STUDY OF NON-TARIFF MEASURES IN THE FOREST PRODUCTS SECTOR

Committee on Trade and Investment

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This report on non-tariff measures in the forest products sector in the APEC economies has been prepared by ***Forest Research***, New Zealand, on behalf of the Asia-Pacific Economic Cooperation Secretariat.

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EXECUTIVE SUMMARY

Background

Trade liberalisation and the increase in international trade arising from it has been credited with much of the world's unprecedented economic growth of the last 55 years. The theory behind this unprecedented growth - comparative advantage and the gains from trade - may be traced back to the 18th century and David Ricardo.

Despite the theory, and the achievements of the last 55 years in regard to tariff reductions, there are suggestions that in the 1980s reduction in tariff rates has been accompanied by a simultaneous rise in the use of **non-tariff measures (NTMs).** There are a number of possible reasons for this rise, including a concern that a gradual reduction in trade constraints, as is implied by **GATT(General Agreement on Tariffs and Trade)/WTO (World Trade Organisation)** negotiated reductions, may not be optimal. Attempts to tackle other international problems may have encouraged the growth of NTMs and it is possible that awareness of NTMs has only increased as the incidence of tariff measures has declined.

NTMs are much more difficult to identify and evaluate than are tariff measures. International agreements may also serve to encourage increased use of such measures. For example WTO rules allow parties to adopt measures that may be trade discriminating provided these measures might be shown as having a direct relevance to environmental conservation.

Economists generally believe that trade measures should not be used to resolve environmental problems. The effectiveness of such measures is unproven and there may well be unintended consequences. The use of direct environmental policy instruments to deal with environmental issues is preferred.

Definition of Non-tariff Measures

For the purposes of this project NTMs are defined as government laws, regulations, policies and or practices which either protect domestically produced products from the full weight of foreign competition or artificially stimulate exports of particular domestic products. NTMs include both formal institutional measures designed to restrict or distort trade patterns and other restrictions which act as impediments with the same result. "Natural" barriers such as cultural attitudes, language and distance from markets, and normal competitive conditions are not NTMs. The many NTMs included in the report have been grouped according to social and political, health and safety, and environmental measures.

Incidence of NTMs in APEC Economies

NTMs which affect forestry and forest products trade were identified in all **Asia Pacific Economic Cooperation (APEC)** member economies for which data were available. Most economies provide some form of incentive for afforestation. The extent of assistance in the processing sector is more difficult to discern, although it is present in many of the economies.

Other widely encountered NTMs that have significant trade impacts are logging bans, restrictions on the export of unprocessed material, and quotas. These measures are significant in Indonesia, Malaysia, Thailand, the **United States of America (USA**) and Canada. Customs and entry procedures are an issue for some products and economies, as are phytosanitary regulations. Codes and standards, particularly building codes that discriminate against wood, are of concern in the Republic of Korea**, the People's Republic of China (China),** Japan and Chinese Taipei. The non-transparent route that is required for standards acceptance is a major concern in Japan.

Illegal activities, although not a category of NTM, are often the result or consequence of some NTM. The information available on illegal logging and trading in Indonesia, Thailand, Malaysia, China, and the Russian Federation suggests that this activity is significantly distorting trade.

Environmental Effects of Measures Affecting Trade

Relationships between trade and the environment are becoming increasingly important as the world addresses sustainable development and economic growth across a diverse range of economies. Given the current focus on global environmental issues, economies are adopting a diverse range of strategies, responses and measures, which include taxes and/or subsidies, licences, prohibitions, sanctions or incentives. These may apply at any point in the supply chain from production to consumption. Other instruments applied are increasingly stringent environmental legislation, restrictions on the use of chemicals or hazardous substances and encouraging the use of voluntary agreements (certification). In isolation, these measures often make sound environmental sense, especially where they address specific economy issues. However, in the interpretation and final implementation of these measures, complex interactions with other policies, in particular forestry and trade, evolve.

At this stage, however, there are insufficient data available to allow an accurate assessment of the environmental impacts of these measures. In the case of certification of forests and forest products, which has been introduced to improve forest management and ensure market access for certified products, stakeholders consider that these objectives are being met. However, no specific empirical data have become available during the study, either at an individual economy or at a regional level, which link certification to, for example, changes in water quality, biodiversity, pollution control, nutrient retention or atmospheric process.

To overcome the apparent lack of data required to assess the environmental impacts of trade-affecting measures, it is recommended that some detailed life cycle analyses are undertaken that can be related to a specific policy mix in particular economies. This type of approach would allow the development of a quantitative framework to compare relative environmental impacts in terms of, for example, global warming potential, biotic depletion, resource depletion and nutrient loads.

Socially and Politically Motivated NTMs

Quantitative restrictions and / or quantity controls have been identified as the most common NTMs applied to the forest products trade. However, because at times there can be a multiplicity of reasons for the introduction of a particular measure with different rationales being given prominence, any attempt at a simple classification of NTMs invariably results in overlap among the various categories. Bans, quotas, entry procedures and even afforestation subsidies can all be characterised, or partially justified, as environmental measures.

Of the various social and political NTMs identified in this study, bans and quotas set in place with the goal of capturing an economic benefit for the wood-producing economy appear to have had the most obvious and visible trade effects. These bans and quotas are also most likely to be identified as a problem. North American and Asian log export bans have quite clearly affected the international log trade.

Bans and quotas, while the most visible of measures, may not be the most trade distorting. They are associated with a limited number of economies and products. This is also the case with industry and export support programmes, entry procedures and para-tariff measures.

Most APEC economies provide afforestation incentives to some classes of wood producers. Even when these incentives are significantly modified or even phased out completely, as is the case in some APEC economies, the impact of past subsidisation on forest products trade can persist for many years.

Few direct subsidies to forest product processing appear to exist in the APEC economies. Of greater importance are likely to be indirect subsidies, tax concessions and other NTMs that reduce the cost of individual production inputs, that is, raw materials, labour, energy, and transport. Determining the economic impact of these subsidies, however, is difficult because of the variety of forms the subsidies take and the differences in processing technologies among APEC economies. Economies such as New Zealand, Canada and Chile have apparently reduced subsidies but there has been little change in economies such as Japan and the USA.

Government assistance to processing industries often involves reducing production costs through low stumpage fees, afforestation subsidies, tax concessions, assisted transport and the provision of infrastructure such as roads and power generation. The plethora of assistance mechanisms that exist, and the difficulties associated with disentangling true comparative advantage from subsidised advantage, make it difficult to assess the extent to which government assistance creates a barrier to trade.

Health and Safety Motivated NTMs

Codes and standards are necessary adjuncts to trade as they define the product or service passing between producer and consumer. In the APEC economies, the main issues in relation to building codes and standards as NTMs include:

- differing cultural expectations;
- building codes which favour non-wood products;
- non-transparent approval systems for the acceptance of new wood products;
- non-acceptance of foreign testing methods; and
- prescriptive codes and standards, in particular the Japanese Agricultural Standards.

Code harmonisation, the development of international standards and the move to performance-based standards will facilitate trade but the slow progress to date suggests that this is one area where gains may only be realised very slowly.

Phytosanitary measures are generally employed for legitimate purposes for health and safety reasons. Our survey noted a number of concerns listed below that were perceived by exporting economies as generating obstacles to trade in forest products:

- restrictive measures imposed without a formal risk assessment to justify them;
- an increasing trend towards imposing restrictions for phytosanitary reasons, particularly in the USA and Mexico;
- bureaucracy associated with phytosanitary administrative procedures that inhibit the flow of information about requirements and result in time delays;
- some developing economies lack the technology required to meet phytosanitary requirements in some markets.

Economic Impacts of Environmentally Motivated NTMs

Assessing the economic impact of environmentally motivated NTMs is difficult, as such measures are not easily distinguished from other NTMs. The same instruments, such as afforestation and reforestation subsidies, are often used to target more than one objective, for example, forest conservation, or to increase future commercial production. The impact may well be positive on the environment but potentially distorting on trade. The effects of such measures on economies and trade will depend on how the measures are formulated and applied.

In the case of subsidies for afforestation programmes, trade diversions may result from different levels of subsidies being applied by various countries. Such measures help to tilt trade in favour of exporting countries that offer a higher level of planting subsidies because the exporters can capture market share by competing at lower prices. To ensure that unfavourable trade outcomes do not arise from the introduction of these measures, there will be a need for more transparency on subsidy schemes and their targets.

The conclusion was similar for certification: change in market position for respective exporters has more to do with the competitive dynamics of exporting countries than the emergence of forest certification. Certification is likely to have a muted impact on trade because the market for certified product is small. The consumer market for certified wood products was less than 1% of the total European consumption in 1997, though this trend may be changing with growth in the certified wood products market.

Quantitative Assessment of NTMs

A quantitative analysis of selected cases of non-tariff measures was conducted using a General Equilibrium model. The aim was to identify the impact these measures have on trade in forest products in particular, but also on the economy more generally. In addition to exploring the effect of a multilateral removal of all import and export tariffs, taxes and subsidies, three particular case studies were examined:

- the effect of environmental certification of tropical wood products;
- the Indonesian log export ban and prohibitive export taxes on sawn timber; and
- the Canada-US Softwood Lumber Agreement.

An experimental modelling of the removal of existing quantitative trade distortions (all tariffs, taxes and subsidies) of the forestry sector indicated that the prevalent use of NTMs, in addition to the use of tariff measures, may significantly distort trade, often with accompanying welfare losses.

The impact of environmental certification requirements for forest products was modelled assuming the cost of certification is only imposed on forest product exports from the tropical economies and using two cost scenarios. Assuming that Japan, USA, Europe and Australia required certified product, the effects of removing certification requirements for all APEC economies were minimal in terms of changes in **gross domestic product (GDP)** for both scenarios.

The modelling of the removal of the Indonesian log export ban results in Indonesia increasing its exports by a significant amount. The additional supply of logs on the world market depresses the price of logs, and GDP in other log exporting economies tends to decline. Economies that are net importers of logs experience welfare gains. These benefits and detriments are much smaller orders of magnitude than the gains made by Indonesia in repealing the log export ban. In this case study world, GDP rises marginally. The availability of cheaper Indonesian logs induces a supply-side response from other log exporters who reduce production of logs. Faced with cheaper logs, the global wood processing and pulp and paper industries increase output, although the net impact on forest products output is negative.

An investigation of the impact of the Canada-US Softwood Lumber Agreement, which was designed to rectify inequity arising from Canadian setting of stumpage fees, indicated that the USA lumber industry suffers as a result of removing the agreement. However, the losses suffered by the sector are exceeded by the gains experienced by households from lower prices, and from interests in other economies. While this may be of little comfort to

lumber producers in the USA, it demonstrates the need for a multisectoral and multilateral approach to trade barrier reforms.

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1. INTRODUCTION[1]

This draft report has been prepared for the APEC Secretariat's project CTI 17/99T entitled "Study of non-tariff measures in the forest products sector".

1.1 Objectives

The overall objectives of the project are to provide:

1. a comprehensive inventory of non-tariff measures and other policies impeding or distorting trade in forest products;
2. an identification of the most frequently used measures and policies; and
3. a qualitative and quantitative analysis of the impact of the measures and policies on trade and, where applicable, a broader analysis of the policy goals underlying these measures and policies and of the economic and environmental costs and benefits stemming from their application.

1.2 Structure of the Report

This report is structured as follows:

Section 2 sets the scene by providing a background on trade in the APEC region. A review of the trade theory in relation to NTMs, including a review of the background on growth in NTMs and causes of their proliferation, is given in Section 3.

Section 4 provides our definition of NTMs in relation to forest products trade and Section 5 provides a summary of the inventory of NTMs. This is categorised according to type of measure, affected products, level of enforcement, significance of the measure and the imposing and affected economies.

Section 6 assesses the environmental impact of NTMs in the APEC region, addressing such issues as globalisation and environmental management, and the effects of deforestation. Case studies examined include certification (forest management and product certification), biodiversity habitat protection and endangered species, logging bans, and pollution control.

Section 7 provides a qualitative assessment of the impact of socially and politically motivated NTMs. It reviews the effects of afforestation and processing subsidies, harvest control, log export bans, and entry procedures in an economic context.

Section 8 focuses on NTMs motivated by health and safety objectives, namely, codes and standards and phytosanitary measures.

[1] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.

Section 9 provides a qualitative assessment of NTMs that are environmentally motivated. The section analyses the potential impact of the different NTMs on forest products trade in a qualitative way. More importantly, it also attempts to assess their effectiveness in terms of achieving the intended environmental objectives.

Section 10 quantitatively models the economic impact of NTMs by assessing the effects of:

- the Indonesian log export ban and prohibitive export tariffs on sawn timber exports;
- environmental certification on tropical wood products ;
- the Canada-United States Softwood Lumber Agreement.

Finally, Section 11 discusses the conclusions drawn from the study.

1.3 APEC Member Economies

The member economies of APEC, all of which have been assessed in this project, are:

Australia	Brunei Darussalam	Canada
Chile	People's Republic of China	Hong Kong, China
Indonesia	Japan	Republic of Korea
Malaysia	Mexico	New Zealand
Papua New Guinea	Peru	Republic of the Philippines
Russian Federation	Singapore	Chinese Taipei
Thailand	United States of America	Viet Nam

1.4 Limitations of the Study

The results of this study have been drawn from analysis of information provided by member economies and other sources. We have based our assessment on the information available, which in many instances is limited. In addition, definitions of NTMs are contentious. There is a diversity of opinion over what is or is not an NTM, based on the experience of the concerned party. We have attempted to provide a fair definition and where there is clearly contention, we have erred on the side of inclusion, rather than exclusion.

It is not the intention of this report to give a bias towards tropical products and tropical forest issues. They have not been intentionally singled out but given the geographical location of the South East Asian region within APEC, and the preponderance of literature on tropical forest products, there is considerable use of tropical forest issues in this report.

Similarly, the level and quality of information on NTMs for particular economies is uneven. This report does not intentionally single out particular economies but, as for tropical forests, there is more information available for some economies. Any conclusions concerning the comparative incidence of NTMs between economies should take this into consideration.

Another limitation is that there has been limited opportunity for objective clarification of some claims. However, we believe we have produced the most comprehensive current database on NTMs affecting forest products in the APEC economies. This should serve as a good basis for refinement and discussion, and enable identification of areas for future analysis.

2. BACKGROUND ON TRADE IN THE APEC REGION[2]

2.1 Introduction

APEC member economies account for approximately 50% of the global trade in forest products. In 1995, 50% of the $140 billion of global forest product exports was from APEC member economies. The region dominates global exports of chips and particles (82% of the total) (see Figure 1), and industrial roundwood (64% of the total). Imports are slightly less important, accounting for 47% of global forest product imports in 1995. The APEC economies also dominate global imports of raw forest products (chips and particles, industrial roundwood) (91% and 69% respectively). On the other hand, the APEC economies account for significantly less of the global processed forest product imports, particularly pulp and paper (40% of total). Japan's dominance as an importer in the region and its preference for importing raw materials is reflected in Figure 1 and Figure 2.

An overall trend in forest products trade has been the considerable expansion in exports of most products, and an increase in the number of exporters and importers[1]. For example, export volumes of sawn timber have doubled since 1970. The expansion of exports reflects the increased global consumption of industrial wood, a trend which is slowing slightly in developed economies, but which continues in developing economies.

2.2 Dominant Forest Product Exporters and Importers

Japan and North America dominate world production and consumption of industrial forest products. China, however, is a rapidly emerging consumer of forest products in the Asia-Pacific region. The USA, Japan and Canada currently dominate forest product trade among APEC economies. Canada and the USA accounted for 38% and 25% respectively of APEC economies' forest product exports in 1995. The next largest exporter was Indonesia, accounting for close to 7% of exports, mainly of hardwood plywood. The USA is also the largest importer of forest products, accounting for 31% of forest product imports in 1995. Japan is another major importer of forest products taking 30% of the total, followed by China which accounts for approximately 10% of imports.

2.3 Trade Patterns Among APEC Economies

Much of the trade in forest products among APEC economies is within regions or between neighbouring economies. For example, Canada is the USA's second largest market accounting for 20% of USA forest product exports, whilst the USA is Canada's largest export market, taking 74% of the total value of Canadian forest product exports, (Figure 3 and Figure 6). Another example of intra-regional trade is the importance of Australia as a market for New Zealand forest product exports (Figure 3 and Figure 5). Intra-regional

[2] Footnotes appear at the end of each page.
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trade has grown following the increase in regional trade agreements such as the **North American Free Trade Agreement (NAFTA)** between Canada, the USA, and Mexico[1] and the **Closer Economic Relations Agreement (CER)** between Australia and New Zealand.

The involvement of APEC developing economies in forest products trade has increased. China, the Republic of Korea and Chinese Taipei have increased their imports of logs and sawn timber from the developing economies[1] such as Papua New Guinea, the Philippines, Thailand and Malaysia (Figure 2 and Figure 3).

The close regional ties between Canada and the USA mean that nearly all USA imports of forest products come from Canada; the only exceptions are plywood and veneer which are predominantly imported from Indonesia and Malaysia (Figure 4). In contrast, Japan's forest product imports tend to come from several APEC economies. For example, Japan imports logs from the Russian Federation, USA, Malaysia, New Zealand, Chile and Papua New Guinea (Figure 2).

Figure 1:

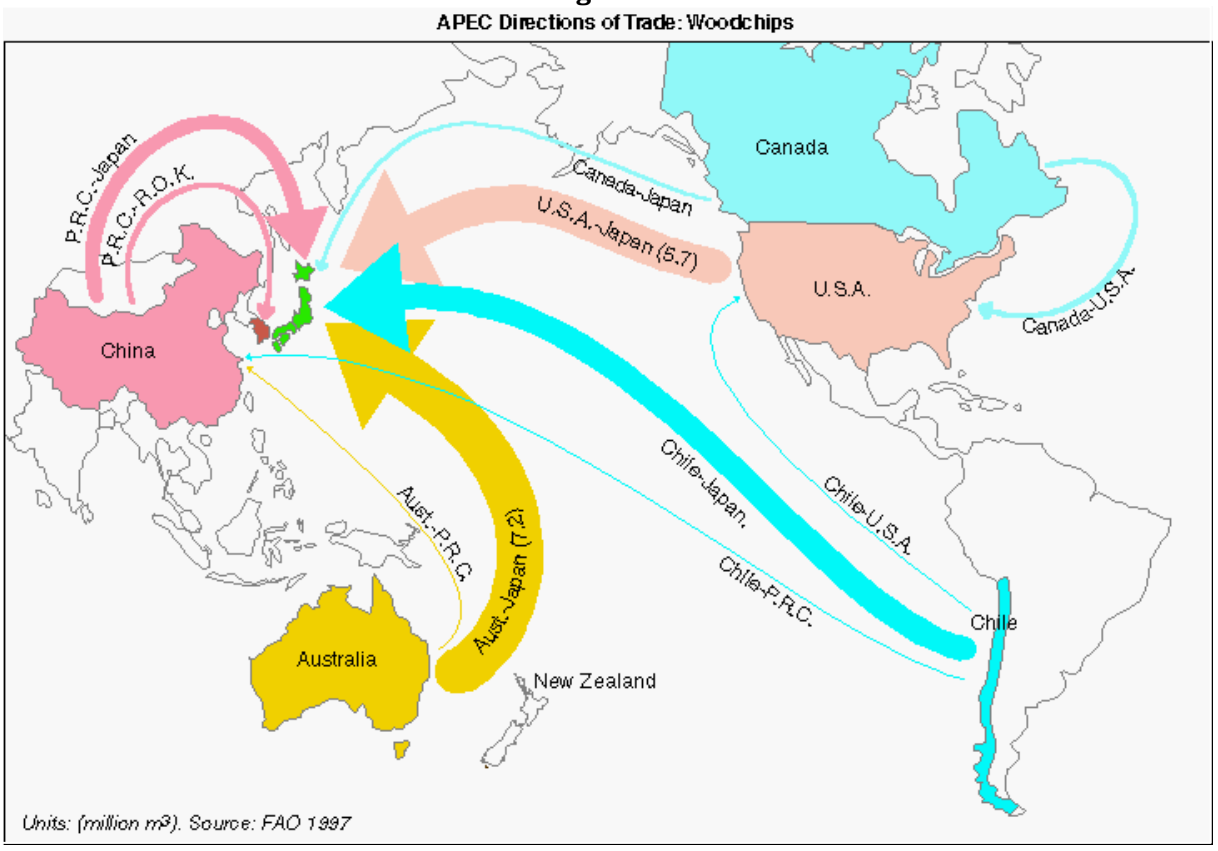
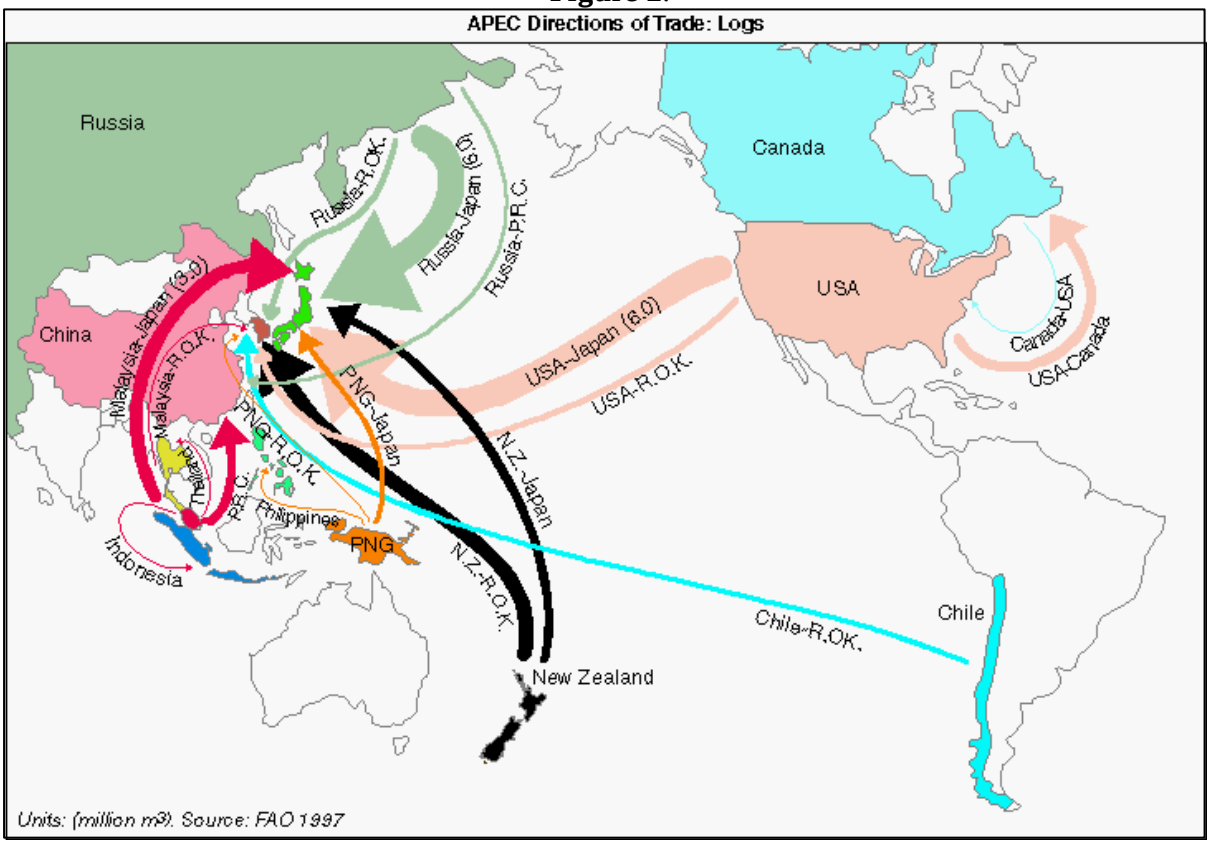


Figure 2:



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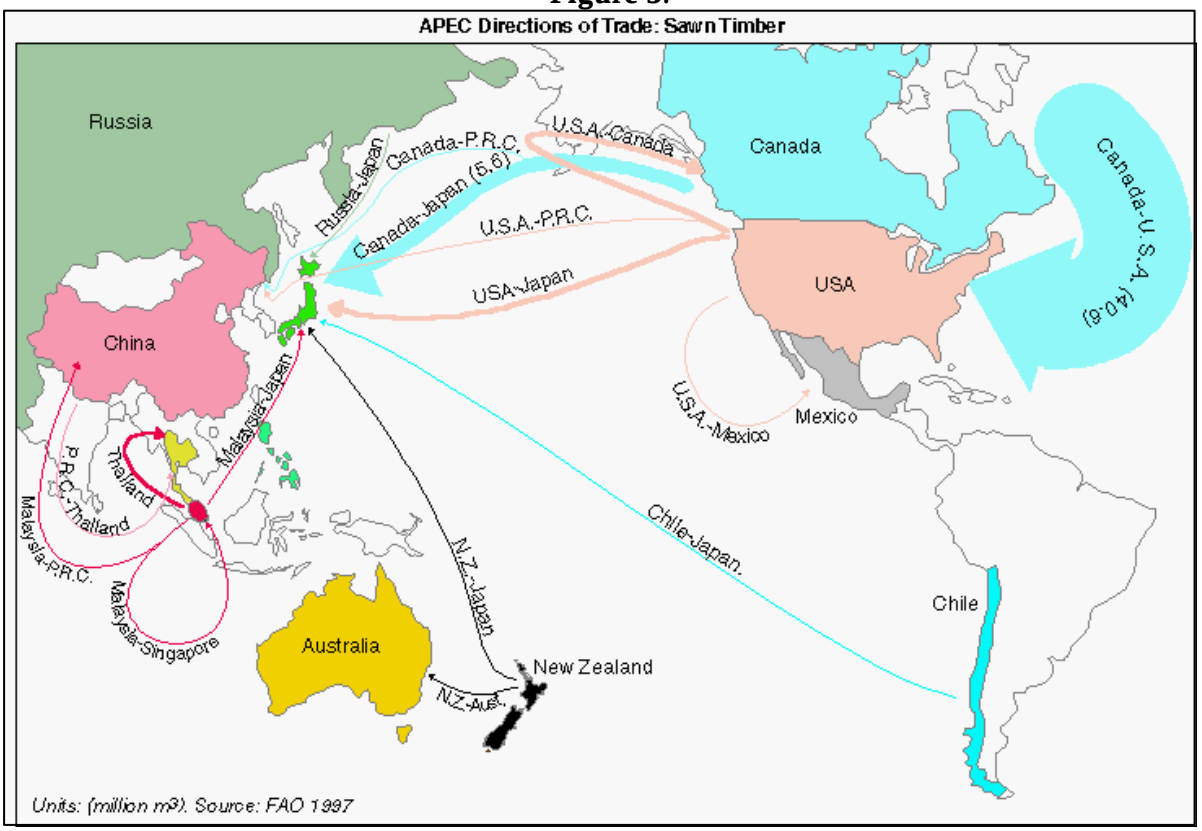

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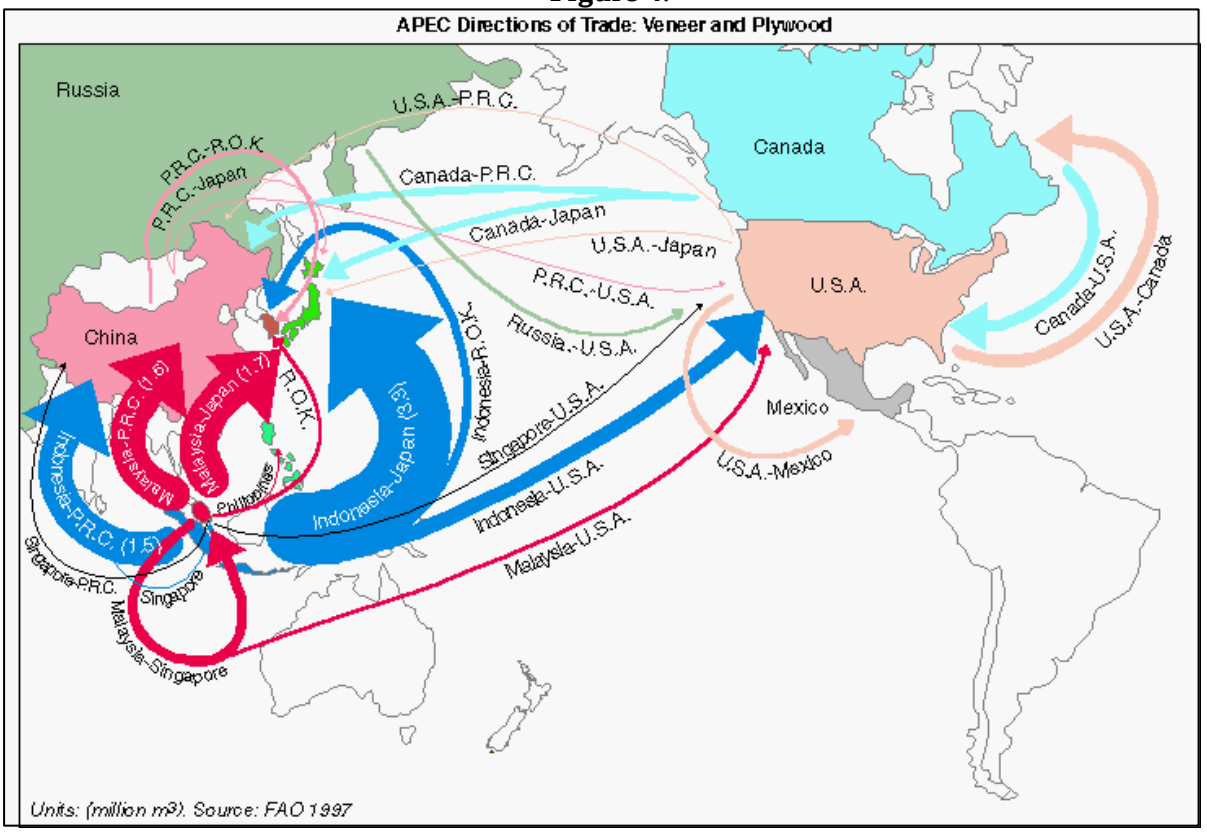
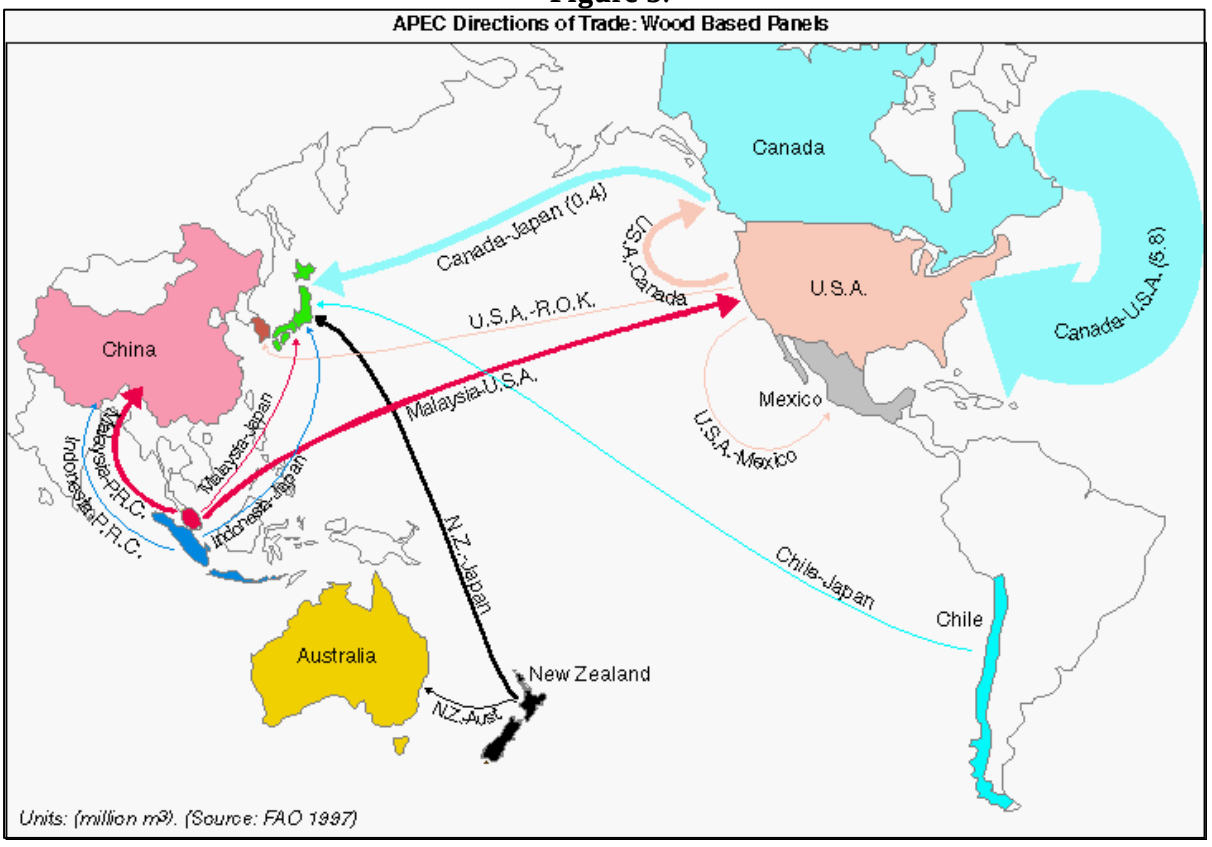


Figure 5:



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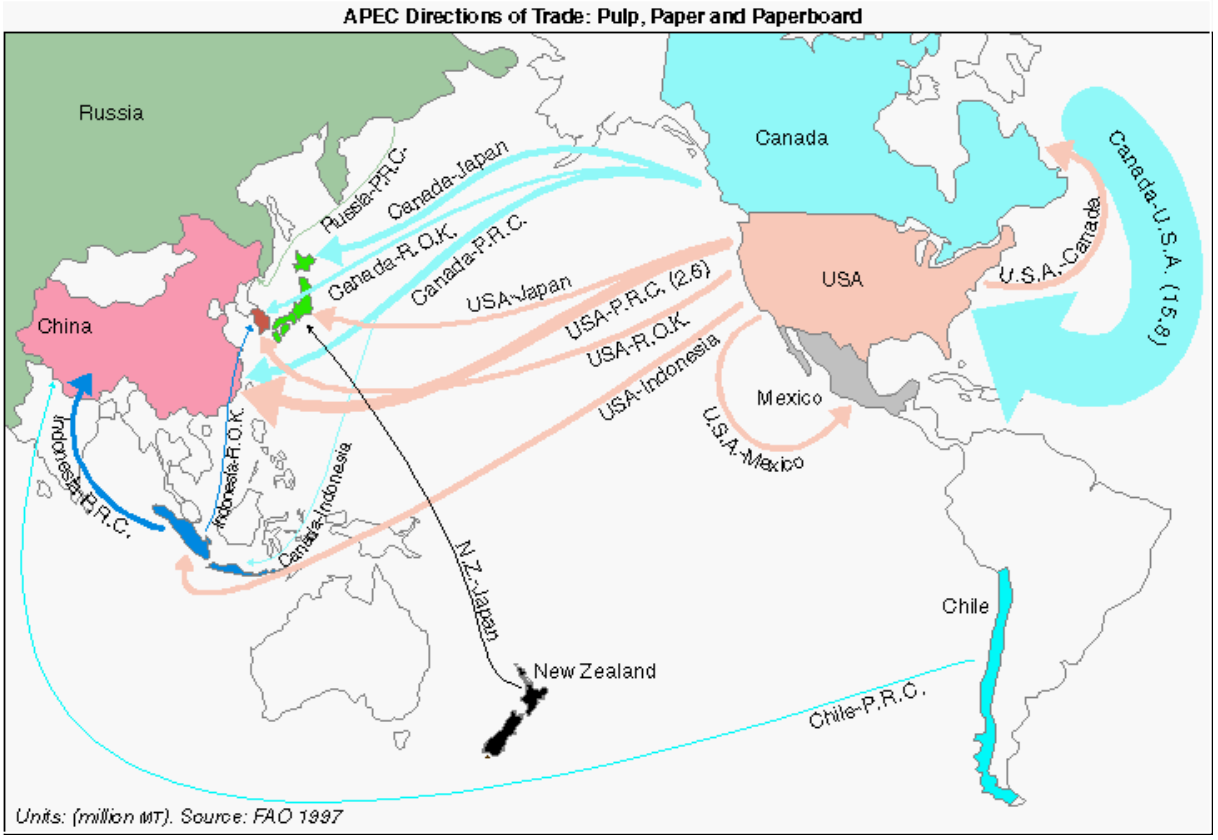


2.4 Changes in Forest Products Trade

The dominant change in forest product trade among APEC economies is the decline in the importance of trade in unprocessed forest products. Since 1990, export values have increased 40% for sawn timber, 52% for wood-based panels, and 300% for paper and paperboard[1]. There has also been an expansion in the trade of processed forest products such as furniture and carpentry products[2]. This increase has arisen from a number of factors that have influenced the supply of logs for manufacture of solid wood products. Government policies encouraging domestic processing, and environmental pressure to ban the tropical log trade are key influences. These pressures have increased the scarcity of large-diameter logs suitable for sawing, forcing a shift to engineered wood products utilising small-diameter logs. In addition, gains in efficiency and increased use of recycled material, alternative raw materials and residues have enabled growth in the output of products derived from roundwood without increasing roundwood consumption[2].

Japan's dominance as the major consumer of forest products within the Asia-Pacific region means it has an important influence on the types of forest products traded within the region. Japan's preference for importing raw materials rather than finished products may, therefore, serve to limit the expansion of the trade in processed wood products.

