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Forest Certification: Economic Issues and Welfare Implications

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1.0 Introduction and Background

In 1992, many of the world's governments came to a consensus on the goal of sustainable development at the United Nations Conference on the Environment and Development (i.e. the Earth Summit) and among other things, agreed to adopt some common principles of forest management. Since 1992, there has been increasing emphasis on promoting sustainable development including sustainable forest management (SFM). This emphasis has come from increasing public and political pressure for countries and producers to decrease the environmental impacts of timber harvesting operations. In recognition of the need to provide guarantees to consumers that forest products are originating from well-managed forest lands, producers and governments have initiated certification programs. Accordingly, certification has emerged as one possible tool in attaining SFM.

Forest certification has become a topic of considerable interest and debate. The potential impacts of certification on forest management practices and timber trade are far reaching. However, the exact nature and magnitude of these impacts are difficult to predict due to the large number of factors that play a role in shaping the evolution of forest certification. Nonetheless, the importance of the timber industry to the Canadian economy make certification an issue of considerable importance in Canada (Cabarle 1995b).

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In the mid 1980s concern was mounting over tropical deforestation. In response to these concerns, two international initiatives where launched: the FAO Tropical Forestry Action Plan and the International Tropical Timber Organization (ITTO) (Elliot and Donovan 1996). Concerns were initially focused on tropical forests, but attention was soon diverted to forest management in North America. The Rainforest Alliance's "Smart Wood Program" became the first formalized certification scheme in 1990 (Vallejo 1996). Since this time, certification programs have been developed at the international, national, regional, and local levels, by public and private sector organizations in a number of different countries. Coupled with the evolution of certification, there has been continuing effort at the international and national levels to reach agreement on appropriate indicators of sustainable forestry. Attempts were made to set broad standards and identify indicators at the international level through the Helsinki and Montreal Process (Cabarle 1995b)[2]. The criteria and indicators identified at these conferences have formed the basis for a number of certification programs.

There are two fundamental approaches to evaluation used by certification programs[3]. The first is called the product, or outcome approach. The primary focus of assessment is the forest resource itself which is evaluated by measuring or ranking specific characteristics (criteria) attributed to the origins of the products according to ecological, social, and economic performance indicators. This approach might be seen as output driven since it focuses on variables that reflect the condition of the forest area that results from forestry activities.

[2] European governments were involved in the Helsinki Process and many non-European countries were involved in the Montreal Process.

[3] Certification schemes are also sometimes classified according to whether certification is performed by first, second, or third parties. The term "first party certification" is used if the program is limited to an internal audit or assessment of the product or practices by the producer themselves. "Second party certification" refers to "endorsements made by trade associations or similar affiliates with a vested, financial interest in the producer's competitiveness" (Ozanne and Vlosky 1996 p. 158). "Third party certification" refers to evaluations that are completed by an independent agency or firm.

The second approach focuses on processes, or whether the company or land owner has adopted quality management procedures that are consistent, repeatable, and conducive to continuous improvement. The company or land owner is evaluated based on its objectives, goals, planning, quality control measures, record keeping, staff responsibilities, regulatory compliance, and training and education of its employees. This approach might be seen as input driven since it focuses on management practices rather the actual results of these practices at the field level.

In reality, most programs are a combination of both these approaches, however, in some cases a program clearly emphasizes one or the other. Almost all certification programs are alike in that they advocate the use of some set of standards and indicators to measure and verify SFM (Cabarle 1995b). Indicators may consist of general information about ecological and socioeconomic conditions of forested areas, while standards may require management plans, including regulation and enforcement measures (Cabarle 1995b).

Three of the programs that certifiers of Canadian forests are likely to use as a basis of evaluation are ISO 14000, the Canadian Standards Association (CSA) SFM standards, and the principles and criteria endorsed by the Forest Stewardship Council (FSC). Each of these programs emphasizes the systems and management aspect, although the FSC criteria have significant outcome based components.

ISO 14000 refers to a series of environmental management standards developed by the International Standards Organization (ISO),"a worldwide federation of national bodies responsible for standardizing internationally traded goods and services" (Stevens and Tsigas 1997 p. 2). The ISO 14000 standards provide a "generic procedural framework for timber companies to reduce environmental impacts and risks" (Stevens and Tsigas 1997 p. 3). Due to the difficulty in reaching international consensus on performance standards, the ISO has developed an

environmental management system (EMS) which allows "producers in various countries to start at different benchmarks, thereby providing for environmental improvement at differing rates" (Stevens and Tsigas 1997 p. 3). Most industry groups, especially in developing countries, find this approach preferable since it allows industry to establish their own performance standards consistent with domestic environmental laws and it is therefore more flexible and less stringent than many other certification schemes. However, critics argue that the ISO approach will not guarantee that companies are practicing sustainable forestry. Another criticism of the ISO approach is that there are no specific provisions for the chain-of-custody[4]. That is, timber supply at the mill site or the retail level is not required to be traced back in the supply chain.

