's export value, and nearly 10 percent of non-oil and gas exports.¹⁴ Keeping in mind that many additional forest products are exported, the importance of Indonesia's forests to its economy is evident.

Indonesia exports a range of forest products to a variety of nations around the world. While the United States, Japan, Singapore, and the European Union are the primary importers of Indonesian products (See Figure 2), trade in forest products with other Asian countries has been growing, in large part due to China's increasing demand for goods. Indonesia has increased trade with other Association of South East Asian Nations (ASEAN) countries in recent years, and this expansion is expected to continue in 2002 and beyond with the implementation of the ASEAN Free Trade Agreement (AFTA). According to the World Bank, in 1999 inter-ASEAN trade accounted for 22.2 percent of all ASEAN exports, up from 19.8 percent in 1990, although this was lower than the peak of 25.4 percent reached in 1995 and 1996;¹⁵ this percentage should continue to rise. Japan is by far Indonesia's single most important trading partner, accounting for 23.2 percent of exports in 2000, the highest percentage for any of the countries with which Indonesia shares a market. The United States follows Japan as the second most important trade partner, absorbing 13.6 percent of Indonesian exports; Singapore is third with 10.6 percent.¹⁶ Japan, the US, and Singapore therefore account for over 47 percent of Indonesian exports, and while this represents a range of goods, not only forest products, the power of these markets must be considered in relation to the effect of trade policy on Indonesia's forests.

Indonesia has extensive and diverse forest resources, and consequently exports a multitude of forest products, both timber and non-timber. Timber products are harvested primarily by commercial entities, while indigenous and local actors tend to play a more significant role in non-timber forest product harvesting, though possibly still not a dominant one. According to the Indonesian Ministry of Forestry, Indonesia's exported wood products include the following: roundwood, sawn timber, plywood, blockboard, wood working, furniture, chipwood, pulp, paper, particle board, wood flooring and chopsticks. Of non-timber exports, rattan and charcoal are the most important (See Table 2), but others include gum resin, turpentine, cassiavera, sago and silk.¹⁷

Though general reference is often made to the "forest products sector," it is useful to keep in mind the breakdown of products in this sector, particularly when examining products in trade from tropical forests, where many non-timber products are harvested in addition to wood-based products. To truly understand the effect of trade on Indonesia's forests it is also helpful to look at

how the trade of each product relates to maintenance of forest resources. Non-timber forest products can often be harvested without diminishing the resource base, but for the harvesting of timber-based products to be sustainable, it must be done at a rate that is not greater than the natural replacement rate of the resource, or there must be efforts made toward reforestation to make-up for the replacement rate deficit.

Theoretical Framework for Analysis

According to the Heckscher-Ohlin (H-O) model of international trade, one would expect Indonesia to be a major exporter of forest products. The H-O model indicates that countries will trade heavily in sectors in which they have large factor endowments, which can be specified in Indonesia's case as natural resources and labor. The forest products industry requires access to large quantities of timber, and the harvesting and processing of timber in Indonesia is a labor-intensive process; to be productive and profitable the industry makes use of the large pool of relatively cheap labor. The mobility of the labor force is important when considering policies related the trade in forest products. The sector does not require skilled labor, and therefore labor can generally be considered mobile, although in Indonesia's case this mobility can be negatively impacted by the unavailability of other sources of employment. The forest products industry also requires a large investment in capital, although once the base of capital is established the annual requirement for new capital is relatively low. Capital in the forest products sector (wood processing plants and heavy machinery for harvesting) is not easily mobile, and this has implications for sector "momentum" when policies designed to influence the sector are evaluated. Indonesia is rich in both forest resources and cheap labor, the two most important factors for forest products, and as the country has been commercially harvesting and processing timber since at least the 1960s, it has developed a large capital endowment.

When looking at the data for trade in forest products in Indonesia, we see that forest products indeed account for a significant proportion of Indonesia's exports, as previously mentioned. However, only in certain product sectors does Indonesia have a large enough share of the global market to influence prices; when considering these keystone sectors Indonesia should be considered a "large" country. One example of this is the wood-based panels market, in which exports from Indonesia make up a large percentage of world trade. As pointed out earlier, Indonesian plywood was recently responsible for as much as 41 percent of the global plywood trade,¹⁸ although this percentage has declined in recent years.

The effect of Indonesia's export restriction policies will be considered in the subsequent discussion, and these should be given a theoretical grounding as well. According to Appleyard and Field, the imposition an export tax leads to a decrease in the domestic price of the taxed good, as producers shift production from the international to the domestic market to avoid the export penalty. The domestic price falls until it equals the international price less the amount of the tax (see Figure 3). As the domestic price falls, producers are willing to supply a smaller quantity, and these factors combine to result in a reduction of producer surplus. An increase in consumer surplus, as consumers benefit from the lower domestic price, helps offset the loss in producer surplus. The government gains revenue from the tax, but the revenue may not be as

much as predicted since exports decline, and despite these gains there remains a deadweight efficiency loss in the system. The loss of efficiency combined with the loss in producer surplus outweighs the gains of the government and consumers, and results in an overall negative effect on the economy. These effects can be tempered or augmented by varying degrees of elasticity in domestic and international supply and demand for the good on which the export tax is placed.¹⁹ In the case of export restrictions on the forestry sector in Indonesia, these effects are naturally not so clear, and are complicated by the presence of externalities. However, the general conclusion is the same – export restrictions result in system efficiency losses, and long-term negative effects on the economy are seen.