Some of the factors influencing the shift to value-added exports, particularly the use of alternative raw materials, have also contributed to the increasing substitution of softwood sawn timber for limited supplies of hardwood sawn timber[2; 3]. This increased substitution

of softwoods for hardwoods has led to increased trade by softwood exporting economies such as New Zealand and Chile[1].

Another change in the type of forest products being traded is the decline in importance of tropical forest products. Tropical hardwoods account for 20% of industrial roundwood exports, 10% of sawn timber, less than 10% of pulp and paper exports, 39% of wood-based panel exports, and 71% of plywood exports in the Asia-Pacific region[2]. The decline in tropical log and sawn timber exports is a result of Malaysian reductions in harvest levels in response to environmental concerns and export market conditions[3]. The decline in tropical forest products trade also reflects increased domestic consumption (and export of processed products) by developing producer economies and recent reductions in demand in Japan[3].

2.5 Effect of Asian Economic Crisis

In mid-1997, several important Asian currencies experienced considerable depreciation. In May 1998 the Malaysian, Philippine, Korean and Thai currencies were all trading at approximately two-thirds their previous year's value. The Indonesian rupiah had dropped to 25% of its May 1997 value[3].

The FAO report "State of the World's Forests 1999"[3] identifies four key impacts of the Asian economic crisis on forest products trade. Firstly, there was a reduction in demand for all forest products, most significantly affecting China, Japan, the Republic of Korea and Thailand. Exchange rate depreciation increased the competitiveness of exporting economies such as Indonesia and Malaysia but this was offset by a reduction in demand. The crisis also led to a fall in prices for forest products throughout the Asia-Pacific region, which in turn led to reduced earnings in the forestry sector followed by processing plant closures, and reduced harvests[3]. The impact of the Asian economic crisis on NTMs is examined in more detail in Section 7.7. The effects of the crisis are not depicted in Figures 1-6, as the data were produced before the Asian economic crisis. Although the directions of trade have changed only slightly, the magnitude of trade in some products has changed considerably.

3. TRADE THEORY[3]

3.1 Background

Trade liberalisation has been credited for the worldwide economic growth in the post-World War II period[4]. Time-series data on production and income from 1950 to 1980 show that following the dismantling of the heavily protectionist structures which took hold in the 1930s and the subsequent move by the world toward freer trade, world trade and output grew at average annual rates of 6% and 4% respectively[4].

The economic rationale underpinning the economic trade theory is that free trade increases the efficient allocation of resources, or allocative efficiency, at a global level. Through trade, firms in each country are able to specialise in producing those goods and services that they can produce most efficiently and exchange these items for goods and services, which another country produces better. By exploiting its "comparative advantage"[4] each region effectively expands its production and consumption frontier beyond that which would be the case in an environment without trade.

Implicit in the "benefits from trade" claim is the pre-condition that price signals are not distorted. The assumption is that the price levels of goods and services traded across borders "truly" reflect the full costs of the underlying demand and supply. In other words, all costs are "fully" internalised in production and consumption. If this is the case, then it can be shown that any trade expansion arising from freeing up cross-border trade will lead to an increase in overall economic welfare. An extension of the trade benefit claim is that it also helps to break down local monopolies by introducing contestability in the local market and thereby compelling firms to innovate in order to compete internationally.

With the completion of the Uruguay Round in April 1994, the rapid dismantling of tariff barriers continued into the 1990s. The liberalisation programme has resulted in the unweighted average tariff rate in the APEC region falling from 15.4% in 1988 to 9.1% in 1991[5]. Among the APEC members, three have virtually zero tariffs, and only four economies had tariffs higher than 15% in 1996[5][6]. However, most of the members with the higher tariffs have since significantly reduced their tariff rates.

Trade liberalisation momentum appears to have picked up in recent years with the voluntary agreement of some APEC economies to liberalise their tariffs on forest products ahead of the Uruguay Round schedule. Model simulation carried out as part of the Manila Action Plan for APEC shows that the GDP of APEC economies as a whole will be raised by about 0.4%. This represents a permanent increase of $69 billion per year in 1995 prices

[3] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.
[4] The original exposition of the comparative advantage concept, leading to mutual gains from international trade, is attributed to an Englishman, David Ricardo (1772-1823), and the modern development and refinement of the concept is associated with Hechscher and Ohlin.
[5] The economies with virtually zero tariffs include: Brunei Darussalam, Hong Kong China, and Singapore. The four economies with tariffs higher than 15% include: China, Papua New Guinea, the Philippines and Thailand.

if a wide range of measures, including tariff reductions, acceleration of future tariff reductions and the Uruguay commitments are implemented[5]. These simulations also show wide inter-economy variation in the impact of liberalisation. The impact of trade liberalisation was explicitly modelled for 16 of the 21 economies with the net impact varying from a high of 7.4% of GDP (Malaysia) to a low of 0.1% of GDP (USA).

3.2 Post 1980s – Growth in NTMs

During the post-1980 era, there appears to have been a shift in the underlying trend. NTMs have increased in parallel with the decline in tariff barriers. In recent years, NTMs have been more significant than tariffs[7]. Unravelling and quantifying the impact of NTMs is more difficult because they are not as transparent as tariff barriers. It is difficult to determine whether the measures are being used to restrict trade or for other legitimate reasons. Even if the reasons for restrictions are legitimate, they can at times be so exceedingly restrictive that they pose an unwarranted barrier to trade. Even the effects of the same mechanisms can vary widely between countries depending on the circumstances in which they are being introduced. It was noted that the incidence of NTMs in APEC economies has been cut by nearly one half, declining from 9% on import coverage in 1988 to 5% in 1996.

Complicating the issue is the considerable difference in views of NTMs. Proponents of trade expansion generally see NTMs as one of the main obstacles facing international trade. However, some see increased trade as an important contributor to the unsustainable development of forestry resources and NTMs as necessary measures to alleviate the pressures placed on the forests[8]. Others suggest unrestricted “free” trade essentially perpetuates the colonial dependency of developing countries on foreigners in the post-colonial period[9].

3.3 Causes of Proliferation in NTMs

Since the 1970s, the expansion in international trade volume has not only increased global wealth but also has given rise to concerns in three areas. Firstly, for free trade to be optimal all resources, including labour, must be able to move to those areas where they can be used most productively. Restrictions imposed by countries to the free flow of some resources, for example, labour, mean that the necessary and sufficient conditions for free trade do not strictly hold. In this case there is no guarantee that freer trade will necessarily take nations closer to the optimal solution.

There is also a subsidiary thread to this argument relating to country-level manipulations. The argument might best be thought of as a variant of ideas to be found in texts outlining the theory of an optimal tariff. At its simplest this involves a two-country, two-traded-goods world in which the government of the tariff-levying (home) country acts as a monopolist to dominate world markets. While the classic argument for free trade emerges from viewing the global economy as an example of the competitive mechanism, the optimal tariff theory departs from this by allowing the home government to manipulate proceedings. This manipulation not only raises strategic issues but also raises questions

about how governments and individuals perceive their responsibilities in international markets[10].

Proponents of this view point to the disparity in economic development among countries and claim that to bridge the gap, developing countries must invest in and nurture their comparative advantage in order to gain a better share of the benefits from free trade. This is generally reflected in the national policies of developing countries, which attach greater importance to economic growth than to environmental issues. Many are eager to provide inducements to attract foreign investment to facilitate the development of their comparative advantage.

There are success stories from this "infant industry nurturing" programme. However, there are also less compelling stories. Vincent *et al* (1991)[11] note, for example, that although Indonesia was able to use the log export ban to develop its plywood industry and exercise market power for some time, Japanese importers later switched to temperate timbers possibly causing permanent damage to Indonesia's export potential.

The second area of debate relates to the growing concern among environmentalists that valuation of resources is based on a narrow commercial perspective at the expense of a more holistic social and ecological valuation. In this case growth in trade may perpetuate over-exploitation of natural resources. Trade liberalisation is believed to increase the pressure for public policies to focus more on development in the trade-intensive sectors. Often these policies are seen as undervaluing environmental concerns, particularly in areas of the world where development is at a premium. As a result, trade is linked to unsustainable development. An extension of this claim is that free trade robs nations of the ability to effectively manage environmental issues within their borders. Some restrictions are therefore necessary.

Deforestation, and its implications for human welfare, wildlife, and climate, has been associated with international trade even though most deforestation is caused by conversion of forestlands to other agricultural uses. Johnson (1991) estimated that 64% of deforestation in the tropics is due to agriculture, 18% to commercial logging, 10% to fuelwood gathering, and 8% to cattle ranching[12]. FAO[13] studies also support the view that the major cause of change in forest cover in the tropics is not commercial logging but rather, expansion of subsistence agriculture and the growth of large-scale development projects involving resettlement[6].

The third area of concern is the increased demand for environmental, health and safety goods as a result of greater affluence. This is, to some extent, reflected in the policies of many developed countries. The movement towards using discriminatory trade barriers to address environmental issues gathers momentum.

[6] The extent to which timber harvesting for industrial products plays a central or even indirect role in deforestation remains a subject of continuing debate and inquiry. In some countries, and especially in relatively undisturbed forests, timber harvesting (and associated road building) may often be the first step in the process of degradation and deforestation.

Whether the above issues are real or imagined is probably inconsequential. The result has been a rise in the use of NTMs post-1980s while, at the same time, the world has made great progress in cutting tariff rates since the signing of the GATT in 1947[14]. NTMs are probably favoured because of their less transparent features and they are easily disguised as legitimate measures. When implemented they generally tend to cause less political strife at home and with the foreign country.

The proliferation of NTMs is reported in the forestry sector both of developing and of developed countries. For example, developing countries are continuing to use export restrictions on wood in rough and semi-processed products to support domestic processing industries and to improve export prospects for higher-valued forest products[15]. Developed countries are turning to a variety of NTMs, that may have significant trade implications, to address environmental problems[16]. Some of the NTMs are specifically directed at producers who are perceived to be engaging in economic activities that result in unsustainable development of natural resources.

3.4 NTMs for Environmental Conservation are Permissible

The paramount importance of sustainable development has been recognised by the WTO. The general agreement is that trade and environmental issues should be mutually supportive. The preamble to the Agreement establishing the WTO notes:

> *".. relations in the field of trade and economic behaviour endeavour should be concluded with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their [countries] respective needs and concerns at different levels of economic development…"*

Parties to the WTO are allowed to adopt measures that are inconsistent with traditional trade objectives in certain circumstances that have direct relevance to environmental conservation. These exceptions include measures which are necessary to protect human, animal and plant life or health and which relate to conservation of exhaustible natural resources. However, the measures must not be a disguised restriction on trade and they must not involve arbitrary or unjustifiable discrimination between countries where the same conditions prevail.

In addition, the Uruguay Round also advanced rules applicable to non-tariff measures, specifically the agreements on **Technical Barriers to Trade (TBT), Sanitary and Phytosanitary Standards (SPS),** and **Subsidies and Countervailing Measures (Subsidies Agreement).**

The TBT Agreement addresses mandatory technical regulations and voluntary standards applying to all products, including industrial and agricultural products. The SPS Agreement applies to all sanitary and phytosanitary measures (food and health standards) that may affect international trade. However, it is the responsibility of the countries applying the measures to provide scientific evidence to justify deviation from an international standard. The Subsidies Agreement establishes rules for the use of most

subsidies that can favour domestic producers, and delineates when such subsidies can be countervailed by importing countries. Among the permissible subsidies is a one-off assistance of up to 20% of the costs of adapting existing facilities to meet new environmental requirements, provided the assistance is directly linked to the environmental issue.

Although the use of NTMs for environmental conservation is permissible, there are widely differing views on how this can be achieved. For example, sanitary and phytosanitary standards have a track record of being used in the past for reasons which have more to do with protecting domestic producers than with protecting human, plant and animal health[7].

3.5 Economic Interpretation of Trade and the Environment

From an economic perspective, trade is generally regarded as being environmentally neutral - although most (or even all) environmentalists would dispute this. Free trade, by definition, promotes the efficient utilisation of resources by allowing the most efficient producers to provide the world's goods and services. More efficient production, which reduces the drain on scarce resources, is consistent with some aspects of the concept of environmental conservation. In fact most environmental problems can be attributed to market or governmental failures whereby the full costs of a particular set of actions are not reflected in the price of inputs paid by producers or in price of the final goods paid by consumers. Against this background, the major economic issue that needs to be addressed is how to ensure that the full cost of production is passed on to consumers so that the allocative efficiency from free trade is not impeded. Here lies the crux of the matter. The Pigovian approach of forcing the end user to pay for the cost is difficult enough to apply within a country. It is much more difficult when the goods and services are traded across borders.

Firstly, the disparities in economic development between countries, as discussed above, are generally reflected in differing national priorities. Whose priorities should carry the greatest weight? Until the gap between nations is narrowed, progress in this area will be difficult. Some countries will continue to attach greater significance to economic growth than others. Secondly, in commodity trade, global demand is highly price sensitive and commodity prices have been on their secular decline. The structure of the markets makes internalisation difficult. In a buyers market, this effect is accentuated making market access even more difficult. Lastly, there is a general lack of confidence as to the efficacy of NTMs in addressing externalities.

If the external environmental costs are not fully internalised, the view that trade is environmentally neutral is likely to be very difficult to sustain. The corollary of free trade leading to greater externalities from production and consumption should not be dismissed lightly. The evolution of environmental economics to date has not been particularly useful in helping international economics to resolve this problem, with the result that

[7] This issue is further complicated by what is perceived to be an acceptable level of risk.

environmental economics and trade theory address different questions and employ different methods[17].

More recently, a new school of thought has emerged. It argues that environmental regulations may in fact enhance a country's competitive position by prompting innovations in production that will both decrease negative externalities and decrease costs or increase output efficiency[18]. However, support for this school of thought is still mixed as there is also growing counter-evidence that environmental regulations can shift comparative advantage and change the structure of resource use between countries[19].

3.6 Literature on NTMs and Environmental Degradation

The general consensus among economists is that trade policies should not be used to address environmental issues. Apart from their unproven effectiveness, using trade policies in such a way also increases the risk of their being manipulated to favour inefficient producers. Moreover, NTMs are difficult to identify, especially when designed as part of domestic policy objectives.

3.6.1 Direct Environmental Instruments are Preferred to NTMs

The literature reviewed generally tends to favour policies that address environmental externalities directly, as these policies are regarded as more efficient than trade measures in achieving environmental ends. The **Framework Convention on Climate Change (FCCC)** and its Kyoto Protocol are examples. The purpose of the Protocol is to specifically address the issue of global warming arising from human activity. The Protocol, though it has yet to be ratified, provides a global agreement where legally binding greenhouse gas emissions constraints are set for a list of developed countries and countries in transition to a market economy, for the period 2008-2012. Different percentage reductions relative to 1990 emissions are set for different countries such that total emissions by the listed countries are reduced by more than 5%.

Flexibility, including international emissions trading, is provided for in the Protocol to help individual countries achieve their emission targets at the least possible cost. Such measures for addressing environmental issues are generally far more effective and efficient than resorting to NTMs which are distorting and either fail to achieve their intended proposes or do so at very high costs.

3.6.2 NTMs can be Inconsistent with Environmental Objectives

On balance, trade interventions are more likely to be harmful to environmental conservation than free trade[8]. This is because of a relatively stronger correlation between increasing economic wealth and demand for environmental conservation. Increasing incomes may generate greater demand for environmental services. Kitabatake (1992)[20] noted that the economic growth in Japan has helped to finance forest conservation and

[8] Note that there are several economists who have, in varying degrees, opposed free trade based on environmental concerns. Ekins, Folke and Constanza (1994)[111] argued that the gains to free trade are exaggerated because the welfare-enhancing nature of trade is seldom, if ever, realised.

increase demand for forest services at home. In contrast, trade protectionism tends to perpetuate poverty and narrow options for employment and income generation.

Hettige *et al* (1992)[21] looked at the issue of toxic industrial pollution and trade policy and found that developing countries that pursued more outward-oriented strategies in trade have suffered less growth in toxic industrial emissions. The intensity of industrial emissions has increased more rapidly in economies that are relatively closed to international trade. This is because highly protected developing economies attract the relocation of dirtier industries as a result of the tightening environmental regulations in the industralised nations.

3.6.3 Trade Liberalisation and Deforestation

A number of studies have looked at the impact of trade liberalisation on tropical deforestation. Ropke (1994)[22] argued that trade is inherently detrimental to the environment, and Nectoux and Kuroda (1989)[23] believed that Japanese demand for tropical timber is responsible for significant deforestation in South East Asia. Nevertheless, most analysts appear to be in favour of trade liberalisation. Wisdom (1996)[24] showed that the elimination of sawn timber import tariffs in the Philippines can contribute to forest preservation there. Thiele and Wiebelt (1994)[25] concluded that trade liberalisation can both enhance economic performance and reduce deforestation. Barbier *et al* (1995)[26] noted that*: "there seems little scope for the use of trade policy interventions as a means to reducing tropical deforestation in Indonesia"*. Wheeler and Martin (1992)[27] argued that the reduction of trade barriers could enhance environmental quality through the diffusion of cleaner and environmentally friendly technologies.

3.6.4 Unintended Effects of NTMs

The risk associated with the use of trade measures is that they often not only fail to achieve their intended purposes but that they also create potentially undesirable unintended effects. For example, the trade measures of one country may transfer that country's domestic environmental impacts to other countries. Sedjo (1999)[28] noted that trade measures impeding the wood products exports of the USA would simply result in Japan going elsewhere to meet it's demands. Japan would then have to draw more heavily on the forest resources in other regions, including the tropical forests. In many cases the environmental damage associated with harvesting in the tropical region will be substantially greater than if the harvest were made in the USA.

3.6.5 NTMs Impact on Trade

The impacts on trade and economic wealth of some NTMs used to address environmental issues can be very significant. Perez-Garcia (1995)[29], using the CINTRAFOR Global Trade Model, indicated that the international impact of the log export restrictions in the USA Pacific Northwest is substantial. The negative economic impacts are much larger than necessary, resulting in important consequences for both exporting and importing countries. Lippke (1999)[19], using the same Global Trade Model, found that trade liberalisation would more likely reduce than increase environmental damage at the global level. This is because

liberalisation will favour production by more efficient producers and they generally cause less negative environmental impacts.

3.6.6 Government Failures and NTMs

Ineffective government policy is often blamed for the over-exploitation of natural resources, especially in developing countries. For example, Chichilnisky (1993)[30] shows that property rights problems make developing countries more vulnerable to environmental degradation as a result of trade with industrialised countries. Experience shows that even small changes to forest management, in terms of tenure and property rights, can show remarkable new commitments from the private sector to sustainable forest management. This is because the private sector will pursue improved forest management most aggressively when there is a clear economic incentive.

3.7 Summary

The use of NTMs has risen since 1980, while the world has made great progress in cutting tariff rates since the signing of the GATT in 1947. NTMs are much more difficult to evaluate and identify, especially when designed as part of domestic policy objectives. The WTO recognises sustainable development as a key objective of its activities and allows the use of measures "*necessary to protect human, animal or plant life or health*" or "*relating to the conservation of exhaustible natural resources*" under certain conditions.

Economists agree with the importance given to sustainable development but generally favour the market approach as a means of achieving that objective. They accept that if the full costs of production and consumption are not reflected in the price, free trade can exacerbate environmental problems. However, they generally believe that trade measures should not be used to resolve environmental problems because their effectiveness is unproven and there are unintended consequences. They prefer the use of direct environmental policy instruments to deal with environmental issues. Most economists tend to take the view that free trade is more likely to enhance environmental quality by providing nations with the wealth needed to protect their resources and by increasing their willingness to pay for this protection.

There may be some increase in environmental degradation associated with greater economic activity. However, the longer-term positive effects on the environment are more likely to outweigh the cost of this degradation.

4. DEFINITION OF NON-TARIFF MEASURES[9]

NTMs are difficult to define, difficult to evaluate and even more difficult to quantify. By their very nature they defy a fixed definition because it is difficult to determine the motivation for their existence – whether they are being used to restrict trade, or for other legitimate purposes. NTMs are not necessarily consistent or inconsistent with GATT or WTO agreements. Their economic and environmental impacts, however, will vary and may be of greater impact when combined with other NTMs and where tariffs are present.

In the language of trade analysis, trade restrictions are limited to formal institutional measures, which either overtly or covertly restrict trade. In particular, these are government measures imposed with the deliberate goal of restricting or distorting trade patterns, or measures which do so by accident. Such restrictions are the subject of formal international trade negotiations of the type carried out by the WTO. These measures are divided into two categories: tariffs and NTMs. As well as these formal measures there are, however, other restrictions which fall into an undefined "grey" area. They are not formal trade barriers and might best be regarded as trade impediments. A number of health and safety and environmental measures would fall into this category. However, as their impact on trade is very similar to the more formal measures, and in many cases their intent is the same, they are included in this analysis.

In addition there are other measures which make trade difficult or affect the competitiveness of particular economies, and which are sometimes loosely referred to as trade barriers. In fact they are 'natural' barriers which result from comparative advantage (or lack thereof) and normal competitive conditions. Differences in freight rates, wage rates, tax base, business practices, language, etc., whilst making it difficult for exporters, are not trade barriers specifically imposed by importing or exporting countries. They reflect such things as geographical location, resource endowment and cultural differences. They are not defined as NTMs.

Despite the above segregation there are still difficulties of definition. The USA, for example, considers that logging bans, harvesting restrictions and similar actions are not NTMs in that these are domestic actions taken for domestic reasons and have little or no impact on the trade in forest products. The authors of this report, however, argue that they do, in some cases, impact on the trade in forest products, although there will be differences in the extent of impact of various measures. There is, and will continue to be, considerable debate as to whether they are NTMs, trade impediments, or simply 'natural' barriers to trade.

In cases where there is doubt over whether a particular measure is, or is not, an NTM it has, if for no other reason than completeness, been included in the report. The many NTMs have also been grouped under three broad headings for analytical purposes. These

[9] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.

groupings are based, where possible, on the reasons used to justify imposition of the particular measure. The headings are:

- Social / Political
- Health and Safety
- Environmental

Social / political measures are motivated by factors such as a desire to increase domestic growth, add value to existing resources, protect current local employment and processing, increase the local wood supply to provide the basis for a new or expanded industry, and increase exports. Included in this category are measures such as surcharges, import and export taxes, and licences and quantity control measures, where the motivation is either unstated or is clearly not environmental.

Health and Safety measures are intended to protect the economy and its population from the risks of introduced pests and diseases and from inappropriate use of materials. Measures covered by this category are those concerning phytosanitary and quarantine requirements, and the codes and standards relevant to the use of wood in structural and non-structural end-uses. Many of these measures fall into the category of impediments rather than formal barriers.

Environmental NTMs include harvesting restrictions where the reason for the restriction is clearly stated as environmental, certification and labelling requirements, and technical standards designed to achieve particular environmental goals, for example, a mandated minimum recycled fibre content in paper. Some may query whether measures aimed at "improving our environment" should be regarded as NTMs. However, given that a number of environmental measures have impacts on trade patterns, albeit as a by-product of the intended outcome, these impacts need to be recognised and acknowledged. Failure to do so can mean that a ban or quota introduced for social reasons may have trade impacts but an identical ban or quota introduced for environmental reasons, producing exactly the same results, has none. The complex nature of environmental measures affecting trade is discussed more fully in Section 9.

Although not a category of NTM, illegal activities are also mentioned at various points in the text. Some illegal activities might well be regarded as the result or consequence of some NTM and obviously accurate data on such activities are not generally readily available. However, illegal activities do have trade implications and their existence and impacts should, where possible, be acknowledged.

A fuller description of the types of measures included in each of the categories may be found in Appendix 1**.**

5. SUMMARY OF INVENTORY OF NON-TARIFF MEASURES

This section provides summary information on the inventory of NTMs in forest products trade in the APEC economies. It includes the results of structured discussions with key experts in selected economies and a review of existing literature. Information was derived from published material, existing databases, work in progress and from field surveys conducted in selected APEC member economies. Information from APEC member economies was provided through a questionnaire sent to member economies by the APEC Secretariat. The information was, however, somewhat limited as only three economies provided information.

NTMs have been categorised by type of measure, affected products, level of enforcement, significance of the measure, and the imposing and affected economies. NTMs have been classified as near as possible to the system described in the previous section but, as has been mentioned previously, there will be some instances where there is overlap or uncertainty as to the motivating influence.

5. SUMMARY OF INVENTORY OF NON-TARIFF MEASURES[10]

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM[11]
Indonesia, Malaysia, PNG, Philippines	Australia	Environmental Eco-labelling	Waverly Council of Sydney Good Wood guide, and Sydney 2000 project, restricts use of tropical hardwoods.	All tropical hardwood products	Local	Restricted trade. Perceived reduction in harvest of indigenous forests.
All	Australia	Health and Safety Phytosanitary	Restrictive measures without formal risk assessment to justify them.	All	National	Moderate – precautionary treatments often carried out.
NZ, Canada, USA, Malaysia	Australia	Health and Safety Building codes and standards	Conservative and prescriptive codes and standards	Construction	State / National	Reduction in wood products in structural uses.
All	Australia	Social / Political Government intervention Export assistance	Export market development grants to small and medium sized firms to assist with development of new markets	All	National	Encourages Australian firms to export. Increases competition.
All exporters of sawn timber (Malaysia, Indonesia, NZ, Canada)	Australia	Social / Political Government intervention Research subsidies	Levy on domestic and imported timber	Sawn timber	National	Small, research does not necessarily benefit importers.
All exporters to Australia except Canada, NZ, developing nations	Australia	Social / Political Para tariffs	Preferential tariff access to Australian market	Sawn timber, pulp and paper	National	Price advantage for products from Canada, New Zealand, developing nations
Indonesia, Korea, Thailand	Australia	Social / Political Government intervention Anti-dumping and countervailing duties	Threat of anti-dumping investigations	Pulp and paper	National	Restricts imports.
Japan, Korea, China	Australia	Social / Political Government intervention Export licence	Federal Government issues export licences for all export products	Hardwood woodchips	National	Minor, increased markets for other woodchip suppliers

[10] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.
[11] Consideration of the environmental impact of NTMs is provided in Section 5. Many of the measures listed in the tables will have environmental effects or they will affect forest harvesting and processing capacity.

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
Malaysia, Philippines, Indonesia, Thailand	Australia, USA	Health and Safety Phytosanitary measures	Fumigation and packaging restrictions. Developing nations do not have technology to meet requirements. Australia does not provide sufficient information on requirements.	Sawn timber, plywood	National	Product range of exports restricted.
All	Canada	Environmental Certification Requirements for "environmentally friendly" products	Government programme EcoLogo Certification	Primarily paper products	National / local	Minimisation of environmental impacts.
All	Canada	Social / Political Government intervention Labelling	Consumer Packaging and Labelling Act, Weights and Measures Act, Canadian Agricultural Products Act - Canada requires bilingual designation of the generic name on most pre-packaged consumer products	Selected	National	Minimal effect, increases product cost.
All suppliers to Canada	Canada	Social / Political Para tariffs **Value Added Tax (VAT)**	GST of 7% on nearly all goods and services at federal level. Combined with Provincial VAT can equal 18%[12].	All	National / Provincial	Minimal impact, may encourage exporting.
All suppliers to Quebec market	Canada	Social / Political Government intervention Labelling	All products sold in the province of Quebec must be labelled in French	All	Provincial	Minimal effect, increases production cost.
USA	Canada	Social / Political Government intervention Government procurement policies	Variety of legally established procurement rules at sub-federal level identifying Canadian companies as preferred suppliers.	All	Provincial / Local	Encourages consumption of Canadian produce at expense of foreign.
USA, Chile, NZ, Japan, Korea, China, Chinese Taipei	Canada	Social / Political Quantity controls Bans	Variety of Federal and Provincial regulations regarding the export of logs	Logs	National / Provincial	Encourages domestic processing,
USA, NZ, Chile	Canada	Social / Political Government intervention Export subsidies	Export promotion funds: Program for Export Market Development, Agri-Food Trade 2000, Post-Initiated Agri-Food Fund and the Regionally Initiated Agri-Food Fund. Several provinces also operate industry specific promotions organisations.	All	National	Encourages Canadian exports to detriment of competitors, lowers prices.

[12] VAT is trade neutral but may be an NTM when border tax adjustments more than compensate for the taxes imposed or when the size of the tax differs across commodities[61]

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
All	Canada	Social / Political Government intervention Subsidies	Provincial government setting of "stumpage fees" for right to harvest public forest	Logs	Provincial	Where the appraised value of the stumpage fee falls below the market value there is an effective subsidy to Canadian forest product processors.
All	Canada	Social / Political Government intervention Subsidies	Canadian timber sale programme. In all tenure arrangements, costs of afforestation taken into account in setting of stumpage	Logs	National	Provides subsidised raw material to the Canadian industry. Disadvantages competition
All	Chile	Social / Political Government interventions Customs and entry procedures	Certain imported materials, including building and construction materials, must comply with specific resolutions applying to the supervising entity.	Selected – building and construction materials	National	May increase import costs
All	Chile	Social / Political Government intervention Customs and entry procedures	Import permits are issued on a case-by-case basis, leading to uncertainty and possible discriminatory treatment.	Selected	National	Increases costs of imports
Mexico, Canada, MERCOSUR	Chile	Social / Political Government intervention Free trade agreements	Free trade agreements with Mexico, Canada and MERCOSUR give exporters from these countries significant competitive advantages, over non-member economies.	All	National	Trading disadvantage for exporters excluded from Trading Agreement
NZ, USA, Canada, Russian Federation	Chile	Social / Political Government intervention Export subsidies	Special free trade zone to Regions I or XII. Imports leaving the free trade zones, but remaining in Regions I or XII pay a 6% import duty instead of 18% VAT.	All	National	Encourages Chilean exports to detriment of competitors
NZ, USA, Canada, Russian Federation	Chile	Social / Political Government intervention Export subsidies	Import duty for 7 years for capital goods imports to be used as inputs for products to be exported, and waived for capital goods to be used solely for production of exports.	All	National	Encourages Chilean exports to detriment of competitors
NZ, USA, Canada, Russian Federation	Chile	Social / Political Government intervention Export subsidies	Duty drawback system for non-traditional export products. Exporters receive a 3% to 10% drawback on exports depending on value.	Poles, piles, posts, softwood sawn timber, temperate hardwood veneer, plywood and particleboard	National	Encourages Chilean exports to detriment of competitors

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
NZ, USA, Canada, Russian Federation	Chile	Social / Political Government intervention Growing subsidies	In May 1998 a new subsidy scheme (L19561) focusing on assisting small farmers was set in place. Maximum available funds will be $15 million / annum, with special land tax exemptions also being part of the programme. Covers part of the cost of planting.	All	National	Lowers production cost of Chilean raw material. Disadvantages competitors.
Selected economies	Chile	Social / Political Para-tariffs VAT	VAT 18% + import duty of 10%, paid by the importer and applies to c.i.f value of all sales transactions[13].	All	National	Import cost differential which disadvantages some suppliers
All	Chinese Taipei	Health and Safety Generic building codes	Building codes favour non-wood construction	All except pulp, paper, woodchips and furniture	National	Reduction in demand for wood in construction
All	Chinese Taipei	Social / Political Quantity restrictions	Harvesting restricted to 500 000m^3 / year in plantations	Logs	National	Encourages imports
China	Chinese Taipei	Social / Political Quantity controls	Import restriction on imports of China fir from China .	Sawn timber	National	Protects local producers. Minimal impacts
All	Indonesia	Illegal Activities	Illegal logging and log exports (estimated at 32 million m^3 / annum)	Logs	National	Affects resource availability, depresses prices in short term, environmental effects.
All	Indonesia	Social / Political Government intervention Current natural forest logging concessions	Concessions only issued to companies with wood processing facilities. Being changed as part of concession reform	Logs from natural forests	National	Encourages domestic processing
All except NAFTA countries.	Indonesia	Social / Political Government intervention Investment support	Reduction in import duty and VAT, income tax exemptions	Manufactured products for export	National	Encourages regional (**ASEAN**) investment
Japan, China, USA, Malaysia, Korea, Australia	Indonesia	Social / Political Government intervention Log quota	Quantity limit on the total volume of logs that may be exported	Logs	National	Encourages illegal log trade, depresses raw material prices, encourages processing in Indonesia.

[13] VAT is trade neutral but may be an NTM when border tax adjustments more than compensate for the taxes imposed or when the size of the tax differs across commodities[61]

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
Japan, Chinese Taipei, Korea, China, USA, Malaysia, Hong Kong China	Indonesia	Social / Political Government interventions Export licensing of processed product	Mills need an export licence before they can export	Plywood	National	Potential for facilitation fees and biased control of industry. Increases cost of exports
Malaysia, Australia, USA	Indonesia	Social / Political Government intervention Growing subsidies	Plantation loans – HTI development. Encouragement of low cost plantation alternative to current natural forest supplies.	Hardwood woodchips, pulp.	National	Increased pulpwood resource availability, reduction in market prices, environmental effects.
Malaysia, Philippines, PNG	Indonesia	Social / Political Government intervention Export tax	Export taxes for logs and sawn timber based on check prices	Logs, sawn timber	National	Discourages legal exports, increases prices, third country competitors disadvantaged.
Australia	Indonesia, Thailand and Viet Nam	Social / Political Tied to foreign aid	APEC economies that are recipients of foreign aid are tied to products to be supplied by the aid-giving nation. In most cases this is Japan	Particleboard and MDF	National	Disadvantages imports into aid receiving economies from economies not providing aid.
All	Japan	Environmental Certification / labelling	Marketing of products under Eco Mark and Forest Certification schemes	All	National / State / Local	Minimal impact. Reduction in environmental impact to forests and processing operations.
Indonesia	Japan	Environmental Technical standards	Environmentally motivated product standards unable to be achieved	Paper	National	Import restriction. Reduction in environmental impacts.
Indonesia, Malaysia	Japan	Environmental Certification	Guidelines issued for use of tropical hardwood plywood for concrete sheathing in municipal works in 12 cities	Plywood	Local	Minimal impact, reduced local consumption of tropical hardwoods.
All	Japan	Health and Safety Structural codes and standards	Product approval process (JAS / JIS) is lengthy, non-transparent and favours domestic firms.	Sawn timber, re-manufactured products.	National	Restricts imports, adds to import cost, deters new entrants.
Australia	Japan	Health and Safety Codes and standards	Japanese Housing Industry requires Australian particleboard and MDF to pass the Japanese Industrial Standards or the Japanese Agricultural Standards with a Certified Accreditation Mark.	Particleboard and MDF	National	Restricts imports, adds to import cost, deters new entrants.