The CSA has also developed SFM standards that are based on the ISO 14000 framework. However, certification to the CSA differs from the ISO 14000 framework in that it requires a third party audit of both the management system and performance on-the-ground as well as public consultation on forest management objectives. The standard includes ecological and socioeconomic criteria and indicators for sustainable management that have been approved by the Canadian Council of Forest Ministers (CCFM) and are based on the Montreal Process (Rotherham 1997). The ecological indicators include measures such as the size of a specie's habitat or the quality of water and soil. Socioeconomic indicators include measures such as the number of visitor days attributed to recreation and tourism in the area and the degree of recycling of forest products[5].

A number of certification agencies have adopted the principles and criteria endorsed by the FSC. Established in 1993, the FSC is the first international accrediting organization to develop a

[4] The chain of custody is defined by Vallejo (1996) as "an unbroken trail of acceptability that ensures the physical security of samples, data, and records".
[5] See Rotherham (1997) for more details on the CSA SFM Standard.

process used to set principles and criteria for forest management and a manual for performance standards and management systems, which can be adjusted regionally, for certifiers (Stevens and Tsigas 1997 p.3). The council's goal is "setting a worldwide standard for good forest management by promoting widely recognized and respected principles of Good Forest Management" (Stevens and Tsigas 1997 p.3).

Despite a plethora of different certification schemes, there are not many companies that have pursued certification. The quantity of timber being produced worldwide that is certified is small but growing. It was estimated that in 1993 certified products accounted for only about 0.5 per cent of world trade in timber (Baharuddin and Simulla 1994). Vallejo (1996) estimates that in 1996 there was about 4 million hectares of certified forest in developing countries and about 1.5 million hectares in developed countries. Baharuddin and Simulla (1994) estimate that by 1999 certified timber products will represent 15 per cent of all timber traded.

The objective of this paper is to review the impacts of certification schemes on markets and assess ways in which these schemes may or may not further social welfare. In pursuit of this objective, the next section will review the objectives of certification. Next, section three will deal with the impacts of certification on markets and will address the questions of: whether a green premium exists; whether producers will voluntarily adopt certification; and how certification affects forest product markets. The fourth section will draw on the objectives and known effects of certification to discuss the welfare implications. In the final section, conclusions are given.

2.0 Objectives of Certification

Since its introduction, supporters of certification have been driven by a number of different objectives. These objectives vary depending on whether the environmentalist, consumer or producer perspective is considered. From the environmentalist's perspective certification

represents a mechanism for decreasing the environmental impacts of forest harvesting (Rotherham 1997) and promoting sustainable forest management and multiple uses of the forest such as recreation, hunting, trapping, and fishing (Kiker and Putz 1997). Environmentalists often support particular certification schemes because they include specific requirements that control clear cutting and protect old growth stands.

Demand for certification by consumers stems from the benefits that are derived from the information that certification provides. Certification allows consumers to make more informed purchasing decisions based on product attributes (Sikod 1996), and gives them the ability to contribute to environmental enhancement through their purchasing decision (Cabarle et al. 1995b).

From the producer's perspective, certification may represent a mechanism for advertising about the sustainability of its forest management practices and/or creating non-tariff barriers. Certification may thereby secure or protect the producer's market share and possibly lead to increased profits. Certification may also improve the company's and industry's stature in the local community and larger public (Rotherham 1997). The advertising provided by certification may eliminate misperceptions and convince the public to accept, and have confidence in, forestry activities and the producers' ability to promote SFM (Kiker and Putz 1997).

3.0 Impacts of Certification on Markets

3.1 Is there a Green Premium?

One highly contentious issue relating to certification is whether a green premium exists for certified timber, and whether this premium will be temporary or permanent (Cabarle *et al.* 1995b, Sedjo *et al.* 1997). The answer depends on what the term green premium means. If it refers simply to a higher price for certified wood than uncertified wood, then it is debatable whether

certification will lead to a price premium. However, a green premium can also be viewed as any additional benefit to the producer, whether it be manifested in a higher price in the market, or increased and more secure market share. In this case, it is almost certain that there will be a green premium associated with certification.

Consumers may be willing to pay (WTP) more for certified timber products if they attain increased utility from the assurance that the timber product that they purchase originates from a certified forest. Alternatively, if a consumer is given a choice between a certified and a non-certified product, they may opt for the certified product if they attain satisfaction from the belief that they are contributing to environmental enhancement through their purchasing decision (Cabarle *et al.* 1995b).