Reviewing Indonesia's Forest Product Trade Policy History

When considering issues of trade and environment it is important to distinguish between effects of trade on the environment and effects of environmental factors on trade. For example, an import tariff on teak may be intended to protect domestic teak harvesters. However, this measure may increase pressure on domestic sources, leading to greater depletion of domestic teak. Conversely, as can be seen in Indonesia, the reduction in availability of large trees required for plywood processing has contributed to a reduction in plywood exports and an increase in pulp and paper exports. According to *The Economist*, because of the increasing scarcity of large diameter logs, companies have turned their attention to the pulp and paper sector, which increased from a production capacity of 1.1 million tons in 1991 to 4.9 million tons in 2000.²⁰ These two perspectives should be kept in mind throughout the subsequent discussion.

The issue of illegal logging is especially problematic when attempting to quantify patterns of trade and resource use. First and foremost, the unregulated nature of illegal logging makes it difficult to accurately understand the market forces operating in the Indonesian timber sector. Illegal logging occurs for many social and economic reasons, but the rapid expansion of Indonesia's wood processing industry in the 1980s and 1990s was one of the primary factors driving the increase in illegal logging in the late 1990s. The International Crisis Group (ICG) identifies one study showing that domestic demand for timber in Indonesia is nearly four times greater than the possible legal timber supply,²¹ and the World Bank has said that in 1998 illegal log and pulpwood production was estimated at nearly three times the official harvest.²² Monitoring the use of Indonesian timber is further complicated by the fact that much of the wood harvested is smuggled into Malaysia for export from that country, either by ship or across the two countries' mutual border on the island of Borneo.

The discussion now turns to the empirical evidence demonstrating the effect (or lack thereof) of forest-product related trade policies. There are a variety of trade restrictions that can be implemented by policy makers attempting to influence trade patterns. These include export and import tariffs, bans, and quotas; however, the intention of this research is to examine the environmental and economic effects of export restrictions. Export restrictions have become a common method of influencing trade patterns, as pointed out by the FAO: "While trade liberalization is progressing at the global level, some countries are making increasing use of export restrictions such as bans, levies and quotas as a policy tool to address national

environmental or market problems. Bans or very high export taxes are in place in countries as diverse as Canada, Ghana, Indonesia, Mongolia, the Philippines, the Sudan and the United States.”²³

Indonesia’s export policies have gone through three major stages. Throughout the 1980s and early 1990s Indonesia placed bans or prohibitive tariffs on the export of roundwood, with the intention of expanding the wood processing sector and increasing the share of Indonesian processed wood products on the global market, specifically plywood. In the late 1990s, following the Asian financial crisis, in an attempt to liberalize its trade and to win IMF financial support, Indonesia rapidly and dramatically dropped its export tariffs on roundwood. This measure, however, was not supported by appropriate domestic government regulation and enforcement, and was therefore partially responsible for an increase in the rate of deforestation in Indonesia to a level even greater than those seen through the 1980s and early 1990s. In recent years international organizations, civil society actors and governments have become alarmed at the rapid loss of Indonesia’s forest resources, and the Indonesian government has begun to heed this concern. In late 2001 the Indonesian Ministry of Forestry, in conjunction with the Ministry of Industry and Trade, implemented an export ban on logs from the country’s forests, similar to the original export ban from the 1980s, but with different intentions.

The first major shift in domestic trade policy came in 1978 when Indonesia doubled its ad valorem tax on exported logs from 10 to 20 percent, and exempted most plywood and sawnwood. Then, beginning in 1980, export controls on logs were progressively tightened, resulting in an outright ban in 1985.²⁴ The ban was subsequently replaced in 1992 by a prohibitive export tariff.²⁵ The original intent of this ban was to keep roundwood from directly leaving the country, so that Indonesia’s domestic processing industry would not have to compete with foreign processors for access to Indonesia’s timber supply, as often happens in a country’s forest products sector. Indonesia’s intention was realized: wood and lumber exports dropped, and processed wood exports increased (see Figure 4), with the volume of plywood exports surpassing the volume of wood and lumber exports in 1985.²⁶ The common use of such policies is described by the FAO:

Restrictions on log exports have traditionally been associated with promotion of the domestic processing industry in timber producing countries, mainly for export rather than domestic demand. Other aims range from attempts to increase the financial return to the country, efforts to ensure adequate wood supplies for the domestic wood-working and other wood-based industries (especially in competition with overseas log buyers), through to attempts to protect forests from overuse.²⁷