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
Australia, NZ	Japan	Health and Safety Codes and standards	Despite an agreement to adopt a harmonised standard as an interim draft standard for particleboard and MDF, (Japan) MITI will not rank new harmonised standards and the existing JIS Standard equally, thus maintaining the current impediment to equal acceptance by buyers in Japan.	Particleboard and MDF	National	Restricts imports, adds to import cost, deters new entrants.
NZ, Chile, USA	Japan	Health and Safety Codes and standards	JAS / JIS licensed products required for government financed construction	Manufactured products for export	National	Restricted imports of manufactured products, Tropical hardwood producers favoured by JAS process.
USA, Canada, NZ	Japan	Health and Safety Structural codes and standards	Prescriptive standards continue to be referred to in BSL despite revisions in 1998 to a performance basis. Imported non-traditional systems subjected to much greater scrutiny and requirements than traditional house construction systems.	All except pulp and paper, woodchips	National	Restricts / impedes imports of non-traditional housing systems
USA, NZ, Russian Federation, Papua New Guinea.	Japan	Health and Safety Phytosanitary Quarantine	Logs require fumigation adding tariff equivalent of 1-4% to logs	Logs	National	Increase costs of imports
All	Japan	Social / Political Government interventions Government over-regulation	Excessive regulation in price controls, testing and certification, and unconventional standards	All	National	Increase cost of doing business in Japan, impedes imports
All	Japan	Social / Political Government intervention Growing subsidies	Grants, loans, tax concessions provided in the approved subsidy budget of the Japan Forestry Agency (3.6 billion to 185.9 billion yen)	Selected	National / Provincial	Long term reduction in import requirements
All	Japan	Social / Political Government intervention Price manipulations	Government control in finance, banking, and foreign exchange and capital flows	All	National	Contributes to decline in economic performance
All	Japan	Social / Political Government intervention Processing subsidies	Domestic sawmillers obtain raw materials at artificially low prices due to growing subsidy.	Sawn timber	National	Encourages domestic processing at expense of imports
All	Japan	Social / Political Price manipulations Entry procedures	Slow import clearance procedures due to logistical issues.	All	National	Increases costs for exporters

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
All	Japan	Social / Political Price manipulations Exclusionary business practices	Weak enforcement of Japan's Antimonopoly Law and Exclusionary Business practices.	All	National	Inhibits foreign investment. Non-transparent corporate relationships inhibit foreign firms
NZ, USA, Canada	Japan	Social / Political Government intervention Processing subsidy	Equipment subsidies in precutting plants affect material components for post and beam market.	Re-manufactured products for post and beam market	Local	Discourages imports for products used in post and beam market.
USA, Canada, NZ, Chile, Russian Federation, Malaysia, Indonesia	Japan	Social / Political Government intervention Subsidies	Five Prefectures require use of domestically produced timber in a government financed housing programme.	All except pulp and paper, woodchips	Provincial	Encourages consumption of domestically produced sawn timber.
All	Korea	Health and Safety Generic building codes	Industrial substitution policy of synthetic materials for wood encourages use of non-wood materials	All except pulp, paper, woodchips and furniture	National	Restricts imports of structural products.
All	Korea	Health and Safety Generic building codes	Approval system for the acceptance of new materials and building systems	All except pulp, paper, woodchips and furniture	National	Increases cost of approval and discourages new building systems
All	Korea	Health and Safety Generic building codes	National Building Code restricts consumption of wood products. Wood structural components prohibited in all buildings over 3000m^2 and with eaves over 9 metres high. Only non-combustible materials permitted.	All except pulp, paper, woodchips and furniture	National	Restricts imports of structural sawn timber.
USA	Korea	Health and Safety Phytosanitary	Pine logs banned from some economies because of pine nematode risk	Logs, sawn timber, panels	National	Restricted trade
USA, Canada, NZ, Chile, Russian Fed.	Korea	Health and Safety Phytosanitary	Pine and larch lumber must be kiln dried with phytosanitary documentation	Sawn timber	National	Raises cost of pine and larch imports.
All	Korea	Social / Political Government intervention Price manipulations	Restricted government financing for multi-family homes supplied by government projects favours non-wood construction	Logs, sawn timber, panels	National	Limits product selection to least expensive building system, favours use of non-wood materials
All	Korea	Social / Political Government intervention Subsidies	Government funded investment programme to develop and protect new forest lands and a loan programme to assist forest related industries	All except pulp and paper	National	Minimal impact

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
All	Korea, China and the Philippines	Social / Political Government intervention Import licensing	Some APEC economies will only allow importing through licensed trading agents. There is also a restriction on companies allowed to carry out transactions in foreign currencies.	Particleboard and MDF	National	Limits access to buyers interested in importing forest products.
All	Korea	Social / Political Government intervention Customs and entry procedures	Adjustment tariffs, adjustments promulgated each year, tariffs lowered to encourage imports and raised to encourage domestic industry.	Selected	National	Restricts trade
All	Malaysia	Social / Political Government intervention Currency control	Fixed controlled exchange rate, currency not freely convertible	All products	National	Discourages imports, encourages exports.
All	Malaysia	Social / Political Government intervention Customs and entry procedures	Importers must be licensed and import duties are payable	Logs	National	Allows payment of facilitation fees. Increases import cost.
All except AFTA economies.	Malaysia	Social / Political Industrial development	Tax and duty concessions plus soft loans for export focused industry development	Manufactured products	National	Encourages domestic processing
Indonesia, Philippines, PNG	Malaysia	Social / Political Government intervention Growing subsidies	10 year tax exemption for pioneer forestry projects		National	Increased resource availability in the long term.
Philippines, Indonesia, Thailand, Chinese Taipei	Malaysia	Social / Political Government intervention Export tax	Export levies on logs, sawn timber, ply and veneer production	Logs, sawn timber, ply and veneer.	National	Affects ability of Malaysian producers to export. Encourages production of furniture, which is sold on domestic market at a lower price.
All producing economies	Malaysia Sarawak / Sabah	Illegal activities	Illegal logging in East Malaysia	Plywood	Regional	East Malaysian processors maintain processing, supply and prices affected
Producers in Peninsular Malaysia	Malaysia / Peninsular	Social / Political Government intervention Log export control	Ban on log exports from Peninsular Malaysia	Logs	Regional	Effects minimal because resource has been already depleted.
Japan, Chinese Taipei, Philippines, Korea, China	Malaysia / Sabah	Social / Political Government intervention Log export control	Quota on the export of logs from Sabah	Logs	Regional	Limits export opportunity for logs, encourages domestic processing
Indonesia, USA, Philippines, China	Malaysia / Sarawak	Social / Political Government intervention Industrial development	Royalty rebate	Processed product	Regional	Encourages domestic processing

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
USA	Mexico	Health and Safety Phytosanitary Restrictions	NOM-017. Visual inspection of imports of used sawn timber, veneer sheets and wood to be used in Mexico's border regions, leading to certification if pest free. If certain specified pests are found the products will be destroyed or returned to country of origin. If pests other than those specified are identified the products will undergo fumigation.	Used sawn timber, veneer and plywood	National	Protection for local industry against imports. Would prevent all new USA sawn timber entering Mexico
USA	Mexico	Health and Safety Phytosanitary Restrictions	Required fumigation of redwood sawn timber	Redwood sawn timber	National	Minor impact, increased cost on imports of redwood
USA, Canada	Mexico	Health and Safety Phytosanitary Restrictions	NOM-016. Sets sanitary requirements for new sawn timber imported to all parts of Mexico. Requires an international phytosanitary certificate specifying wood's moisture content =<20%, that the product originates from a zone free of pests or diseases, as well as the certificate of origin. Also includes visual inspection. If certain specified pests are found the products shall be returned or destroyed. For pests other than those specified the products will be fumigated at owner's cost.	Selected	National	Protects local industry
USA, Canada	Mexico	Health and Safety Phytosanitary Restrictions	NOM-014. Visual inspection of new or used wooden pallets, crates, boxes and other wooden packing material to be taken into Mexico's border regions, leading to certification if pest free. International Phytosanitary Certificate required stating that the product comes from areas free of specified pests for products destined for Mexico. If unspecified pests are detected the product can be returned or destroyed. Fumigation of shipment will be required.	Selected	National	Minor impact

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
Canada, USA, Chile, Malaysia, Indonesia	Mexico	Social / Political Government intervention Customs and entry procedures	Document guaranteeing payment of additional duty for undervalued goods	All	National	Minor impact
Canada, USA, Chile, Malaysia, Indonesia	Mexico	Social / Political Government intervention Customs and entry procedures	Fines and even confiscation of merchandise for errors in paperwork on customs documentation	All	National	Minor impact
Canada, USA, Chile, Malaysia, Indonesia	Mexico	Social / Political Government intervention Customs and entry procedures	Very restrictive interpretation of regulations and standards by private sector customs brokers in spite of new 1996 customs law	All	National	Increased compliance costs
Canada, USA, Chile, Malaysia, Indonesia	Mexico	Social / Political Para tariffs Customs surcharge	Customs processing fee: 0.8% assessed on total selling price of product, inland freight cost, other fees, duty paid and customs broker fee	All	National	Increases price of imports, protection of local industry
Canada, USA	Mexico	Social / Political Government intervention Customs and entry procedures	Arbitrary complexity in regulations, for example executive order regulations; NOM certificates (certification that a good complies with an applicable standard) obtainable only by Mexican importers or producers, not foreign exporters.	All	National	Discourages small and medium sized companies from exporting
Indonesia	Mexico	Social / Political Government intervention Anti-dumping investigations and duties	Reference pricing of tropical hardwood plywood and other “sensitive” products. A bond must be paid if a Mexican importer reports a lower price, which is forfeited if they do not submit proof of actual product cost.	Tropical plywood	National	Minor impact
USA	Mexico	Social / Political Government intervention Anti-dumping investigations and duties	Alleged that USA cut-size bond paper was being dumped in Mexico and that USA exports threatened to injure the Mexican industry.	Cut-size bond paper	National	Protects domestic paper industry
USA	Mexico	Social / Political Government intervention Customs and entry procedures	Inconsistent enforcement of phytosanitary regulations, for example non-acceptance of APHIS-issued phytosanitary certificates.	Wide range	National	Increases cost of imports / protects domestic industry

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
USA	Mexico	Social / Political Government interventions Export subsidies	Free trade zones where raw or semi-processed materials, parts and machinery can be shipped in-bond, free of tariff for processing in Mexico and export from Mexico.	All	National	Encourages domestic processing
USA	Mexico	Social / Political Para tariffs VAT	15% assessed on cumulative value of US plant value, inland US freight charges and any other charges listed on the invoice, plus duty	All	National	Protection of local industry
USA	Mexico	Social / Political Quantity controls Quotas	Tariff Rate Quotas to import wood products established under NAFTA, mainly covering softwood chips and planks.	Selected	National	Reduced imports
USA	Mexico	Social / Political Quantity controls Quotas	Mexico uses auctions to allocate both import and export tariff-rate quotas. Announcement of the auctions is made no more than 15 days in advance of the auction.	Sawn timber	National	Reduced trade flows, higher costs of imports
USA mostly affected but all potentially	Mexico	Social / Political Government intervention Customs and entry procedures	Emergency notification of phytosanitary and other standards-related requirements with little or no notice given to trading partners.	All	National	Increased uncertainty / risk in exporting (limited impact)
USA, Canada	Mexico	Social / Political Government intervention Government procurement policies	Procurement Law (1994) distinguishes between procurement contests open to national and international suppliers. Most government tenders are open to all countries. Requirements are same for foreign and domestic suppliers.	All	National	Minor impact
USA, Canada	Mexico	Social / Political Para tariffs Import taxes and licence	A two year temporary import licence is required to import raw materials	Logs	National	Minor impact
USA, Canada, Chile	Mexico	Social / Political Government intervention Growing subsidies	National Programme of Reforestation; Forestry Development Programme or Forestry Plantation Support Programme; Promote the Forestall Development.	Growing	National	Longer term increase in Mexican wood supply
USA, Canada	Mexico	Social / Political Government intervention Customs and entry procedures	Import permits for softwood and hardwood sawn timber required by Sectaria de Agricultura y Recursos Hidraulicos	Sawn timber	National	Breaches NAFTA

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
China	Mexico	Social / Political Government intervention Anti-dumping investigations and duties	A certificate of origin and a sworn statement as to the origin of the merchandise to prove that a good is not from China	Selected	National	Discriminates against China goods.
Australia	New Zealand	Health and Safety Generic building codes	Approval system for acceptance of new material and systems	All	National / Local	Minor impact
Australia, USA, Korea, Russian Fed, Indonesia, Malaysia	New Zealand	Health and Safety Phytosanitary	Forests Act (1949) requires response to discovery of all pests	All	National	Minor impact
All	New Zealand	Social / Political Government intervention Afforestation subsidies	Landowners willing to plant eroding land can apply to forest authority for financial assistance for silvicultural operations.	All log output	Provincial	Minor effects. Limited growing area affected.
Japan, Australia, Chile	New Zealand	Social / Political Government intervention Logging ban	1993 Forest Amendment Act bans export of most logs, chips and sawn timber from natural forests and restricts harvest to areas with an approved sustainable management plan	Logs, sawn timber and chips from natural forests	National	Minor, further limits native forest harvest. Encourages imports of substitute material. Promotes sustainable management of indigenous forests.
All	Papua New Guinea	Social / Political Government intervention Subsidies	Development assistance in forest management and domestic processing from IMF, World Bank and donor countries development assistance	All	National	Minor impact
All	Peru	Health and Safety Other health and safety Contract enforcement	Slow and uncertain judicial decisions make contracts difficult to enforce	All	National	
All	Peru	Social / Political Government intervention Export subsidies	Juridical Stability Agreements which guarantee current statutes on income taxes, remittances, export promotion regimes, administrative procedures will remain unchanged for 10 years.	All	National	Export promotion at expense of competitors
All	Peru	Social / Political Government intervention Export subsidies	Peru has three types of Free Trade Zone: export processing, special commercial treatment, special development and tourist. Activities in export processing zones are exempt form customs duties and all taxes except social security for 15 years.	All	National	Export promotion at expense of competitors

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
All	Peru	Social / Political Government intervention Export subsidies	The Andean Development Corporation provides limited financing to exporters at rates lower than Peruvian banks	All	National	Export promotion at expense of competitors
All	Peru	Social / Political Government intervention Export subsidies	Exporters can receive rebates of import duties and a portion of the value added tax on their inputs.	Selected	National	Export promotion at expense of competitors
Peru, all	Peru	Social / Political Quantity controls Bans	Peru bans the export of logs	Logs	National	Environmental impact
USA	Peru	Social / Political Government interventions Customs and entry procedures	Imports of $ 5,000 or more are subject to a pre-shipment inspection, which must be performed by one of the three selected pre-shipment inspection companies.	All	National	Excessive delays, increases costs of imports, importers pay 1% of FOB value of goods.
USA	Peru	Social / Political Government intervention Government procurement policies	Seller or agent must register as a supplier with the appropriate ministry and provide credentials that a Peruvian firm is legitimate representative of the USA company. An agent must be resident of Peru.	All	National	Opportunity for corrupt practices
NZ, Indonesia, Malaysia, PNG	Philippines	Health and Safety Phytosanitary	Imported logs required to be debarked and anti-sapstain treated	Logs	National	Increases costs for log producers.
All exporters, importers	Philippines	Illegal activities	Corrupt activities (including DENR) / smuggling / international piracy distort price mechanisms, processing and trade	All	National / Provincial / Local	Increases trading costs, depletes resource.
	Philippines	Social / Political Government intervention Growing subsidies	Plantation development support for private investors on unforested land for example IFMA. Financial incentives for Industrial Tree Plantations	Selected	National / Provincial / Local	Minimal effect. Balance of government regulations a disincentive
All except AFTA countries.	Philippines	Social / Political Government intervention Processing subsidies	Incentives for activities in priority investment areas, tax credits if 50% of income from exports	Composite boards, construction, joinery, furniture, pulp and paper	National / Regional	Encourages domestic processing
All exporters	Philippines	Social / Political Para tariffs Customs procedures	Import clearance procedures involving disputes over invoices and "facilitation" fees	All	National	Universally applied. Adds to import costs

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
All exporters, Philippines	Philippines	Social / Political Government intervention Trade practices	Cost of inter-island shipping high due to restrictions on shipping lines.	All	National / Regional	Discourages within-country trade to add value. Increases cost of Indonesian resource.
Philippines	Philippines	Social / Political Government intervention Quantity controls Bans	Export ban on all native wood products with the exception of value-added products (plywood, furniture, pulp and paper)	Logs, sawn timber.	National	Small impact, restricts Philippine exports, encourages domestic value-added processing.
Philippines	Philippines	Social / Political Government intervention Quantity controls Bans	Export ban on sawn timber from imported logs	Sawn timber	National	Small impact, restricts Philippine exports
Malaysia, Japan	Papua New Guinea	Social / Political Government intervention Quantity controls Log export tax	Previous log export tax introduced 1994. Tax breaks on log exports introduced October 1998. No tax on logs under $60 / m^3	Logs	National	Encourages log exports when prices low, environmental impacts
All	People's Republic of China	Environmental Legislation	Environmental protection rules apply to all operations but variability in compliance monitoring	All processing activities	National / Local	Favours domestic / local industries. Reduced environmental impacts of forest product processing facilities.
All	People's Republic of China	Health and Safety Generic building codes	Wood Substitution Policy, 1983, no longer enforced but effects continue.	All except pulp, paper, woodchips and furniture	National	Significant impact in reducing wood consumption.
All	People's Republic of China	Health and Safety Phytosanitary	Phytosanitary certificate required for all imported wood products. Fumigation requirements for some products. Additional charges for South East Asian panel products	All	National	Adds to import cost.
USA, Canada, NZ, Chile	People's Republic of China	Health and Safety Structural codes and standards	Foreign testing methods not recognised for structural wood products. Acceptance procedures not transparent.	Sawn timber, panels.	National	Restricts imports of structural wood products
	People's Republic of China	Social / Political Government intervention Growing subsidies	Afforestation incentives under Forest Law of China (revised 1998): Long term loans for afforestation and silviculture, taxes on "tending" and tied surcharges on forest industries. $723 million invested in natural forest protection in 1998.		National / Provincial / Local	Low cost plantation resource, imports less competitive.

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
All	People's Republic of China	Social / Political Government intervention Other	Bureaucracy and inconsistent application of laws and regulations. Lack of clear consistent framework of laws and regulations	All	National / Provincial / Local	Adds to cost of supplying market
All	People's Republic of China	Social / Political Government intervention Price manipulations	Inconsistent and widely fluctuating monetary exchange practices and limitations on exchanges of currency	All	National	Market uncertainty discourages imports.
All	People's Republic of China	Social / Political Government interventions Price manipulations	Discriminatory issuing of trading licences. Variability in import policies and requirements by region, economic zone or government entity.	All	National	Market uncertainty discourages imports.
All	People's Republic of China	Social / Political Para tariffs Additional taxes and charges	VAT 13% for logs, 17% for other products. Russian Federation, North Korea and Mongolia had advantage with a 7% VAT.	All	National	Adds to cost of imported goods, Russian Federation imports advantaged.
Canada, Korea, USA	People's Republic of China	Social / Political Government intervention Anti-dumping investigations and duties	Anti-dumping and anti-subsidy Regulation 1997 enacted. Investigations against Canadian, Korean and USA newsprint producers in 1998. Exporters allege injury to China's newsprint industry caused by market conditions	Newsprint	National	Discourages imports of newsprint
Indonesia	People's Republic of China	Social / Political Import tax	Plywood check price adjusted to protect domestic industry	Plywood	National	Encourages raw material imports, protects domestic industry
Indonesia, Malaysia	People's Republic of China, Hong Kong China	Illegal activities	Smuggling of wood products through HKC to avoid VAT. Estimated illegal trade is $700million / annum	Plywood	Local	Reduced Government revenues
Malaysia	People's Republic of China, Chinese Taipei	Social / Political Import tax	Plywood import taxes based on check price, not actual price	Plywood	National	Encourages raw material imports, protects domestic industry
All	Russian Federation	Illegal activities	Illegal activities in processing and trade	All	National	Discourages investment
All	Russian Federation	Social / Political Government interventions Multiple exchange rates	Separate trading sessions for importers and 'speculators'	All	National	Minor but potential to increase
Japan	Russian Federation	Social / Political Government intervention Additional charges	5% export duty imposed on softwood logs and sawn timber	Softwood logs and sawn timber	National	Discourages trade
Selected	Russian Federation	Social / Political Government intervention Export licensing	Licensing and export tax for beech, oak and ash	Hardwood sawn timber	National	Minor impact

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
USA, Canada, Japan, Korea, China	Russian Federation	Social / Political Government intervention Structural	Lack of legal framework, lack of commercial orientation and lack of clear enforceable property rights	All	National	Discourages investment in Russian Federation industry
Cambodia, Laos, Myanmar	Thailand	Illegal activities	Illegal log traffic from Myanmar, Cambodia and Laos . False imports from Myanmar to cover illegal logging in Thailand	All	National / Provincial / Local	Environmental impacts, reduction in log prices.
All	Thailand	Social / Political Government intervention Afforestation subsidies	Celebration of golden jubilee of King's accession to throne - subsidised planting of up to 800,000 ha of community forestry	All	National	Increased longer term Thailand wood supply
All	Thailand	Social / Political Government intervention Export assistance	Reduction in import duties, taxes, and duties for businesses establishing in certain parts of the country	All manufactured products	National	Encourages processing and Thai exports.
All	Thailand	Social / Political Government intervention Logging ban	Total commercial logging ban applying to the economy's natural forest estate	All	National	Encourages imports
All	Thailand	Social / Political Para tariffs Customs procedures	Import clearance procedures, duties may be assessed on check prices, "facilitation fees" may be required.	All	National	Increases costs of imports.
Canada	USA	Environmental Certification Mandated minimum quantities	Recycled content requirements for products used by federal government and by individual states	Paper / paper products	National / State / Local	Favours producers able to meet standards at low cost. Reduction in waste, increase in use of transport fuels.
Indonesia, Malaysia	USA	Environmental Certification	Demand for certification of sawn timber as being from sustainable managed forests	Sawn timber, value-added sawn timber products.	National	Application of certification has potential to be an NTM. If cannot meet certification requirements may encourage processing of low quality products for markets not requiring certification.
Malaysia, Indonesia	USA	Environmental Certification Requirements for "environmentally friendly" products	FSC, Green Seal (primarily paper products), etc	Selected	National / State / Local	Minimal impact, discourages consumption of goods without label, increases product cost.
Malaysia, Indonesia, Peru	USA	Environmental Certification Sub-national authority actions	Ban or restriction on municipal purchase of tropical timber	Tropical timber	State / Local	Minor impact but visible. Reduces consumption of tropical hardwoods.

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
USA	All economies with less stringent environmental protection requirements	Environmental Technical standards	Required capital expenditure by domestic producers to comply with environmental protection requirements	All	National / State / Local	Compliance costs for USA producers, competitive disadvantage with imports not required to comply.
USA, Canada, Chile, NZ, Indonesia, Malaysia	USA	Environmental Technical standards	Harvest reductions as required by legislation and policy drastically reducing timber supply	Sawn timber	National	Encourages imports
All	USA	Health and Safety Generic building codes	Lack of uniform building codes, local ordinances and regulations vary widely making it difficult to ensure product compliance	Building	State / Local	Raises cost of exports to USA, protects local industry.
All	USA	Health and Safety Other Health & Safety Testing and inspection requirements	Complex regulatory systems, lack of adoption of international standards	Selected	National / State / Local	
All	USA	Health and Safety Other health and safety Non-structural codes and standards	Lack of full implementation of the metric system	Selected	National	Increases costs of doing business in USA for foreign firms.
All	USA	Health and Safety Phytosanitary Restrictions	Proposed rule to accept no untreated solid wood packing materials from anywhere	Softwood packing material	National	Raises cost of exports to USA, protects local industry.
All except Mexico / Canada	USA	Health and Safety Phytosanitary Quarantine	Importation rules for unmanufactured wood articles, which include heat treatment, fumigation, irradiation and other means of pest control. Exceptions and additions for specific products and sources.	Selected	National	Raises cost of exports to USA, protects local industry.
Mexico	USA	Health and Safety Phytosanitary Restrictions	Restrictions proposed on the importation of unmanufactured wood articles from border states in Mexico thus making importation requirements the same as for rest of Mexico and the world (except Canada) and allows for additional treatment of sawn timber	Logs, lumber, railroad ties and other "unmanufactured wood products"	National	Potentially limits competition from Mexican producers

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
NZ, Chile, Russian Federation	USA	Health and Safety Phytosanitary Prohibition	No new permits and difficulty with old permits to import unmanufactured wood products from temperate forests, except Canada and Mexico. Appeal filed in March 1999, no request for an injunction pending appeal, no date set for oral arguments	Logs, sawn timber, chips	National	Although lifted in January 1999, the threat of a new appeal impedes trade. Limits imports, protects local wood producers
China / Hong Kong China	USA	Health and Safety Phytosanitary Restrictions	Softwood packaging material imported from China is required to be heat treated, fumigated or treated with preservatives prior to departure from China.	Softwood packing material	National	Raises cost of exports to USA, protects local industry.
All	USA	Social / Political Government intervention Customs and entry procedures	Trade defence instruments not in conformity with WTO: 1916 Anti-Dumping Act. Prohibits import and sale of products at a price substantially less than the actual market value in the principal markets of the country of their production.	All	National	Discourages competitive exporters, protects local industry
All	USA	Social / Political Government intervention Export subsidies	Foreign Market Development Cooperator Programme (FMD) and Market Access Programme (MAP): assistance for market research, trade servicing, technical assistance, consumer oriented promotions	Selected	National	Encourages USA exports to detriment of exports of competing suppliers
All	USA	Social / Political Government intervention Export subsidies	Export Credit Guarantee Programme (GSM 102): encourage exports to buyers in countries where credit is necessary to maintain or increase US sales	Selected	National	Encourages USA exports to detriment of exports of competing suppliers
All	USA	Social / Political Government intervention Government procurement policies	Many US federal “Buy America” provisions are included in State and local procurement when federal funding is provided	All	Provincial / Local	Limits access to USA procurement and contracts

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
All	USA	Social / Political Government intervention Government procurement policies	Buy America Act (1933): prohibits public bodies from purchasing from foreign sources, requiring certain levels of local content and / or extension of preferential price terms. Waived for certain qualifying countries.	All	National / Provincial / Local	Favours consumption of local products.
All	USA	Social / Political Government intervention Growing subsidies	Cooperative Forestry Assistance Act (1978); Resource Planning Act (1980); Food, Agriculture, Conservation and Trade Act (1990)	Selected	National	Increased supply of USA wood, limited impact
All	USA	Social / Political Government intervention Growing subsidies	Preferential taxation: Capital gains taxation. Taxpayer Relief Act (1997), maximum capital gains tax rate of 28% available to individuals and businesses structured as non-corporate entities	Selected	National	Encourages forestry investment
All	USA	Social / Political Government intervention Growing subsidies	Preferential taxation: Forest land taxation. Modified Property Tax Laws: land is taxed on an *ad valorem* basis where land in forest use is taxed at forest land values irrespective of its potential for higher and better use.	Selected	State	Encourages forestry investment
All	USA	Social / Political Government intervention Growing subsidies	Foreign Sales Corporations (26 USC Sections 921-27). Approximately 15% of income generated from sales abroad of goods made in US with not more than 50% of value of such goods attributable to imported parts exempt from taxation	All, except unprocessed softwood timber (post 1993)	National	Promotes USA exports
All	USA	Social / Political Government intervention Tax code discrimination	Information reporting requirements of the US Tax Code as applied to certain foreign owned (25% + foreign shareholding) corporations mean that domestic and foreign companies are treated differently.	All	National	Adds to complexity and cost for foreign-owned corporations in USA.
All	USA	Social / Political Government intervention Tax code discrimination	Conditional National Treatment: specific reciprocity and performance requirements for foreign-owned firms.	All	National	Adds to complexity and cost for foreign-owned corporations in USA.

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
All	USA	Social / Political Government intervention Tax code discrimination	Internal Revenue Code 163j: limits the tax deductibility of interest payments made to 'related parties' which are not subject to USA tax, and of interest payments on loans guaranteed by such related parties.	All	National	Adds to complexity and cost for foreign-owned corporations in USA.
All	USA	Social / Political Government intervention Tax code discrimination	State corporate income tax for foreign-owned companies assessed on basis of a proportion of their total world wide profits, and is calculated in such a way that a company may have to pay tax on income earned outside of the USA.	All	Sate	Adds to complexity and cost for foreign-owned corporations in USA.
All	USA	Social / Political Government agreement Trade blocks	Regional trade blocks which agree to mutual concessions, or preferential treatment that enhances trade within the block, for example NAFTA.	All	National	Encourages within block trade to the exclusion of others.
All	USA	Social / Political Para tariffs Customs surcharge	Customs & Trade Act (1990),Omnibus Budget Reconciliation Act (1990): user fees on arrival of merchandise, vessels, trucks, trains, private boats and planes.	All	National	“Excessive” fees discourage imports.
Canada	USA	Social / Political Quantity Controls Quotas	Canada-US Softwood Lumber Agreement[14]	Softwood sawn timber	National / Provincial	Limits Canadian exports, protects USA industry
Canada, Mexico	USA	Social / Political Government intervention Government procurement policies	Selective purchasing at the sub-federal level: companies’ access to contracts curtailed as a result of business links to particular third party countries, for example Massachusetts in the case of Myanmar	All	Provincial / Local	Limits access to USA procurement and contracts

[14] Although this is a negotiated solution to an NTM (Canadian subsidies), the authors contend that this is an NTM if it does not accurately capture trade distortion due to Canadian subsidies.

Economies affected by NTM	Economies imposing NTM	Type	NTM Description	Products Affected	Level	Significance/effects of NTM
Canada, Mexico.	USA	Social / Political Government intervention Government procurement policies	Small Business Act (1953): provides loans and grants, encourages bids, sets aside certain contracts for US small businesses (approx. 30% of all federal procurement dollars; some states set aside 70%)	All	National / Provincial	Limits access to USA procurement and contracts
Japan, Indonesia, Malaysia	USA	Social / Political Government intervention Customs and entry procedures	Invoice / information requirements for exporting certain products to US are burdensome and costly.	Unknown	National	Additional cost to exporting economies
Japan, Korea, China	USA	Social / Political Quantity Controls Bans	Forest Resources Conservation and Shortage Relief Act (1990): 100% export ban on logs from Federal lands west of the 100th meridian, except timber surplus to needs, and 1995 ban on log exports from State and other public lands (excluding Indian land) west of the 100th meridian.	Sawn timber, logs	National / Local	Reduced log exports, more local processing, lower log prices to local producers
Indonesia	USA	Social / Political Government intervention Anti-dumping	Threat of anti-dumping investigations	Pulp and paper	National	Discourages robust competition
All	Viet Nam	Health and Safety Phytosanitary	Phytosanitary certification required for all products	All	National	Unnecessary costs on imports additional
All	Viet Nam	Social / Political Government intervention Export ban	Ban on export of logs and sawn timber for wood harvested from natural forests	Logs and sawn timber	National	Encourages domestic processing
All	Viet Nam	Social / Political Government intervention Growing subsidies	There are a number of these but they have not been quantified, effects (to date) are not believed to be significant.	All	National / Regional / Local	Minor impacts
All	Viet Nam	Social / Political Government intervention Logging ban	Limit on harvest from natural forests	All	National	Environmental impacts, encourages illegal activities in surrounding economies
Selected	Viet Nam	Social / Political Para tariffs	Variable Import tariffs	All	National	Favours certain suppliers

6. ENVIRONMENTAL EFFECTS OF MEASURES AFFECTING TRADE[15]

In this section, NTMs are examined from an environmental impacts perspective.

6.1 Introduction

Relationships between trade and the environment are becoming increasingly important as the world grapples with sustainable development and economic growth across a diverse range of economies. Numerous international organisations and conventions, including the WTO Committee on Trade and Environment, the **International Tropical Timber Organisation (ITTO)**, APEC, the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**, and **the Convention on Biological Diversity (CBD)** are confronting trade and environmental issues. However, measures must ensure global environmental protection and, at the same time, must not impinge on the sovereign rights of countries or impose limitations to trade.

Forests are complex ecosystems capable of providing a wide range of economic, social and environmental benefits. However, such benefits are valued differently by different people and communities. Local, national and international interests in forests also vary, and forests are increasingly expected to fulfil different roles over time. During the 1970s local communities increased their stakes in forests in response to growing awareness of how important these resources are to them[31]. Furthermore, countries began to recognise that forests have a global role. With such shifts in emphasis, governments have been compelled to act as intermediaries between international interests in forests, national actions, competing demands for forest resources, and forest product trading organisations.

Increasing concerns about relationships between forests and the environment occur at three levels: forests, industrial processing and utilisation of products. In the case of forests, deforestation and damage caused by poor forest management and excessive harvesting have consequences for biological diversity, local communities, global climate change and environmental quality, for example, the erosion of landscapes and water quality. When wood is processed pollution occurs, energy requirements are often high, and there are issues of waste disposal. Finally, the consumption and utilisation of wood products contributes to environmental problems through transporting, packaging, energy use, recycling and disposal.

By the late 1970s, changes in the overall concept of economic development had created a new role for forestry with forests becoming recognised as an integral part of national economies contributing natural capital, raw materials and environmental goods. Timber has typically been a primary source of capital for forested nations, through the trade of wood for currency, and the use of forests as equity for loans, debt relief and other similar purposes. Some nations have used forest industries to create employment and increase

[15] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.

incomes by building industrial capacity to process wood into finished consumer products. Forests also provide a diverse range of environmental benefits such as providing biodiversity and a focus for eco-tourism, protecting water quality, regulating hydrological flows, and protecting landscapes.

In view of the complex interactions between forests, environmental issues and economic development, as outlined above, it is little wonder that environmental management and trade issues are becoming even more closely inter-woven. This trend has been largely driven by concerns that international trade may be partly to blame for unsustainable development and that freer trade may be contributing to the relocation of polluting industries to economies with less stringent environmental controls and to resource exploitation in primary commodity exporting countries. However, the counter view is that free trade may enhance environmental quality by increasing global wealth, enabling poorer countries to afford environmental protection, that greater wealth increases willingness to pay for environmental quality and that international trade facilitates the exchange of more environmentally benign technology.

Given the current focus on global environmental issues and the development of Multilateral Environmental Agreements[5], economies are adopting a diverse range of strategies, responses and measures. Such approaches may include taxes and/or subsidies, licenses, prohibitions and various types of sanctions or incentives at any point in the chain from production to consumption. Other instruments include increasingly stringent environmental legislation, restrictions on the use of chemicals or hazardous substances and encouragement for adopting voluntary agreements for environmental enhancement. That is, guidelines and practices for forest harvesting, certification and eco-labelling. In isolation, the promulgation of these measures often makes sound environmental sense, especially in the context of addressing specific country issues. However, with the interpretation and final implementation of these measures, complex interactions with other policies, in particular forestry and trade, evolve.

From the literature review and survey carried out during this study, it is evident that little empirical information currently exists from which firm conclusion can be drawn regarding the environmental impacts of measures. In view of this, the study presents a number of case examples that should be used to guide future discussion and further studies on how best to expand trade and meet the environmental objectives of economies, communities and the diverse range of societies' stakeholders. The economic implications of environmental measures are examined further in Section 9.

6.2 Global Trends and Environmental Impacts

Before considering the environmental effects of some measures affecting trade, it is useful to consider significant global trends that were identified during the study and how they

5 For example the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change 1994 (INC/FCCC), the Convention on Biological Diversity 1992, and CITES.

are linked to environmental issues. Such links markedly influence responses to introduced measures.

6.2.1 Globalisation and Environmental Management

Globalisation of the world's economies is rapidly increasing due to developments in information transfer, transport, economic growth and expanding world markets. As privately owned organisations, rather than countries, principally carry out trade, there is an increasing tendency for such trading organisations to encounter unfamiliar and changing terms and conditions. The products being traded vary with organisations, and the products may face different restrictions depending on the type of product or even its specific dimension, species, composition, degree of surface preparation, etc[7].
In addition, the organisations tend to assume that trade in products within the market has taken into account the full range of costs, including environmental costs, but such an assumption is often inappropriate. Rarely are policies and conditions in place that would enable producers to take full account of the cost of sustainable resource use and the impacts this may have on other goods and services provided. This is particularly true for forest resources.

A common response to this imbalance is the development of systems to internalise environmental costs, that is , to reflect them in the price of the end product. Governments introduce a diverse range of environmental measures and regulations on air and water quality, waste management, toxic chemicals, and land management to achieve this. However, the introduction of such measures can also affect competitiveness. Based on a number of studies that have assessed the impact of environmental legislation on the competitiveness of trade[17], it has been concluded that the effects on competitiveness of such international differences in environmental regulations are small. Although the direct effect of any one regulation may be small, when a variety of measures exists simultaneously the effects may be more significant.

Internalising of costs can be expected to increase with time as global awareness of environmental issues increases and as technology and information advances increase awareness of new and perhaps as yet undiscovered or unrecognised environmental issues. At the same time, the internalisation of costs is becoming more difficult in the global economy as such costs need to not only reflect country environmental issues but also global concerns. The effect of added cost from these actions is creating increasing uncertainty in the trading environment. Trading enterprises react to this uncertainty by highlighting the measures as apparent trade inconsistencies. Specific examples of environmental policy applied within the APEC region are provided in the following section.

6.2.2 Environmental Policy

Concerns about sustainable development have led many APEC economies to reorientate domestic policies to focus more on environmental objectives. As a result, forest management objectives in the region have evolved considerably in recent years. APEC consists of economies of great diversity and circumstances, and some economies are better positioned than others to pursue coherently structured national environmental policies that are based on the concept of sustainable development. The developed economies in the

region have already withdrawn large areas of their natural forests from industrial production functions and significant amounts of the remaining production forests are being managed sustainably. The trend has spread to some of the developing economies, and we can expect the number of sustainably managed forests to increase as the member economies prosper. The following are specific examples of environmental policy applied within the APEC region:

New Zealand - Resource Management Act

New Zealand has a coherent, consistent and comprehensive environmental policy. The **Resource Management Act 1991 (RMA)** controls all resource use within New Zealand including land, water and air. The purpose of the Act is to promote the sustainable development of natural and physical resources. It aims to preserve the natural character of the environment and protect outstanding natural features and landscapes, and uphold the principles of the Treaty of Waitangi. The Act is 'effects based' rather than activity focused. The most significant impacts of processing industries involve the siting of new plants and the control and management of site discharges. The Act singles out industrial and trade premises by regulating the discharge of contaminants from these sites to air and land. Implementation of the Act is still evolving but it has already made a significant positive contribution to sustainable development.

Australia - National Forest Policy Statement

In Australia, the National Forest Policy Statement ensures the sustainable development of the country's forestry resource. A component of this process has been the development of **Regional Forest Agreements (RFAs)** which are agreements between Commonwealth and State Governments for providing a blueprint for the future management of Australian forests. The 20-year agreements aim to establish:

- a world class **Comprehensive, Adequate and Representative (CAR)** forest reserve system;
- certainty for industries and regional communities, enabling the development of internationally competitive and ecologically sustainable industries; and
- ecologically sustainable management of the whole forest estate, both on and off reserves.

RFAs have been developed by State and Commonwealth Governments in consultation with stakeholders.

Other Developed Economies

Japan, the USA and Canada also have comprehensive environmental policies to guide sustainable development. Canada recently amended its Forest Practices Code. The USA probably has the most stringent and rigorously enforced environmental policy of the APEC economies. It is estimated that 13% of the capital spent by the paper industry over the past 10 years went into environmental requirements. Sustainable management of public and private forests is controlled by a wide range of national, state and local environmental laws. The industry's **Sustainable Forestry Initiative (SFI)** programme provides a rigorous system of principles and guidelines pertaining to wildlife and water quality protection,

biodiversity conservation and responsible harvesting practices. This is a voluntary industry code of conduct (mandatory for American Forest and Paper Association membership), which sets additional requirements beyond what is required at the national, state or local level. An independent Expert Review Panel reviews the programme and advises on its progress.

6.2.3 Deforestation

There is a widely held public opinion that we are "cashing in" our forests, and commercial logging is perceived to be a major cause of accelerating tropical deforestation and temperate forest degradation.