Unfortunately, there is very little information available on the number of consumers that are WTP higher prices for certified wood or how much more they are WTP. Most estimates that are available are based on opinion polls, and it is uncertain as to whether these results have any value in predicting actual purchasing decisions. In addition, most of these opinion polls inquire about environment-friendly goods in general and do not specifically ask about the WTP for certified timber products. There are, however, a few exceptions. Vertinsky and Zhou (1997) cite the results of two WTP studies that focus specifically on wood products. One of these studies found that consumers are WTP 13.6 per cent more on average for wood products originating from sustainable forests and the other "…study found that 19 per cent of educated consumers with relatively high incomes claim they are willing to pay more for certified wood products" (Ozanne and Vlosky 1996 in Vertinsky and Zhou 1997 p. 160-161). Mattoo and Singh (1994) also cite a poll that estimates that "consumers in Europe are WTP a 'green premium' in the order of 5-15 per cent more for sustainably produced timber products" (p. 62).

In a nationwide opinion poll in Canada, 80 per cent of those polled said that they were WTP up to 10 per cent more for products that are environmentally less harmful and studies in Austria and Sweden show similar results (OECD 1991 p. 12). Other opinion polls throughout OECD countries have demonstrated that consumers are WTP a premium for environment-friendly goods (Mattoo and Singh 1994 p. 55). Lober and Eisen (1995) report that "on average consumers seem WTP 5 to 10 per cent more for green products" (p. 40).

Consumers' WTP for certified wood products may be influenced by the certification process. Awareness and education promoted by certification and advertising associated with certification may alter consumer preferences (Kiker & Putz 1997). Dynamic preferences further complicate estimation of the magnitude of consumer demand for certified forest products.

A number of forces may also act to undermine the benefits that consumers attain from purchasing certified rather than non-certified timber products. For certification to be effective, consumers must be able to differentiate between products that originate from well and poorly managed forests. At least two phenomena could make differentiation of certified products difficult. First, many forest products generally go through a number of production stages before they are sold in the marketplace. The further down this supply chain a product is, the more difficult it is to show that timber originates from a certified source. Many forest products are made from a combination of different wood types that originate from different sources. Thus it could be difficult to ascertain whether a product should be certified. Second, differentiation implies information gathering costs to the consumer. A consumer's product selection time and information gathering costs will be affected by the number and type of certification 'labels' that are applied to timber products. Therefore, if there are a myriad of different 'timber labels' that result from the application of many different certification programs, the consumer may be

confused and feel that choosing between labels is not worth the bother. Furthermore, if the consumer is uncertain of, or lacks confidence in, the credentials behind the claims that a label or certificate represents, they may not bother to purchase certified products.

3.2 Will Producers Voluntarily Adopt Certification?

Producers may voluntarily pursue certification if they believe that the benefits outweigh the costs. The direct benefits and costs of certification to producers are listed in Table 1. On the benefits side, green premium attributes of increased price and/or market share (as discussed above) are joined by the potential to better public relations and staff morale. On the costs side, there are initial and ongoing costs. Initial costs include obtaining and understanding the certification scheme's requirements and the alteration of operations to meet those standards and securing markets for the certified products. Ongoing costs include documentation and data collection, identification and tracking of the chain of custody and the opportunity costs associated with altered harvesting practices.

Table 1 Producer Benefits and Costs of Certification

Benefits	*Costs*
Access to new markets and secured position in existing markets (Rotherham 1997) Increased revenue if certified products sell at a higher price (Rotherham 1997) Public assurance of sustainable forest management (Rotherham 1997) Improved staff morale (Rotherham 1997)	Obtaining, learning and understanding the certification standard (Johnson 1997) Alteration of operations to comply with certification standards and requirements (Rotherham 1997)[6] Documentation and data collection requirements for certification (Rotherham 1997) Identifying and tracking the chain of custody (Cabarle et al. 1995a) Finding markets for certified products

[6] Alterations of operations that may be required to meet certification standards, include decreasing or eliminating harvests on certain sites, decreasing or eliminating clear-cutting, and allowing a broader mix of species on stands, introducing harvesting techniques that are more environmentally benign or increasing silviculture (Sedjo *et al*. 1997). As Stevens & Tsigas (1997) point out, in addition to the initial cost associated with these operational

A number of factors will influence the benefits and costs of certification that accrue to producers including the political, social, and economic realities in each country producing wood products (Cabarle 1995b), and the characteristics of the specific certification program being applied. Forest type, size of management unit, and the current state of management and operations will also play a role. There has been very little study or analysis that attempts to quantify the benefits and costs of certification and how they vary with these influences. However, some broad estimates and general conclusions can be made.

Reliable data on the cost of actually being certified are scarce because only a few certifiers are willing to provide such information which is considered confidential by many private companies (Simula 1996). Baharuddin and Simulla (1994) estimate the cost to be between US $0.30-$0.60 per hectare for producers in developed countries and between five and ten per cent of logging costs in developing countries.