The wood processing industry in Indonesia benefited greatly from this policy, and processing capacity and export value increased rapidly through the 1980s and 1990s. In 1976 there were two plywood processing plants in Indonesia; by 1986 the number was up to 100 with another 25 planned for development. Indonesia established itself as a major player in the international plywood market, and plywood exports by volume grew rapidly into the mid 1990s (see Figure 5). Plywood exports also grew in value from \$163 million in 1980 to \$880 million in 1985,²⁸ and jumped to more than \$4.25 billion in 1993.²⁹

However, despite the infiltration of Indonesian processors into the global market throughout this period, there were a number of negative economic consequences. As described by Barbier: “The export tax structure created effective rates of protection of 222 percent for plywood manufacture, and the drop in export revenue to the government from diverting log exports was not compensated by any gain in value-added in sawmilling, resulting in a loss of US\$15 per m³ at world prices.”³⁰ The preferential status of the wood-processing sector allowed the industry to expand continuously without high regard to efficiency in processing capacity, and this had economic repercussions as well. According to Barbier, “[It has been] estimated that over 1979-82, due to the inefficient processing operations resulting from this policy, over US\$545 million in potential rents was lost to the Indonesian economy.”³¹ These economic consequences are important, and demonstrate the potential difficulty in attempting to use trade measures to coerce forest product markets into expansion or contraction.

Indonesia’s historical emphasis on exporting processed wood over raw timber also had environmental implications, though it is doubtful that much regard was paid to this aspect during the implementation of these policies. The development and expansion of Indonesia’s timber processing industry intensified pressure on Indonesia’s forest resources, and aggravated the already significant rate of deforestation. According to the World Bank, Indonesia’s average rate of deforestation from 1985 to 1997 was over 1.6 million hectares per year.³² With respect to the relationship between the export restrictions and deforestation, another source adds, “Although the switch to value-added processing of timber initially slowed down the rate of timber extraction, the inefficiencies and rapidly expanding capacity of domestic processing may actually increase the rate of deforestation over the medium and long term.”³³ The environmental consequences of the inefficiency of the Indonesian processing sector is another angle to be considered, and the level of inefficiency in Indonesian plywood mills can be extrapolated to determine that for every cubic meter of plywood processed in Indonesia, 15 percent more trees are used compared to plywood produced in neighboring countries.³⁴ While deforestation would not have stopped with the absence of a large timber processing sector, the ultimate effect of Indonesia’s initial export restrictions was an increased burden on domestic forests, and a resulting long-term increase in deforested area.

In 1998, at the behest of the IMF, Indonesia dropped its log export tax from 200 percent to 10 percent in an effort to reform the economy in exchange for an IMF support package, which was needed as a result of the Asian financial crisis. This policy has had unfortunate economic and environmental consequences. According to a local news source, the decision has led to a massive outflow of logs from the country, as the easing of log export restrictions prompted many logging companies to sell their logs overseas to obtain hard currency instead of selling to local wood businesses.³⁵ The Chairman of the Association of Indonesian Wood Panel Exporters said that the large amount of logs being exported had hurt local wood-related firms as they were not able to obtain sufficient supplies of timber, their prime raw material. He added that unless log exports were stopped, many wood-related businesses, which contribute a large amount of federal revenue, would be forced to shut down.³⁶ Indonesian plywood exports did in fact drop to 4,611,878 cubic meters in the 1999/2000 statistical year, down from 10,270,230 cubic meters in 1996/1997.³⁷ The Indonesian Forestry Society chairman remarked that the lucrative log export business had raised Indonesia’s logging volume to 60 million cubic meters in 2000,³⁸ compared to an average of slightly over 26 million cubic meters between 1991 and 1997. The increased

outflow of timber from the country is certainly affecting the rate of deforestation, but this effect is far beyond what can be officially calculated due to the impact of illegal logging. As export restrictions on legal roundwood are eased and export volumes increase, it is easier for illegal loggers to export their timber without detection.

The third and most recent series of actions in forest export trade policy has occurred within the past year. Following the environmental and economic complications created by the sharp reduction in export tariffs in 1998, the Ministry of Forestry proposed a log export ban in the Fall of 2000 in an effort to support the domestic processing industry and slow deforestation. This ban was enacted on October 8, 2001 for a trial period of six months.³⁹ The exact effect this ban will have on the rate of deforestation and on trade patterns will not be known until statistics are available for the period covering the ban, but given historical patterns, conjectures can be made. Presumably the domestic processing industry will benefit from an increase in the availability of timber for processing, but unless steps are taken to control illegal logging and the current over-capacity of the domestic processing industry is reduced, the rate of deforestation will not be greatly affected.