The rates, causes and effects of tropical deforestation differ greatly from one country or region to another. Such differences relate to population density, population growth rates, the extent and quality of forest resources, levels and rates of development, the structure of property rights, and cultural systems. Estimates indicate that something in the order of two-thirds of tropical deforestation worldwide is attributable to farmers clearing land for agriculture[31][16]. The largest loss of tropical forest area is taking place in the tropical moist deciduous forests, the zone best suited for human settlement.

Of the 3,354 million m^3 of total roundwood consumption in 1996, around 1,864 million m^3 was used for fuelwood. Developing economies utilise approximately 90% of the fuelwood production.

There is growing public concern about how temperate forest resources are being managed and used with forest quality, health and vitality being major issues. Forest stakeholders are raising issues regarding the ability of current forest policies, management practices and ownership structures to balance forest quality with competing demands for timber, jobs, wildlife conservation, water resources, landscapes and recreational benefits. For example, in North America groups are especially concerned about logging practices, stumpage fees, and the rate, level and intensity of timber extraction in old-growth forests[32].

Plantation forests, which cannot provide the full range of goods and services supplied by natural forests and which often have a simplified ecology of one or a few species, are becoming increasingly important especially where large wood processing industries are being established.

From the above, it is apparent that forest utilisation and depletion is complex and that simple generalisations about the nature and extent of forests need to be balanced against changing socio-economic, political and environmental conditions.

6.3 Major Environmental NTMs in APEC

Environmentally motivated NTMs are widely used in the APEC economies. Almost every economy included in the inventory survey indicated that some type of environmental

[16] Note that such trends in deforestation impact on societies' responses to forest management and ecological sustainability. This comment does not infer that the same deforestation trends as seen globally necessarily apply in the APEC region.

measure is being used to protect the environment. The most common measures were logging bans and restrictions, and subsidies. Other important, although less frequently used measures were certification, recycling/emissions policy and procurement policy restrictions. These are discussed more fully in this section.

6.3.1 Logging Bans and Restrictions

The most widely used environmental measures in the APEC economies are logging bans or restrictions. Almost every economy has some form of restriction imposed. However, the circumstances under which they are introduced vary between the developing and developed economies.

Developing Economies - to Slow Deforestation

In the developing economies, logging restrictions are used to curb massive deforestation. In China, record floods in the upper reaches of the Yangtse River, especially in Sichuan province, were attributed to over-logging which led to deforestation and erosion. A logging ban was introduced in the Province on September 1, 1998 and a nation-wide logging ban is scheduled to become effective this year. As a result, it is estimated that wood supply will be reduced by 12-15 million m^3/year and that by 2000, a 40 million m^3 gap is expected to exist between domestic supply and demand. The actual gap is likely to be much lower, and the difference will probably be met by imports.

Developed Economies - to Conserve Native Forests and Biodiversity

In the developed economies, logging restrictions are aimed at conserving native forests and biodiversity. In the USA, for example, the Endangered Species Act restricts logging in certain areas to conserve the natural habitat of the northern spotted owl and the marbled murrelet[17]. As a result of the restrictions, there is a total export ban on timber and logs from federal lands, with the exception of timber surplus to needs, almost exclusively Alaska yellow and Port Orford cedars. There is also a total ban on log exports from state and other public lands west of the 100th meridian, excluding Alaska and Hawaii. Current log export controls disallow substituting public timber for exported private timber. These measures have a major impact on log flows in the Pacific Rim, and were partially responsible for the Asian log price spike in mid-1993.

In New Zealand, under the Forest Amendment Act (1993), the commercial harvesting of most natural forests requires an approved sustainable management plan. The natural forest areas not covered by the Act are: West Coast indigenous production forests managed under the West Coast Accord (an agreement between Government and industry and the conservation movement), lands reserved under the South Island Land for Landless Natives Act 1906, and planted indigenous forests. The Act's purpose is *"the promotion of sustainable management of indigenous forests"* and it seeks to achieve this by focusing on three specific areas: Landowners seeking to fell natural forests must have a management plan approved by the Ministry of Agriculture and Forestry; mills processing indigenous

[17] The USA note that the Endangered Species Act is not the only Act that restricts logging in certain areas, and that the ban on Federal lands does not extend to Indian lands.

timber must be registered to cut the timber; and, to promote the domestic use of indigenous timber, controls are imposed on exports.

The impact on trade is not expected to be significant because the role of the indigenous forestry industry in the domestic economy has diminished considerably. The New Zealand forestry industry is now based primarily on its plantation resource. Following the privatisation of its state-owned plantation estate, New Zealand forestry has become one of the most globalised industries.

6.3.2 Subsidies

Subsidies are the second most widely used environmental NTM. Most APEC economies provide subsidies or incentives to the private sector to encourage afforestation and reforestation. Environmental reasons are just one explanation. Increasingly they have been used to target the expansion of the forest resource base for developing domestic wood processing industries. As a result, it is difficult to distinguish their underlying motivation.

For example, the Chinese Government invested nearly $722.9 million (6 billion yuan) on natural forest protection in 1998. The amount invested is likely to increase each year along with the development of the country's economy, but the funds needed do not necessarily have to come from the government only. Although there is certainly an environmental element in the planting programme, the resource developed also provides a backstop of wood supply for future commercial production, as China is a wood deficit country. Similarly, the government of the Republic of Korea operates an investment programme to develop as well as protect new forest lands. The loan programme, which includes forestry development, public finance, prices and special accounts for institutional improvement of agricultural and fishing villages, totalled $3-4 million in 1997.

In the USA, the United States Forest Service provides assistance in the management, protection and use of forest resources on state and private lands in co-operation with state foresters, other state and federal agencies, tribal governments, non-profit organisations and academic institutions.

Afforestation and reforestation programmes are likely to become a controversial issue over time as the global plantation area expands and the real prices of many forest products continue to face a downward trend. The impact of the subsidy schemes is potentially distorting on trade. They can alter the comparative advantage of importing and exporting countries by the extent of the subsidies, provided other factors remain unchanged. Afforestation subsidies are also discussed in Section 7.2.

6.3.3 Recycling and Emission Control Policy

Recycling and emission control policies are prevalent largely in the developed economies of APEC, namely Japan, the USA and Australia. They are instituted to protect the environment as well as humans from health risks. In Japan, formaldehyde emissions from building products are strictly limited to the lowest level permitted even in German standards. This is because house construction has become virtually airtight with reliance on air conditioning rather than natural ventilation for cooling. The regulations affect all

timber products containing adhesives, such as panel products and laminated members. Volatile organic compounds from paints are also tightly restricted.

Concerns have been expressed by Indonesian producers that environmentally motivated measures have been used by the Japanese paper industry as an opportunity for raising new non-tariff barriers. The Japanese Environment Protection Agency has proposed that no government agency should purchase PPC (a photocopying paper grade) with a recycled fibre content below a minimum level or with a brightness greater than 70 units. This has created a response from the principal distributors of PPC to seek to convert all their supplies to 100% recycled paper at a variety of brightness levels. This is perceived as a barrier to the Japanese market for Indonesia's highly competitive PPC producers.

Regulations on the recovery and recycling of waste paper have the potential to affect the competitiveness of manufacturers and divert trade. For example, to meet the USA waste paper content requirements, Canadian newsprint producers have had to import waste paper from the USA. However, the policies promoting recycling waste paper can also lead to new trade creation. Trade in waste paper worldwide has grown over the last 15 years. Global exports have increased by more than 6% per annum since 1980 while world consumption of waste paper has grown by almost 4.6% annually over the same period.

Compared to developed countries, recycling and emission control policies are not widely used in the developing economies. Chinese Taipei is one of the few developing economies with such a policy in place. Its **Environmental Protection Agency (EPA)** imposes restrictions on all industries for gaseous and other effluent emissions. These controls affect the timber industry as much as other industries. In the Republic of Korea, the Ministry of Environment regulates the use of toxic chemicals, including wood preservatives. Neither the chemicals, nor the wood treated with them, may be imported. However, provided there is a standard to which the treatment chemicals are made, there is no problem importing treatment chemicals or treated wood in practice.

6.3.4 Procurement Policy and Usage Restrictions

Procurement policy and usage restrictions are not widely used in the APEC region except for the developed economies. Nonetheless, they have become the subject of much criticism because the main target has usually, but not exclusively, been tropical timber. When products are being singled out, the measures become significant barriers to the producers in these markets.

In the USA, a number of local governments have implemented or proposed bans or restrictions on the use of tropical timber or timber products in municipal projects. The city of Santa Monica, California pushed through legislation banning the use of tropical hardwoods in city projects. New Jersey introduced a bill in November 1994 aimed at prohibiting state purchase or use of tropical wood products unless "verified as sustainably produced by a comprehensive, reliable, and independent tropical hardwood certification program" approved by the environmental protection department. Another bill, introduced on 2 March 1998, proposed to ban the purchase of tropical hardwoods unless they come from certified sustainably managed sources. New York City may introduce restrictive measures that would ban the use of tropical woods or wood products in future city

contracts, unless purchased from a sustainably managed forest and independently certified by any group accredited by the **Forest Stewardship Council (FSC).** Further legislation is in the pipeline elsewhere to restrict the use of tropical timber in city projects.

The USA legislation also set a specific recycled content for paper and products used by the Federal Government. In the case of newsprint, the minimum recycled content is 40%.

Of the 12 ordinance-designated cities in Japan, the city authorities of Tokyo, Kanagawa, Kashiwa and Kobe have issued guidelines regarding the use of tropical hardwood plywood for concrete sheathing in municipal civil works. In 1993, the Tokyo Municipal Government introduced measures aimed at reducing tropical hardwood plywood consumption to 50% of current use within 3 years and to 30% of the current use within the next 5 years. Calculations by the ITTO suggest that this will have a minimal impact on the volume of tropical hardwood plywood consumed nationally as the proportion of the volume of tropical hardwood plywood affected by the ban is only 0.2%[33].

The Hong Kong, China Government is concerned about environmental issues regarding the use of tropical forests. Some government projects specify the use of softwoods for concrete formwork in order to preserve tropical hardwoods. This trend is expected to strengthen with time.

6.3.5 Certification and Eco-labelling

Probably the most contentious issue in the APEC economies in recent times is certification and eco-labelling. Environmentalists view certification as an alternative that is intended to ensure that forests are properly or sustainably managed using the “power of the market” to generate incentives. In addition, timber certification is perceived as a way to alleviate consumer concerns that the products they purchase are somehow contributing to the irreversible damage to the environment[34]. Producing countries have argued that they are unnecessary, lack a scientific basis, go against multilateral efforts to develop effective and balanced procedures, and discriminate against developing economies, especially the tropical hardwood producers.

Certification is not so much of an issue in Asian markets. However, it has become a growing concern among exporters to the developed economies in the APEC region and non-APEC economies. In the USA, the Certified Forest Products Council, a group of retailers committed to environmental standards, has been particularly active in this area. Such buyer groups are partnerships between environmental groups and industry, where members are committed to purchasing forest products from well-managed forests and to supporting independent certification and the FSC.

Canada also has a certification scheme in place, called EcoLogo Certification. The EcoLogo Certification is awarded to products “environmentally preferable” to their alternative. The objective is for 20% of products in a product category to meet the criteria for EcoLogo.

The Japanese Government supports voluntary implementation of certification and labelling. The Eco Market and Forest Certification schemes, both voluntary, are marketed in Japan. The Japanese public was reported to have become increasingly environmentally

sensitive. Tropical timber importing companies report that public resistance to the use of tropical hardwood is growing. The Seihoku group of plywood manufacturers has made a 70% reduction in the use of tropical hardwood over the last 8 years but the motivation for this is driven more by supply than by environmental concerns. Like the USA, Japan has restrictions imposed on the use of tropical hardwood plywood for concrete sheathing in municipal works.

Tropical producers also claim that the Waverley Council's (Sydney) "Good Wood Guide" is implicitly banning specific species of wood, including tropical timber, by advocating they are not to be used, instead promoting the use of softwoods and recycled fibre. Sydney 2000 is reputedly taking a similar approach. Apparently **Non-Government Organisations (NGOs)** and lobby groups have been working behind the scenes on these issues and have promoted their adoption by the local government. Tropical producers point out that Australia is a signatory to the ITTO, and as such is bound not to take such action until the deadline of December 2000.

6.4 Case studies

6.4.1 Certification

Background

Before considering the environmental implications of certification, it is worthwhile to briefly recap on its origins and objectives, as these must ultimately be used to assess the success of certification in achieving environmental goals.

Following on from the **United Nations Conference on Environment and Development (UNCED)** in 1992, international sustainable development has become a central theme. Many forestry nations came to realise that environmental management was an issue not only for tropical forests but also for all the world's forests. Subsequently, **the Commission on Sustainable Development (CSD)** was established with a mandate to oversee progress towards a global sustainable future. However, in parallel to the efforts of the CSD, a number of other developments were occurring. These included:

- efforts by the ITTO to work towards sustainable management of tropical timbers through the development of criteria and indicators;
- a growing sense of frustration that, 2 years after UNECD, limited progress had been made in promoting sustainable forest management and reducing the rate of deforestation;
- mounting concern among major forestry export countries about the actions of some European nations, notably Austria, which legislated for an eco-labelling scheme on tropical timber entering their market.

These issues, coupled with a desire by many countries to comply with UNCED commitments, led to the formation of the **Inter-governmental Panel on Forestry (IPF)** whose brief was to rapidly address sustainable forestry issues. The Austrian legislation was subsequently withdrawn due to pressure from tropical timber exporters. However, the measure was seen by forestry exporting nations as a forerunner to similar emerging

constraints in the main consumer markets. These perceptions in turn pressured countries to develop policies for sustainable forest management and to evolve internationally agreed criteria and indicators of its measurement.

This series of events led to a number of responses, which included the development of new alliances such as the Indo-British initiative, the Canada/Malaysia Working Group on Forests and the Montreal (1995), Helsinki (1994) and Amazonian (1995) Treaty Processes. Two other developments were initiatives by environmental NGOs to establish the Forest Stewardship Council (FSC) and an industry proposal co-ordinated through the **International Standards Organisation (ISO).**

Therefore, there were two main streams of activity developing to improve sustainable management of forests. One was multilateral, led by governments, and industry or environmental organisations led the other. The government-led initiatives were focused on criteria and indicators for defining sustainable management at the national level, whereas the other approaches were developing mechanisms for individual organisation responses. In the case of FSC, the focus was on creating a certification mechanism for sustainably managed timber and for the ISO approach developing a standard on sustainable forest management. For the ISO process, the final outcome was a Technical Report that provided guidance for forestry organisations on using existing information to set internal environmental policy, objectives and targets.

Since 1992 there has been unprecedented activity in the international forestry area with two major outcomes. Firstly, a significant increase in the awareness of forestry environmental issues by forestry stakeholders and secondly, recognition that all forests need to be managed in a sustainable manner.

On the whole, the record of progress on the Rio commitments in the area of trade and sustainable development has been poor. There are a number of reasons but probably the most important is the disparity in economic growth between developed and developing countries, which makes progress on environmental issues of shared concern difficult.

While few will dispute the importance of sustainable forest management, implementing the concept is not straightforward because of its ambiguity and vagueness. Some define sustainable forest management as developing a set of techniques to maintain the physical attributes of forests while others see it as a far broader philosophy for forest management which involves a broad spectrum of issues.

Forest certification is a process which results in a written certificate being produced by an independent third party validating claims to the location and management status of the forest in which the timber originated and consists of two components. These are:

- *Certification of Forest Management or Forest Auditing*:
  This involves inspection of forest management on the ground against specified standards and can be carried out at the forest management unit level or forest owner, region or country level. Existing certification programmes operate at the forest management unit level.

- *Product Certification*:
  Product certification depends on having effective chain-of-custody tracking procedures and is critical to ensuring certification is effective in influencing consumer product choice.

The two main objectives of certification are to improve forest management and to ensure market access for certified timber[35].

Forestry companies indicate that certified forests have resulted in a substantial improvement in management practice, which is achieved as a result of maintaining discipline, creating consistency and having in place a rigorous system of self-checking. Anecdotal evidence indicates that the pressure of an external auditing process creates a drive to meet targets, constantly review systems and look for improvement opportunities. To date there is no independent, verifiable work indicating that these results have been achieved.

Whether certification improves environmental quality is a simple question, which is difficult to answer[18]. No specific empirical data have become available either at a country or at a regional level which unequivocally link certification to changes, for example, in water quality, biodiversity, pollution control, nutrient retention or atmospheric processes. Even if such studies did exist, it would be difficult to separate the effects of certification from numerous other measures such as resource management, hazardous substances legislation, and land use planning measures. These effects will apply irrespective of whether the forest is certified or not. Another difficulty is extending the assessment of environmental effects beyond local boundaries, especially if as a consequence of certification, buying and selling behaviour for wood products is altered.

The total area of forest independently certified worldwide is approximately 15 million hectares[36], much of which is in temperate regions, largely Europe and North America[3]. This represents less than 0.8% of the world industrial forest estate. Only a minor part of the certified area is in tropical economies, where the problem of deforestation is greatest. The decline in forest cover during the period 1990-1995 for insular South East Asia was 1.75 million hectares of which 1.1 million hectares being in Indonesia. Although it may be argued that these figure reflect historic trends, recent data from an Indonesian –UK Tropical Forest Management Programme indicate that similar deforestation levels are still occurring with 29.5 million m^3 of official log supply and 32 million m^3 of illegal logging[37]. Blanchez (1997)[38] indicates that the decline in natural exploitable forests for Indonesia between 2000 and 2010 will be approximately 6 million ha or 1.2 million ha per year.

However, at a global level, FAO 1999[3] statistics indicate that loss of forests is still high but there is accumulating evidence that the rate of deforestation is declining.

[18] Certification could also have unintended negative environmental impacts resulting from unintended discrimination and loss of market share. For example, if a producer is forced to switch from a market where prices are high (but where certified products are required) to a market where prices are low (but certified products are not required), it could lead to an increase in the harvesting levels in the producing country.

The focus of the above discussion has been on international certification efforts. However, there are also a number of regional and local initiatives including those of the Indonesian Eco-labelling Institute (LEI) and the establishment of the National Timber Certification Committee in Malaysia.

Much of the current literature draws attention to the issue of linkages between certification and trade. A common misconception is that all certification schemes are the same. Although the fundamental goals may be similar, the operating process and implementation of different mechanisms of different systems vary. Where schemes are between private organisations, voluntary, and driven by environmental goals, they should not be regarded as having formal trade implications and can therefore fall outside trade negotiations[19].

It has been argued that many certification schemes, although voluntary, may in reality be compulsory due to important retailers being unwilling to carry uncertified products[7]. However, such concerns should be re-evaluated in light of the recent move by Rayonier Inc not to renew its FSC certification for 34 000 ha of radiata pine plantation in Southland, New Zealand at the end of 1999. Organisations obviously have the ability to make decisions based on business strategy, not compulsion. Although this development illustrates that certification is not compulsory, it should not necessarily be taken to reflect a new trend. The issue of certification is analysed in more detail in Sections 9 and 10, and more conclusions are drawn regarding the effectiveness of certification.

6.4.2 Biodiversity Habitat Protection and Endangered Species

Biodiversity and its maintenance are increasingly international obligations. Two important biodiversity-related conventions affecting forestry, and that will potentially impact on trade are the **Convention on Biological Diversity (CBD),** signed at the Earth Summit in 1992, and the 1975 CITES.

The CBD provides principles and obligations for the conservation, sustainable use and fair and equitable exploitation of other species. Furthermore it emphasises that a fundamental requirement for maintaining biological diversity is the *in-situ* conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings. The CBD does not prescribe any particular methods for conserving biological diversity, but it does require member countries to develop national biodiversity strategies and to integrate these with other forms of planning. Furthermore, it requires countries to monitor their biodiversity, establish a system of protected areas, and introduce procedures to assess and avoid, or minimise, the impact on biodiversity of proposed projects[39].

CITES aims to limit the threat posed by trade through a system of import and export controls. Compliance with this convention is typically supported by country-specific legislation, for example the Trade in Endangered Species Act 1989 in New Zealand. Endangered species may only be traded when accompanied by an export permit, issued by

[19] Several economies believe that even if "schemes are between private organisations, voluntary and driven by environmental goals" they are subject to the relevant disciplines of the agreement on Technical Barriers to Trade, including transparency and non-discrimination.

the country of origin, and an import permit, issued by the country of import. Threatened species may only be traded if accompanied by an export permit from their country of origin stating that the transaction is not harmful to the species[39].

The implementation of these conventions and the development of country policies that support their objectives are underpinned by a broad spectrum of measures. Measures which relate to forestry include logging bans, establishment of set-aside areas, habitat protection, codes of practice for forest management, stream-side reserves and riparian strips, and the addition of tree species to Appendix III of CITES. The following discussion considers links between some of these measures and the achievement of biodiversity objectives. However, it should be noted that these measures might not necessarily be considered as NTMs. However, their implementation often has influences on trade and/or may contribute to the introduction of other measures that are more clearly regarded as NTMs, for example, the introduction of subsidies following implementation of logging bans.

6.4.3 Logging Bans: Thailand

A nation-wide logging ban was instigated in Thailand in January 1989 and is still in force today. Although the move was in response to large-scale landslides and flash floods in 1988, in more recent times it has had implications on the country's biodiversity management strategy. The implementation of the logging ban effectively ended a legal log trade and the country was forced to meet local sawn timber demand from abroad as only a small proportion of wood was available from plantations. Timber supplies were subsequently sourced, either legally or illegally, from Cambodia, Laos and Myanmar[40], contributing to the depletion of forest resources of neighbouring countries.

To address issues of deforestation and loss of biodiversity, areas within Thailand have been identified and given legal protection with 7.82 million ha (or 60.4% of the remaining forest area) being designated national parks, wildlife sanctuaries, forest parks and non-hunting areas. However, despite efforts to further increase the protected areas, they are still threatened by continual agricultural encroachment, shifting cultivation, illegal logging and hunting. The construction of roads, dams and industrial estates is also placing pressure on natural resources by contributing to habitat fragmentation and degradation[40].

An important protected area in Thailand is the "Western Forest Complex" which is part of a contiguous ecological unit covering 1.21 million ha and is one of the largest protected areas in continental South East Asia.

To date, Thailand has not ratified the CBD. However, it is apparent from the above that although there are no empirical data on the effect of the logging ban on biodiversity within Thailand, the instigation of the ban in 1989 was a catalyst for many subsequent actions, in particular the establishment of protected areas. Some may argue that such actions are too little too late and that structural aspects of ecosystems are still under threat due to industrial development. However, encouragement should be taken from the responses of the Government in moving to slow the pace of environmental degradation.

6.4.4 Logging Ban: Republic of the Philippines

Similar developments have occurred in the Republic of the Philippines. All logging within old-growth forests was prohibited in 1992 in response to deforestation, grazing, shifting cultivation and forest conversion for permanent subsistence agriculture that occurred over a 20-year period. All remaining virgin residual forest was transferred to non-exploitable reserves and a total log ban was imposed. Once again such actions appear to have been catalysts for significant responses to growing international concern about biodiversity and the CBD. The Republic of the Philippines ratified the CBD in 1991. Of particular importance was the promulgation of the Republic Act 7586, otherwise referred to as the National Integrated Protected Areas System[41]. The objectives of this legislation were to conserve biodiversity and promote sustainable development.

Although such legislative measures have been put in place, there is currently few empirical data that allow for objective assessment of their environmental benefits. It is commonly recognised by commentators that the lack of baseline information and subsequent monitoring of natural resources is a major obstacle to the enhancement of biodiversity.

6.4.5 Implementation of a Biodiversity Strategy in New Zealand

Recently the New Zealand Ministry for the Environment released a document outlining a draft strategy for New Zealand's biodiversity[42]. The strategy reflects New Zealand commitment, flowing on from the ratification of the CBD, to help stem the loss of biodiversity worldwide. The strategy establishes a strategic framework for action to conserve and sustainably use and manage New Zealand's resources for the maintenance or improvement of biodiversity.

Following on from the release of the strategy, a number of issues have been raised by forest industries regarding its potential impact. Of particular concern is the implementation of measures that will effect the competitiveness of New Zealand's plantation forestry in international markets and how the environmental benefits of measures will be assessed against the change in competitiveness.

On the cost side there is potential for increased environmental monitoring costs, and costs associated with land retirement for riparian set-asides or retention of indigenous forest islands within plantation stands. However, where plantations are adjacent to some of New Zealand's indigenous forests, biodiversity has been enhanced due to pest control in the adjacent pine forests. In addition, pine plantations have been found to provide a suitable habitat for native birds, in particular the ground-dwelling kiwi. This has been enhanced by the use of pest control in such areas.

6.4.6 Pollution Control and Waste Management

A wide range of measures are being adopted in order to reduce wastes and many of these measures influence trade. Such measures include the introduction of stringent environmental emission standards, limitations on the use of chemicals, standards for the use of recycled fibre for paper products and restriction on packaging. Some measures, such

as requirements for recycled fibre in paper products, have been previously recognised as restrictive and therefore fall into the category of an NTM.

The use of waste paper as fibre furnish for paper manufacturing has been increasingly introduced in order to reduce waste and potentially reduce demand for virgin fibre. However, since the collecting, sorting and recycling processes add cost and therefore reduce profitability, paper makers have been reluctant to introduce them[43]. The counter-action by national and local authorities has been the introduction of regulations or financial incentives for including recycled fibre in paper products. In some cases measures have been mandatory.

Following the introduction of legislation by the USA that set minimum levels for recycled fibre in newsprint, typically 40%, there was a marked decline in the export of newsprint products from Canada to the USA. This reduction was in part attributed to Canadian producers having to import waste paper from the USA, as local collection networks could not supply adequate quantities to meet the necessary recycled component. Although the flow of waste paper from the USA to Canada reduced a waste disposal issue in the USA, a range of other environmental issues was created. For example, larger amounts of fossil fuels were used for transportation, and industries were relocated away from areas near to forests and closer to points of consumption, with greater log haul distances[43].

During this study no empirical data were found which analyse the positive and negative attributes of introducing mandatory requirements for recycled fibre into paper products from an environmental impacts perspective.

Controls on the use of chemicals have also markedly affected the competitiveness of wood processing industries. The following section provides a case example that has attracted public attention and outlines how these concerns have resulted in costly remedial action which, in turn, will have impacted on competitiveness. The case example considers chlorine bleaching of pulp and the production of dioxins.

6.4.7 Chlorine Bleaching of Pulp and the Formation of Dioxins

In mid-1985, a series of US Environmental Protection Agency tests at supposedly ‘clean’ background sites unexpectedly led to the detection of 2,3,7,8 tetrachlorinated dibenzodioxin (2,3,7,8 TCDD) and related dibenzofurans in fish[44].

These studies provided the first indications that pulp and paper mills employing chlorine-bleaching technology were a source of dioxins. Subsequent investigations at five bleached kraft mills in the USA confirmed that trace quantities of dioxins were found in most of the sludges, effluents and bleached pulps. Although the concentrations detected varied widely, it was shown that the bulk of the formation occurred in the bleach plants[45].

Dioxins, which are more correctly referred to as polychlorinated dibenzo-dioxins (PCDDs), constitute a family of 75 different congeners with molecular structures varying depending upon the extent, and location, of chlorination. A closely related group of compounds, the furans, or polychlorinated dibenzofurans (PCDF’s), is a family of 135 congeners. The

mammalian toxicity of these compounds varies by a factor of 1000 and the most toxic congener is 2,3,7,8 TCDD. Of the compounds tested, this congener has one of the lowest LDSs (lethal dose to 50% of the test population), with values in the range of 0.6 –2.5 p.p.b being reported for most mammals. Sublethal effects are exhibited at significantly lower concentrations.

The concentrations of dioxins observed at some mills were clearly above guideline levels set by the USA EPA. These environmental concerns, together with political and market issues, meant that it was critical that the bleached kraft pulp industry responded by minimising the discharge of these compounds.

As a result of the link between dioxins and the use of chlorine in kraft pulp bleaching, detailed research programmes were initiated in Canada, the USA and Sweden to investigate the problem. In the USA, 104 bleached kraft pulp mills had their effluent, sludge and pulp surveyed, while in Canada all 47 bleached kraft mills were also investigated. The results indicated that the TCDD concentrations in bleached pulp ranged from undetectable to about 0. 1 p.p.t (parts per trillion), from 10 to several hundreds p.p.t. in sludge and from undetectable to about 100 p.p.q (parts per quillion) in final effluents. The concentrations varied significantly from mill to mill and were influenced by pulping and bleaching conditions. The study of the Canadian mills reached the following conclusions:

- oxygen delignification reduced dioxin concentrations in pulp by about 40%;
- mills using high levels of chlorine dioxide substitution in the chlorination stage produced extremely low or non-detectable levels of dioxins;
- having a low chlorine multiple was very beneficial in minimising dioxin formation;
- defoamers may contain dioxin precursors;
- the use of chips from sawmills using PCP as an antisapstain should be avoided.

The chlorine multiple is the ratio of the mass of chlorine used in bleaching to the lignin content of the pulp. Oxygen delignification is a means of lowering the lignin content of the pulp entering bleaching. The use of oxygen delignification, together with high chlorine dioxide substitution, was therefore a means of preventing dioxin formation if care was taken with the sources of chips and the nature of the defoamers used. Further studies enabled the Pulp and Paper Research Institute of Canada to define a ‘dioxin-free zone’ which prevented the formation of detectable concentrations of dioxins. In response to legislative pressure and market demands, the international pulp and paper industry moved rapidly to address the problem. Mills invested substantial sums in oxygen delignification and chlorine dioxide bleaching technology to ensure that they were operating in the ‘dioxin-free zone’. For example, in Canada alone, over $2.2 billion was invested in order to alleviate this problem with the result that dioxin emissions were greatly reduced between 1988 and 1994.

New Zealand has two bleached kraft mills that have been at the forefront of international developments in regard to minimising dioxin concentrations. In 1990, Tasman Pulp and Paper was the first New Zealand company to install oxygen delignification and they followed this process with a conventional bleach plant using 35% chlorine dioxide

substitution[46], and the level of substitution has subsequently been increased. This bleach sequence enabled Tasman Pulp and Paper to reduce its already very low dioxin concentrations. The 2,3,7,8 TCDD concentration in the pulp has been reduced by 90%.

Carter Holt Harvey Pulp and Paper, Kinleith, completed the modernisation of its bleach plant in 1991. A proprietary oxygen delignification process is used, followed by a molecular chlorine free bleaching process[46]. No recently published data are available on dioxin concentrations from this state-of-the-art bleaching plant, but their operating conditions would ensure that it is within the 'dioxin-free zone'.

Despite the implementation of these dioxin control strategies, international studies have occasionally detected very low levels of dioxins in bleached kraft pulp and associated effluents[47]. As a point of reference, analyses from mills that do not bleach, or do not bleach with chlorine-containing compounds, show similar or higher dioxin TEQ (toxicity equivalents) concentrations. It therefore appears that some overseas mills have reached background dioxin levels. Insufficient data are available from New Zealand to confirm the situation in this country.

In the case provided above, industries were forced to alter processing conditions and comply with more stringent environmental regulations and significant costs were incurred. Furthermore, it is likely that the industries' competitive positions were markedly affected, at least in the short term, by increased costs.

The introduction of the Cluster Rules in the USA also imposed a substantial cost on the USA pulp and paper industry; current estimates are in the vicinity of $3 billion[48]. Moore (1999)[49] indicated that investments required to meet domestic environmental regulations in the USA markedly increased costs and diverted capital for plant modernisation; it is estimated that these investments accounted for approximately 13% of the capital spent by the paper industry over the last 10 years. This percentage is expected to double over the next 5 years.

6.5 Conclusions

The integration of forestry, environmental and trade policies appears set to increase dramatically in response to increasing demand being placed on forest resources to meet both environmental and economic goals for markedly differing economies. Key drivers for these trends are increasing awareness of the global role of forests, in particular issues concerning deforestation of tropical forest land, degradation of temperate forests, and the impact excessive harvesting has on biological diversity, local communities, global climate change and environmental quality. The responses to these issues have been diverse, with approaches including the introduction of taxes and / or subsidies, licenses, prohibitions, sanctions or incentives at various stages of the supply chain. Other measures have included increasingly stringent environmental legislation, growing acceptance of certification and implementation of codes of practice.

Given the range of measures that can be adopted and the points of application in the supply chain, there are many possible interventions. With this in mind only selected

examples of measures have been considered in this study to outline the possible environmental effects.

A complex and diverse range of measures is being applied to bring about improvements in environmental quality. Unfortunately, there appears to be little empirical evidence that unequivocally allows direct assessment of their environmental impacts.

Certification of forests and products has been introduced to improve forest management and ensure market access for certified sawn timber. Both of these objectives appear to have been met as forest owners recognise that their management systems have improved as a consequence of certification. Measures that have been introduced to improve biodiversity such as logging bans, set-aside areas, codes of practice, and stream-side reserves may contribute to a range of environmental effects such as increased harvesting in marginal areas or increased CO_2 emissions arising from product substitution by non-renewable materials. However, most importantly, there appears to be an increasing commitment to environmental protection by many stakeholders, although effective environmental monitoring is often lacking to verify the benefits of such policy measures.

To overcome the apparent lack of data to assess the environmental impacts of trade-affecting measures it is recommended that some detailed life-cycle analyses be undertaken for different time periods, which can be related to a specific policy mix in particular economies. Such an approach would allow the development of a quantitative framework to compare relative environmental impacts in terms of, for example, global warming potential, biotic depletion, resource depletion and nutrient loads.

7. ECONOMIC IMPACT – SOCIALLY AND POLITICALLY MOTIVATED NTMS[20]

This section focuses on NTMs identified as having a social or political motivation.

7.1 Introduction

Barbier (1995)[50] identifies the most common NTMs applying to forest products trade as qualitative restrictions and / or quality controls directed at specific products, wood species and even individual exporters. The survey work carried out as part of this project supports the claim that quantity controls are widespread. Bans and quotas were identified as an issue in over half the APEC economies. Aspects of entry procedures for imports were also identified as a major issue for many of the economies. However, the survey work (Section 5) also revealed that afforestation subsidies, industry / export assistance, the threat of anti-dumping procedures, and procurement policies, particularly at a local or sub-national level, are significant NTM issues within APEC.

There is invariably some overlap in classifying NTMs into a simple set of categories because of their complexity. Bans, quotas, entry procedures, and even afforestation subsidies can all be portrayed as containing elements of environmental protection in their rationale. Categorising industry assistance or export support as social / political NTMs is less likely to raise concerns of overlap than the issue of anti-dumping measures. Protection from anti-dumping is permissible under WTO rules. However, at times, there is debate concerning whether the threat of anti-dumping is used legitimately. Whatever the truth, the threat posed by such provisions is clearly a factor taken into account by some in determining trading behaviour.

Overlap between various categories is also acknowledged and is made more challenging by changing justification for particular programmes over time. An afforestation programme, which began life with the clear objective of creating a new export industry, can with time become targeted at protecting eroding lands by converting them to forests. However, vestiges of the earlier objective may still be apparent with, for example, assistance being available not only to plant the eroding lands but also to carry out silvicultural management designed to enhance the value of these forests as a source of industrial wood.

7.2 Afforestation Subsidies

Most economies provide some incentives for afforestation. However, the actual policies affecting investment in forest growing vary widely among the economies of the APEC region. In some cases the prime reason for afforestation subsidies is clearly environmental (see Sections 5 and 6). There are also economies where the main rationale for support for afforestation differs according to different regions of the economy. This is demonstrated by

[20] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.

New Zealand's East Coast Project where the primary reason is stabilisation of erosion-prone land. However, the primary reason for support for afforestation in New Zealand from the 1960s until 1990, or in Chile in the 1970s and 80s was clearly economic. There are also cases where other social / political justifications, for example a royal jubilee (see summary of NTMs), dominate. In most of these latter situations environmental benefits are clearly of secondary importance.

The economic consequence of a subsidy for afforestation is reasonably obvious. It gives a higher return on a forest investment and encourages greater immediate investment in afforestation. In the longer term, this investment should result in a greater supply of wood than would have been the case without the subsidy, and a greater return on the investment.

Even in economies where there is a considerable history of support for afforestation, the rationale for this support can and does change over time. This makes the categorisation and analysis of any afforestation subsidies difficult. Today's wood output may well be the result of an intervention made 30 or more years earlier, and which was justified at the time by reasons that would no longer be regarded as acceptable or legitimate. A good example of a change of purpose occurred in New Zealand; it illustrates the difficulties of categorising these subsidies and quantifying their impacts.

New Zealand's first foray into afforestation occurred in the 1920s and 1930s. This investment was approximately a 50:50 state:private mix justified by a desire for self-sufficiency and expectations of a looming world wood shortage. The 1960s saw the start of the second planting effort, a taxpayer-subsidised programme aimed at creating the resource base for a major export industry[51]. Restructuring at the end of the 1980s saw tax reform, removal of subsidies and privatisation of the State's commercial forests. Despite this loss of assistance, the level of new afforestation in New Zealand during the 1990s has been greater than in any other decade this century. It can be argued that New Zealand's current afforestation effort is not entirely assistance free. The tax system allows the costs of afforestation to be written off in the year in which they are incurred, making investment in forestry more appealing than some other land based investments. However, any tax based assistance is minor compared to that of the earlier grant scheme era and plays a relatively minor role in the current rate of afforestation[52].

Unlike some other APEC economies, in most cases there is no legal requirement that, on harvest, land must be retained in forestry. To date, however, virtually all forest has been replanted in forestry after harvesting. This suggests that subsidies in this economy, or at least most subsidies for the pre-1970 period, were targeted at lands that were best suited for forestry. In New Zealand's case subsidised afforestation may not have resulted in excessive and inappropriate investment in trees, but instead accelerated the switch in land use from pastoral to tree farming.