Costs of certification may be influenced by the type of ownership and the size of forest holdings. For example, Simula (1996) cites estimates of initial inspection costs that range from US$1.30 per hectare to $0.01 per hectare depending on the size of the management unit. There appears to be economies of scale associated with certifying logs. Similarly, compliance costs, associated with altering procedures and practices to meet certification requirements, may be lower on large units. “Sustainable forestry management practices may be easier to develop in public and in large and medium-sized, privately-owned forests” (Stevens & Tsigas 1997 p. 11). Therefore, it appears that countries with large publicly owned forests, and accompanying management infrastructures, may be better placed to respond to certification. In this respect,

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changes such as the purchase of new equipment, there may also be opportunity costs in the form of forgone harvests due to lower yields per unit.

Canada could be well positioned to respond to log certification with its large governmental presence in the sale of logs from public land.

In contrast, some developing countries would lack the institutional infrastructure necessary to facilitate the inspection of harvesting practices. Compliance costs, associated with altering procedures and practices to meet certification requirements, have been estimated to range from 10-20 per cent of average tropical log prices for developing countries (Sikod 1996). These costs are likely to be highest in the developing world, because the required expertise and management systems for adapting to new management practices are less readily available (Sikod 1996). According to Stevens and Tsigas (1997), "forest industries in developing countries generally face many constraints, such as lack of funding to produce and implement effective forest policies and management systems" (p. 11).

3.3 How Does Certification Affect the Supply and Demand of Forest Products?

Although it is known that certification will affect the supply and demand of forest products, there have been few attempts to predict the implications of forest certification on timber markets using economic models. Sedjo *et al*. (1997) and Mattoo and Singh (1994) use simple models to assess the market effects that may result from certification.[7] The result of the certification process is the differentiation of timber into certified and uncertified product markets. The certified market is characterized by higher production costs and consumers with a higher WTP compared to the uncertified market segment[8]. Sedjo *et al.* (1997) predict that although some consumers will be WTP a higher price for certified wood, this WTP will be limited and "…consumers with differing values for certified wood would substitute between the two types in

[7] While Sedjo *et al.* (1997) specifically discuss forest certification, Mattoo and Singh (1994) analyze eco-labeling in general.

response to relative prices" (p. 4). That is, the demand for certified and uncertified wood would not be independent, but would be conditional on the prices in the two markets.

Sedjo *et al.* (1997) and Mattoo and Singh (1994) explain that the demand in certified and non-certified markets may also be affected by how consumers respond to wood substitutes in the presence of certification. For example, the introduction of a certified wood products market could attract demand from consumers of non-timber substitutes, thereby increasing the overall pressure on timber resources. Sedjo *et al.* (1997) predict that the final equilibrium will occur at a point where the price of certified wood is slightly higher than that of uncertified wood, and that "…production from certified forests could either decrease or increase, depending upon the differential effects of production side costs and demand-side valuation related to certification" (p. 6).

De and Nabar (1991) analyze the implications of efficient but imperfect certification. In their analysis, certification is considered efficient because the probability that a product gets correctly classified into its appropriate quality category is higher than the probability that it is incorrectly classified. However, certification is imperfect because some classification errors are made. Their results provide a powerful argument for accreditation of certifiers or opting for government or non-profit certifying agencies. They show that "the certification process is noisy, [therefore, some lower quality suppliers]... opt for certification with a view to benefiting from the noise and possible misclassification" (p. 335).

A recent study by Vertinsky and Zhou (1997) examines the welfare consequences of requiring producers to meet minimum environmental protection standards combined with the option to pursue certification voluntarily, versus compulsory government enforced SFM

[8] For some producers costs may not increase since their management practices were already meeting certification

standards. They find that, theoretically, voluntary certification coupled with a minimum quality standard is preferable in welfare terms. This implies that if certification is mandatory then it is preferable to offer different certification levels. However, as noted above there are costs associated with providing certification at different levels. It is not known at what point the benefits of offering numerous different certification levels are outweighed by the costs. Furthermore, Vertinsky and Zhou (1997) only compare the relative welfare effects of two types of certification regimes and do not address the issue of whether an alternative mechanism for promoting SFM is preferable to certification.

Although some general conclusions about the trade implications of certification have been identified, effects on specific regions and countries are difficult to determine. In absolute terms, non-tropical countries, export and import the majority of timber traded globally. For example, Canada is the largest exporter of timber products in the world. However, tropical countries export a large share of their national production. The main importers of timber include Europe and Japan. The relative number of consumers that are WTP a price premium for certified timber is likely to vary by country, since evidence suggests that consumers in Europe and North America are generally more environmentally sensitive and more likely to consider the environmental attributes of products in their purchasing decisions (Sikod 1996). Due to differences in export patterns, some producers depend more heavily on markets that are likely to be environmentally sensitive and therefore may face more pressure to certify their exports in an effort to secure their export markets (Sikod 1996). For example, Canada's European and U.S. markets are likely to exert pressure on Canadian forestry practices.

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standards.