In sum, Indonesia's export policies in the early 1980s created intense pressure on domestic forest resources. These policies, when combined with weak governance and corruption, led to an unsustainable level of deforestation into the 1990s. The situation was exacerbated by the IMF led policy shift in the late 1990s when export tariffs were sharply reduced, and, again combined with poor governance and corruption, this policy greatly increased the already high rate of deforestation. While multiple factors influence the legal and illegal extraction of forest resources in Indonesia, the government's export policies have had a profound impact on the rate of deforestation. As discussed below, efforts to slow the destruction of Indonesia's once expansive tropical forests should not look to trade measures as a lone remedy, but because of the clear link between trade policy and the rate of deforestation, it should be noted that trade measures can play a role in a multi-faceted response to Indonesia's deforestation problem.

Considering the Effectiveness and Appropriateness of Trade Measures in Addressing Market and Environmental Problems

The roller coaster ride of export policy on roundwood in Indonesia begs the following questions: How effective are export barriers in influencing market or environmental factors? Are such measures appropriate? In the case of Indonesia it would seem that initial policy measures did accomplish what they set out to do – expand the wood processing industry. This, however, resulted in market distortions that allowed for processing inefficiency and led the industry to expand beyond what could be sustainably supported by (legally) available resources. Now the industry is facing a painful restructuring. The IMF supported reduction in export tariffs also accomplished its goals of expanding and liberalizing trade in the forest product sector, but in this case there were unforeseen costs to the environment. As previously mentioned, the effects of the recent export ban on roundwood will not be known for some time.

It is generally accepted that trade barriers are “second-best” solutions to addressing market or environmental problems, the first-best option being a non-trade related measure. As explained by Pearson,

There is general agreement that the first-best method for dealing with a domestic distortion is with a domestic rather than trade measure. The implication is that if an externality arises in, say, log harvesting, the market distortion is better approached through a production restriction on logging than an export restriction. The straightforward reason is that an export tax creates a by-product distortion... The by-product distortion involves an additional cost, not present with a simple output restriction. In some instances, however, the first-best policy measure may be unavailable or not feasible. This raises the question of whether a trade measure is a suitable second-best policy.⁴⁰

As we have seen, often a trade measure can be an effective way of addressing a problem in the short-term, but over the long-term serious secondary distortions may arise, and the effect of these distortions must be taken into account when considering the aim behind implementing a trade measure. It is also possible to make effective use of a trade measure if all potential externalities are accommodated and it is found that the trade measure can still accomplish its goal.

In a recent study by the International Food Policy Research Institute, San, Lofgren and Robinson used computable general equilibrium models to explore the impact of devaluation of the Indonesian exchange rate resulting from the Asian financial crisis on the Indonesian forestry sector, particularly in Sumatra. They found that following devaluation, deforestation is likely to increase as Indonesian forest products, both at the finished and intermediate stages of processing, become more competitive on the international market. The researchers went on to analyze a potential policy response of imposing an export tax of 5-20 percent on processed wood to discourage further deforestation. The proposed export tax would place downward pressure on the export of processed wood products (as previously discussed in the theoretical framework), thereby reducing pressure on forests. San, Lofgren and Robinson note that (at the time the research was published) Indonesia already had high export taxes on logs and sawn timber designed to support the export of plywood.⁴¹

In measuring the effect of a proposed 5 percent export tax on processed wood, San, Lofgren and Robinson found that “the increase in the export tax discourages the production of raw timber and processed wood,” and “government revenue increased by as much as 12 percent, depending on the size of the devaluation.” The effect on the value of aggregate exports was a decline of 1 percent at most. They concluded that, in light of the fact that devaluation places pressure on forests, a proposed 5-20 percent export tax on processed wood products “effectively offsets the increased demand for raw timber and processed wood generated by the devaluation.”⁴² The results from this study suggest that it is possible to use trade measures to address environmental concerns without creating overly burdensome market distortions, but all potential externalities must be considered before the appropriateness of such measures can be determined.

Though the previous example indicates that the use of trade measures to address environmental issues can in theory be effective, often these policies do not achieve their aims. Numerous observers have indicated that, if possible, environmental problems, such as deforestation and

illegal logging, should be addressed by domestic measures that have a more direct relationship to the problem. The FAO cites the example of Ghana in the early 1990s:

The Ministry of Forestry took several steps to curtail the illegal traffic of wood; initially it imposed export taxes, and then an export ban... Unfortunately, these measures had little impact. In 1994 the Ministry renewed its efforts to combat illegal acts through several regulatory means... These measures proved ineffective as well. At that point, the government took the critical step of making a genuine effort to involve other members of the private sector and civil society... As a result, illegal logging was substantially reduced, with the reduction in log supplies bringing about a fourfold increase in the value of marketed timber between 1994 and 1995 and, hence, an increase in government revenue.⁴³

In this case, trade measures were not an effective solution, and not until efforts to address underlying factors were made did the problem begin to subside.