McGaughey and Gregersen (1988)[53] outline the main social / political reasons that governments might choose to subsidise afforestation. These are to:

- modify a cultural or social bias against forestry investments;
- reduce investor risk and uncertainty;
- eliminate or reduce cash flow problems associated with the planting gestation period.

All of these may be seen as an attempt to deal with the externalities, which are frequently claimed to exist with forestry. As Paul Samuelson (1976)[54] stated, with externalities "*there can be no iron-clad presumption that profit seeking laissez-faire will lead to the social optimum*". However, if these externalities are to be appropriately targeted there must be a commitment to attempting to quantify their costs and contrast these with the benefits likely to arise from particular types of afforestation interventions.

7.3 Forest Product Processing Assistance

Few direct subsidies to forest product processing appear to exist in the APEC economies. Of greater importance are likely to be indirect subsidies, tax concessions and other NTMs that reduce the cost of individual production inputs, that is, raw materials, labour, capital, energy, and transport. Determining the economic impact of these subsidies, however, is difficult because of the variety of forms the assistance takes and the differences in processing technologies among APEC economies[55]. Economies such as New Zealand, Canada, and Chile have apparently reduced subsidies but there has been little change in economies such as Japan and the USA[7].

Government assistance to processing industries often involves reducing production costs through low stumpage fees, afforestation subsidies, tax concessions, assisted transport and the provision of infrastructure such as roads and power generation[7]. The plethora of assistance mechanisms that exist and the difficulties associated with disentangling true comparative advantage from subsidised advantage make it difficult to assess the extent to which government assistance creates a barrier to trade[7; 55].

Chilean Law No. 18.634 is an example of a direct subsidy to processing industries. This law offers a form of deferred payment of customs rights and state credit for capital goods. Capital goods are defined as machinery, vehicles, equipment and tools destined for the production of durable goods with a minimum life expectancy greater than 3 years[56].

7.3.1 Raw Material Subsidies

The Indonesian log export ban (May 1980 to May 27, 1992) is discussed in detail in Sections 7.5 and 10.4.3. However, brief mention of the ban's impact on plywood processing costs in Indonesia will be made here as an example of an indirect subsidy to processing. Using a non-spatial equilibrium model, Manurung and Buongiorno (1997)[57] identified that an important impact of the Indonesian ban on log exports was to lower the domestic log price by approximately 25% due to forest growers being unable to obtain export prices for stumpage. As a result of the lower domestic log prices, Indonesian plymills achieved approximately 11% greater gross value-added (the difference between

the f.o.b. export unit values for logs and the log equivalent f.o.b. unit values for processed products)[57].

Another example of government assistance resulting in an effective subsidy to forest product processing is afforestation subsidies. These subsidies have been discussed in detail in Section 7.2 in this study. The long-term impact of increased afforestation under a subsidy or tax concession scheme is to increase domestic wood supply and thus lower the local log price. This in turn may act as a subsidy to processing industries by lowering the cost of raw material inputs.

7.3.2 Transportation Subsidies

Transportation subsidies may take the form of direct government assistance to developing roading networks, car parking, etc, or mandatory regulations. Determining the level of transport subsidies is fraught with difficulty, particularly as there is continuing debate as to how to define a subsidy. Additionally there is debate as to whether the provision of road infrastructure can actually be regarded as a subsidy when marginal costs are zero[58]. Keeping these difficulties in mind, an example is shown by 1991 estimates of subsidisation of road transportation in the USA and Japan which $37 billion and $16 billion respectively (representing approximately 0.5% of GDP in both economies)[58].A proportion of this represents a subsidy to the forestry sector.

Subsidies to ocean freight potentially have an important influence on forest product trade. Ocean freight costs make up a large proportion of the cost of forest products with freight costs typically ranging from 15 to 30% of f.o.b. cost[55]. A number of economies have restrictions forcing exporters to use domestic shipping lines as a means of protecting the domestic shipping sector, for example the Philippines and USA. USA coastal shipping is regulated under the Merchant Marine Act (1920) (Jones Act)) Section 27 which requires the use of ships built, crewed, and owned by USA companies for all domestic trade. Citing studies by the U.S. International Trade Commission[59; 60] Deardorff and Stern (1997)[61] identify the price gap (price comparisons) of the tariff equivalent of the Jones Act as being 133% in 1991 and 89.1% in 1993. Deardorff and Stern do, however, consider these estimates to be slightly problematic.

7.3.3 Energy Subsidies

Energy subsidies have been identified as being pervasive in **Organisation for Economic Cooperation and Development (OECD)** economies[62]. Government assistance can take many forms, for example, direct grants, mandatory regulations, training assistance, guaranteed markets and tax exemptions for some end-uses of energy[58]. Like estimates of transport subsidies, it is difficult to estimate the level of energy subsidies, because of differences in opinion as to what actually constitutes a subsidy. Recognising these difficulties, 1992 estimates of energy subsidies in the USA ranged from $14 to $36 billion[58]. Such subsidies potentially have an important impact on production costs for forest product processing, particularly for energy intensive sectors such as pulp and paper.

Clearly, determining the economic impact of the different forms of government assistance to the processing industry is fraught with difficulty. A factor influencing the economic

impact of the assistance is the relative proportion of key inputs - raw materials, labour, energy, capital. The relative proportion of key inputs varies across economies and processing types, and within processing types according to the level of technological advancement[63]. Bourke (1988)[55] provides a detailed discussion of the results of two separate comparative studies of forest industry cost competitiveness. He concludes that *"[i]t is difficult to make firm cost comparisons between nations because of the many factors which affect competitiveness, the lack of relevant data, and the fact that considerable variation can exist in how costs should be valued"*.

In the following section a discussion of the Canadian tenure system and setting of stumpage fees is provided as an example of the contentious nature of the extent to which government assistance acts as a subsidy to processing industries.

7.3.4 The Canadian Tenure System and Stumpage "Subsidies"

Canada's provincial governments own 71% of Canada's forest resource. The Canadian Federal Government owns a further 23%[64]. Canadian provincial governments use a variety of tenure agreements to set out the responsibilities of private companies, which manage the majority of public forests. An important characteristic of these tenure agreements, which is common to all, is the setting of a fee payable to the Crown. These fees often take the form of a stumpage fee and / or rental charges[64]. Canadian provincial governments set these stumpage fees using a variety of complicated appraisal methods. For example, in British Columbia stumpage fees for major tenure types are determined by the "comparative value pricing system". The Crown sets a target annual revenue from the sale of stumpage. The burden of the desired revenue is then distributed among tenure holders according to the "relative" appraised values of the stands being harvested[65]. Where the appraised value of the stumpage fee falls below the market value there is an effective subsidy to Canadian forest product processors.

The difficulties of determining the market value of stumpage in a non-market economy has resulted in considerable debate regarding whether or not stumpage fees are undervalued in Canada[66; 67; 67; 67]. The complexities of determining appropriate stumpage fees mean that identification of the extent, if any, to which estimates of Canadian stumpage fees undervalue stumpage, is beyond the scope of this report.

A previous attempt to estimate whether or not Canadian stumpage fees are underestimated was made by Haley (1980)[66]. Recognising that the method of appraising the value of standing timber used by the US Forest Service and the British Columbia Forest Service are essentially similar, the appraised stumpage for the British Columbia Coast was found to be considerably lower than for western Washington[66]. These differences could not be explained purely in terms of cost differentials or timber quality differences between the two regions. A possible explanation identified is imperfections in the Vancouver log market, resulting in the log prices used for stumpage appraisals consistently failing to reflect full timber values[66;] .

There is certainly strong evidence to suggest that in British Columbia at least, government setting of stumpage fees is used as a means of stimulating the Province's economy. In June 1998, British Columbia reduced stumpage rates by 24% / m^3 for coastal loggers, and

14% / m^3 for inland operators. These measures were taken by the provincial government in an attempt to reduce the pressure on forest product producers due to the downturn in exports to Asian economies[68]. In response to this lowering of the stumpage fee, the USA and Canada agreed to amend the Softwood Lumber Agreement as it affects lumber manufactured in British Columbia[68].

The US-Canada softwood lumber dispute is likely to continue for some time, despite the efforts of the USA to force Canada to adopt the USA-style competitive bidding for stumpage. This is a reflection of the policy legacy created by the tenure system in Canada which creates community well being, employment and revenue that is dependent on the present tenure system and the public ownership of forests in Canada[69].

7.4 Harvest Control

Most economies also exert some control over the harvest, from prescribed 'allowable cuts', restrictions on the types and sizes of trees that may be harvested, or outright bans on the harvest of wood from certain areas or forest types. In all cases the rationale for these controls would appear to be clearly environmental. The justification for the particular management imposed is that the goods and services provided by the forest continue to be needed by local populations and these can be produced more efficiently by retaining land under forest than by converting the forest to other forms of land use.

As discussed in Section 6, the main concern with direct forest controls, such as bans, is not the ban itself but, rather, the frequent failure to describe intended environmental objectives. There is also often a failure to commit resources to monitoring and evaluating the programmes.

7.5 Log Export Bans

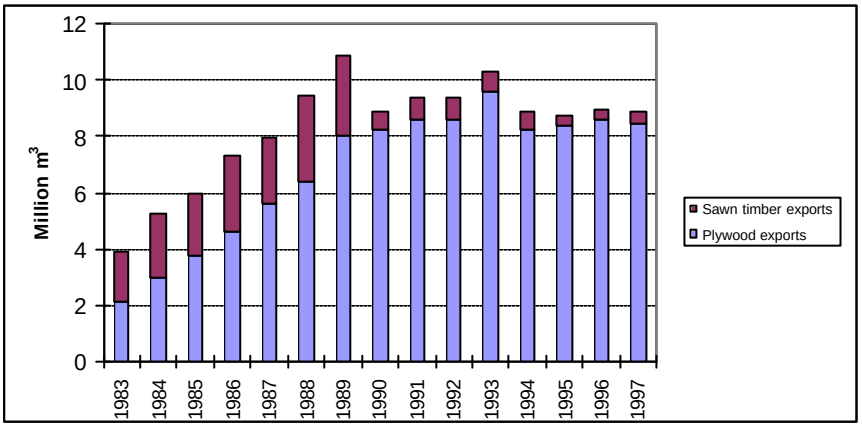
Log export bans are common throughout the APEC region, with examples to be found in Thailand, the USA, Canada, the Philippines, New Zealand, Viet Nam, Indonesia, Malaysia and Mexico. In most cases these bans are restricted to certain species or classes of forests and it may be argued that the bans are in place for environmental reasons. However, there are cases where bans are clearly intended to boost the development of the local economy. Lane (1998)[70] characterises the tone of various export bans in the Pacific North West and British Columbia as seeking "*to maintain economic stability, provide natural resources for national needs, and* [only] *more recently, to preserve the existing resource from overharvesting or pest infestation, or both, and to officially direct the use of public forests towards multiple use*".

One of the more studied examples of a log export ban is that of Indonesia. In 1980 Indonesia was the world's largest exporter of tropical hardwood logs. Between 1980 and 1985 log export bans were progressively phased in with the intention of building up value-added forest products processing along the lines of the well-established Peninsular Malaysian plywood and sawnwood industries.

Indonesian log exports ceased officially after 1985. The log ban and the later introduction of punitive export taxes on sawn timber in 1988 / 89 favoured the development and maintenance of a plywood industry.

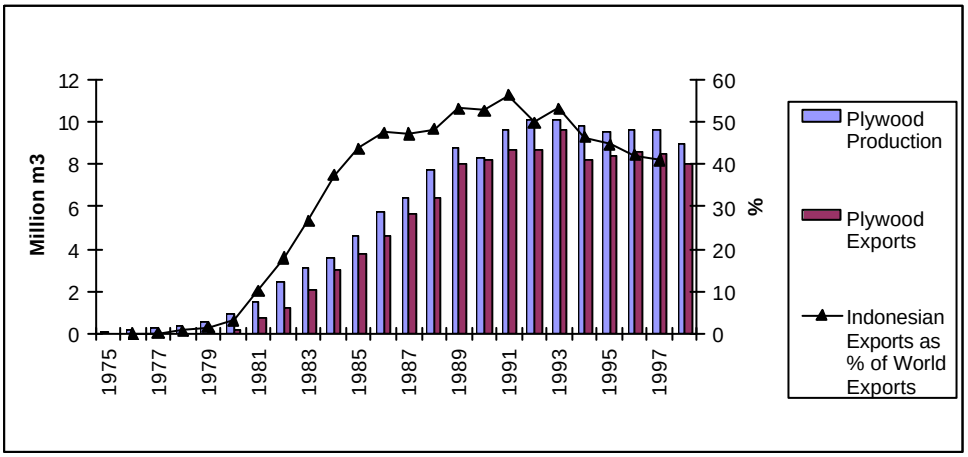
Plywood and sawn timber exports between 1983 and 1997 are illustrated in Figure 7. The importance of the introduction of the tax is immediately apparent. Within 18 months of the imposition of the sawn timber export taxes, exports had fallen from 2 million m^3 per annum to 600-700 thousand m^3 per annum. Since then they have remained at around this level. The significance, in world terms, of the Indonesian plywood industry, is illustrated in Figure 8. In 1980 Indonesia accounted for less than 3.5% of the world plywood trade. However, with the log export ban and the emphasis on value-added processing it rapidly became the world's major producer and exporter of tropical hardwood plywood, peaking in 1991 as the supplier of 56% of all plywood traded internationally (Figure 8).

Figure 7: Indonesian Exports of Plywood and Sawn Timber for the Period 1983-1997



Source FAO Yearbooks – various issues[71]

Figure 8: Indonesian Plywood Production and Exports for the Period 1975-1997

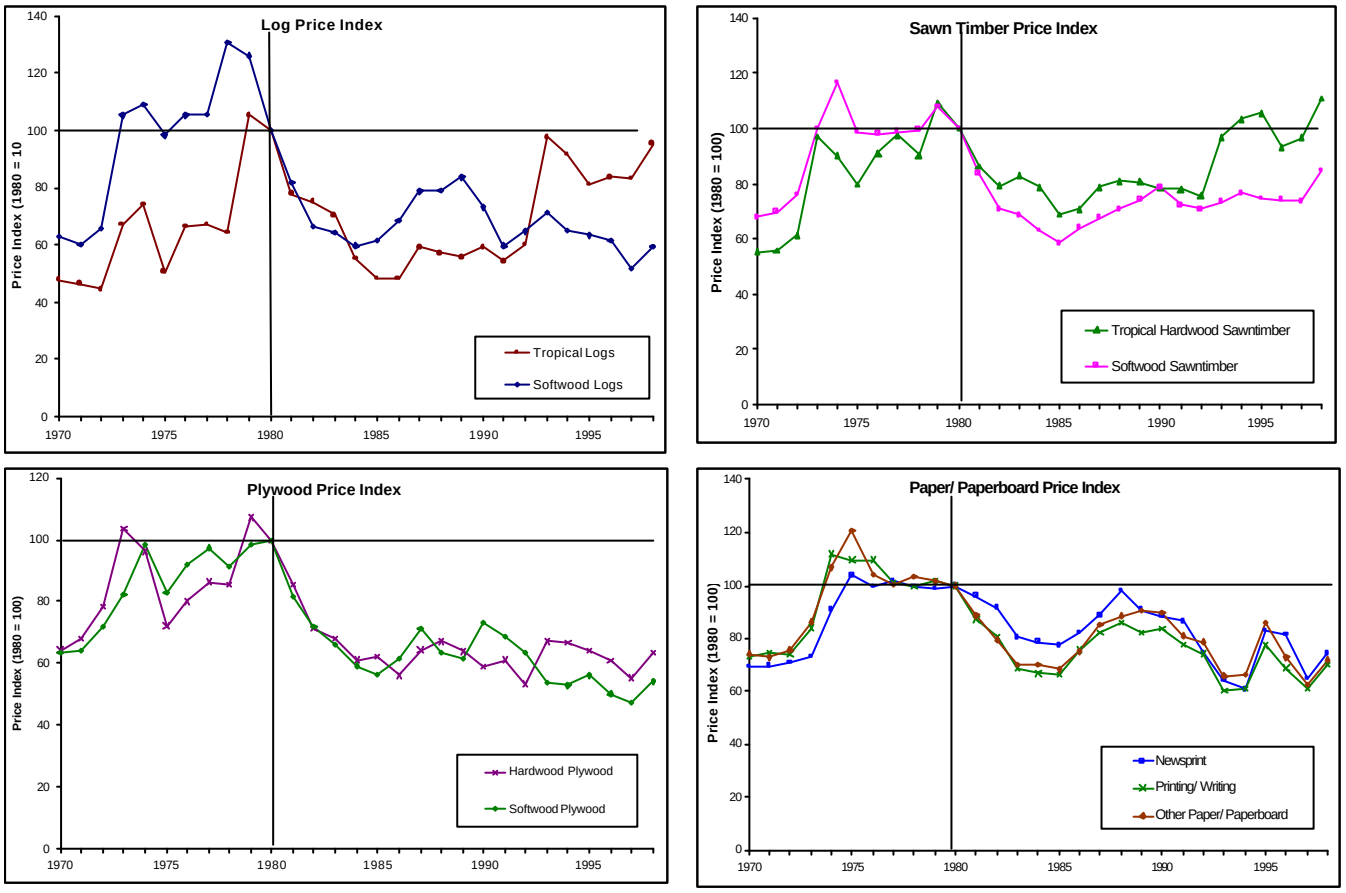


Sources: FAO Yearbooks, various issues. FAO 1999[71]
FAO – Forest Products Prices 1973-1992 (FAO Forestry Paper 125)[72]

Plywood from Indonesia has been consistently cheaper than the average world plywood price[73]. In 1980 it was \$227 / m^3 whereas the world price was \$409 / m^3. However, the

discrepancy between the Indonesian price and the world prices has been reduced over time, mainly because as Indonesia's contribution to the percentage of traded plywood increased, the world price declined towards the Indonesian one, as shown in Figure 9. In 1997 Indonesia's plywood exports averaged \$402 / m^3 whereas the world price was \$420 / m^3.

Figure 9: Real Price Indices of Selected Forest Products



Source: FAO Yearbooks, various issues. FAO 1999[71]

In analysing the impacts of the ban and subsequent success of the Indonesian plywood industry, it has at times been argued that the success was a result of a heavy subsidisation. Indonesian plywood recoveries have been claimed to be substantially lower than those of the industry (Japanese) it replaced. They may be as low as "*…43.5% … versus 50% elsewhere in Asia and up to 55% in Japan…*"[74]. Low recoveries have in turn been used to argue that the negative environmental impacts of the ban were much greater than the impacts that would have occurred had log exports simply been allowed to continue.

Not all commentators, however, share the view that the Indonesian industry is inefficient. Fenton (1996)[73] provides the counter case identifying the biggest problem as not low plywood yields, but rather, that abundant local supplies of cheap plywood have inhibited development of the reconstituted wood-based panel industries. This occurred despite the ready availability of suitable raw material. Fenton's[73] estimate of this raw material was "*15 to 22 m^3 of waste at the industrial plants and a further 20 to 70 m^3 of log waste in the forest*

to recover about 27 m³ of plywood and derivatives", or between 1.3 and 3.4 m³ of raw material for every cubic metre of plywood produced.

Another significant impact of the log export ban was a reduced internal price for logs. Fenton (1996)[73] reports the f.o.b. export value of logs used by the plywood industry as $77 to $132 / m³. With the ban in place the local price for these logs is reported to be typically in the range of $50 to $60 / m³. In March 1999, the ITTO[75] reported the Indonesian log prices as follows:

- face ply logs $85 - $95 / m³
- core ply logs $70 - $75 / m³
- saw logs $85 - $100 / m³

In summary, it appears that the world market price for logs used by the Indonesian plywood industry is in the range of $80 to $130 / m³ and the local price, with the ban in force, is $50 to $70 / m³. Thus the price impact of the ban suggests a loss to forest growers of $30 to $60 / m³. This reduces the incentive to invest in forest growing, possibly leading in turn to claims that afforestation subsidies are required.

The difference between local and world prices created by the ban also raises questions about the success of the local processing industry in adding value. With a transfer price of $60 / m³, a weighted domestic / export plywood price of $300 / m³, equivalent to $163.30 per cubic metre of log input, and manufacturing costs of $80 / m³ of input, Fenton (1996)[73] calculates the valued added in plywood manufacturing as some $23.40 / m³ of log processed. However, if an international market price is applied to the logs used by the industry the value added is significantly lower and may in fact even be negative. That is, it results in a value loss.

As a result of the ban Indonesia has a much larger plywood industry than would have been the case had no ban been put in place. Whether the contribution of that plywood industry is sufficiently great to justify the intervention is more debatable. However, the Indonesian ban does illustrate the main economic results of such interventions. These are:

- lower local log prices;
- loss of wealth by the owners of the forest resource;
- possible delay in introduction of some forms of processing;
- ongoing questions about the true value of value added by the processing which, in the absence of the ban, would have been exported unprocessed.

The quantitative impact of the Indonesian log export ban is examined further in Section 10.4.3.

7.6 Entry Procedures

The survey work revealed a number of social / political concerns relating to entry procedures. Issues concerning licensing, import permits, check price base entry taxes, additional charges and levies, complex regulations, arbitrary and variable interpretation of regulations by those controlling entry, and even "facilitation fees" were characterised as

being social or political in character rather than health and safety issues. Concerns relating to at least one of the above were identified for nearly a quarter of all the APEC economies. In most cases the impact of the entry procedures appears to be an increase in costs of trading with the economy in question. In a few cases, particularly where different interpretations of rules and check price based entry taxes are an issue, entry procedures cause exporters to divert trade to the economy through agents in other economies.

7.7 Asian Economic Crisis

The concern that the Asian economic crisis would result in an increase in regional NTMs as economies sought to protect themselves from the effects of the crisis, does not appear to have been realised. Reforms, agreed to by some economies as part of the conditions of the **International Monetary Fund (IMF)** and other international support during the worst of the crisis will, if fully implemented, serve to reduce rather than increase NTMs. The crisis may also have served to accelerate one of the major trends that was observable within the international forestry industry before the crisis, namely an increasing global integration of ownership of processing plants. As a result of the crisis a number of Asian plants have either been acquired partially or outright by European and North American groups. This acquisition of plants or interest in processing within the region by external groups and organisations may serve to dampen the tendency to impose NTMs.

Over the last 30 years international trade in forest products has increased at approximately twice the rate of increase in world demand for forest products. This trend is likely to continue. However, the role of the state and independent stand-alone processors in this trade is likely to decline. Trade between divisions of a single company domiciled in different economies is likely to increase. These transnational companies are likely to provide vigorous opposition to the introduction of new regulations they perceive as limiting the ability to produce and trade products from any part of the group with other parts of the same group.

7.8 Discussion

Of the various social / political NTMs, bans and quotas have the most obvious and visible effects and are most likely to be cited as a problem. The North American and Asian log export bans have quite clearly affected the international log trade. Although the USA Pacific Northwest is not free of restrictions on the log trade, they are less severe than those of British Columbia. The log trade from here is, as a percentage of harvest, 30 times that of British Columbia. The Indonesian ban on log exports precipitated that economy's change from the world's largest exporter of tropical logs to the largest exporter of plywood.

The bans and quotas set in place with the goal of capturing an economic benefit for the wood-producing economy may be the most visible of social NTMs. However, they are not necessarily the ones which will result in the greatest longer-term trade distortion. To date, at least, they are associated with a limited number of economies and products. Industry and export support programmes, entry procedures and para-tariff measures are issues for

some economies and products. However, they are not measures, which appear to be applied consistently by all economies to most products.

The measure with the greatest potential to distort trade would appear to be subsidised afforestation. Most economies provide some afforestation incentives to some classes of commercial wood producers. It can take many years before the supply impact of any particular afforestation incentive becomes apparent. During this period, however, the incentive may be modified or even phased out. For economies with significant plantation establishment, such as Chile, New Zealand and Malaysia, the potential for afforestation subsidies to have significant yet almost unrecognised effects on trade is marked.

8. ECONOMIC IMPACT – HEALTH AND SAFETY MOTIVATED NTMS[21]

This section focuses on NTMs that are motivated by health and safety objectives. It examines firstly, codes and standards in relation to building practices and secondly, phytosanitary and quarantine requirements.

8.1 Codes and Standards

Codes and standards are essential to trade as they define the product or service passing between producer and consumer and form the basis of commercial agreements. Although standards *per se* do not create trade, they are a necessary adjunct to that activity and should be an aid, not a deterrent. Domestic standards that differ from those of exporters can form an effective protective mechanism for domestic industry producing for home consumption but restrict the options for domestic producers to supply export markets with goods produced to their domestic standards.

When trade patterns change, existing codes and standards may become a barrier to trade in that they were first written for specific materials, products or practices whose descriptions do not suit new alternatives which have adequate performance. This problem occurs when the standards imposed by the importing country are prescriptive rather than performance-based.

This section will outline the regulatory framework for codes and standards and incidence of codes and standards as NTMs in the APEC region, and discuss the issues regarding these, other than environmental standards, in relation to health and safety objectives. Code harmonisation and the issue of prescriptive *versus* performance-based standards is discussed in relation to trade effects.

8.1.1 Agreement on Technical Barriers to Trade (TBT)

The 1994 agreement on **Technical Barriers to Trade (TBT)** resulted from the Uruguay Round of Multilateral negotiations and is a revision of the agreement of the same name resulting from negotiations during the Tokyo Round of GATT held during the 1970s. It commits signatories to ensure that when governments or other bodies adopt technical regulations or standards for reasons of safety, health, consumer or environmental protection, or for other purposes, such regulations and standards, and the testing and certification schemes related to them, do not create unnecessary obstacles to trade. It seeks to ensure that product standards are not used as disguised protectionist measures, and to reduce the extent to which they act as barriers to market access. The trade agreement requires member countries to collaborate to ensure that they each have mutually

[21] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.

acceptable technical regulations and conformity assessment procedures, and adequate and enduring technical competence.

The TBT agreement emphasises the use of international standards. WTO members are obliged to use international standards or parts of them where they exist, except where the international standards would be ineffective or inappropriate in the national situation. The agreement calls for harmonisation of standards and obliges members to fully participate, within the limitations of available resources, in developing and adopting standards at international and regional levels.

Progress to date on the development of ISO standards for forest products has been slow. Typically it has taken 10 years for ISO standards to progress from first draft to published standards but this is improving with the added impetus given to ISO work by the TBT agreement.

8.1.2 Incidence of Codes and Standards as NTMs in the APEC Region

Although the importance of Japan in APEC regional trade in forest products tends to highlight trading issues with this economy, our survey tends to confirm that the Japanese wood products market in particular as being obstructed by certification-related problems. Exporters to Japan consistently protest that the Japanese industry continues to support safety and other standards that are unique to Japan and which restrict competition. The requirement for **Japanese Agricultural Standard (JAS)** licensed products for government-financed construction has been restrictive for exporters to the Japanese market.

The North Asian economies of the Republic of Korea, China and Chinese Taipei have, or have recently had, building codes that discriminate against the use of wood products in construction. Although not commonly regarded as NTMs, as they affect both domestically produced and imported wood products, they do affect trade.

The lack of uniformity in building codes in the USA, and the variability in local ordinances and regulations, make it difficult to ensure product compliance. The lack of adoption of international standards and the use of conservative and prescriptive codes and standards appears to be common.

In brief, most issues relating to codes and standards were reported in North Asian markets, particularly Japan and the Republic of Korea.

8.1.3 Main Issues

Our survey indicates that the following are the main issues concerning codes and standards as trade distorting measures:

- differing cultural expectations;
- building codes which favour non-wood products;
- non-transparent approval systems for the acceptance of new wood products;
- frequent non-acceptance of foreign testing methods;
- prescriptive codes and standards, in particular the JAS standards

Standards are Regarded as an Expression of Cultural Expectations

Attitudes towards homes and cultural preferences for materials and structures can result in a diversity of preferences, which can often be interpreted as trade barriers. The Japanese expectations of exceedingly high quality are interpreted by foreign suppliers as being an over-specification of required performance. Japan argues that it is merely an expression of cultural expectations.

Non-structural codes and standards rarely feature as NTMs in a formal sense as they are usually overshadowed by more stringent "Japanese" grades, with the product specification demanded by the client making the published JAS standard irrelevant. These higher specifications are justified as they are not necessary to meet Japanese taste for appearance or because the product has to be handled by automated machinery, which is very intolerant of imperfections in shape. Arguments over appearance characteristics are difficult to assess as they are subjective. The expectation of near-perfect appearance quality is hard to understand when it relates to products that are not visible in a completed construction. This tendency for over-specification should diminish in the face of competition and dwindling supplies of perfect wood.

Building Codes in Some APEC Economies, although not NTMs, Discriminate Against the Use of Wood in Construction

In some APEC economies, building codes discriminate against the use of wood and wood products and therefore influence the volume and types of wood products traded. Bourke (1998)[7] notes that these codes cannot be considered as trade barriers when the discrimination is not just against imported wood. However, these policies can have trade-distorting effects. In China, for example, the wood product substitution policy of 1983 required that steel, cement, plastics or other materials be used in place of wood in most construction applications. The motivation here was not to promote health and safety reasons but to conserve the domestic wood supply. Although the policy is no longer enforced, exporters contend that the impact of past enforcement is significant and in applications where wood was used in the past, for example railroad ties, mine support beams, concrete formwork and telephone poles, wood products may continue to be discriminated against in building projects.

In the Republic of Korea, the National Building Code also effectively restricts consumption of wood products but fire safety is the motivating factor rather than conservation of domestic wood supplies. Wood structural components are prohibited in all buildings over a certain size and only non-combustible materials are permitted in the structure of these buildings.

Fire safety requirements in building codes are often used in many APEC economies to discriminate against the use of wood. Although advances in technology allow some wood products to perform to fire safety standards more than adequately in structural applications, emotive rather than technical arguments are often used as a basis for eliminating wood in construction. The by-laws in Japan, for example, stem from World War 2 experience, which saw widespread and uncontrolled urban fires, not unlike the

Great Fire of London. The logical reaction is to ban the use of combustible construction materials

The trend in fire safety requirements has been to focus on egress, building separation and compartmentalisation, and the specification of fire ratings for building materials rather than the specification of the materials themselves. A typical example of the inadequacy of prescriptive standards *versus* performance standards for fire safety is that unprotected steel beams will survive only a few minutes in fire before they soften and collapse. In comparison, sawn timber beams with the same load-carrying capacity will survive some 30 to 60 minutes in the same fire before collapsing.

Foreign Testing Methods are Often not Accepted

The above measures discriminate against both imported and domestic wood products. However, the opportunity for foreign firms to present technical evidence, in the case of fire safety standards, relating to product performance of wood in structural applications is often impaired. The lack of acceptance of foreign testing methods is often cited as an impediment for acceptance of new products in markets such as Korea and Japan. In Korea, for example, the **Ministry of Construction and Transportation (MOCT)** which controls the building code, does not offer foreign firms the opportunity to comment on draft standards and regulations, whereas domestic firms participate through the trade associations. Foreign firms are not able to offer the benefit of technological advances, or to influence measures which may be a hindrance to trade.

Another example of the hurdles involved in foreign testing procedures is the Japanese issue relating to Notification 56, a prescriptive standard describing 2 x 4 construction according to usual North American practice. This standard has been amended by the addition of a section allowing alternative materials, grades and species to be substituted on the basis of calculated performance. The properties of those alternatives must be evaluated by test procedures that foreign critics consider to be unnecessarily complicated and to draw little on established information. Thus, while a performance-based alternative is offered, it contains a hurdle that practically negates it. The test procedures have been distributed for discussion and will be published in late 1999.

In Japan, the Ministry of Construction is entering into **Memoranda of Understanding (MoU)** with equivalent bodies in other countries. This will allow data obtained outside Japan to be accepted for material evaluation, and recognises the status of third-party auditing bodies in other countries. These MoU concern the supply of building materials and are a result of the Japanese Government's recognition of, and determination to rectify, the financial burden that over-regulation in the building industry causes for Japanese consumers.

In 1997, a plan of deregulation was announced that aimed to reduce building costs by one-third by 2000. While this aim will not be achieved, extensive deregulation has taken place and is continuing. For example, in July 1999 laws were enacted which allow the **Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF)** to deal directly with foreign organisations for product examination, approval and certification, rather than having to

act through a Japanese industry association. This change should reduce the cost and time required for product approval on the Japanese market. This, however, may not be a simple process if equivalency agreements between Japan and the foreign testing organisation is required. At a higher level, testing procedures and evaluation criteria are being harmonised internationally through ISO standards but this is a slow process.

Acceptance Routes for New Products are often Non-Transparent

Many of the APEC economies exporting to Japan and other importing economies point out the non-transparent procedures often required to gain acceptance for new products. The known means of access for an exporter to the Japanese market, for example, have been identified as being one of at least five routes:

- "compliance", where an exporter gains the right to use the appropriate JAS or **JIS (Japan Industrial Standards) standards;**
- special approval, where a specific building, material or system is evaluated and approved under Article 38 of the **Building Standard Law of Japan (BSL)**;
- MoU, where mutual standards are recognised, harmonised and used;
- international standards, where goods are supplied to international (ISO) standards instead of Japanese standards;
- "association", where goods are supplied to a suitable Japanese building company to mutually agreed, but not necessarily JAS or JIS standards.

The process for product approvals in Japan by some of these routes was consistently quoted in our survey as an obstacle for new entrants in the Japanese market. To gain "compliance", authority to use JAS grade marks on products can be gained from MAFF. The process, however, is reported by exporters to be lengthy, involving requests for information that has little obvious relevance and hindered by close government-industry relationships which favour domestic firms.

An example of this difficulty is the process required for acceptance of preservative-treated timber products. A producer (exporter) must apply to the **Japan Wood Preservers Association (JWPA)** which checks that the type of chemical used complies with JIS standards, and that retention of those chemicals comply with JAS standards. The involvement of the JWPA is time consuming and is suspected of being a means by which the Japanese industry, through the consultative relationship between the JWPA and the Japan Wood Preservers Industry Association, can restrict competition and learn details of proprietary processes used outside Japan. Approval is given for specific proprietary brand formulations of preservative chemicals rather than for generic types.

Approval occurs more quickly if a Japanese manufacturer manufactures a particular chemical rather than a company outside Japan. The difficulty in gaining approval means that the exporting company has a vested interest in keeping the system in place and not making it easier for a competitor to enter the market. There is an alternative approval route called Acceptable Quality and involves **HOWTEC, the Housing and Wood Materials Testing Centre**. This tends to be more objective but the approval process is still protracted and is available only to Japanese companies. Thus, unless an exporter is large enough to

have a Japanese subsidiary through which the application can be made, this route is closed to exporters.

8.1.4 Code Harmonisation and International Standards

Theoretically, code harmonisation is the process of defining performance levels for given products or services and developing standards which will meet those levels. Code harmonisation will improve trade access by removing barriers within standards and by widening the applicability of those standards[76].

An example of code harmonisation within APEC economies is between the USA and Japan. It is evident that Japanese standards for newer, non-traditional building products being exported to Japan are almost *verbatim* copies of the corresponding North American standards. This is a situation that favours North American exporters since their production for the domestic market is also suitable for the Japanese market.

Under the **Closer Economic Relations (CER)** agreement, New Zealand and Australia have been working to remove barriers to trade between the two countries by harmonising standards. The main issues to date have been sawn timber dimensions, moisture content, grade, treatment and adhesives. The first of these differences has meant that NZ producers have to manufacture specifically for the Australian market. This issue is gradually being resolved by educating the New Zealand market to accept the Australian product. The second concern, adhesives, relates to glued products such as finger jointed framing for use in housing. The Queensland authorities insist that resorcinol adhesive be used when New Zealand experience and opinion shows that cheaper melamine-urea adhesives perform adequately for use in wall studs.

8.1.5 Performance *versus* Prescriptive Standards

Standards can be described as performance-based or prescriptive. Inspection authorities prefer prescriptive standards because the features of the product are clearly described, so it is easy to determine whether or not a product meets the standard claimed. Products made to performance-based standards must rely on grade marking or branding that shows that the particular product has been made to the claimed standard and may require verification by third party auditing. Producers often prefer prescriptive standards because they set out how a product is to be made. The responsibility for the performance of that product is implicitly transferred to the authors of that standard.

Performance-based standards may contain some prescriptive requirements but basically they set out the expected performance of a product, and may contain a description of means to verify that the performance is being, or will be, provided. They implicitly require the manufacturer to be more aware of the performance of the materials used and the effect of the processing undergone than is the case with prescriptive standards. The TBT agreement directs members to specify product requirements in terms of performance rather than design or descriptive characteristics because performance-based standards allow a producer to satisfy the stated intent of a customer while allowing the use of available resources. Along with the greater flexibility in production goes a responsibility and liability for the properties of the product.

Performance-based standards thus allow several suppliers to compete on an equal basis rather than favouring only suppliers who can fulfil a certain prescription. As described previously, most of Japan's newer prescriptive standards are based on USA grades and therefore tend to favour the USA and Canada. A move to performance-based standards may enable other suppliers such as Chile, the Russian Federation and New Zealand to be more competitive.

Despite revisions in 1998 to the Building Standard Law of Japan (BSL) so that it emphasises performance-based standards, it continues to refer to other prescriptive standards. Thus the revisions have created additional requirements, rather than creating a new basis for evaluating and accepting innovative products. Traditional Japanese housing construction is generally exempt from the BSL for structural requirements. There is a tacit expectation that the carpenter is competent. Thus imported non-traditional systems are subject to greater scrutiny than the traditional system of house construction. The more prescriptive aspects of the BSL relate to fire resistance which, as discussed previously, is a more subjective than technical variable to assess.