Some countries may find it advantageous to pursue less environmentally sensitive markets rather than incur the cost of certifying their timber. For producers in countries where certification is less onerous, this will present an opportunity to access new markets or to expand their exports in countries that are environmentally sensitive.

If each developed country that imports timber products imposes its own requirements or subscribes to a different verification or accreditation system, then there will be increased costs imposed on exporters trying to enter these markets. This may induce some countries to specialize in particular export markets (Sikod 1996).

There is some uncertainty as to whether a country or region could make certification a mandatory requirement for access to its market. Under the rules of the World Trade Organization, certification cannot explicitly be used as a barrier to trade. For example, a country cannot require wood imports to be certified unless all domestically produced wood must also be certified. A certification scheme legislated by a country must be applied to all timber regardless of its origin. If the country does not have a legislated certification scheme, it cannot impose a penalty on an exports that have not been certified "except that imposed by the preferences of consumers" (Cabarle 1995b p. 8).

Despite these restrictions, a country can still implicitly impose a trade barrier by legislating a national certification program that includes requirements which domestic producers can feasibly meet but which are very costly or difficult for foreign producers to comply with (OECD 1991). However, this country's action may be subject to criticism by other countries that view the actions

as supporting a technical barrier to trade (TBT) and these countries may appeal to the World Trade Organization (WTO)[9].

Stevens and Tsigas (1997) investigate the implications of a European Union (EU) policy that essentially makes certification a necessity for access to the EU market[10]. The imposition of the eco-label policy is predicted to cause producers that export to the EU to do one or more of the following: (1) change their forest management practices in order to become certified, which, in turn, would drive up production costs; (2) increase their exports to non-EU countries such as Asia and Latin America; or (3) sell their products domestically instead of to the EU (Stevens and Tsigas 1997 p. 14).

In general, Stevens and Tsigas (1997) find that "the welfare effects show that the European Union benefits from the simulated eco-label policy, with a $US 1,752.6 million increase in equivalent variation" (p. 15-16). All other regions experience welfare losses. Most of these losses fall on producers of forest products. Welfare in Canada declines by US $94.2 million and by US $22.4 million in the United States. Canada's welfare loss is largely driven by the loss of market share that results from the preclusion of harvests from old growth stands (see footnote 8). An important implication of the EU's trade policy is that some foreign producers are forced to

[9] Under the Technical Barriers to Trade (TBT) Agreement, World Trade Organization (WTO) members "agreed that using technical requirements, whether voluntary or mandatory, should not create unnecessary barriers to trade" (Stevens and Tsigas 1997 p. 7). However, there is some disagreement among members on the applicability of the TBT Agreement to certification and eco-labeling. Although trade rules are in place to ensure that equal treatment on trade is applied to all members, "…many delegations are still concerned about the potential impact of eco-labeling. Some countries believe that additional disciplines and transparency of WTO rules regarding eco-labeling requirements may be needed, possibly by extending the coverage of the TBT Agreement" (Stevens and Tsigas 1997 p. 7).

[10] Stevens and Tsigas (1997) use a "…comparative static, multi-region, computable general equilibrium model with price taking behaviour for all economic agents" (p. 8). The application of the model requires a large number of assumptions, many of which may influence the predicted results (see Stevens and Tsigas 1997 p. 8-9 & 11-12). Some of the more important assumptions relate to the characteristics of the certification criteria applied. For example, it is assumed that wood from primary/old growth is not eligible for certification. Based on this and other requirements, Stevens and Tsigas conclude that none of Canada's harvests would be eligible for certification.

produce in less efficient sectors. "As a result, returns to forest land decrease for all regions, excluding the European Union" (p. 18)[11].

4.0 Welfare Implications of Certification

From the perspective of an economist, certification may be seen as means of addressing the inefficiency resulting from failures in the timber market. To the extent that certification can remedy these failures, a welfare gain can be realized.

4.1 What Types of Market Failures is Certification Trying to Address?

Market failure results because the forest provides many benefits for which markets are absent or not functioning well (e.g. recreation, hydrological benefits, carbon sequestration, etc.). These benefits may be under-provided and timber may be over-harvested since the costs of cutting trees in terms of lost non-market benefits may not be considered (Sikod 1996).

Another market failure that may be relevant is information asymmetry. If we believe that the sustainability of forest management is an attribute that consumers value, but about which they are not well informed, then the situation is somewhat analogous to the commonly used example of the "market for lemons" in cars. If a consumer cannot differentiate the good quality cars from the bad quality cars (lemons) then the WTP for quality is driven to the lowest common denominator (Akerlof 1970). In the case of timber products, consumers may also be WTP more for timber that

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However, in order to include Canada in the analysis they assume that 3 per cent of harvested timber in Canada would achieve certification.