In particular, when considering the effectiveness of export restrictions, Barbier concludes that when combined with the problems of domestic market and policy failures, the goals of such restrictions are achieved with high economic and environmental costs⁴⁴. The underlying causes of conflicts between trade and environment must be considered when attempting to resolve such conflicts. As Pearson points out, "There are few inherent conflicts between liberal trade and environmental protection. Many of the apparent conflicts arise... because countries have failed to take appropriate domestic environmental protection measures, in which case trade can be the agent but not the root cause of environmental degradation... Environmentally motivated trade restrictions will not solve these conflicts."⁴⁵

The use of domestically initiated trade measures to address environmental issues has been shown to be a "second best" solution, but what about the use of international or externally initiated trade measures? Do countries have a right to place restrictions on other countries (often developing countries) in an attempt to force them to follow certain practices or enact domestic regulation? John Jackson asks,

If an importing nation can prohibit goods from a poor third world country in which the production occurs in a manner that is moderately dangerous to humans, could a nation prohibit the importation of goods produced in an environment that differs in many social or cultural attributes from its own society? Why should one country be able to use its trade laws to depart from the general liberal trade rules of the GATT system to enforce its own view of how plant or animal life in the oceans beyond its jurisdictional limits of the territorial sea are treated, or how tropical hardwoods are harvested?⁴⁶

The Netherlands has been active with trade measures designed to allow only the import of tropical timber that can be shown to be sustainably harvested, and the Dutch have encouraged others to follow suit. Though these efforts are well intentioned and potentially beneficial, Robert Repetto points out that by placing barriers on natural resource products, developed nations may indirectly force developing ones to intensify their use of natural resources to maintain export value: "By impeding exports of labor-intensive products, especially when developing countries are under pressure from high debt-servicing requirements, these trade barriers virtually force

developing countries to raise exports of natural resource-based commodities.”⁴⁷ Ed Barbier outlines a host of reasons why bans on tropical timber are ineffective, including the fact that they can be interpreted as being discriminatory, they can prove to be arbitrary and unworkable, they may not actually achieve a reduction in deforestation, and they may have little impact on economic incentives at the lowest level of harvesting and production.⁴⁸ For example, in Indonesia the expansion of palm oil plantations and forest fires contribute more to the overall rate of deforestation than does timber harvesting.⁴⁹ A 1998 FAO report on trade restrictions and their impact on global trade in forest products succinctly states: “...better solutions to the deforestation and degradation problems can be found outside the area of trade than inside it.”⁵⁰

In Indonesia’s case, the causes and conditions of deforestation are so varied and complex that the imposition of import bans by members of the international community would likely fail to achieve their intended purpose for many of the reasons mentioned above. That is not to say however that the international community should not take an active role in helping Indonesia address its forest management problems. The international community has a large incentive to do so, given the amount of biodiversity harbored in Indonesia’s forests. As previously pointed out, though it makes up only 1.3 percent of the world’s land area, Indonesia is home to more than 10 percent of the world’s species, and this natural endowment should be considered in economic as well as intrinsic terms. Biodiversity resources have proven to hold economic value in both the pharmaceutical and tourism sectors, and the international community could help Indonesia take advantage of its biodiversity resources in these fields. If a country wishes to reduce its demand for timber that may be unsustainably harvested, it should consider supporting certification and labeling standards, such as the Forest Stewardship Council. Consumer education is also an area in which there is always room for improvement, though education takes time, whereas trade restrictions have been attractive because they can be implemented relatively quickly. There are many roles to be played and many beneficial actions to take if foreign governments have a desire to address the problem of deforestation; trade restrictions are certainly not the whole solution, and only with certain circumstances and safeguards should they be considered a partial solution.

Conclusion

Looking at the effects of Indonesian domestic trade restrictions since 1980, we can see that Indonesia’s export tariffs and bans on roundwood have been one of the primary factors influencing the rate and composition of resource use by the forest products sector. Considering the importance of the forestry sector to Indonesia’s economy, it is imperative that a firm awareness of how export policies influence the forestry sector be established. Many aspects of the forestry sector are affected by the imposition of export restrictions, both economic and environmental, and we have seen negative long-term economic and environmental effects of Indonesia’s policies undertaken in the late 1970s, and continuing through to today. The wood processing industry has reached a capacity well beyond what can be sustainably supplied, and international organizations are recommending a contraction of the industry; this will lead to economic hardship for Indonesians who are making a living in this sector. The drive to expand the domestic wood-processing sector resulted in a rapid and unsustainable rate of forest use, leading to an overall shrinkage in Indonesia’s forested area. Illegal logging has spiraled out of control, and illegal sources now help fill the domestic demand in the wood-processing sector, which cannot be met by currently available legal timber resources. When examining these issues it becomes apparent that without a strong governance infrastructure, and without government

willingness to control illegal logging, the ability of trade measures to affect forest management is much compromised.