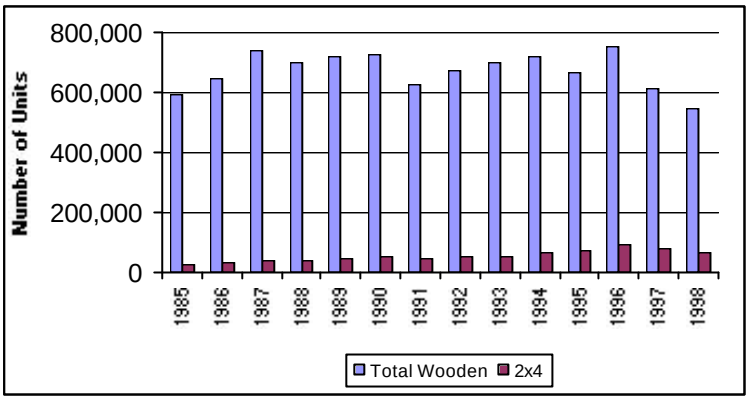
Another example of the restrictions imposed on exporters by prescriptive standards is the **Japanese standard for finger-jointed dimension sawn timber (JAS 701)** which specifies a minimum finger length of 12 mm. This prescription is justifiable for denser species and those with poor glue-line strength, but not for lower density species such as radiata pine. A performance-based standard would avoid this problem.

8.1.6 Discussion

The difficulty in assessing the economic impact of codes and standards as NTMs, and in isolating their effects, is illustrated by the example of the export of western-style housing systems to Japan.

Despite massive efforts by North American interests, the level of 2 x 4 housing in Japan has increased only marginally over the last 20 years, as shown in Figure 10. The exception was an increase in market share of 2 x 4 houses following the Great Hanshin-Awaji earthquake in January 1995[77]. Consumer demand for 2 x 4 houses increased following observations that the performance of 2 x 4 housing construction was superior to traditional post and beam housing systems during the earthquake. This occurred without a major change in the standards acceptance route. However, the question arises as to whether the increase would have been higher if there were fewer problems associated with accessing the Japanese market.

Figure 10: Japan Wooden Housing Starts for the Period 1985-1998



Source: JAWIC, Various

In the case of Japan, problems associated with the product acceptance route tend to divert rather than eliminate trade in forest products. At a macro level, Japan is still one of the largest single forest products markets in the world and dominates APEC regional forest products trade. Imports, however, continue to be of relatively unprocessed products such as logs and woodchips, suggesting that there is some impediment to foreign-processed products reaching the Japanese consumer. Although tariff escalation has been a deterrent to imports of processed products, the difficulty in gaining product approval is also an impediment for specific products, although its contribution is difficult to measure given the complexity of the issues.

Although the Japanese manufacturer must conform to the same standards, the ability of foreign products to gain acceptance is impaired by issues discussed previously, such as non-transparent approvals routes, costly bureaucracy, and the cost of maintaining input to the myriad of committees which influence product approvals. Code harmonisation, the development of international standards and the move to performance-based standards will facilitate trade but the slow progress to date on this front suggests that this area is one where gains may be realised only very slowly.

8.2 Phytosanitary and Quarantine Requirements

8.2.1 Background

Standards in relation to plant health are generally acknowledged as legitimate, since introduced pests and diseases can have devastating effects on the health of domestic forests. However, the complexity and severity of the requirements and the manner in which they are enforced may have such a substantial effect on trade that they are interpreted as obstacles to trade by exporting countries[7]. Exporters also perceive costs associated with conforming to phytosanitary rules as being non value-adding compared with other “fitness for purpose” requirements such as kiln drying or preservative treatment

The international rules concerning plant health are set by the **Agreement on the Application of Sanitary and Phytosanitary Measures (SPS)**. This agreement concerns the application of measures associated with the protection of human, animal and plant health in such a way that they are not a disguised restriction on international trade. The SPS is

particularly relevant for plant quarantine measures. It recognises that governments have the right to adopt phytosanitary measures but that they should be applied only to the extent necessary to achieve the required level of protection. Governments should not discriminate between members without sufficient scientific evidence, or arbitrarily when identical or similar conditions prevail. The SPS Agreement encourages economies to adopt international standards.

Most economies have phytosanitary regulations, which are generally accepted by exporters as legitimate procedures for health and safety reasons. However, our survey noted a number of issues, which were perceived by exporting economies as generating obstacles to trade in forest products. Whether they are, in fact, trade barriers is difficult to determine. These are:

- restrictive measures imposed without a formal risk assessment to justify them;
- increasing trend towards imposing restrictions for phytosanitary reasons, particularly in the USA and Mexico;
- the bureaucracy associated with phytosanitary administrative procedures, which inhibits the flow of information on requirements and results in time delays;
- a perception that authorities issuing phytosanitary certificates have a vested interest in maintaining them, as their issue produces revenue for these authorities; and
- developing economies' lack of technology to meet phytosanitary requirements in some markets.

8.2.2 Incidence of Phytosanitary Regulations as NTMs in the APEC Region

Most economies have some requirement for phytosanitary documentation or inspection for forest products. This is usually considered by exporters to be acceptable practice and the additional costs reasonable. However, Australia, the USA, Canada and New Zealand were identified as having strict phytosanitary procedures and Mexico was identified as proposing strict measures. Indonesia and China were reported by exporters as having procedures that resulted in unnecessary delays in getting products to customers.

Our survey received several claims from exporters to Australia that this economy has restrictive quarantine and health regulations without always having produced the necessary risk assessments to justify this[78]. New Zealand exporters, for example, are concerned about the **Australian Quarantine and Inspection Service's (AQIS)** application of rules concerning bark in export shipments of sawn timber, as well as requirements on kiln drying certifications. If more than 3 months have elapsed from the time of kiln drying the dried sawn timber is reclassified as air dry and the shipment may need reinspection and sterilisation / fumigation at additional cost.

Philippine producers would also appear to have concerns, with Alexander (1999)[79] stating that since December 1998 AQIS reportedly had:

"added another element to the packing declaration used to clear timber in full container loads. If timber has been used in a container, the packer-supplier must declare whether the timber has been inspected and found free of bark contamination. If a packing declaration has declared timber but no bark statement, the container will be subjected to an unpacked inspection."

There is also concern that some pests pose little real threat to Australian plants or wildlife but that AQIS requires fumigation whenever the pest is present.

In Japan logs require inspection and fumigation regardless of whether actual or possible organisms are already present in Japan and are applied even in, for example, situations where logs are frozen. Exporters consider the additional costs unreasonable.

Whilst these concerns are a cause of irritation for exporters, and there is an additional import cost, the measures alone have not contributed a significant restriction to trade.

The USA and Mexico have implemented, or are proposing to implement, a number of restrictions on the importation of forest products from areas with potentially hazardous forest pests; some of these restrictions may have significant effects on trade.

Mexico has proposed that all new USA sawn timber should carry an International Phytosanitary Certificate stating that the product is sourced from pest-free areas. Detection of any pest will result in either the return or destruction of the product with the cost burden passed on to the exporter. **APHIS (US Animal and Plant Health Inspection Service)** will be unable to certify that new sawn timber exported to Mexico is sourced from pest-free areas. This could prevent all new USA sawn timber from entering Mexico. The USA industry has recommended relying on visual inspections at the border, paralleling requirements for pallets and packaging materials. It was expected that this would be resolved by September 1999 in favour of visual inspection.

The proposed regulations NOM-14 and NOM-17 for the importation of used sawn timber, veneer, plywood, pallets, crates and other wood packing material confines the export of these products to Mexican border areas and regions. It further specifies that these products may only be used in these regions. NOM-17 also states that the detection of certain pests will result in the destruction or return of the product when the same is not required for local products. This regulation also includes fumigation requirements that USA sawn timber exporters and Mexican importers are concerned may impede the movement of their products into Mexico.

The USA has placed or proposed the following restrictions on:

- importation of wood articles from the USA border states in Mexico, requiring wood articles from these states to be treated in the same way as Mexican articles, and articles from most of the rest of the world (excluding Canada). It also allows for an additional treatment option (methyl bromide). This was proposed on 11 June 1999[80];
- softwood packing material from China and Hong Kong China is required to be heat treated, fumigated or treated with preservatives prior to departure from China. Packing material made of synthetic or highly processed wood is exempt;
- softwood logs from sources other than Canada, Mexico's USA border states, Chile and New Zealand must be debarked and heat treated (debarked and fumigated if from Chile or New Zealand)[80];
- tropical hardwood logs must be either debarked or fumigated[80];

- temperate hardwoods must be either fumigated or debarked, and then heat-treated[80];
- log and sawn timber imports from eastern Russia (and other places north of the Tropic of Cancer and east of Longitude 60°E) must be debarked and heat-treated[80].

The USA import restrictions imposed on “unmanufactured wood products for phytosanitary reasons” have been the focus of attention from environmental groups. The concern has been that APHIS regulations are not sufficient to protect local forest against forest pests and diseases.

The USA District Court in Northern California issued an Injunction (lifted 15 January, 1999) requiring APHIS to stop issuing new permits for the importation of certain unmanufactured wood products (logs, timber) from New Zealand, Chile, Siberia or any other of the world's temperate forests. Exceptions to the injunction included all tropical wood and temperate wood from Canada and the Mexican USA border states. This restriction was discriminatory in that it did not include imports from Canada, Mexico, non-Siberian temperate hardwood logs or tropical hardwood logs. As this injunction occurred at a time when softwood sawn timber exports to the USA were increasing in response to reduced availability of USA traditional supplies, it was perceived to be an action which limited forest products trade rather than addressing a legitimate phytosanitary problem.

It was environmental groups using USA law, rather than the law itself, which sought limitations to trade. The plaintiffs, Oregon National Resources Council and California Against Toxic Substances, intend appealing the lifting of the ban[33; 81-83].

9. ECONOMIC IMPACT – ENVIRONMENTALLY MOTIVATED NTMS[22]

9.1 Introduction

Although Section 6 examined NTMs and other measures in the APEC region from an environmental viewpoint, this section focuses on the economic impacts of NTMs that are environmentally motivated. However, the section begins with a brief description of the complex nature of environmental NTMs, and then considers the major types of environmental NTMs used by the APEC region and their intended purposes. The potential impact of the different NTMs on forest product trade is then analysed.

9.2 Background

In recent years, environmentally motivated NTMs have been growing in prominence. They have generated a considerable degree of uncertainty in many markets for three reasons.

Firstly, environmental NTMs are not technically trade impediments and some of these measures have the potential to have positive influences on trade and resource management. The WTO allows members to adopt measures that are inconsistent with traditional trade objectives, that is measures that discriminate, and that in certain circumstances are directly relevant to environmental conservation. These exceptions include measures necessary to protect human, animal and plant life or health, which relate to the conservation of exhaustible natural resources. However, the measures can also result in impacts on trade.

Secondly, environmental measures, such as certification, are considered to be outside the influence of GATT/WTO. In the language of trade negotiators, trade restrictions are confined to formal institutional measures that restrict trade and are the subject of normal international trade agreements as determined by organisations such as the WTO[7]. Certification and some environmental measures appear to fall outside this ambit. Adding to the ambiguity, the **United Nations Intergovernmental Panel of Forests (IPF)**, which has been the central arena of the international forest policy debate, has urged countries to consider the potentially mutually supportive relationship between sustainable forest management, trade, and voluntary certification and labelling schemes operating in accordance with relevant national legislation. It also urges economies to endeavour to ensure, as necessary, that such schemes are not used as a form of disguised protectionism , and to help to ensure, as necessary, that they do not conflict with international obligations.

Finally, distinguishing environmental NTMs from other trade measures is often difficult. As discussed in Section 7.1 the same instruments, such as afforestation and reforestation subsidies, are often used to target more than one objective, for example, forest conservation

[22] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.

or increasing future commercial production. The impact on the environment may well be positive but can potentially distort trade, especially when the instrument is set at various levels in different countries. Moreover, the effects of the same mechanism can also vary widely between different countries because of varying local conditions. This makes NTMs and a range of other environmentally related measures difficult to assess.

9.2.1 Whether NTMs are Trade Impediments Depends on Formulation and Implementation

Whether environmental NTMs are impediments to market access therefore depends on how the measures are formulated and applied. Recently, considerable attention has been focused on the application side by developing countries. The concern is about discriminatory treatments such as similar standards not being applied evenly to timber products and competing substitutes, and a tendency to target tropical forest products. Such actions have the capacity to divert trade in favour of the non-discriminated countries. In the APEC region, the **Association of South East Asian Nations (ASEAN)** economies, particularly Malaysia and Indonesia, have been vocal about the use of trade restrictions on environmental grounds. Forest products have been an engine for economic growth in some of these economies.

9.3 Qualitative Analysis of Environmental NTMs

Despite widespread use in recent years, the economic impacts of environmental NTMs are extremely difficult to assess. To a large extent, this is due to the difficulty in differentiating between measures introduced to restrict trade or measures introduced for other legitimate reasons. Complicating the matter is that a measure could well be introduced for legitimate reasons but the outcomes are often diffused and some have the potential to yield unintended restrictions on trade. The literature linking environmental measures to trade has been relatively thin so far. Against this backdrop, the analysis here has to be subjective. It tends to focus on three issues: whether the prescribed environmental instruments have been effective in achieving their intended objectives, what the unintended spill-over effects are, and their likely impact on the terms of trade from an economic perspective.

9.3.1 Forest Certification

Emergence of Certification

At the APEC level, the need to address environmental problems has led to a considerable evolution of forest management objectives in recent years. There is a notable reorientation of forest policy towards environmental objectives. Many economies have accelerated reforestation efforts and given increased attention to forest conservation, exemplified by the creation or expansion of protected areas.

Nevertheless, progress in sustainable forest management has been generally slow in developing economies. The Asia-Pacific Forestry Sector Outlook Study[2] noted that few forests in Asia and the Pacific can currently be regarded as sustainably managed. It is possible that the appropriate incentives are not in place to encourage sustainable forest management.

Campaigns originally mounted by NGOs to pressurise tropical countries into giving more urgency to sustainable development were oriented towards bans and boycotts of timber. Trade was seen as the cause of the depletion of natural forests[85]. More recently, their stance has evolved as many have come to recognise that the trade in timber is not in itself harmful provided the timber is sourced from sustainably managed forests. This has led some NGOs to switch focus on other alternatives.

Environmentalists claimed that forest certification and labelling were born out of increasing desperation over "the continued loss and mismanagement of the world's forests"[84].

Certification has some attractive features. Firstly, it uses market-based incentives and, secondly, it is voluntary. The method is therefore a less controversial instrument with which to encourage sustainable forest management. The main focus of certification to date has been on timber and timber products, but recently attention has extended to pulp and paper. The effectiveness of this approach will be discussed later. Nonetheless, it is useful to note that NGO support for forest certification is not universal. Some express doubt whether certification is of any use if logging destroys the social benefits brought to the indigenous communities by the surrounding forests.

For a certification programme to be credible, it must fulfil three conditions. Firstly, the scheme must be able to evaluate the integrity of the producer's claim and the authenticity of product's origin. Secondly, it must also be seen to be objective and impartial. Thirdly, participation must be voluntary, non-discriminatory in nature and adaptable to local conditions, cost effective, practical and transparent. As will be discussed later, all of these conditions are not always fulfilled.

The costs of certification can be divided into two categories:

- the incremental cost of improving forest management over current practices at the management unit level to meet certification standards; and
- the cost of the certification itself, including an assessment or audit of management practice and the cost of identifying and monitoring the chain of custody.

Baharuddin (1995)[85] estimated the cost of certification assessment at between $0.30 and $1.00 per ha per annum in tropical countries. The costs of identifying and tracing the chain of custody have been estimated to be up to 1% of the border prices[86]. Our survey shows that processors rather than concession holders carry the overall cost of certification in Indonesia. It is estimated at 16% of log cost, which is a significant cost to carry for a price-sensitive commodity trade industry.

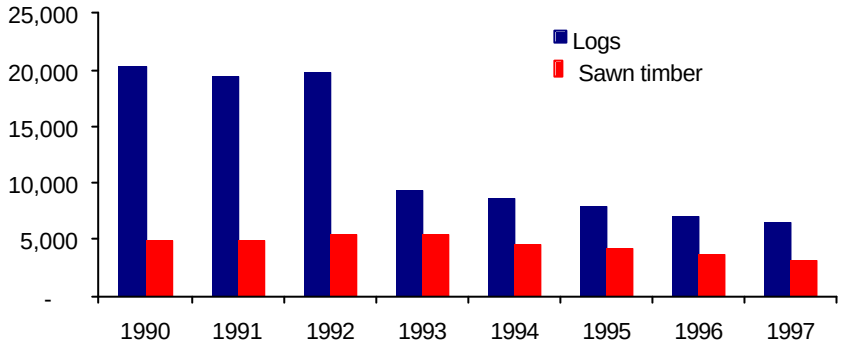
While media tends to focus on the indirect impact of logging causing deforestation through the provision of roads to previously inaccessible forests, the root causes, which have received less attention, have been poverty and low agricultural productivity. When combined with rapid population growth they have resulted in severe pressure on forest lands[87]. Unless the poverty and productivity issues are simultaneously addressed, at best, the impact of certification may be neutral.

Impact of Certification on Trade

Although it is a highly subjective approach, one way of assessing this impact is to examine the trade flows of importing countries where requirements for certified products are reported to be on the rise. In the USA, where there has been intensive lobbying to restrict the use of tropical hardwood products unless they are certified, the imports of hardwood sawn timber have increased two-fold to 1.3 million m^3 from 1992 to 1998. The share of sawn timber imports from tropical countries fell from around 12% to 9%.

The decline can be explained to some extent by developing countries restricting sawn timber exports to encourage domestic value-adding processing. For example, Indonesia, Malaysia and the Philippines have some forms of restrictions imposed on semi-processed timber exports (Figure 11).

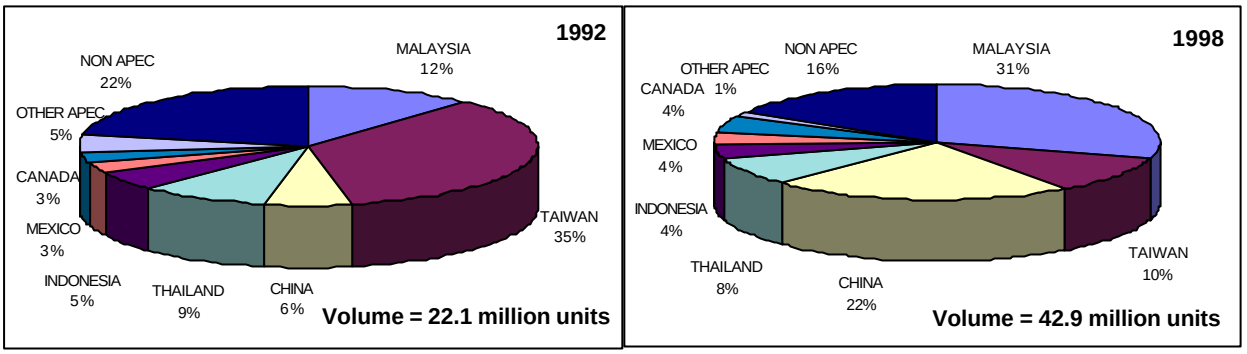
Figure 11: Malaysia, Exports of Logs and Sawn Timber 1990-1997



Source: ITTO Annual Review 1997

The efforts of increased value-adding processing are reflected in their expanding share of wooden furniture products market in the USA. The total volume of USA imports of wooden furniture products has increased by nearly 95% from 1992 to 1998 (Figure 12). For the major tropical producers, Malaysian market share has risen from 12% to over 30% during this period though the Indonesian and Thai shares have declined slightly. China's share has also increased significantly from 6% to 22%. Exports from Chinese Taipei to the USA have been affected most during this period with Chinese Taipei's market share falling from 35% to 10%.

Figure 12: USA, Wooden Furniture Product Imports by Country of Origin



Source: Woodwide™

Japan is a major consumer of tropical hardwood. Environmental concerns in Japan are growing but not as strongly as in the USA. In 1993, two countries (Malaysia and Papua New Guinea) supplied 81% of Japan's total hardwood logs. Although the total Japanese hardwood log imports have fallen by over 55% between 1993 and 1998, the joint share of the two suppliers has remained relatively stable (Woodwide™).

The decline in Japan's log imports is attributed to the reduction of supply as developing countries imposed logging bans and restrictions on log trade. However, the consumption of secondary processed wood products from tropical countries has increased in value by 140% from 1991 to 1995. Tropical producers have also increased their market share in Japan from 30% to 36% during this period[88].

It appears that the change in market position of respective exporters has more to do with the shift in competitive dynamics of the exporting countries rather than the emergence of forest certification. One explanation for the muted impact of certification on trade is that the market for certified products is small. The consumer market for certified wood products was less than 1% of total European consumption in 1997[89]. The supporters point of view, however, is that although the amount of trade is small, the growth trend is strong. If this is the case, its impact is likely to increase as the market expands.

Demand for Certified Forest Products

Unfortunately, there are only a few studies that examine consumer perceptions of, and demand for, environmentally certified wood products. It is difficult, therefore, to verify claims and counter claims. Currently, the largest demand for certified products appears to be coming from the buyers' groups. They are companies that voluntarily join together and commit to purchasing wood and wood products that originate from well-managed forests. Most of these groups can be found in Europe and North America. Public entities in a number of developed economies are also moving in support for certified products.

The WWF indicated that demand for FSC certified wood in the United Kingdom (UK) is on the increase. The largest supplier of decorative timber to the UK's retail sector claimed that the demand for FSC-certified wood from retailers and manufacturers currently exceeded supply. It appears that the lack of supply is a problem rather than a general lack of demand.

Others, such as the Cameroon's National Certification Working Group, noted that to date the market is still small. Final consumer demand is not a significant part of the total picture. A recent independent study commissioned by the **International Wood Products Association (IHPA)** in the USA looked at various levels of the distribution chain and found that certification of tropical woods has little impact on purchasing decisions by buyers[33]. Few consumers know what certification is. In the USA, some companies selling certified timber products stated that they have had difficulties attracting buyers.

Table 1: Some of the Existing Operating Buyers' Groups

Company	Group Name	Founded	Members	Total Annual Member Sales (millions)
United Kingdom	1995+ Group	1991	87	$69,000
Netherlands	Hart Voor Hout	1995	11	
	Organisations committed to FSC	1992	473	
Belgium	Club 1997	1994	79	$270
Austria	Gruppe 98	1996	26	$960
Germany	Gruppe 98	1997	31	$12,000
Switzerland	WWF Wood Group	1997	10	$170
North America	Certified Forest Products Council	1997	Business: 140 Individuals: 500	

Source: ECE 1998[90]

Willingness of Consumers to Pay a Premium

There are also few studies looking at consumers' willingness to incur a premium for certified wood products. Of the few, the **World Wide Fund for Nature (WWF)** study found that 66% of consumers would be willing to pay higher prices, up to 13.6%, for wood originating from sustainable sources[91]. Winterhalter and Cassens (1993)[92] found that 56% of affluent consumers, defined as households with incomes of over $50,000, would pay 1-10% more for sustainable wood products. About 19% would pay 11 to 20% more, 3% would pay a premium exceeding 20%, but 19% said they would not be willing to incur premium for assurances of sustainability. A survey carried out by Bigsby, Ozanne and Vlosky (1997)[93] showed that there is a high level of awareness and interest in environmental certification of forest products. Around 75% of the respondents said they would pay a premium. Some 50% of the respondents stated that this premium could be between 10 and 25% of the original product price across a range of wood products.

However, the surveys may not be a reflection of actual consumer behaviour. For example, when Bigsby *et al* (1997)[93] asked New Zealand respondents if they had purchased environmentally certified products in the past year, the results showed that most respondents had not or were unsure. Collins Pine, a privately held wood products manufacturer located in the USA, has also attempted to market certified wood products. Their attempts *"have revealed little, if any, willingness on the part of consumers to pay a price premium for certified products"*[94]. They have also noted that consumers perceive sustainably certified products to be of lower quality than wood produced otherwise.

Consumers may be insisting that good forest management is a necessary condition for market access. So far, there is little evidence to suggest that sustainable forest management related investment would generate a sufficient premium to make the exercise attractive. The Cameroon's National Certification Working Group stated that the consumer is generally not willing to pay and for many companies, certification is still more of a cost than benefit. Unless producers are able to get a premium, it will be difficult to see that more will wish to become involved in the promotion of certified products because price is still the overriding factor in the sale of forest products.

9.3.2 Logging Restrictions and Bans - How Effective?

Logging restrictions and bans for protecting the environment are permitted under Article XX of GATT if they are made in conjunction with restrictions on domestic production and consumption. They are seen as necessary to curb deforestation and to protect endangered habitats.

However, the effectiveness of these measures is often difficult to assess because of potentially negative "spill-overs". In developing countries, enforcing the measures is often problematic.

There are allegations that companies are importing logs from Myanmar as a cover to harvest logs illegally on the Thailand side of the border. The Thailand-Myanmar border harbours some of the region's top quality hardwood reserves.

It was reported recently that the illegal logging trade in Indonesia is "out of control" and that it now supplies a greater volume than the legitimate sector[95]. The official log supply in 1998 was 29.5 million m^3 of roundwood but it was estimated that the illegal sector was 32 million m^3. The breakdown of law and order and resurgence of poverty since May 1998 have exacerbated the problem. The illegal timber, which supplies domestic demand, faces no environmental pressures from importing countries and is generally sold at a fraction of its value. The illegal trade is further perpetuating the inefficient use of the resource.

Sedjo (1999)[28], commenting on the USA situation, argued that restricting timber harvest in certain places simply deflects the harvests to other locations. In many respects the environmental damage associated with illegal harvesting as a result of logging bans is likely to be substantially greater than legalising logging, but with policies in place to strengthen local institutions and environmental stewardship. However, an alternative approach may also be to strengthen local institutions and impose logging bans.

Studies[2] find that logging is likely to lead to an increase in deforestation if the following conditions all apply:

- roads are built that open up new areas, especially if they remain open after harvesting is completed;
- there is very poor enforcement of forest boundaries by government agencies;

- there is an institutional or legal context in which people believe that land which they occupy, claim or "stake out" will eventually be recognised as theirs or even legalised by government; and
- there exists a large pool of unemployed or landless people, with relatively low incomes and poor economic prospects.

The answer under this situation is not to stop logging, or to stop logging in all new areas, but rather to reform those policies, institutions and economic circumstances that lead to illegal logging. The evidence from rapid economic growth of the newly industrialised economies in the APEC region tends to suggest that as employment and income prospects outside the agriculture sector improve, fewer people want to undertake illegal work clearing forests for agriculture. Viewed from this perspective, trade restriction is unlikely to be as effective a remedial action as some would suggest.

9.3.3 Subsidies *versus* Sustainable Development

Subsidy programmes take several forms. Governments may assume the cost of afforestation or reforestation, or provide financial aids to private investors through low-interest loans and tax breaks. As discussed earlier, it is difficult to determine whether these measures are legitimate or whether they are trade impediments because of their dual effects; they have both environmental and commercial contributions. From a commercial perspective, such measures shift the margin of relative profitability between forestry and the competing land use, and encourage more forest conversion of tropical forests to plantations.

Conversely, plantations are an essential part of any programme to conserve natural forests because they create an alternative source of supply to meet growing domestic demands. Although they are generally monoculture and may result in some loss of biological diversity, plantations relieve some of the pressures on natural forests. In essence, plantation forestry is consistent with the sustainable development concept.

The area under forest plantations in the APEC region has increased substantially since 1945. Nearly 60% of the reported global plantation area of 180 million ha was in the APEC region in 1995[96].

A recent assessment of physical forest resource[96] shows that there are adequate global fibre supplies to meet the projected demand for the foreseeable future. However, consumers have to recognise that the traditional sources of wood fibre from natural forests are under increasing pressure to meet demand due to the withdrawal of some existing and new production areas, and to past forest management practices. This change must be consciously addressed by shifting fibre supply towards non-traditional sources such as plantations, trees outside the forests and other wooded land. This does not mean that localised scarcity will not be evident in some markets, but trade will become increasingly important for balancing these local shortages.

There could be trade diversion effects as a result of different levels of subsidies provided by various countries to their forestation programmes. They help to tilt trade in favour of the

exporting countries that offer a higher level of planting subsidies because of their exporters' enhanced ability to capture market share by being able to compete at lower prices. The issue is likely to become a contentious one and has to be discussed at a multilateral level. As declining tariffs on forest products become less significant trade barriers, such measures will become the centre of attention. The subsidy schemes and their targets will need to become more transparent.

There will also be trade creation as localised scarcity and declining tariff barriers encourage a growth in trade volume to balance the shortages. Restricting trade will therefore be counter-productive. Free trade and greater transparency will also encourage the establishment of more plantations in areas with a "real" comparative advantage, as found in biological and local conditions.

The fact that deforestation is continuing in most tropical countries indicates that policies which exacerbate the loss of natural forest resources rather than constraining the terms of trade need to be addressed urgently. Trading restrictions are more likely to severely limit the ability of a global trading system to rebalance localised shortages and destroy the potential efficiency advantages associated with exchange and trade.

9.3.4 Procurement Policies and Trade

In the developed economies of APEC, particularly the USA, public entities have restrictions on the use of tropical timber. The United States government, in its planning for $1.4 billion military base renovations projects, is pilot-testing a buy green programme. The conditions in the request for quotations included the term "certified wood", though it is unclear how certification was defined.

Unilateral sanctions, imposed on imports because they were produced in ways which do not meet domestic standards, could fundamentally shift the global trading system towards one based on power rather than on rules. Not only are such actions potentially discriminatory because they tend to target tropical timber products, they are also generally counterproductive as they encourage affected parties to seek retaliatory measures. More importantly, these sanctions do not necessarily improve the status of the environment because they side-step the equity issue and the lack of capacity by the producing countries to deal with environmental and development problems.

The proponents[97] argue that trade restrictions on the importation of unsustainably produced forest products are justified. They argue that GATT should be amended to allow contracting parties to:

- discriminate between like products that vary in the degree to which the environmental and resource costs of their production are incorporated in their price;
- protect domestic industries that internalise more of their costs than foreign competitors, with import tariffs or export subsidies; and
- provide subsidies to maintain the competitiveness in international markets of exported products with greater cost internalisation than competing products.

Barbier (1995)[50] noted that such action would open the global trading system to potential abuse. Nations would be able to invoke whatever policy measures were available to them for intervention in the forestry trade. In that event, these new barriers to trade would overshadow all of those potential benefits of the Uruguay Round to forest products trade. On the positive side, there is little evidence to date to suggest that unilateral measures are a destabilising factor. Their usage is confined to a few economies. Their impact to date has not been significant.

9.3.5 Recycling Policy and Implications on Trade

Waste disposal is a major issue for some economies within the APEC region. One approach to address the issue is to promote the increased use of wastepaper in paper production by legislation. Leaving the market to resolve the problem may be difficult because the cost of collection and recycling may impinge on profitability. Legislation introduced usually sets mandatory levels of recycled content by including various financial incentives to make the activity attractive to the private sector. At a national level, the measures appear relatively harmless and provide a partial solution to the waste disposal problem. However, such measures can create unintended effects on forest products trade.

For example, the attractive incentives provided in the USA led to a proliferation of recycling plants in the mid-1990s. Because recycled paper competes with virgin fibre pulp, the growth caused intensive pressure in the volatile global pulp market, which was already facing over-capacity. This was believed to be one of the main factors contributing to the collapse in market pulp prices in late 1995. The fall in pulp prices affected the prices for wood fibre and the profitability of intensive forest management. The impact on the global forestry companies is very significant. Many have yet to fully recover from the losses incurred.

The recycling policy of the USA has had an adverse impact on Canadian newsprint trade[43] because Canada has a relatively small and dispersed population. In order to meet the USA wastepaper content requirements for newsprint exports to the USA, Canadian producers had to import waste paper from the USA. In 1989, Canada supplied about 56% of all newsprint consumed in the USA, but by 1992 it had fallen to 50%.

9.4 Conclusions

To date, environmentally motivated NTMs and other environmental measures are not having a significant effect on trade. However, the uncertainty they have created remains a threat to the global trading system because the interface between trade, development and the environment will continue to be contentious. As long as the wealth disparities are unbridged and the pressure for land continues, the issue of sustainable development will be difficult to resolve.

Given a choice, most societies would like more of the economic, environmental and social services provided by forests. However, in reality, trade-offs are necessary. Achieving a suitable balance is a complex process. Some of the poorer countries simply cannot afford to forego the economic benefits available from forest exploitation.

10. QUANTITATIVE ASSESSMENT OF NTMS[23]

10.1 Introduction

The purpose of this chapter is to describe the quantitative analysis of selected cases NTMs. In doing so, we attempt to identify the impact these measures have on trade in forest products in particular, but also on the economy more generally. We use a **General Equilibrium (GE) model** to conduct the analysis. It is not possible to analyse in detail the complete range of NTMs that have been identified. Rather, we focus our attention on three particular cases:

- the effect of environmental certification of tropical wood products;
- the Indonesian log export ban and prohibitive export taxes on sawn wood;
- the effect of the Canada-US Softwood Lumber Agreement.

In addition, we explore the effect of a multilateral removal of all import and export interventions. We do this under two scenarios; one where complete liberalisation is applied to all sectors, and a second where such liberalisation is applied only to the forest products sectors.

10.2 The Analytical Model

10.2.1 The Modelling Framework

Before explaining the simulations and presenting their results, we provide a brief sketch of the modelling framework. The GE model we use for this analysis is based on version 4, the latest available, of the GTAP database. **GTAP** stands for the **Global Trade Analysis Project**, and is based at Purdue University in Indiana. The GTAP database combines detailed bilateral trade, transport, and protection data, which together characterise the economic linkages among regions. In addition, it contains economy specific input-output tables, which describe the intersectoral linkages within regions. The GTAP database is extensively documented in McDougall et al. (1998)[98].

The specific model we use is a fairly standard, static GE model specification based on Rutherford (1998)[99]. We incorporate some minor modifications to the underlying behavioural assumptions as presented in Rutherford's specification. This model is essentially the GTAP model except that it is coded using the GAMS-MPSGE software package[100], a package with which we are more familiar. The GTAP model, as specified and developed by GTAP, is usually implemented using the GEMPACK software from Monash University in Australia.

[23] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.

Briefly, the model we employ is one where firms use primary inputs (land, labour, and capital) and intermediate inputs (output from other firms) to produce their outputs. We assume that in all sectors and in all regions, the production technology exhibits constant returns to scale. Hence, we can represent each region's production from each sector as if a single firm produced it. Primary factors are mobile across sectors within a region, but are immobile internationally. Firms differentiate their output between that destined for exports and that for domestic markets, but exports are not differentiated by country of destination. Firms may use imported intermediate goods in their production.

Consumers in the model are assumed to maximise utility by choosing a pattern of consumption while adhering to their budget constraints. They receive income from the sale of primary factors to firms, and from transfers via the government. We assume that within each region, consumers have identical preferences so we can therefore model each region as having a "representative consumer". Demand is characterised, as is typical in many GE models, by a nested **Constant Elasticity of Substitution (CES)** utility function, which permits multi-stage budgeting by consumers. At the top level, consumers choose among the various final goods on offer. Having made the choice as to which goods to consume, they then decide how much to consume from domestically produced sources *versus* imports. Finally, of the expenditure consumers decide to allocate to imports, they must decide how much to allocate to imports from each of the regions included in the model. All of these choices are reflected in the specification of the CES utility function for each representative consumer.

The model also has a government entity in each region whose role is to collect taxes, provide transfer payments, and provide the desired level of public goods. The GTAPinGAMS package, as Rutherford calls it, is described mathematically in Rutherford (1998)[99]. In addition to the references already cited, Hertel (1997)[101] provides a comprehensive description of the GTAP model, the database, and a number of applications to which it has been applied.

10.2.2 Sector and Product Aggregations

The model is both multi-regional and multi-sectoral. For the present analysis, we have specified 24 regions, 11 sectors (or industries), and three primary factors of production, see Table 2. The scheme by which the 45 regions and 50 sectors contained in the GTAP version 4 data base were aggregated into those used here is presented in Appendix 2. Of the five primary factors of production, skilled and unskilled labour were aggregated into a single labour category, and natural resources were aggregated with capital. Land is not aggregated with anything else and remains a distinct factor.

In all, eighteen of APEC's 21 member economies are explicitly included in the model as distinct regions. The notable exception, as far as the forestry sector is concerned, is Papua New Guinea. We attempted to add Papua New Guinea as a distinct region using data obtained from the National Centre for Development Studies at the Australian National University. However, given the time constraints under which this work was completed we were unable to do so satisfactorily. We should also point out that the model includes the "former Soviet Union" rather than the Russian Federation (Table 2).

Table 2: Regions, Sectors and Primary Factors

Label	Description	Label	Description
Economies / Regions			
AFR	Africa	KOR	Korea
ASN	Rest of Asia	MYS	Malaysia
AUS	Australia	MEX	Mexico
CAN	Canada	NZL	New Zealand
CHL	Chile	PHL	Philippines
CHN	China	ROW	Rest of World
EUN	European Union	SCA	South and Central America
EUR	Rest of Europe	SGP	Singapore
FSU	Former Soviet Union	TWN	Chinese Taipei
HKG	Hong Kong, China	THA	Thailand
IDN	Indonesia	USA	USA
JPN	Japan	VNM	Viet Nam
Sectors			
AGR	Agriculture	MFD	Manufactured food
CGD	Composite savings good	MFG	Manufacturing
CNS	Construction	PPP	Pulp and paper
ENG	Energy goods	SRV	Other services
FRS	Forestry	TRN	Trade and transportation
LUM	Lumber and wood products		
Primary Input Factors			
LND	Land	CAP	Capital
LAB	Labour		

Source: NZIER

10.2.3 Benchmark Data

The first step in using the GTAP data base is to construct a set of "benchmark" data that corresponds to the regions and sectors described above. This benchmark data is then used, along with a set of behavioural parameters, to calibrate the model. Calibration, in this sense, means defining parameters for the functions specified in the model such that the model is able to reproduce the benchmark data. An overview of the benchmark data can be gained from the following two tables. However, we should hasten to add that these tables by no means constitute the data requirements of the model. The previously mentioned references can be consulted for such a description.