[11] Stevens and Tsigas note that their paper represents a preliminary analysis and that more accurate trade statistics and information on the costs of certification are required. It would be useful as well to test the sensitivity of the results to many of the assumptions made, such as the criteria of the certification scheme. The assumption that 3 per cent of Canada's harvesting was eligible for certification had a significant impact on the predicted impact of the EU policy. It would also be interesting to predict the implications of certification being mandated by other regions such as both North America and Europe or just select European countries (i.e. Germany). Furthermore, the model used by Stevens and Tsigas considers no dynamic effects and assumes that consumers WTP for certified products does not exceed their WTP for uncertified products. A model that incorporates a consumer WTP for the assurance of sustainably produced wood and preferences that evolve with the certification process and other dynamic effects may produce more reliable predictions.

comes from a sustainably managed forest. However, consumers may lack the information required to differentiate between timber products that come from sustainably and unsustainably managed forests. Just as warranties arise in the used car market as a medium for relaying quality information and providing consumers with the assurance required for them to be WTP extra for higher quality, certification of forest products aims to provides consumers with the information they require to identify products which originate from sustainably managed forests.

Although, these two types of market failures are often seen as separate, they are connected in the case of forest certification. Market failures regarding information are frequently associated with the consumer lacking information about the performance of a product (e.g. a "lemon"). However, in the case of forest products, the information that consumers lack is not related to how the product will perform. Instead, the lack of information relates to the degree to which forests are managed in a way that considers non-market values. Accordingly, both problems are not, strictly speaking, market failures. Whereas the non-market values clearly represent a market failure, the information problem is associated with having consumers act as regulators to correct the non-market valuation failure. In essence, the information problem addressed by forest certification may be a regulatory failure, where regulators (i.e. consumers) are lacking information.

Market forces may be used to aid in addressing market failures, through the use of so-called "economic instruments".[12] Although certification uses the purchasing decisions of consumers in markets to attempt to address market failures, it does not necessarily display the qualities of an effective economic instrument. The traditional use of economic instruments involves governments recognizing values external to market forces, and adjusting market signals

[12] For example, tradable emissions permits (Dales 1968) may achieve a desired level of pollution at minimum cost.

so that these omitted values are considered. Although such an approach is theoretically possible, a number of questions have been raised in the regulatory literature as to whether governments are capable such an optimal regulation process (e.g. Wolf 1988). However, as will be discussed below, certification is quite different from this approach, and may have its own problems in effectively correcting market failures. In the discussion that follows, we consider which regulatory body, consumers or governments, may be in a better position to address market failures.

4.2 Problems with Regulating Markets with Certification

There are a number of reasons why certification may not be the best mechanism for addressing market failures. In order for consumers to express their preferences for non-market values in their purchasing decisions, they require information regarding production aspects that are not observable at the point of purchase. Consumers may attain this information through individual research. However, Vertinsky (1997) points out that the economies of scale in the generation of such information has led to the formation of certifying organizations.

Certification involves collecting a great deal of information about forest processes and practices, and then summarizing this information with a certification label or rating. It is this final certified label that provides the information to consumers that directs their purchasing/regulatory decision. In Canada, provincial governments have historically collected much of the raw data that would be used in certification assessments. Therefore, governments have had the raw data informing their regulatory policies, as opposed to being limited to information from the label. If increased information leads to better regulatory policies, it would follow that the agency collecting the information would be in a better position to regulate than the consuming agents receiving the summarized information.

The regulatory response using this information is likely to be very different depending on whether consumers or government agencies are addressing market failures. One argument against having consumers act as regulators through certification is that the group of individuals that actually consume wood products may not represent members of society that value the forest for its non-timber values. At best, certification can only capture the preferences of those individuals that actually purchase timber products, and even then it may not accurately reflect the intensity of consumers' preferences since their consumption of timber products may not be commensurate with the intensity of their preferences for non-market values provided by the forest. In this case, some other regulatory mechanism may capture societal preferences more effectively. It can be argued that the government may be in a better position to assess societal preferences, rather than allowing them to enter diffusely through market signals with the aid of certification.

A further problem arises as it is not understood how certification will change consumer purchasing decisions, and how and whether producers will respond with altered forest management practices. Indeed, the studies by Sedjo *et al.* (1997) and Mattoo and Singh (1994) show that the impact of certification on consumer and producer behaviour is ambiguous. However, government would face similar problems in predicting producer and consumer responses to its regulatory policies.

Another possible problem associated with certification is the potential for double counting. Suppose that some forest products are not certified, but are nonetheless subject to a number of governmental regulations designed to protect non-timber values. A consumer, may register his/her regulatory vote by rejecting the product, not considering that the government has already instituted a regulatory regime to protect non-timber values according to its assessment of societal preferences. While the governmental regime may fall short of certification standards, there may

nonetheless be a partial fix in place. If further regulation is called for, governments would likely be in good position to coordinate additional regulatory responses with existing regulations.