Though Indonesia's timber export policies have often achieved their short-term goals, the long-term negative implications for the economy and the environment resulting from market distortions will far outweigh any short-term progress. This observation leads to the general conclusion that export restrictions are not an efficient means of controlling market forces or affecting environmental problems, and should only be considered as policy tools to achieve these goals if all externalities and conflicting market forces are carefully analyzed before implementation. As many sources have pointed out, the same may be said for the effectiveness of externally mandated trade restrictions in addressing environmental problems. Trade restrictions are "second best" remedies, and although in some instances they may be the only feasible option, potential outcomes should be scrutinized to ensure that a trade restriction measure, whether domestic or external, does not result in an effect opposite of that intended. While trade measures may not be the single answer, it is crucial that the international community become more aware of and involved in the issue of tropical deforestation, particularly in Indonesia, which stands to lose some of the richest, most diverse ecosystems on the planet.

Appendix

Table 1: Log, Sawntimber and Plywood Production, Last Ten Years (cu. m.)

Year	Log	Sawntimber	Plywood
1991/1992	23,892,000	3,006,046	9,123,500
1992/1993	28,267,000	3,534,356	9,874,000
1993/1994	26,848,011	2,244,000	9,924,000
1994/1995	24,027,277	1,729,839	8,066,400
1995/1996	24,850,061	2,014,193	9,122,401
1996/1997	26,069,282	3,565,475	10,270,230
1997/1998	29,520,322	2,613,452	6,709,836
1998/1999	19,026,944	2,707,221	7,154,729
1999/2000	20,619,942	2,060,163	4,611,878
2000*	13,798,240	3,020,864	3,711,097

Source: Ministry of Forestry, online. *Note: Data for 2000 has not been completely reported.

Table 2: Non-Wood Forest Product Exports, Last Five Years (Tons)

Year	Rattan	Charcoal	Cassiavera	Agathis Resin	Dipterocarp Resin	Teng. Nut	Glutta	Others
1996/1997	71,804	131,350	4,432	1,600	18,609	984	2,142	7,344
1997/1998	102,577	103,612	20,202	-	-	213	2,785	19,681
1998/1999	81,670	36,142	-	-	3,972	-	-	538,106
1999/2000	6,686	8,158	-	-	2,521	-	-	-
2000*	780	32,599	-	-	1,325	-	10	-

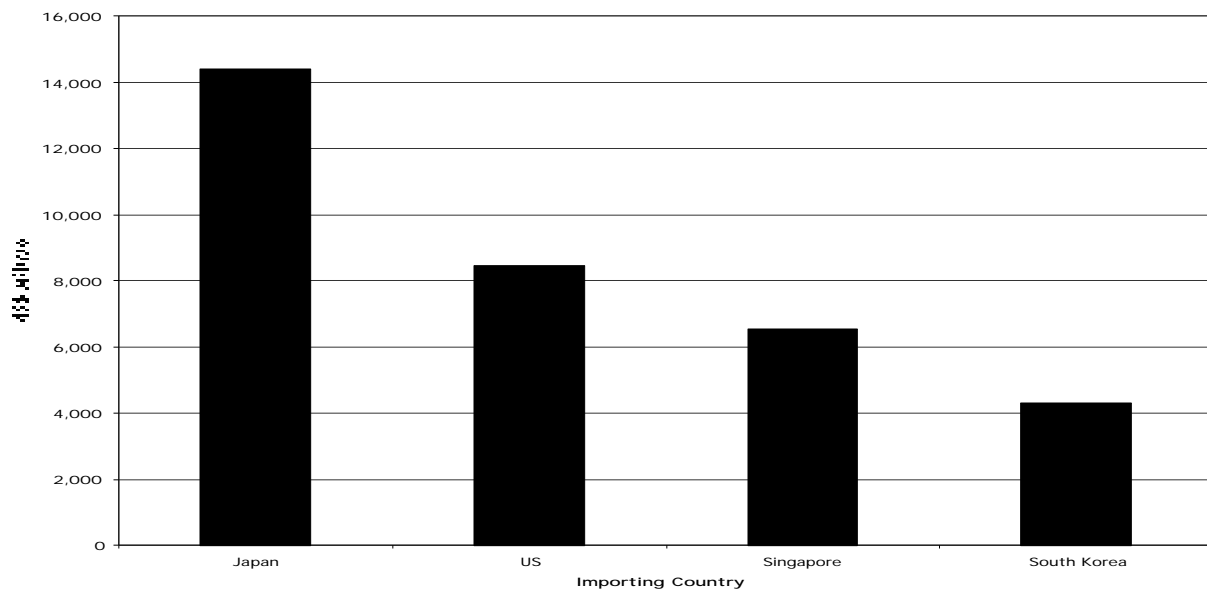
Source: Ministry of Forestry, online. *Note: Data for 2000 has not been completely reported.