Table 3: Summary of Economic Activity by Sector
Tens of billions of 1995 US dollars

Sector	GDP	GDP (%)	Trade	Trade (%)
Agriculture	118.6	4.6	24.7	4
Construction	164.3	6.4	2.2	0.4
Energy goods	133.3	5.2	36.9	5.9
Forestry	9.3	0.4	1.2	0.2
Lumber and wood	23.9	0.9	11	1.8
Manufactured food	80	3.1	35.1	5.6
Manufacturing	485.6	18.8	394.2	63.5
Other services	1011.1	39.1	46.4	7.5
Pulp and paper	46.5	1.8	16.1	2.6
Trade and transportation	513.3	19.9	53.3	8.6

Notes: (1) GDP (%) denotes percent of global GDP
(2) Trade (%) denotes percent of global trade
Source: GTAP 4 Data Base

Table 3 shows GDP and trade by sector, summed up over all regions. It also shows each sector's GDP and trade as a proportion of the global totals. Table 4 illustrates the same thing for each region summed over all sectors. In both cases, the units of measurement are as they are used in the model, tens of billions of US dollars.

Notable in Table 3 and Table 4 is the dominance of the three largest economies – the European Union, the United States, and Japan which together account for more than 70% of global GDP. This dominance should be borne in mind when considering the results of our simulations of the case studies. For example, looking at Indonesia with only 0.8% of global GDP and accounting for only 1% of world trade, it is difficult to imagine that a policy change in the Indonesian forestry sector would have widespread ramifications throughout the global economy. In might, however, be expected to have significant implications within the international forestry sector.

10.2.4 Behavioural Assumptions

As noted earlier, some behavioural parameters are required to specify the model. Some of these parameters, presented in Appendix 2, define the manner in which firms are able to substitute among various inputs. For example, the column labelled "value added" specifies the degree of substitutability possible among primary inputs. Likewise, the "imports *versus* domestic" and "imports *versus* imports" columns describe, respectively, how firms substitute intermediate inputs for imported and domestically available goods, and between the various sources of imports. All of these parameters are specified on a sectoral basis and are assumed to be invariant with respect to region. The source of these parameter estimates is the GTAP database, although we have had to weight the GTAP values (see Table 19.2 in McDougall et al., 1998)[98] to get an average reflective of the sector aggregation used in this study. Finally, the elasticity of substitution that applies to firms

choosing whether to produce for the domestic market or for exports is specified to be 2 for all sectors and regions.

Table 4: Summary of Economic Activity by Region
Tens of billions of 1995 US dollars

Economy / Region	GDP	GDP (%)	Trade	Trade (%)
Africa	41.0	1.6	14.1	2.3
Rest of Asia	35.8	1.4	6.6	1.1
Australia	32.0	1.2	7.3	1.2
Canada	50.7	2.0	21.2	3.4
Chile	5.5	0.2	2.0	0.3
China	55.2	2.1	23.9	3.8
European Union	763.6	29.5	241.3	38.9
Rest of Europe	130.9	5.1	48.6	7.8
Former Soviet Union	44.0	1.7	9.9	1.6
Hong Kong	10.0	0.4	8.2	1.3
Indonesia	19.7	0.8	5.9	1.0
Japan	468.5	18.1	54.3	8.7
Korea	39.3	1.5	15.9	2.6
Malaysia	25.3	1.0	8.8	1.4
Mexico	7.0	0.3	9.3	1.5
New Zealand	5.1	0.2	2.1	0.3
Philippines	5.8	0.2	2.8	0.4
Rest of World	22.9	0.9	3.3	0.5
South and Central America	119.7	4.6	19.1	3.1
Singapore	5.9	0.2	13.4	2.2
Chinese Taipei	14.9	0.6	7.5	1.2
Thailand	25.0	1.0	15.1	2.4
USA	656.9	25.4	79.7	12.8
Viet Nam	1.1	0.0	0.8	0.1

Notes: (1) GDP (%) denotes percent of global GDP
(2) Trade (%) denotes percent of global trade
Source: GTAP 4 Data Base

10.2.5 Evaluation Criteria

GE models are capable of producing an inordinate amount of output. We have had to be selective in what we present here. Given the focus on the trade distorting impact of NTMs, we focus on presenting trade results as a means of assessing the NTMs under study. For example, in each case, we present a table of the percent change in imports, exports, and the trade balance (i.e. exports minus imports) for each of the forest products sectors in each of the 24 regions. It is important to note that the percent change in the trade balance indicates the magnitude of change in the gap between imports and exports in a sector and

region. A positive figure, therefore, suggests the gap between imports and exports has increased. The figure does not provide any information as to whether or not a region is a net importer or exporter of forest products.

We also present the percent change in GDP by region, which provides a gauge of the measure's impact on the output of all sectors in each economy. Finally, we report a value known as the **Equivalent Variation (EV),** again as a percentage change, to gain a sense of the welfare implications of removing the particular NTM.

When a policy measure, such as an NTM, is altered, we would expect price impacts. As prices change, consumers will adjust their consumption pattern so that at the new prices they are still purchasing a utility maximising bundle of goods whilst satisfying their budget constraint. However, their income, and therefore their budget constraint, would also change following a policy shift. The Equivalent Variation measure asks: at the new price level (of all goods), what income change is necessary to leave the consumer equally as well off as they were before the policy change? In other words, what income change, at current (new) prices, would be equivalent to the proposed change in terms of its impact on utility? The concept of Equivalent Variation is formally discussed in Varian (1992)[102].

10.3 Simulation Approach

The model described in the previous section was used to simulate the effects of abandoning the use of selected NTMs. Unfortunately, the GTAP database does not typically include existing NTMs. To incorporate the effects of these NTMs we have modelled their impact by interpreting each of them as an equivalent tariff, tax or subsidy. For each case study, we adjust the benchmark data to include the tax (subsidy) equivalents of the NTM. These adjusted benchmark models, calibrated to our case study specifications, are called *base cases*. The base cases should not be confused with the benchmark model, which is based on the unadjusted, aggregated GTAP data.

In other words, for each of the case studies we generate a new "benchmark" dataset. We do this by imposing some additional taxes (or tariffs or subsidies) on the benchmark data to reflect the NTM of interest (see the "impose" routine described in Rutherford, 1998)[99]. As a consequence, the functions in the model are calibrated to a slightly different set of data in each case, and hence our simulations are not comparable across cases. Rather, the simulation of the removal of each NTM should be compared with the base case (i.e. adjusted benchmark) for that particular experiment. While this approach is less than ideal, it nevertheless allows us to consider each NTM in turn. The preferred approach would be to impose *all* (not just for forest sectors, but all sectors) NTMs on the benchmark data simultaneously, calibrate the model to this data set, and then selectively (as well as simultaneously) remove them to analyse their impacts. In this way, all simulations would be coming off the same base.

What this means is that the base cases do not each include all forestry NTMs. The data collection exercise required to support such an analysis is well beyond the scope of this study. This affects the interpretation of the results. When each NTM is removed, in essence we are assessing what would have happened in a world where there are no other NTMs in

operation. This may tend to overstate the benefits or detriments of removing each NTM, as trade-distorting NTMs may limit economies ability to take advantage of lower priced forestry products.

In the GTAPinGAMS model, there are seven different types of "taxes". These are:

- output taxes;
- intermediate input taxes;
- import tariffs;
- export taxes;
- taxes on government demand;
- taxes on private demand;
- taxes on primary inputs.

These taxes can be negative, which effectively means they are a subsidy – i.e. a negative export tax is an export subsidy.

Modelling the effects of NTMs using tax/subsidy equivalents does have some drawbacks. Although the price effects on the forestry products will be the same when using an NTM equivalent measure, there are problems with induced demand side effects as the taxation revenue is transferred to consumers. However, these second round effects will be small compared to the GDP/welfare changes resulting from the removal of the NTMs. More importantly, they will have a negligible impact on trade flows.

Non-tariff measures are notoriously difficult to turn into tariff-equivalent effects. To date we are not aware of any comprehensive dataset that attempts to compute a comprehensive range of tariff-equivalent rates on forest products. Indeed, the inventory of NTMs compiled in the first phase of this project provides a useful springboard from which researchers can begin to build such a dataset. Hence, the quantitative analysis in this project is based on introducing the tariff-equivalent of the NTMs into the base case data, and then assessing the changes in GDP, welfare, exports, imports, and the trade balance as the NTM is removed.

The disadvantage of this approach of course is that we are not able to include all the NTMs compiled in the inventory into the base case model, which means that we have to create a new base case scenario for each case study. This means that the results are not strictly comparable between case studies, as the basis of comparison for each case is slightly different. Actually, variables such as output and trade flows are not different across the base cases. What is different is the rate of tax (or tariff or subsidy) associated with that pattern of production, consumption, and trade.

10.4 Case Studies

As determined by our survey, the predominant NTMs in existence are log export bans and producer subsidies, with an increasing proliferation of environmental NTMs. Producer subsidies are exceptionally difficult to model as they involve calculating the present value

of the reduction in capital and operating costs that have resulted from past subsidies. Data collection problems create an obvious limitation here.

Therefore, we restrict ourselves to an assessment of the effects of:

- environmental certification on tropical wood products;
- the Indonesian log export ban and prohibitive export tariffs on sawn timber exports;
- the Canada-US Softwood Lumber Agreement.

We first present the results of removing the existing quantitative trade distortions in the forest products sector.

10.4.1 Trade Liberalisation in the Forest Products Sector

Introduction

To gain an indication of the changes that can occur, and to provide some point of reference for the results gained from the case studies, we first run an experiment where we remove all export taxes / subsidies and import tariffs / subsidies in the three forest product sectors of all regions. The instruments we are setting to zero in this experiment are those called import tariffs and export taxes in Appendix 2. We should point out that a sector-specific liberalisation such as this is highly unlikely to actually occur; we include it here for illustrative purposes.

We should also stress that for this particular experiment, the base for comparison is in fact the benchmark model. In other words, all that we are doing is removing the taxes / subsidies that already exist in the GTAP database. We are not first imposing a new structure of taxes and subsidies.

Results

Here we indicate the impact of total liberalisation of the forestry sector using the benchmark tariffs, taxes and subsidies in the GTAP database. It is important to note that this does not include any of the NTMs assessed in this study, only the tariffs and subsidies compiled by the Centre for Global Trade Analysis. The results are set out in Tables 5 and 6.

Table 5: Trade Liberalisation in the Forest Products Sectors, Trade Performance[24]

Percent change relative to base case from eliminating forest product tariffs

	Change in imports			Change in exports			Change in trade balance		
Economy / Region	FRS	LUM	PPP	FRS	LUM	PPP	FRS	LUM	PPP
Africa	27.8	31.2	15.6	16.2	9.5	5.5	15.5	145.4	21.6
Rest of Asia	60.8	143.3	34.1	59.8	10.8	37.4	60.8	-220	33.7
Australia	0.3	13.9	9.8	1.0	-1.3	9.0	1.1	39.9	10.0
Canada	-3.7	-4.5	-3.1	14.2	4.2	2.4	-19.5	6.8	4.2
Chile	31.1	18.1	7.9	4.3	5.9	6.6	4.2	3.8	6.2
China	11.1	27.5	15.2	-2.5	2.1	7.3	14.9	-16.4	22.3
European Union	9.4	3.9	4.0	15.1	18.2	8.6	8.5	-68.0	20.3
Rest of Europe	10.4	3.1	2.3	-0.3	5.7	4.9	-48.1	262.6	-0.8
Former Soviet Union	2.5	24.3	1.6	17.9	8.3	9.2	18.0	152.9	32.6
Hong Kong	7.3	5.9	5.2	24.4	8.4	3.4	7.3	5.7	6.8
Indonesia	8.5	28.7	4.9	11.0	3.2	8.9	12.8	2.8	19.8
Japan	-1.8	-4.6	-3.1	0.0	15.3	10.9	-1.8	-5.8	-20.6
Korea	3.3	12.0	6.3	0.0	5.1	10.4	3.3	14.9	1.6
Malaysia	179.1	109.3	17.8	-25.8	-15.9	-1.8	-31.7	-24.1	25.8
Mexico	-3.4	-3.4	-2.1	4.2	3.0	2.6	-10.3	11.5	-3.8
New Zealand	56.8	77.3	40.4	-35.5	-28.5	-22.6	-35.6	-58.1	-126
Philippines	21.7	66.3	18.9	-9.0	-11.2	1.1	29.3	-53.0	22.7
Rest of World	-13.0	41.0	19.0	35.7	35.5	26.5	36.4	-42.2	17.0
South and Central America	36.3	34.8	5.9	13.5	1.5	7.6	10.7	-39.0	1.9
Singapore	11.2	5.0	6.8	90.8	8.2	2.7	-107	-3.8	28.1
Chinese Taipei	5.3	5.5	9.4	-11.4	2.1	8.0	5.8	-1.6	11.3
Thailand	6.8	12.8	8.1	-0.6	4.1	8.7	7.1	-8.9	7.7
USA	-6.9	2.5	2.1	1.3	3.1	1.1	1.8	2.0	-29.2
Viet Nam		26.8	8.6	10.5	4.0	11.2	10.5	-4.2	8.5

Source: NZIER

[24] Please refer to section 10.2.5 above for an explanation of the trade performance measures in this Table.

Table 6: Trade Liberalisation in the Forest Products Sectors, Welfare Impacts[25]

Percent change relative to base case from eliminating forest products tariffs

Economy / Region	Change in GDP	Change in welfare
Africa	0.4	-0.3
Rest of Asia	-10.4	2.0
Australia	1.8	1.9
Canada	-1.8	-1.2
Chile	-1.5	0.2
China	-0.5	1.8
European Union	-2.0	0.0
Rest of Europe	-2.5	0.0
Former Soviet Union	-3.8	-0.4
Hong Kong	6.5	1.8
Indonesia	1.0	0.4
Japan	-2.9	1.1
Korea	0.7	1.2
Malaysia	24.6	0.0
Mexico	-1.8	-1.0
New Zealand	19.1	9.6
Philippines	7.2	-0.4
Rest of World	-15.3	1.0
South and Central America	-1.9	0.5
Singapore	5.5	6.5
Chinese Taipei	4.5	2.4
Thailand	-2.8	2.1
USA	0.4	0.4
Viet Nam	13.7	5.83

Source: NZIER

This scenario indicates that the 1995 levels of trade instruments were heavily distorting the pattern of world trade. Although the case studies we have conducted on the effects of NTMs indicate that the effects can often be quite small, these are only isolated removals of NTMs. This scenario indicates that the prevalent use of NTMs in addition to the use of tariff measures may significantly distort trade, often with accompanying welfare losses.

As it turns out, the net effect of total liberalisation is to reduce global GDP by 1.4%. This is due to the large economy effect, whereby economies with some influence over prices can

[25] Please refer to Section 10.2.5 above for an explanation of the welfare measures presented in this Table.

exert a positive terms of trade effect which increases GDP. Total global output from all sectors increases by $50 billion dollars, $2 billion of which comes from increased output of forest products. It should be noted that GDP is frequently an inappropriate measure of national welfare.

10.4.2 Environmental Certification

Evaluating the Impact of Certification

Cost of certification may be broadly divided into two parts:

- the additional costs attributed to improving forest management over current practices to meet certification standards;
- the cost of certification itself, including an assessment or audit of management practice and the cost of identifying and monitoring the value chain.

The incremental costs associated with compliance are likely to be lower yields, higher opportunity costs and a redistribution of current costs and benefits between the various affected parties. Lower yields are the result of a reduction in harvest levels to both match the rate of annual growth and minimise damage to standing timber and non-timber goods and services. These costs can be minimised by better planning. The income foregone from reduced production will depend on the market price of timber, the price elasticity of demand, and whether a premium is paid for certified timber.

Baharuddin (1995)[85]estimated the cost of certification assessment at between $0.3 and $1 per ha per year in tropical economies. The costs of identifying and tracing the chain of custody have been estimated to be up to 1% of the border prices[103]. It appears that the cost of certification is borne by processors rather than forest owners. No split of cost is provided but the certification cost is estimated at 16% of the log cost.

Impact of Certification on Returns to Processors

Survey work in the USA on willingness to pay for environmentally certified wood products (Bigsby, Ozanne & Vlosky, 1997)[93] revealed that 63% of consumers were willing to pay a premium for certified products. The amount varied with product, and across the products tested – studs, ready-to-assemble chairs, a dining room set, kitchen remodelling, and a new home. The survey produced estimates of the price premium for eco-labelled products ranging from 4.4% to 18.7% of the base price. Lowest premiums (in percentage terms) tended to be associated with the most expensive good. The ITTO report on impediments to market access for tropical timbers[33] concludes that environmentally motivated trade impediments are a serious problem for tropical timbers in the EU and that sawn timber has been more affected than any other category of tropical timber. This report goes on to state that although EU tariffs for logs and rough sawn timber are zero, tariffs are an impediment to several other categories of tropical timber products. Although the EU has offered as an environmental incentive tariff remission of 15 to 35% for many of these upon application and proof of compliance with the forest management standards of the ITTO, the report goes on to state that *"tropical economies do not appear to be too forthcoming in taking advantage of this incentive"*. This would suggest that either the cost of conforming

is greater than the proposed tariff remission, or alternatively that the premium to be had from conforming is rather small. When it comes to the question of market premiums for timber from sustainably managed forests, Choon & Ginnings (1999)[33] conclude by reporting that there has been no request for certified tropical plywood from Europe, nor any suggestion of higher prices for such a product. The overall conclusion must be that at present, there is not much in the way of a price premium for products certified as environmentally sound.

Scenarios

In the case study, we assume that only three APEC markets require certified timber and timber products (New Zealand, Chile, and Canada are excluded because they are net exporters and are likely to remain such). The markets requiring certified products are the USA, Japan and Australia. Additionally we assume that the EU, a non-APEC economy, also requires certified products.

The forest resources in the USA, Japan, Australia, Canada, and New Zealand (all developed economies) are already being managed on a sustainable basis. We make an implicit assumption here that these economies are already incurring the cost of certification. Because their forest growth rates continue to exceed production growth rates, the opportunity costs of sustainable management are probably immaterial. For the case study, we assume forest certification is applied only in developing economies on their forestry exports to the USA, Japan and Australia.

We assume certification would raise the cost for importers and would be equivalent to an increase in import tariffs. Hence we model this as Australia, Japan, the USA and the EU each imposing an import tariff on Indonesia, Malaysia, Viet Nam, Thailand, Rest of Asia and Central and South America. We run two scenarios based on two estimates of the cost effects. The effects are modelled as an import tariff on the basis that the cost of certification is only imposed on forest product exports from the tropical economies; that is, other economies and domestic purchasers do not require certification.

The trade and welfare impacts under our two scenarios are presented in the next four tables.

Results

Table 7: Certification Imposes a 16% Cost on Tropical Wood Exports, Trade Impacts[26]

Percent change relative to base case from removal of 16% cost

Economy / Region	Change in imports			Change in exports			Change in trade balance		
	FRS	LUM	PPP	FRS	LUM	PPP	FRS	LUM	PPP
Africa	-8.21	-0.09	-0.24	-1.26	-2.11	-0.14	-0.81	10.52	-0.3
Rest of Asia	-1.57	-1.41	-0.08	57.17	24.07	10.8	-2.13	68.48	-1.51
Australia	2.36	13.65	2.1	-0.79	-4.68	-0.03	-1.05	45.21	2.62
Canada	1.98	1.26	-0.16	-2.15	-3.58	-0.45	5.65	-4.99	-0.55
Chile	0.97	-0.15	-1.92	-0.64	-3.09	0.24	-0.64	-3.59	0.98
China	-1.42	-4.58	-0.22	-3.82	-1.94	-0.16	-0.74	-0.03	-0.28
European Union	3.11	10.75	4.32	-2.39	0.4	0.41	3.9	62.75	-9.27
Rest of Europe	-0.2	0.28	-0.06	-1.33	-1.9	-0.52	-6.45	-215.27	0.46
Former Soviet Union	1.64	1.09	0.14	-3.88	-1.85	-0.05	-3.9	24.78	-0.61
Hong Kong	0.64	-0.29	-0.15	1.65	0.39	-0.11	0.64	-0.34	-0.19
Indonesia	14.46	-10.63	1.9	19.26	31.79	6.88	22.73	32.59	20.32
Japan	2.94	8.18	1.05	-0.79	0.16		2.94	8.7	2.19
Korea	0.93	-3.71	-0.49	-0.43	0.01		0.93	-5.1	-1.06
Malaysia	24.75	-9.7	0.3	32.35	35.15	3.42	32.57	38.1	-0.97
Mexico	3.4	0.84	-0.07	-1.84	-2.15	-0.22	8.19	-6.13	-0.02
New Zealand	-1.98	1.09	-0.34	-3.31	-4.93	-0.62	-3.31	-6.62	-1.09
Philippines	-1.72	-2.16	-0.13	-2.5	-2.28	-0.31	-1.53	-2.35	-0.09
Rest of World	1.81	0.22	-0.31	-1.82	-1.14	-0.1	-1.87	-20.39	-0.37
South and Central America	10.22	7.04	2.62	21.84	33.99	28.54	23.3	66.8	-59.87
Singapore	0.09	-1.15	-0.47	3.42	-1.52	0.28	-4.88	-0.13	-4.28
Chinese Taipei	-1.29	-1.3	-0.17	-1.48	-4.19	0.11	-1.29	-7.31	-0.57
Thailand	2.81	-7.21	-0.14	7.18	30.04	6.19	2.61	85.79	-4.59
USA	1.52	3.85	0.83	-4.15	-1.42	-0.03	-4.5	8.2	-24.24
Viet Nam	-9.18	-0.5	0.0	7.48	32.32	10.61	7.48	47.08	-0.88

Source: NZIER

[26] Please refer to section 10.2.5 above for an explanation of the trade performance measures in this Table.

Table 8: Certification Imposes a 16% Cost on Tropical Wood Exports, Welfare Impacts[27]

Percent change relative to base case from a removal of a 16% cost

Economy / region	Change in GDP	Change in welfare
Africa	0.05	-0.01
Rest of Asia	0.12	0.01
Australia	-0.02	-0.01
Canada	-0.09	-0.07
Chile	0.03	-0.05
China	0.04	-0.03
European Union	0.01	-0.01
Rest of Europe	0.05	-0.01
Former Soviet Union	0.01	-0.07
Hong Kong China	0.03	0.79
Indonesia	2.04	-0.01
Japan	-0.02	-0.03
Korea	0.06	2.16
Malaysia	1.77	-0.01
Mexico	0.04	-0.08
New Zealand	-0.09	-0.05
Rest of World	0.04	-0.02
Philippines	0.00	0.00
South and Central America	0.43	0.09
Singapore	-0.17	-0.51
Chinese Taipei	0.01	-0.05
Thailand	0.32	0.2
USA	0.01	-0.01
Viet Nam	0.63	0.34

Source: NZIER

[27] Please refer to Section 10.2.5 above for an explanation of the welfare measures presented in this Table.

Table 9: Certification Imposes a 10% Cost on Tropical Wood Exports, Trade Impacts[28]

Percent change relative to base case from removal of a 10% cost

Economy / Region	Change in imports			Change in exports			Change in trade balance		
	FRS	LUM	PPP	FRS	LUM	PPP	FRS	LUM	PPP
Africa	-5.62	-0.15	-0.18	-0.74	-1.29	-0.09	-0.42	5.88	-0.22
Rest of Asia	-1.09	-0.92	-0.06	34	15.46	7.08	-1.43	44	-1
Australia	1.17	10.74	1.72	-0.52	-3.02	-0.03	-0.66	34.42	2.14
Canada	1.15	0.71	-0.1	-1.27	-2.11	-0.27	3.3	-2.93	-0.33
Chile	0.34	-0.34	-1.36	-0.32	-1.80	0.17	-0.33	-2.05	0.7
China	-0.99	-3.15	-0.16	-2.25	-1.11	-0.1	-0.63	0.38	-0.21
European Union	1.9	6.95	3.01	-1.36	0.33	0.28	2.37	40.24	-6.48
Rest of Europe	-0.23	0.11	-0.05	-0.8	-1.18	-0.35	-3.36	-127.38	0.29
Former Soviet Union	0.89	0.66	0.09	-2.32	-1.13	-0.03	-2.33	15.09	-0.4
Hong Kong China	0.42	-0.27	-0.11	1.13	0.33	-0.06	0.42	-0.32	-0.15
Indonesia	8.55	-7.19	1.15	11.59	19.53	5.01	13.78	20.04	15.44
Japan	1.89	4.98	0.65	-0.44	0.1	0.0	1.89	5.29	1.33
Korea	0.52	-2.58	-0.35	-0.18	0.01	0.0	0.52	-3.6	-0.77
Malaysia	14.69	-6.77	0.14	19.48	21.2	2.39	19.62	23.05	-0.78
Mexico	2	0.47	-0.06	-1.08	-1.24	-0.12	4.79	-3.52	-0.04
New Zealand	-1.84	0.56	-0.24	-1.95	-3.42	-0.48	-1.95	-4.54	-0.86
Philippines	-1.18	-1.58	-0.09	-1.47	-1.36	-0.19	-1.11	-1.24	-0.07
Rest of World	1.01	0.08	-0.22	-1.05	-0.69	-0.06	-1.08	-11.56	-0.26
South and Central America	6.41	4.74	1.79	13.27	21.97	19.1	14.12	42.95	-39.95
Singapore	0.05	-0.81	-0.31	2.19	-0.94	0.17	-3.14	-0.44	-2.79
Chinese Taipei	-0.8	-0.95	-0.12	-0.84	-2.52	0.08	-0.8	-4.21	-0.4
Thailand	1.66	-4.74	-0.12	4.3	18.6	4.04	1.54	53.52	-3.05
USA	0.94	2.33	0.53	-2.45	-0.83	-0.01	-2.66	4.93	-15.38
Viet Nam	-6.27	-0.34	0.0	4.35	20.1	6.82	4.35	29.48	-0.59

Source: NZIER

[28] Please refer to section 10.2.5 above for an explanation of the trade performance measures in this Table.

Table 10: Certification Imposes a 10% Cost on Tropical Wood Exports, Welfare Impacts[29]

Percent change relative to base case from removal of a 10% cost

Economy / region	Change in GDP	Change in welfare
Africa	0.03	-0.01
Rest of Asia	0.08	0.0
Australia	-0.02	-0.01
Canada	-0.05	-0.04
Chile	0.02	-0.03
China	0.02	-0.02
European Union	0.01	-0.01
Rest of Europe	0.03	0.0
Former Soviet Union	0.01	0.0
Hong Kong China	0.02	-0.04
Indonesia	1.25	0.49
Japan	-0.01	-0.01
Korea	0.04	-0.02
Malaysia	1.06	1.3
Mexico	0.02	0.0
New Zealand	-0.07	-0.05
Rest of World	0.02	-0.01
Philippines	0.00	0.00
South and Central America	0.27	0.05
Singapore	-0.1	-0.31
Chinese Taipei	0.01	-0.03
Thailand	0.2	0.12
USA	0.01	-0.01
Viet Nam	0.39	0.21

Source: NZIER

Interpretation of Results

Under both scenarios there are winners and losers from the removal of the certification requirements in Japan, USA, Europe and Australia. The tropical wood exporting economies all increase their GDP, ranging from 0.12% in Rest of Asia to 2.04% in Indonesia in the 16% scenario and 0.08 to 1.25% in the 10% scenario. The economies requiring certification have a mixed experience ranging from a fall in GDP of 0.02% in Australia and Japan to an increase in GDP of 0.01% in the European Union and the USA.

[29] Please refer to Section 10.2.5 above for an explanation of the welfare measures presented in this Table.

Other economies trading in forest products not requiring certification have lower GDP as the tropical wood producing economies become more price competitive. Domestic forestry sector producers in the economies removing the certification requirement lower their exports and tend to increase their imports of forest products. Overall, world GDP increases by 0.05% in scenario one and by 0.03% in scenario two ($12.9 billion and $7.8 billion respectively).

10.4.3 Indonesian Log Export Ban and Export Tariffs on Sawn Timber

The history of the Indonesian log export ban and export tariffs on sawn timber are detailed in Section 7.5.

Tax Equivalents

The Indonesian log export ban is modelled as a prohibitive tariff from the rest of the world on Indonesian log exports. The reason we model it as an import tariff imposed by the rest of the world is to avoid any tax transfer in Indonesia from the log sector to the government sector. In the base case, Indonesia exports logs valued at $60 million. Had we modelled the ban as an instrument where the revenues accrued to the Indonesian government, significant tax revenues would have been collected. However, bilateral trade flows between Indonesia and other economies are each relatively small, so revenue accruing to other governments with the imposition of the prohibitive import tariff is much smaller and has minor effects on the results.

The prohibitive tariff on sawn timber exports is not modelled here, as we were unable to disaggregate the sawn timber sector from the plywood sector in the database.

Results of the modelling are presented in Table 11 and Table 12.

Results

Table 11: Indonesian Log Export Ban, Trade Impacts[30]

Percent change relative to base case from removal of the tariff on log exports

Economy / Region	Change in imports			Change in exports			Change in trade balance		
	FRS	LUM	PPP	FRS	LUM	PPP	FRS	LUM	PPP
Africa	10.75	0.56	-0.01	-11.12	-0.49	0.17	-12.54	6.11	-0.12
Rest of Asia	6.38	1.03	-0.08	-16.42	-0.29	0.01	6.6	-2.57	-0.09
Australia	-5.81	1.23	0.01	-16.13	-1.05	0.05	-17	5.15	0.0
Canada	9.21	0.53	-0.04	-8.8	-0.59	0.05	25.18	-0.91	0.08
Chile	18.7	1.34	0.02	-18.01	-1.42	0.02	-18.2	-1.89	0.03
China	-3.7	2.78	-0.11	-9.65	-1	0.08	-2.02	-3.75	-0.27
European Union	4.66	1.09	-0.1	-18.84	-0.56	0.13	8.04	9.4	0.7
Rest of Europe	-5.14	0.33	-0.02	-7.59	-0.04	0.01	-18.6	-36.26	-0.05
Former Soviet Union	14.54	0.71	-0.03	-12.6	-0.85	0.08	-12.72	13.32	0.44
Hong Kong China	0.06	0.54	-0.04	-17.79	-0.65	0.05	0.09	0.64	-0.12
Indonesia	**-14.29**	**-12.83**	**2.84**	**1547.9**	**1.05**	**-4.77**	**2674.8**	**10.95**	**-25.31**
Japan	-2.61	0.92	-0.04	-0.49	0.08	0.0	-2.61	1	-0.19
Korea	-15.06	0.09	-0.14	1.33	0.21	0.0	-15.06	-0.44	-0.53
Malaysia	109.46	-2.14	0.02	-19.49	3.97	0.6	-23.23	4.37	-0.21
Mexico	10.07	0.42	0.0	-8.03	-0.35	0.0	26.56	-1.36	0.0
New Zealand	8.88	2.25	-0.11	-19.93	-1.81	0.3	-19.97	-2.95	0.99
Philippines	9.06	1.21	-0.07	-10.53	-0.64	0.1	13.86	-1.64	-0.11
Rest of World	-1.98	0.56	-0.15	-12.38	-0.98	0.07	-12.52	-22.85	-0.21
South and Central America	8.97	0.58	0.02	-7.51	-0.42	0.0	-9.57	-1.63	0.08
Singapore	-57.63	0.55	-0.06	-40.37	-0.85	0.2	-83.37	4.31	-1.4
Chinese Taipei	-41.96	0.31	-0.08	-31.18	2.12	0.13	-42.34	4.08	-0.38
Thailand	6.66	1.66	-0.07	-11.94	-0.76	0.08	7.53	-4.39	-0.17
USA	2.19	0.74	0.01	-8.23	-0.58	0.01	-8.87	1.83	0.12
Viet Nam	2.26	-0.12	0.0	-7.1	-1.33	0.02	-7.1	-2.61	-0.12

Source: NZIER

[30] Please refer to section 10.2.5 above for an explanation of the trade performance measures in this Table.

Table 12: Indonesian Log Export Ban, Welfare Impacts[31]
Percent change relative to base case from removal of the tariff on log exports

Economy / region	Change in GDP	Change in welfare
Africa	-0.02	-0.02
Rest of Asia	0.03	0.01
Australia	0.05	0.01
Canada	-0.01	-0.01
Chile	-0.1	-0.05
China	0.00	0.00
European Union	0.01	0.00
Rest of Europe	0.02	0.01
Former Soviet Union	-0.07	-0.03
Hong Kong China	0.02	-0.01
Indonesia	**2.87**	**1.23**
Japan	0.01	0.01
Korea	0.01	0.05
Malaysia	-0.21	-0.11
Mexico	0.01	0.00
New Zealand	-0.29	-0.12
Philippines	-0.01	-0.01
Rest of World	-0.11	-0.04
South and Central America	0.02	0.00
Singapore	0.04	0.01
Chinese Taipei	0.05	0.03
Thailand	0.02	0.00
USA	0.00	0.00
Viet Nam	0.05	0.00

Source: NZIER

Interpretation of Results

As expected, the removal of the prohibitive tariff on log exports leads Indonesia to increase its exports by a significant amount. Log exports increase from $60 million per annum to $900 million. GDP rises by 2.87%.

The additional supply of logs on the world market depresses the price of logs, and GDP in other log exporting economies tends to decline. Economies that are net importers of logs experience welfare gains. These benefits and detriments are much smaller orders of magnitude than the gains made by Indonesia by repealing the log export ban.

[31] Please refer to Section 10.2.5 above for an explanation of the welfare measures presented in this Table.

In this case study, world GDP rises by 0.03% or $6.6 billion. The availability of cheaper Indonesian logs induces a supply-side response from other log exporters who reduce production of logs. Global output of logs falls by $3.4 billion. Faced with cheaper logs, the global wood processing and pulp and paper industries increase output by $80 million and $90 million respectively. The net impact is a fall in forest product output of $3.2 billion.

10.4.4 Canada-US Softwood Lumber Agreement

For a number of years, sawn timber producers in the USA and Canada have disputed the "fairness" of Canadian sawn timber exports to the USA. It is argued that a variety of initiatives and practices in Canada essentially amount to subsidies, and that these subsidies therefore confer upon Canadian exporters to the USA an unfair advantage. The Softwood Lumber Agreement (the Agreement) signed in 1996 by the USA and Canada was an attempt to rectify this apparent inequity. To claim that the two economies continue to disagree on what constitutes "fair" timber trade is a statement that is unlikely to be challenged. In this section we attempt to isolate the impact of the Softwood Lumber Agreement.

The Softwood Lumber Agreement

The Agreement applies to Canadian exports to the USA of softwood lumber, flooring, and siding as classified in HS 4407 and 4409, and where such exports are manufactured in the provinces of Ontario, Quebec, British Columbia, and Alberta. These four provinces account for approximately 85% of all Canadian softwood lumber exports to the USA[64]. The basic mechanics of the Agreement are described below.

All applicable softwood lumber exports have been placed on the Export Control List, as authorised under the Canadian Export and Import Permits Act. Accordingly, a federal export permit is required for each export transaction to the USA. Upon issuance of the permit, the Canadian authorities are required to collect a fee. The fee increases with export volume and is determined as follows:

- Annual exports of less than or equal to 14.7 **billion board feet (BBF)** attract no fee. Given that 1,000 board feet approximately equals 2.36 cubic metres, 14.7 BBF equates to 34.69 million m^3;
- Exports of greater than 14.7 BBF but less than 15.35 BBF (i.e. between 34.69 and 36.23 million m^3) attract a fee of $50 per thousand board feet ($21.19 per m^3); and
- Exports in excess of 15.35 BBF (36.23 million m^3) are charged a fee of $100 per thousand board feet (i.e. $ 42.37 per m^3).

The fees are subject to annual adjustments as they are indexed to the simple average of the change in the USA CPI (all urban consumers all items less food and energy) and the Canadian CPI. Thus, the fees are maintained at the 1996 level in real terms.

Canada must allocate the established base and the lower base fee to Canadian softwood lumber exporters before the start of each calendar year. The quota is allocated to producers. If, in any calendar quarter, the average price for delivered Eastern, Kiln Dried, 2x4 random length Standard and Better Great Lakes **SPF (Spruce-Pine-Fir)** exceeds a

certain threshold, then Canada may export to the USA an additional 92 million board feet (217,120 m^3) of timber during the 12 months following the quarter in which this price occurred without incurring any fee. The relevant threshold price, as published by *Random Lengths*, is $405 per thousand board feet for the period 1 April 1996 to 31 March 1998, or $410 in any quarter thereafter.

The agreement is deemed to have come into force on April 1, 1996 and is to remain in force until April 1, 2001. It may then be extended for a further period of time upon the written agreement of both economies.