Just as existing government regulations may complicate consumers' efforts to regulate market failures, certification schemes may similarly confound government efforts. The government could adjust its regulatory regime to account for the effects of certification, but since the effects of certification on markets are uncertain, such adjustment is likely to be difficult if not impossible. Having certification and government regulations simultaneously addressing the provision of non-market values may not be the most efficient and effective mechanism for correcting the associated market failure. There may be overlaps in monitoring and enforcement, information collection and provision, and administration between the government and certification agencies. The lack of coordination between these two regulatory approaches could confound rather than correct market failures.

In short, the development of certification schemes have not been directly associated with the concept of optimal regulation. Regulation is largely dependent on consumers whose behaviour is ambiguous, does not necessarily reflect the values of society at large, founded on insufficient information, and likely not coordinated with existing government policies. Accordingly, externalities are likely to be over or under-internalized.

In the search for optimal regulatory policies, a number of logical steps are generally undertaken. First, the problem is identified in terms of how markets are failing. Next, an assessment of alternative mechanisms for correcting the problem is made, based on a set of criteria such as efficiency, cost effectiveness, flexibility, and public acceptance. The alternative mechanisms may include command and control regulations such as standards or other market instruments such as taxes or marketable permits. The final step would be to determine the

appropriate methods for identifying conditions that would indicate when the market failure has been corrected.

With regards to the first step, if market failures are to be corrected to facilitate SFM, specific forest management practices required to meet SFM objectives must be known. Accordingly, a clear definition of SFM is required. Given the vague nature of SFM, certification schemes have largely arisen to help to operationally define these concepts. Similarly, a definition of SFM is needed for the third step so that results of a policy can be considered in comparison to SFM objectives. Because of the similar needs for a clear definition of SFM in the first and last steps, and the focus of certification schemes in making operational a definition of SFM, it seems as though the second step has been skipped. That is, by concentrating on the questions of "what is wrong and "how are we going to know when it is fixed" we have jumped over the question of "how are we going to fix it".

This jump of logic may result in a default approach that resembles command and control. Companies are effectively forced to abide by the command of certification, or face the control of consumer rejection of products. Certification may differ from a command and control mechanism when a variety of different certification labels are available to reflect different levels of provision of non-market values. That is, with many different labels to choose from, certification may become similar to a pricing mechanism. However, there are costs to consumers associated with collecting information about whether certification levels/schemes address types and levels of environmental concerns. Accordingly, many producers have pushed towards standardization of certification schemes, and while some certification schemes do have labels that differentiate between performance levels, others merely specify whether a product is certified. The all-or-

nothing approach whereby a company is either rewarded or refused a certified label is analogous to a standard or command and control mechanism.

Whether signals are transferred as "certified or not" or with some additional categories indicating level of performance, the emphasis has been placed on determining the appropriate variables (criteria and indicators) to measure and what levels of these variables constitute SFM. Certification emerged as a means of requiring the provision of information on the chosen variables. By adopting certification as the mechanism for promoting SFM, we have essentially accepted that this type of regulatory approach as optimal without an appropriate assessment of alternative economic instruments.

There are a number of reasons why the signals transmitted by this regulatory approach may not be the most desirable mechanism for promoting SFM. First, the identification of criterion and indicators is not particularly flexible. The heterogeneity in forest types, economic, and social conditions across forest management areas creates the need for standards to be fairly site specific in order to be effective. There has also been some concern expressed by forest managers and owners that the criteria and indicators in the CSA SFM standard are difficult to apply to a local area (Harman 1997). Many criteria and indicators of SFM have developed at the international and national level and include a very large number of indicators that apply to a very broad range of forest types. Adaptation of these criteria and indicators so that a more manageable number, that are still effective at the local level is required. Simula (1996) uses the example of standards related to biodiversity objectives to illustrate how SFM standards developed at the national level may not be applicable at the local level. According to Simula:

> In the same way as sustained yield timber management is not always a practical concept in smaller management units, some biodiversity conservation objectives may not be realistic at the small scale. For

> instance, in boreal forest the vegetation mosaic shifts continuously over time and therefore biodiversity planning and monitoring should be applied over large enough units to be meaningful. (pp. 124-125).

Because of the heterogeneity of forests, many certification schemes focus more heavily on the regulation of the management process which can be considered inputs to production as opposed to the characteristics of the forest and timber products that result from harvesting activities which are the outputs of production. The reason for this does not appear to be motivated by economic considerations of optimal regulation, but instead seem to be due to the fact that standards related to inputs are more easily regulated through a central planning mechanism, such as certification, and do not need to be as site specific as standards related to outputs. The danger with this approach is that by avoiding site specific standards, certification requirements can become so general as to become meaningless.