Fig. 1 Plywood Export Revenue, 1980-2000



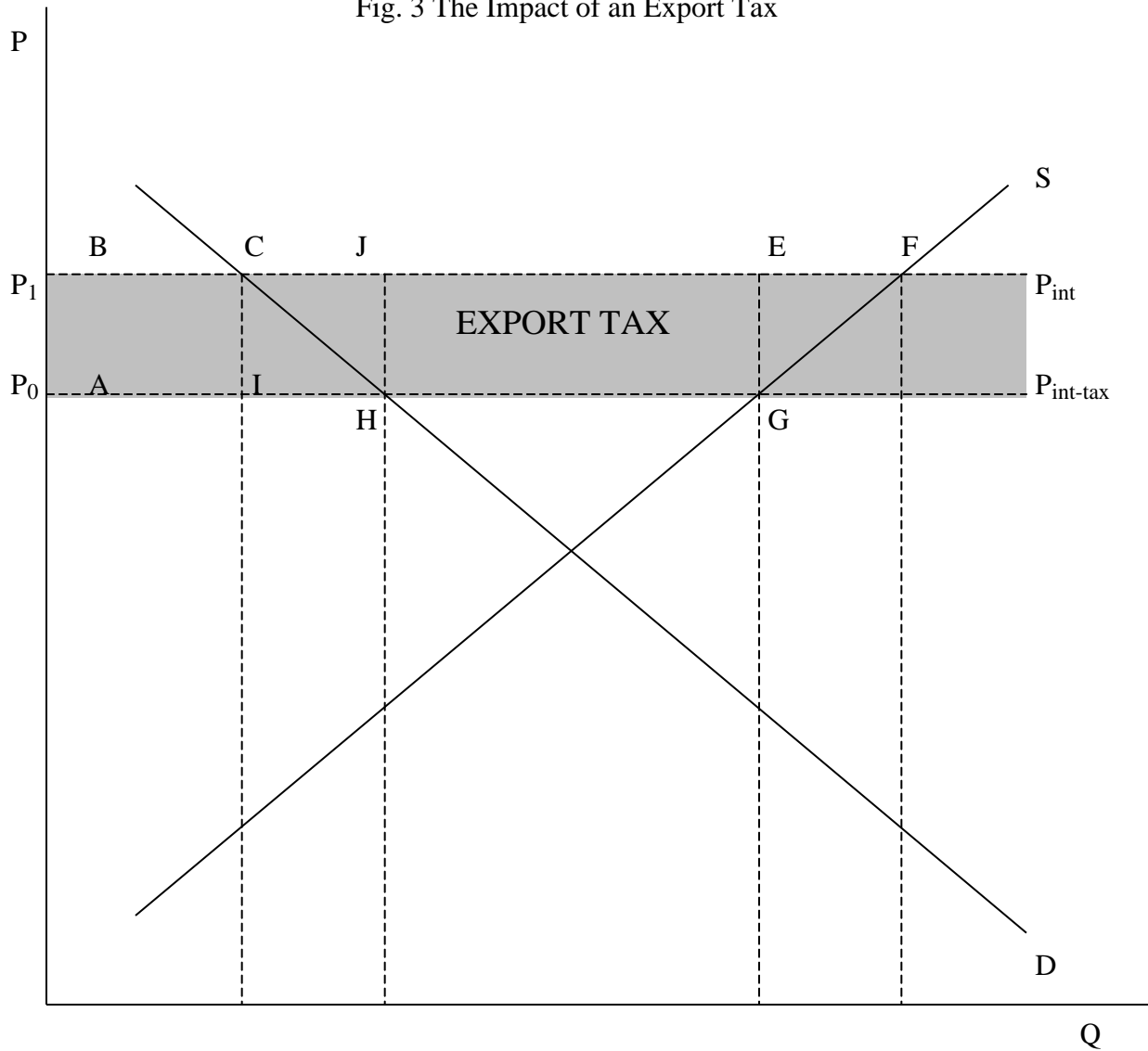
Source: UN, 1991; UN, 1996; UN, 2001; EIU, online.