Experimental Design

We model the Agreement as a volume-weighted import tariff imposed by the USA on softwood lumber imports from Canada. While it is obviously not an import tariff, *per se*, its effect is similar. Of course, modelling it in this way suggests that the fee revenue will accrue to the USA government, when in fact the Canadian government collects it. Nevertheless, the distortion that this introduces to the analysis is very minor given the size of both economies relative to the fee revenue. Of much greater significance is the fact that the implied return to Canadian lumber producers exporting to the USA is lowered by the amount of the fee. That is, the price received by the Canadian exporter is less than that paid by the USA importer. This is true whether a fee is paid to the Canadian government or a tariff to the USA government.

According to the USDA[104], Canadian softwood lumber exports to the USA in 1995 were 39.602 million m^3 (16.78 BBF) and were valued at approximately $4.95 billion. This implies a unit price of $125 / m^3, or $295 / MBF. Note that this is the price paid by the importer and is therefore fee inclusive. From this we can infer that the fee revenue, given the fee structure described above, would have been about US$176 million. This revenue is 3.55% of the total sales revenue. Equivalently, it equates to an *ad valorem* tariff of 3.69% of the implied Canadian producer price. Hence, in the analysis, we model the Agreement as an import tariff of 3.7%.

We use 1995 prices because that corresponds to the data period on which the model is calibrated. However, the relevant prices have increased since that time so by way of comparison, we undertake a second model run using 1997 data on export volumes and values. Going through the same procedure as described above, we can calculate that the implied import tariff based on 1997 data would have been 2.8% of the Canadian producer price. Canadian softwood lumber exports in 1997 were 40.68 million m^3 and were valued at $6.59 billion[104]. This implies a unit price of $161 / m^3, or $382 / MBF.

In the tables to follow, we present the results of two scenarios; one where the import tariff is set at 3.7% and one where the tariff is 2.8%. The 2.8% scenario will enable us to see just how sensitive the results are to the tariff-equivalent value. We should reiterate that the tariffs are volume-weighted averages applied to all Canadian softwood lumber exports, and therefore depart slightly from the step structure of the fee described earlier.

As with the other case studies, the model is calibrated to a dataset that has these import tariffs imposed on it. In each case, the tariff is then removed in the counterfactual simulation.

Assumptions Regarding Canadian Softwood Lumber Exports

This case study does not consider any possible Canadian evasion of the Softwood Lumber Agreement, namely a misclassification, province-of-origin misclassification that may change the level of impact of the Agreement. The case study also assumes that all Canadian exports of softwood lumber are subject to the Agreement. Exports from the Maritime and Prairie Provinces are, however, exempt, though these represent approximately 15% of the total Canadian softwood lumber exports. This assumption will serve to change the level of impact of the Agreement.

Results

Table 13: Canada-USA Softwood Lumber Agreement – Trade Performance; 3.7% Scenario[32]

Percent change relative to base case from removal of the 3.7% tariff on lumber exports

	Change in imports			Change in exports			Change in trade balance		
Economy / Region	FRS	LUM	PPP	FRS	LUM	PPP	FRS	LUM	PPP
Africa	-0.02	0.06	-0.01	0.01	-0.08	0.01	0.01	0.80	-0.01
Rest of Asia	-0.04	0.04	-0.01	-0.01	-0.37	0.01	-0.04	-1.09	-0.02
Australia	-0.27	-0.06	-0.01	0.02	0.07	0.01	0.05	-0.29	-0.01
Canada	**2.90**	**-1.29**	**0.23**	**1.31**	**6.14**	**-0.20**	**4.32**	**8.29**	**-0.35**
Chile	-0.66	0.19	-0.01	-0.01	-0.39	0.02	0.00	-0.48	0.04
China	-0.07	0.15	-0.01	0.05	-0.50	0.01	-0.11	-0.97	-0.04
European Union	-0.04	-0.09	-0.04	0.05	-0.53	0.02	-0.05	2.12	0.15
Rest of Europe	-0.02	0.04	0.00	0.00	-0.07	0.00	0.07	-11.25	-0.01
Former Soviet Union	-0.27	0.05	0.00	0.05	-0.06	0.00	0.05	0.94	0.02
Hong Kong China	-0.03	0.05	-0.01	0.03	-0.10	0.02	-0.03	0.06	-0.03
Indonesia	-0.30	0.29	-0.02	-0.07	-0.20	0.03	0.10	-0.21	0.15
Japan	-0.10	-0.30	-0.03	0.00	-0.39	0.00	-0.10	-0.30	-0.07
Korea	-0.07	0.05	-0.02	0.00	-0.23	0.01	-0.07	0.17	-0.05
Malaysia	-0.33	0.15	-0.01	-0.04	-0.26	0.02	-0.03	-0.29	-0.02
Mexico	-0.75	0.21	0.00	-0.44	-1.65	0.03	-1.03	-4.12	-0.01
New Zealand	-1.06	-0.19	0.00	0.05	-0.16	0.01	0.06	-0.16	0.03
Philippines	-0.23	0.25	-0.01	-0.05	-0.89	0.03	-0.27	-1.51	-0.02
Rest of World	-0.08	0.03	-0.01	0.05	-0.05	0.01	0.05	-1.15	-0.01
South and Central America	-0.26	-0.19	-0.03	-0.01	-0.77	0.02	0.02	-1.48	-0.13
Singapore	-0.01	0.01	-0.01	-0.14	-0.24	0.01	0.19	0.67	-0.09
Chinese Taipei	-0.60	-0.02	-0.02	-0.37	-1.36	0.02	-0.60	-2.81	-0.09
Thailand	-0.07	0.13	-0.02	0.00	-0.37	0.01	-0.07	-1.12	-0.04
USA	**0.41**	**3.38**	**-0.11**	**0.01**	**-0.37**	**0.06**	**-0.01**	**6.48**	**4.95**
Vietnam	0.00	0.11	0.00	0.03	0.06	-0.01	0.03	0.04	0.00

Source: NZIER

[32] Please refer to section 10.2.5 above for an explanation of the trade performance measures in this Table.

Table 14: Canada-USA Softwood Lumber Agreement – Trade Performance; 2.8% Scenario[33]

Percent change relative to base case from removal of the 2.8% tariff on lumber exports

	Change in imports			Change in exports			Change in trade balance		
Economy / Region	FRS	LUM	PPP	FRS	LUM	PPP	FRS	LUM	PPP
Africa	-0.02	0.05	0.00	0.00	-0.06	0.01	0.00	0.60	-0.01
Rest of Asia	-0.03	0.03	-0.01	-0.02	-0.28	0.00	-0.03	-0.81	-0.01
Australia	-0.25	-0.05	0.00	0.02	0.05	0.00	0.04	-0.22	-0.01
Canada	**2.16**	**-0.97**	**0.17**	**0.98**	**4.58**	**-0.15**	**3.22**	**6.19**	**-0.26**
Chile	-0.58	0.14	-0.01	0.00	-0.29	0.02	0.00	-0.36	0.03
China	-0.05	0.11	-0.01	0.03	-0.37	0.01	-0.08	-0.72	-0.03
European Union	-0.03	-0.07	-0.03	0.04	-0.39	0.01	-0.04	1.57	0.11
Rest of Europe	-0.02	0.03	0.00	0.00	-0.06	0.00	0.05	-8.33	-0.01
Former Soviet Union	-0.26	0.04	0.00	0.03	-0.04	0.00	0.04	0.70	0.02
Hong Kong China	-0.02	0.04	-0.01	0.02	-0.07	0.01	-0.02	0.05	-0.02
Indonesia	-0.23	0.21	-0.01	-0.05	-0.15	0.02	0.08	-0.15	0.12
Japan	-0.07	-0.23	-0.02	0.00	-0.29	0.00	-0.07	-0.23	-0.05
Korea	-0.05	0.04	-0.01	0.00	-0.17	0.01	-0.05	0.13	-0.04
Malaysia	-0.24	0.11	-0.01	-0.03	-0.19	0.02	-0.03	-0.21	-0.02
Mexico	-0.55	0.16	0.00	-0.32	-1.23	0.02	-0.76	-3.08	-0.01
New Zealand	-1.04	-0.15	0.00	0.04	-0.12	0.01	0.04	-0.11	0.02
Philippines	-0.17	0.19	-0.01	-0.04	-0.67	0.02	-0.20	-1.13	-0.01
Rest of World	-0.07	0.02	0.00	0.03	-0.03	0.00	0.04	-0.84	-0.01
South and Central America	-0.19	-0.14	-0.02	-0.01	-0.58	0.01	0.01	-1.10	-0.09
Singapore	0.00	0.01	0.00	-0.10	-0.18	0.01	0.14	0.50	-0.07
Chinese Taipei	-0.44	-0.01	-0.02	-0.29	-1.01	0.02	-0.45	-2.10	-0.06
Thailand	-0.05	0.09	-0.01	0.00	-0.28	0.01	-0.06	-0.83	-0.03
USA	**0.31**	**2.53**	**-0.08**	**0.01**	**-0.28**	**0.04**	**-0.01**	**4.84**	**3.68**
Vietnam	0.00	0.08	0.00	0.03	0.04	-0.01	0.03	0.03	0.00

Source: NZIER

[33] Please refer to section 10.2.5 above for an explanation of the trade performance measures in this Table.

Table 15: Canada-USA Softwood Lumber Agreement – welfare impacts; 3.7% and 2.8% scenarios[34]

Percent change relative to base case from removal of the 3.7% and 2.8% tariff on lumber exports

Economy / Region	Change in GDP		Change in welfare	
	3.7%	2.8%	3.7%	2.8%
Africa	0.03	0.02	0.00	0.00
Rest of Asia	0.02	0.02	0.00	0.00
Australia	0.03	0.02	0.00	0.00
Canada	**0.22**	**0.16**	**0.11**	**0.08**
Chile	0.02	0.01	0.00	0.00
China	0.02	0.02	0.00	0.00
European Union	0.02	0.02	0.00	0.00
Rest of Europe	0.03	0.02	0.00	0.00
Former Soviet Union	0.03	0.02	0.00	0.00
Hong Kong China	0.02	0.02	-0.01	-0.01
Indonesia	0.02	0.01	0.00	0.00
Japan	0.03	0.02	0.00	0.00
Korea	0.02	0.02	0.00	0.00
Malaysia	0.02	0.01	-0.01	-0.01
Mexico	0.01	0.01	0.00	0.00
New Zealand	0.03	0.02	0.00	0.00
Philippines	0.01	0.01	-0.01	-0.01
Rest of World	0.02	0.02	0.00	0.00
South and Central America	0.02	0.02	0.00	0.00
Singapore	0.03	0.02	0.00	0.00
Chinese Taipei	0.02	0.01	0.00	0.00
Thailand	0.01	0.02	-0.01	0.00
USA	**0.01**	**0.00**	**-0.01**	**0.00**
Vietnam	0.03	0.02	0.00	0.00

Source: NZIER

Discussion of Results

The results of this experiment are reasonably self-explanatory. Upon removing the Agreement, exports of lumber products from Canada to the USA increase by almost 10% in the 3.7 scenario, and by 7.5% in the 2.8 scenario. At the same time, Canadian lumber exports to all economies, including the USA, increase by 6.14% and 4.58% in the 3.7 and 2.8 scenarios, respectively, see Table 13 and Table 14. GDP in both economies increases,

[34] Please refer to Section 10.2.5 above for an explanation of the welfare measures presented in this Table.

although by relatively small amounts, see Table 15. The USA evidently benefits from access to cheap lumber imports and is able, therefore, to reallocate resources away from this sector. This can be seen, for example, from the small increase in USA exports of logs and pulp and paper.

These results generally correspond with previous findings from a number of other studies[105-109]. Results from these studies indicate that a tariff on softwood lumber imports from Canada benefits USA lumber producers at the expense of USA consumers and Canadian lumber producers[109].

The interesting feature of this scenario is that all economies and regions in this analysis increase their GDP as a result of removal of the Agreement. Although the changes are very small in percentage terms, economies are benefiting from the general reallocation of resources that accompanies the fall in the price of softwood lumber in the USA. By dint of being a major economy, these USA-based effects flow on to the rest of the world. World GDP increases by 0.02 percent ($5.5 billion), and as a result world output of all forest products increases by about US$200 million.

In interpreting the results presented above, it should be remembered that the simulation considers only the impact of removing the Softwood Lumber Agreement. Any subsidies that the Canadian forest sector may receive, or any other policy devices, are left in place. Not surprisingly, the results suggest that the USA lumber industry suffers as a result of removing the Agreement. However, the losses suffered by that sector are exceeded by the gains experienced by households from lower prices, and from forestry interests in other economies. While this may be of little comfort to lumber producers in the USA, it demonstrates the need for a multisectoral and multilateral approach to trade barrier reforms.

11. CONCLUSIONS[35]

Incidence of NTMs Within APEC is Declining But Rate of Reduction has Slowed

Despite claims that NTMs have proliferated in recent years, a significant reduction in the incidence of import related NTMs in the APEC economies has been reported in the last 10 years[5]. Reasons for this reduction are many and varied ranging from unilateral reform by individual economies, through impacts of subregional trading arrangements to the results of commitments made as part of the Uruguay Round. APEC in turn has pledged to a number of measures that are intended to facilitate trade and will further reduce the incidence of NTMs. Included in these are measures to reduce the transaction costs associated with complex customs procedures, and costs of health and safety. The goal is simplified, harmonised and transparent customs rules and procedures throughout the region and a reduction in costs of compliance with diverse standards and compliance costs. However, our survey does not indicate that major gains have, as yet, been achieved.

Justification for NTMs is Changing

Any analysis of NTMs requires a clear, concise, and universally acceptable definition of NTMs. Although simplistically NTMs are measures and institutions which affect trade, this may be claimed for just about all measures and institutions. The challenge is knowing where to draw the line. In the forest products area there are a number of restrictions, many of a relatively recent nature, which fall into a grey area. While these measures impede trade, unlike the justification for some of the more traditional NTMs, this is not the stated raison d'être for these measures. Many relate to environmental issues. Over recent years there appears to have been a trend in a number of APEC economies to switch from justifying measures on the basis of their ability to contribute to local economic well-being, to regulating forest activities to protect aspects of the local environment. Phytosanitary restrictions, harvest bans for clearly stated environmental reasons and a push to provide certification for sustainably managed resources and products made in an environmentally responsible manner, are all examples of this increasing environmental awareness. In some cases, however, measures applied as an environmental protector differ little from measures previously applied for economic reasons.

Concern over NTMs Applies More to Raw and Semi-Processed Materials Rather than Highly Manufactured Products

The economic importance of forestry and forest products varies markedly among the various APEC economies. Trade in a number of products is quite concentrated with typically one or two importing economies accounting for up to 90% or more of the trade in that product. It is therefore not surprising that concerns over NTMs for these products are focused on relatively few economies. As products become more highly manufactured and as trade becomes more diversified, the survey work carried out as part of this project would suggest that NTMs will tend to become less of an issue. Concerns relating to NTMs

[35] Footnotes appear at the end of each page.
References are shown in square brackets and are listed at the end of the publication in Section 12.

seem to be more related to raw or semi-processed raw material rather than highly manufactured products.

Export Bans, Quotas and Licenses Have Had the Most Obvious Impact on Forest Products Trade

Over the last 15 to 20 years export bans, quotas and export licensing have had the most obvious impact on forest products trade. Many of these NTMs were first instituted by the resource-owning economy in an attempt to foster a processing industry and capture the value added by processing for the economy. These bans certainly achieved the goal of increased local processing. Whether this processing added as much value as was intended is more debatable. Evidence that bans and limited export quotas served to depress local log prices is quite strong. This means that the log prices faced by domestic processors in most cases no longer fully reflected the international worth of the product. There is some evidence that bans and quotas may also have encouraged the growth of illegal activity, particularly in economies where the authority's ability to enforce rules is somewhat problematic.

More recently there has been a move to replace some export bans with limited export quotas. In some cases the reason offered for the change is an opportunity to better signal the true worth of the material. In others, the move is part of a series of changes designed to increase competition, mostly forced on economies as part of the price of international support for these economies following the Asian economic crisis of 1997. In this latter case, whether the measures will in fact be fully implemented remains questionable.

The last ten years has also seen the introduction of a number of harvest bans and quotas in a number of APEC economies. These restrictions have been concerned with harvest rather than value-adding and export, and have been instituted expressly for environmental reasons. These environmental reasons have ranged from protection of the habitat of endangered species through to an attempt to slow deforestation.

Afforestation Subsidies are Widespread and Potentially have a Significant Impact

Although more difficult to quantify in terms of trade impacts the survey revealed the widespread existence of afforestation subsides to private sector tree growers. Most APEC economies have had, and continue to offer, afforestation subsidies to some classes of potential growers. Many of these subsidy programmes began life with the stated objective of creating the resource base for domestic self-sufficiency (import substitution). A number of the programmes also have successfully created a new export orientated industry.

Although in a number of cases the basis for subsidisation has now changed to an environmental protection rather than a resource creating role, echoes of the earlier justification may still be found. Even where little direct subsidisation of afforestation now exists, studies suggest that current rules favour afforestation over other forms of land investment. In addition, for those economies that have had significant, subsidised, private sector afforestation programmes, the full benefits of these, in terms of wood supply, have yet to be realised.

For a number of economies within APEC, public rather than private ownership is the norm when it comes to forest ownership but harvest and processing facilities are mainly in private ownership. For economies with this type of industry there are a wide variety of arrangements / agreements designed to transfer timber harvest and management rights from the public to private sector. These arrangements are generally referred to as tenures. In a number of cases tenure arrangements appear to contain an element of subsidisation for forest growing. Typical of the arrangements where a subsidy can exist is where payments to public authorities for wood harvested includes an element that is specified to be spent by these public authorities on reforestation. Where the tenure payments do not contain a reforestation payment they are frequently set on the basis that the person / organisation purchasing the cutting rights to a particular area will ensure that the area in question is reforested to a specified standard.

Processing Subsidies Exist But are Difficult to Quantify

Few direct subsidies to forest product processing appear to exist in the APEC economies. Of greater importance are likely to be indirect subsidies, tax concessions and other NTMs that reduce the cost of individual production inputs, that is, raw materials, labour, energy, and transport. Determining the economic impact of these subsidies, however, is difficult because of the variety of forms the subsidies take and the differences in processing technologies among APEC economies. Economies such as New Zealand, Canada and Chile have apparently reduced subsidies but there has been little change in economies such as Japan and the USA.

Government assistance to processing industries often involves reducing production costs through low stumpage fees, afforestation subsidies, tax concessions, assisted transport and the provision of infrastructure such as roads and power generation. The large number of assistance mechanisms that exist and the difficulties associated with disentangling true comparative advantage from subsidised advantage make it difficult to assess the extent to which government assistance creates a barrier to trade.

Impact of Eco-Labelling on Trade Relatively Minor

Despite claims that environmental concerns in consuming economies pose a significant barrier to tropical timber products there is, as yet, little evidence of a significant effect. Certainly the evidence for any impact within the APEC region is not compelling. Some exporters of tropical timbers, surveyed as part of the project, did express concern about the impact of environmental measures but these concerns related primarily to Europe rather than APEC itself. However, virtually all of the economies that are potentially vulnerable to demands for eco-labelling are already in the process of creating systems that will allow them to provide certification for their products. The major concern at present appears to relate to the type of certification that will be required.

Our analysis suggests that the welfare and GDP impacts of certification are likely to be relatively minor. However, this analysis also reveals that although the overall impact of certification on trade will be minor, from an environmental perspective the introduction of certification practices appears to be having significant positive environmental benefits as forest managers recognise that their forest management practices have improved.

Unfortunately, at this stage there is an absence of empirical data to clearly quantify such benefits.

Regulation may not be Best Way of Achieving Environmental Goals

A useful point to note from the analysis is that using trade measures to force tropical economies to conserve what remains of their natural forests may not be the best approach to the problem. This approach fails to adequately address the issue of financing sustainable development. Government resources in tropical economies have in the past generally proved to be inadequate to this task, leading to a history of forest management inadequacies. If sustainable forest management is a global good, there is a case for strengthening international systems of cooperation at all levels, for more open markets, and liberalisation as the most cost-effective way of achieving the desired goal. Some advocate international transfers from economies benefiting from consuming sustainable management goods to assist "upward convergence".

Liberalisation has Shortcomings but Trade Measures are Neither Without Risk nor Cost.

Free trade has its shortcomings when externalities are not fully internalised into the cost of production and consumption. It is generally accepted that if the externalities are not fully internalised, trade is likely to exacerbate unsustainable development. However, simply applying an NTM or trade environmental measure because an externality exists provides no assurance that the problem will be rectified. Moreover, there are risks in imposing such measures because of displacement effects and unintended negative spill-overs. If a problem is recognised it is generally more desirable, and cost effective, to quantify it and tackle it by a directly rather than indirectly through a trade restriction.

Management of environmental issues by economies, business organisations and other entities is becoming increasingly complex, as both global and national environmental issues require attention. Historically trading organisations have been constrained primarily by local attempts to internalise environmental costs for production, but increasingly, international environmental drivers are playing greater roles, for example the protection of global biodiversity or market demands for certified forest products. This greater degree of complexity, which is directly attributable to globalisation of world economies, is creating uncertainty and making trading organisations more sensitive to factors that may cause changes to their competitiveness and impact on their businesses.

Recommendations for Future Work

In implementing this project, the research team faced both significant data and time constraints. Because of these the modelling effort has been limited to just three issues: environmental certification; the Indonesian export log ban; and the Canada-US Softwood Lumber Agreement. The survey work undertaken for this project revealed a number of other NTMs, including "check prices", complex customs procedures and some concerns over the way legitimate phytosanitary concerns can be manipulated. Further analysis of the impacts of all of these would appear to be warranted. As well as these areas there is also the question of afforestation subsidies. These were shown to be widespread, and given

time lag between planting and harvest the potential impact of past subsidies is still possibly quite significant. There is also a need for much fuller investigation and quantification of the subsidy element of any public sector forestry and of any subsidies inherent in the tenure arrangement for the publicly owned forest resources. This information would also form part of the work needed to assess the impact of indirect subsidies to forest product processing, along with a multi-sector analysis of distortions to economies' transport, labour and energy sectors.

In addition, there is an apparent lack of data required to assess the environmental impacts of measures affecting trade. It is therefore recommended that some detailed life cycle analyses be undertaken for different time periods which can be related to a specific policy mix in particular economies. Such an approach would allow the development of a quantitative framework to compare relative environmental impacts in terms of, for example, global warming potential, biotic depletion, resource depletion and nutrient loads.

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13. ABBREVIATIONS

ABBREVIATIONS	
APHIS	Animal and Plant Health Inspection Service (US)
AFTA	Asia Free Trade Area
APEC	Asia-Pacific Economic Co-operation
AQIS	Australian Quarantine and Inspection Service
ASEAN	Association South East Asian Nations
BBF	Billions of board feet
BSL	Building Standard Law of Japan
CBD	Convention on Biological Diversity
CER	Closer Economic Relations Agreement (NZ, Australia)
CES	Constant Elasticity of Substitution
CFPC	Certified Forest Products Council
c.i.f.	Cost, Insurance and Freight valuation of goods
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975)
CPI	Consumer Price Index
CSD	Commission on Sustainable Development
DENR	Department of Environment and Natural Resources
EPA	Environmental Protection Agency (US)
EV	Equivalent Variation
FCCC	Framework Convention on Climate Change
FMD	Foreign Market Development Cooperator Programme
f.o.b.	Free-on-Board valuation of goods
FSC	Forest Stewardship Council
GATT	General Agreement on Tariffs and Trade
GE	General Equilibrium Model
GST	Goods and Services Tax
GTAP	Global Trade Analysis Project
HOWTEC	Housing and Wood Materials Testing Centre
HTI	Industrial Forest Plantation (Indonesia)
IFMA	Industrial Forest Management Agreement (Philippines)
IHPA	International Wood Products Association
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IPF	Inter-governmental Panel on Forestry
IRS	Inland Revenue Service (US)
ISO	International Standards Organisation
ITFMP	Indonesia-UK Tropical Forest Management Programme
ITTO	International Tropical Timber Organisation
JAS	Japan Agricultural Standards

JAS 701	Japanese Standard for Finger Jointed Dimension Sawn Lumber
JAWIC	Japan Wood Products Information and Research Centre
JFA	Japan Forestry Agency
JIS	Japan Industrial Standards
JWPA	Japan Wood Preservers Association
LEI	Indonesian Eco-labelling Institute
MAF	Ministry of Agriculture and Forestry (NZ)
MAFF	Ministry of Agriculture, Forestry and Fisheries (Japan)
MAP	Market Access Programme
MDF	Medium Density Fibreboard
MERCOSUR	Argentina, Brazil, Paraguay and Uruguay Trade Agreement
MITI	Ministry of International Trade and Industry (Japan)
MOCT	Ministry of Construction and Transportation
MOU	Memoranda of Understanding
NAFTA	North American Free Trade Agreement
NGO	Non Government Organisation
NOM	An Official Mexican Standard
NTM's	Non-tariff Measures
OECD	Organisation for Economic Co-operation and Development
PCDF's	Polychlorinated Dibenzofurans
RFA	Regional Forest Agreements
S-P-F	Spruce-pine-fir
SPS	Agreement on the Application of Sanitary and Phytosanitary Measures
Subsidies Agreement	Agreement on Subsidies and Countervailing Measures
TBT	Agreement on Technical Barriers to Trade
UNCED	United Nations Conference on Environment and Development
US EPA	US Environmental Protection Agency
UNCTAD	United Nations Conference on Trade and Development
$	US$
USDA	United States Department of Agriculture
VAT	Value Added Tax
Woodwide™	***Forest Research's*** Woodwide™ Database on Import/Export Information
WTO	World Trade Organisation
WWF	World Wide Fund for Nature

APPENDIX 1

DEFINITION OF NON-TARIFF MEASURES IN FOREST PRODUCTS TRADE

There are real difficulties in defining non-tariff measures because, by their very nature, they defy a fixed definition. However, for the purposes of this project they can be defined as government laws, regulations, policies and or practices that either protect domestically produced products from the full weight of foreign competition or which artificially stimulate exports of particular domestic products.

We propose that non-tariff measures be grouped under three broad headings, representing motivations for the measure / barrier, and allowing a framework for analysis. The broad classification may assist in identifying the reasons used to justify the imposition of measures.

The broad headings are:

- Social / Political
- Health and Safety
- Environmental

Based on a review of the literature, a classification system was prepared using an adaptation of systems given by Bourke (1988)[7], the UNCTAD coding system of trade control measures, and the US Trade Representatives descriptions.

The following is the classification used in the preparation of this report:

Social/Political

Para-Tariff Measures

Non-tariff measures which behave like tariffs, for example customs surcharges, import taxes and licence fees.

Government Interventions

Direct procurement policies, for example “Buy America”; trading regulations, for example monopolistic measures like single desk buying and selling; and customs and entry procedures.

Other Government Interventions

These are all the measures which affect the price relativity between imported goods and the locally produced alternative by either lowering the real cost of the local good or increasing the cost of the imported good vis-a-vis the local alternative.

Growing Subsidies

- Provision of loan money to make forestry more attractive commercially, grants for afforestation, free government advice and extension services for forest growers, government funded research.

Processing Subsidies

- Accelerated depreciation allowances, tax holidays, government funded research, government subsidies to transport and power generation.

Other Price Manipulations

There are a number of other measures that will increase the prices of imported goods rather than reduce the price of the domestically produced alternative. These include:

- Mandated minimum / maximum price limits for imports
- Voluntary export price restraints (exporters agree to keep prices above some set level)
- Variable import charges based on the cost of the import (low valued imports attracting the higher charge)
- (threat of) anti-dumping investigations & duties
- (threat of) countervailing investigations and duties
- Restrictions in access to foreign exchange at the official rate / Use of multiple exchange rates or different rates for different classes of goods and importers and / or exporters
- Mandated delays between delivery and settlements
- Legislated requirements for importers to increase minimum deposits for cost of goods, duty etc before a transaction may be entered into
- Entry procedures - customs valuations, customs formalities etc

Quantity Controls

- Bans, partial bans or embargoes for political or other reasons
- Discretionary licenses
- Import / export license restrictions
- Quotas

Health and Safety

Phytosanitary

- Prohibitions (bans) for clearly stated phytosanitary reasons
- Restrictions based on risk assessments (other than WTO approved)
- Quarantine requirements

Other Health and Safety

- Generic building codes (eg fire codes)
- Structural codes and standards
- Non-structural codes and standards
- Testing and inspection requirements (eg standards route for acceptance)

Environmental

Harvesting Restrictions for Environmental Reasons

Certification and Labelling

- Government requirements
- Non-government intervention (local authorities, NGOs)

Technical Standards

- Environmental legislation
- Requirements for approval (FSC, ISO, etc) that the product is environmental 'friendly'
- Mandated minimum quantities of certain materials in products (eg minimum quantities of recycled furnish required in paper products)

APPENDIX 2

ADDITIONAL GTAP MODEL DETAILS

Aggregation of GTAP regions

Label	Aggregate Region	GTAP Region
AFRICA	Africa	Morocco, Rest of North Africa, South Africa, Rest of South Africa, Rest of Sub-Saharan Africa
ASN	Rest of Asia	India, Sri Lanka, Rest of South Asia
AUS	Australia	Australia
CAN	Canada	Canada
CHL	Chile	Chile
CHN	China	China
EUN	European Union	United Kingdom, Germany, Denmark, Sweden, Finland, Rest of EU
EUR	Rest of Europe	European Free Trade Area, Central European Associates, Turkey, Rest of Middle East
FSU	Former Soviet Union	Former Soviet Union
HKG	Hong Kong China	Hong Kong China
IDN	Indonesia	Indonesia
JPN	Japan	Japan
KOR	Korea	Korea
MYS	Malaysia	Malaysia
MEX	Mexico	Mexico
NZL	New Zealand	New Zealand
PHL	Philippines	Philippines
ROW	Rest of World	Rest of World
SCA	South and Central America	Central America and Caribbean, Venezuela, Columbia, Rest of Andean Pact, Argentina, Brazil, Uruguay, Rest of South America
SGP	Singapore	Singapore
TWN	Chinese Taipei	Chinese Taipei
THA	Thailand	Thailand
USA	USA	USA
VNM	Viet Nam	Viet Nam

Source: GTAP and NZIER

Aggregation of GTAP sectors

Label	Aggregate Sector	GTAP Sector
AGR	Agriculture	Paddy rice, Wheat, Grains (other than rice and wheat), Vegetable fruit nuts, Oil seeds, Sugar cane and beet, Plant-based fibers, Crops n.e.c., Bovine cattle - sheep and goats – horse, Animal products n.e.c., Raw milk, Wool, Fishing
CGD	Composite savings good	Composite savings good
CNS	Construction	Construction
ENG	Energy goods	Coal, Oil, Natural Gas, Other Minerals, Electricity, Gas manufacturing and distribution, Water
FRS	Forestry	Forestry
LUM	Lumber and wood	Lumber and wood
MFD	Manufactured food	Bovine cattle meat products, Meat products n.e.c., Vegetable oils, Dairy products, Processed rice, Sugar, Other food products, Beverages and tobacco
MFG	Manufacturing	Textiles, Wearing apparel, Leather goods, Petroleum and coal products, Chemicals rubber and plastics, Non-metallic mineral products, Primary ferrous metals, Non-ferrous metals, Fabricated metal products, Motor vehicles, Other transport equipment, Electronic equipment, Machinery and equipment, Other manufacturing products
PPP	Pulp and paper	Pulp and paper
SRV	Other services	
TRN	Trade and transportation	Trade and transportation

Source: GTAP and NZIER

Forestry related sectors in the GTAP data base

Sector	ISIC Class	Description
Forestry	1210	Forestry
	1220	Logging
Lumber & wood	3311	Sawmills, planing & other wood mills
	3312	Manufacture of wooden & cane containers & small cane ware
	3319	Manufacture of wood & cork products n.e.c.
	3320	Manufacture of furniture & fixtures, except primarily of metal
Pulp, paper & paperboard	3411	Manufacture of pulp, paper & paperboard
	3412	Manufacture of containers & boxes of paper and paperboard
	3419	Manufacture of pulp, paper & paperboard articles n.e.c.
	3420	Printing, publishing & allied industries

Source: GTAP 4 Database

Substitution elasticities by sector

	Value Added	Imports v. Domestic	Imports v. Imports
Agriculture	0.24	2.41	4.78
Construction	1.40	1.90	3.80
Energy goods	0.82	2.80	5.60
Forestry	0.20	2.80	5.60
Lumber and wood	1.26	2.80	5.60
Manufactured food	1.12	2.40	4.79
Manufacturing	1.26	2.86	5.93
Pulp and paper	1.26	1.80	3.60
Other services	1.26	1.90	3.80
Trade and transportation	1.68	1.90	3.80

Notes: (1) Weighted Averages
Source: GTAP 4 Data Base and NZIER

The following three tables show the benchmark tax rates by country and type of tax instrument as they appear in our aggregated GTAP dataset. All tax rates are expressed as a percentage and are specified on a net basis for inputs and a gross basis for outputs. In other words, from a firm's point of view, a positive tax rate increases the cost of inputs and decreases the value of outputs[110]. A tax rate might well be negative in which case it would represent a subsidy.

As noted earlier, taxes in the GTAP model typically are only actual taxes, or subsidies. Although some attempt has been made by the Centre for Global Trade Analysis to convert some non-tariff measures to tariffs, these have typically been in the agricultural sectors. Hence, in the case study analysis we have changed the benchmark tariffs to reflect the tariff-equivalent effect of the particular non-tariff measure.

Benchmark tax rates in the forestry sector

Percent

Country / Region	Output Taxes	Intermediate Input Taxes	Import Tariffs	Export Taxes	Tax on Govt. Demand	Tax on Private Demand
Africa	0.9	2.6	10.2	12.1		2.4
Rest of Asia			20.3	1.2		3.9
Australia		1.5				
Canada	1.0	3.0				9.0
Chile	1.0	0.7	11.0			
China	5.0		2.9	-2.0		
European Union	-0.7	1.0				
Rest of Europe	0.5	1.2	3.3	-0.5		2.0
Former Soviet Union	2.0	0.9	17.9	5.0		
Hong Kong China						
Indonesia						
Japan	2.0					
Korea	1.0		1.8			
Malaysia		3.7	23.1	14.0		
Mexico			0.9			
New Zealand		1.0				
Philippines	5.0					
Rest of World	1.0	1.3	17.7			
South and Central America	-0.5	9.2	9.0	7.8		4.5
Singapore						
Chinese Taipei		0.3				
Thailand	2.0		1.0			
USA		2.1		1.7		
Viet Nam		2.6		1.0		1.0

Notes: (1) Import tariffs are import-weighted average rates
(2) Export taxes are export-weighted average rates

Source: GTAP 4 Data Base

Benchmark tax rates in the lumber sector

Percent

Country / Region	Output Taxes	Intermediate Input Taxes	Import Tariffs	Export Taxes	Tax on Govt. Demand	Tax on Private Demand
Africa		4.2	19.5	3.2		15.2
Rest of Asia	2.9		63.3	0.9	1.0	
Australia		0.7	7.2			3.0
Canada	1.0	1.0	1.0			9.0
Chile	1.0	0.1	10.9			18.0
China	4.0		24.2	-7.0		
European Union	1.3	0.1	0.7	0.1	2.4	2.1
Rest of Europe	0.5	0.5	5.2			1.8
Former Soviet Union	1.0	0.4	17.2	1.0		9.0
Hong Kong China						
Indonesia			11.8			
Japan	2.0		0.9			
Korea	3.0	0.7	7.0			1.0
Malaysia		16.1	23.3	14.0		10.0
Mexico	3.0		1.7			
New Zealand	1.0	0.6	5.2			12.0
Philippines	2.0		28.5			
Rest of World		0.4	48.9			1.0
South and Central America	0.1	2.8	14.4		0.2	10.3
Singapore	2.0	1.3	1.1			1.0
Chinese Taipei			3.1			
Thailand	1.0		8.5			
USA		2.8	0.7	1.3	1.0	1.0
Viet Nam		5.8	8.2	6.0		6.0

Notes: (1) Import tariffs are import-weighted average rates
(2) Export taxes are export-weighted average rates
Source: GTAP 4 Data Base

Benchmark tax rates in the pulp and paper sector

Percent

Country / Region	Output Taxes	Intermediate Input Taxes	Import Tariffs	Export Taxes	Tax on Govt. Demand	Tax on Private Demand
Africa	0.8	2.2	14.1	-0.5	0.6	4.4
Rest of Asia	4.9	0.1	49.3	1.2	4.0	4.0
Australia		4.0	6.5	1.9		18.0
Canada	1.0	1.0	0.2			9.0
Chile	1.0		9.7			18.0
China	5.0		20.8	-6.0		
European Union	0.8	0.2	0.5	0.1	4.3	3.4
Rest of Europe	1.0	0.7	5.0		2.0	4.5
Former Soviet Union	2.0	0.4	5.7			5.0
Hong Kong China						
Indonesia			5.4			
Japan	2.0		0.2			
Korea	2.0	0.7	4.4			
Malaysia		3.0	6.8	14.0		10.0
Mexico	5.0		0.8			
New Zealand	1.0	0.5	5.4			12.0
Philippines	2.0		19.7			
Rest of World		0.7	37.1			1.0
South and Central America	0.1	2.0	7.6	0.8	0.5	5.8
Singapore	2.0	1.2	0.0			1.0
Chinese Taipei	1.0	0.2	4.5			
Thailand	1.0		12.3			
USA		3.1	0.3	0.7	1.0	1.0
Viet Nam		6.0	14.4	2.0		2.0

Notes: (1) Import tariffs are import-weighted average rates
(2) Export taxes are export-weighted average rates

Source: GTAP 4 Data Base