Furthermore, the use of standards, or criteria and indicators as they are commonly referred to in literature related to SFM and certification, can create conflicting incentives for producers since some variables focus on the capacity of the ecosystem or the management system to change or adapt while others focus on the state or stock measurements. Pursuing improvement in one set of criteria and indicators may not be compatible with improvement in other sets (Cabarle 1995b). To the extent that the certification scheme is not able to capture all relevant variables, the integrity of the forest ecosystem may be sacrificed. Instead of promoting more environment-friendly and sustainable practices, the long run effect may actually be that managers view the forest as set of indicators to maximize instead of a holistic system with many interdependent components (Vertinsky 1997). Vertinsky also points out that:

> what is available and what is salient and simple to understand is likely to draw more attention. There is a need to assess impacts of cognitive biases that such tendencies create in the use of criteria and indicators (p.3).

As with other forms of command and control regulation, certification may not provide appropriate dynamic incentives. Many certification programs, including ISO 14000, focus on continual improvement towards objectives that the company sets. This may encourage companies to set their objectives at low levels and move towards their objectives very slowly so that they can demonstrate small improvements continuously over time (Johnson 1997). This will result in inefficiency in cases where a company could make improvements more quickly at the same or lower costs.

Certification may also have concentration implications. Certification that includes monitoring of the chain of custody may provide cost advantages to vertically integrated companies and induce mergers and acquisitions or vertical and horizontal integration of processing and elimination of trade intermediaries in the supply chain (Sikod 1996). Since, the FSC system emphasizes a verifiable chain of custody and on-the-ground audits of performance, this process tends to favor larger companies that own a significant amount of forest land. "Mills or companies supplied by small private landowners are disadvantaged by the FSC certification process" (Stevens and Tsigas 1997 p.4). Economies of scale associated with applying for certification and operational changes required to meet certification standards may also induce mergers and acquisitions.

A further concern of certification as a regulatory tool arises from the potential for certification to be an advertising mechanism. The forest industry may have incentives to embark voluntarily on designing certification schemes because, as noted above, it may give them a chance to improve public relations with their customers. However, this incentive may not supply consumers with information required for a regulatory decision. As a regulatory tool, certification requires information regarding social benefits and costs of alternative practices. However, as

suggested by the results of De and Nabar (1991), the use of certification as an advertising tool, could create incentives for this information to be biased to further forest industry objectives. Along these lines, recent studies suggest that voluntary regulatory programs are not necessarily an adequate substitute for regulation (Resources for the Future 1997).

Although no estimates of welfare changes resulting from certification have been produced, due to the potential problems discussed above, attempts have been made to quantify the welfare effects of altered international trade flows. As discussed above, the European Union appears to be the clear winner at the cost of North American and developing countries. However, these results are highly dependent upon the specific certification scheme that is assumed. It follows that it would likely be possible to design a certification scheme that could favor any one of a number of countries at the expense of its competitors. Accordingly, negotiations towards global standards are likely to be difficult, perhaps resulting in a myriad of certification labels designed for specific markets. Indeed, non-price competition among wood products could well involve advertising schemes to differentiate between alternative certified labels.

5.0 Conclusions

The implementation of certification schemes has the potential to significantly effect the markets for wood products. Associated with these effects will be changes in social welfare. Although very few welfare estimates regarding the impact of certification on markets have been made, theoretical considerations suggest a number of problem areas that could arise.

Certification schemes are not innocuous information services for consumers. They are likely to have significant effects on, not only the consumption of forest products, but also on the behavior of firms as they form strategies within a certified world. Accordingly, certification should be viewed as a regulatory instrument with significant implications for how and whether market

failures are corrected. Unfortunately, it appears as though the implementation of certification schemes has largely ignored these types of considerations. While practitioners have been preoccupied with making SFM operational, it seems as though economic implications of certification, in comparison to alternative policy tools, have been neglected.

Certification has the potential to cause producers to consider non-timber values. In this respect, it may facilitate the expression of demand for environmental attributes of forest products that has been heretofore missing in the market. However, a number of considerations suggest that certification schemes may fail to optimally regulate market failure problems, and may actually decrease welfare compared to a non-certified state. Certification schemes provide limited information to consumers upon which consumption decisions are based. This information may not reflect the values of the general populace, and does not convey information about regulatory policies already in place. It is also not known how producers and consumers will respond to this information.

Furthermore, certification schemes may: fail to account for the heterogeneous conditions of forests; and fail to create incentives for producers to manage holistically while considering long-term efficiency. Certification schemes may also: target regulatory efforts towards monitoring inputs rather than outputs; promote the concentration of industries; and create trade barriers.

It is not known whether these potential problems cause the overall impact of certification on social welfare to be positive or negative, or whether certification is better or worse than alternative policy instruments. Accordingly, the main thesis of this paper is the importance of evaluating policy alternatives. Certification is not the only mechanism for promoting SFM, and it would appear that, considering the drawbacks associated with certification, there may be more

appropriate alternatives. A comprehensive review of the advantages and disadvantages of policy alternatives for promoting SFM seems warranted.

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