Fig. 2 Value of Exports



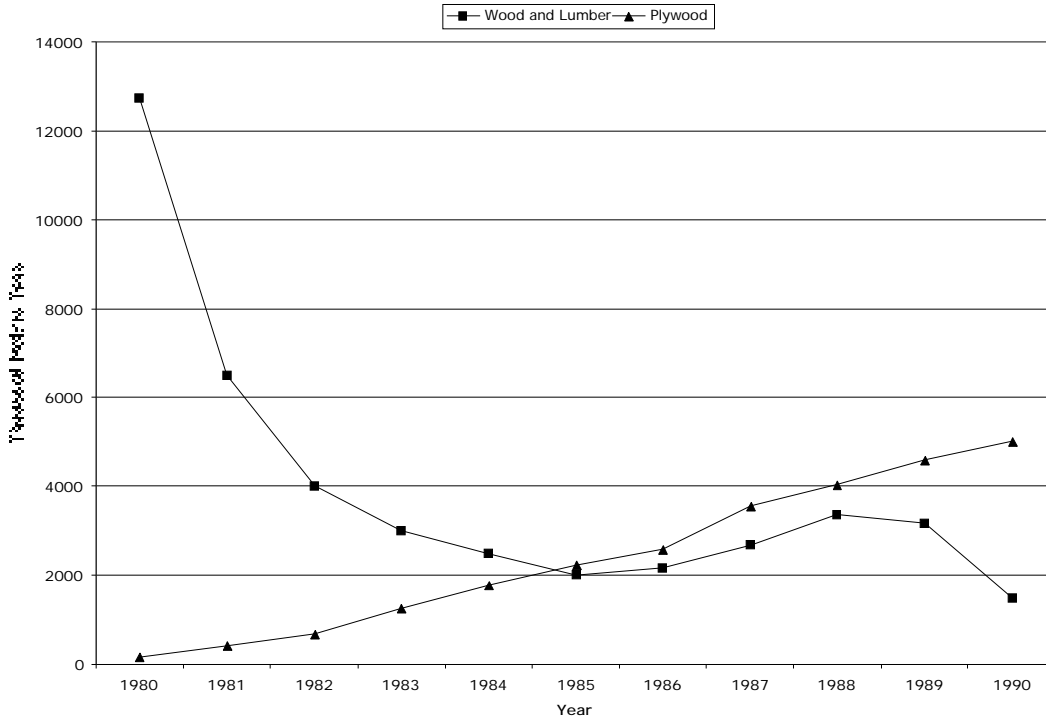
Source: EIU, online.

Fig. 3 The Impact of an Export Tax



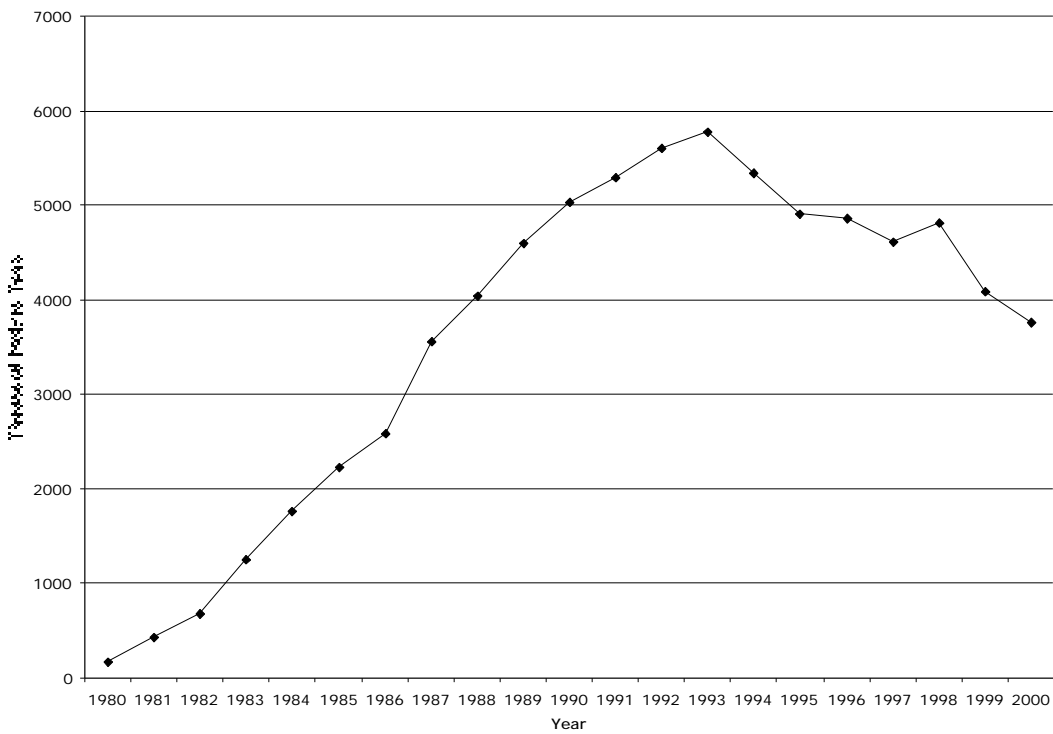
The imposition of an export tax reduces the price received for each unit of export by the amount of the tax. This causes the domestic price to fall from P_0 to P_1 as domestic producers expand sales in the home market to avoid paying the export duty. The fall in the domestic price leads to a loss in producer surplus equal to area ABFG, an increase in consumer surplus of ABCH, an increase in government revenue of HJEG, and deadweight losses to the country of CJH and GEF. (Source: Appleyard and Field, 2001)

Fig. 4 Wood and Plywood Exports 1980-1990



Source: UN, 1990; UN, 1995.

Fig. 5 Plywood Exports by Volume, 1980-2000



Source: UN, 1990; UN, 1995; UN, 2000.

Notes

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