

## Chapter 10

# Green building drives construction market and forest certification: Certified forest products markets, 2007-2008<sup>1</sup>

---

### Highlights

- From 2007 to 2008, the world's certified forest area grew by 8.8%, reaching 320 million hectares, which is 8.3% of the global forest area, and 13.4% of the managed forest area.
- While the rate of increase in forest area certification has been slowing since 2006, chain of custody (CoC) grew by 50% in 2007, attaining 12,600 certificates worldwide in 2008.
- Green building systems are helping to drive certification in the construction market in the United States and Europe.
- Western European countries have certified more than 50% of their total forest area, North America more than one third, but Africa and Asia only 0.1%.
- Approximately 80-90% of the world's certified forest is located in the northern hemisphere, where two thirds of the world's roundwood is produced; more than half (57%) of the certified forest is in North America.
- Canada and the US continue leading the UNECE region in hectares of forest area certified, while Australia and Brazil have the most certified area outside the UNECE region.
- In the tropical region, 40% of the certified forest remains under certification schemes that are not certified by independent third parties.
- Globally the United Kingdom, the US and Germany have the most CoC certificates, while outside the UNECE region, Japan, China and Brazil are top ranked.
- Green purchasing policies and public procurement policies remain key drivers for certified forest products (CFPs) and forest certification.
- Double certification by multiple schemes is increasing as the wood and paper industries achieve better market access.
- The most prominent market benefits for CFPs are market access and brand image; price premiums for CFPs are an exception in Europe and North America.

---

<sup>1</sup> By Mr. Florian Kraxner, International Institute for Applied Systems Analysis; Dr. Catherine Mater, Mater Engineering; and Dr. Toshiaki Owari, University of Tokyo.

## Secretariat introduction

The market developments and policy drivers for CFPs are analysed in this chapter. Governmental and organizational procurement policies, as well as those of trade associations, often call for certification as a means to assure that their paper and wood products are derived legally from sustainably managed forests. The UNECE Timber Committee and the FAO European Forestry Commission initiated reporting on CFP markets and certification of forest management in 1998. To support the reporting process they set up an officially nominated Network of Country Correspondents on Certification and Certified Forest Products Markets. The authors of this chapter surveyed the entire network this year to elicit information for this chapter.

We thank those country correspondents who responded in a timely manner, which enables us to incorporate their contributions into the chapter analysis. This source of information is particularly important since there are currently no official statistics for trade in CFPs. The FAO/UNECE Working Party on Forest Economics and Statistics in 2006 confirmed the fact that CFPs do not feature in the Harmonized Commodity Description and Coding System maintained by the World Customs Organization. Unless otherwise attributed, all estimates and opinions in this chapter are based upon the authors' interpretations.

The chapter will provide a basis for an exchange on CFP markets at the joint Timber Committee and European Forestry Commission Market Discussions on 21-22 October 2008. Another basis for the discussions will be country-market statements in which Governments will be requested to report on certification market developments and public-procurement policies for wood and paper products and their impacts on sustainable forest management (SFM) and timber markets. The central theme of the discussions will be green building systems' impacts on the forest sector, and exploration of systems for building more environmentally friendly and energy-efficient buildings that have requirements for certified wood. These can be either a facilitator of trade or a barrier, depending on the availability of CFPs and the green building system regulations.

Mr. Florian Kraxner,<sup>2</sup> Research Scholar, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria, led the production and wrote most of this chapter. Mr. Kraxner is a member of the UNECE/FAO Team of Specialists on Forest Products

<sup>2</sup> Mr. Florian Kraxner, Expert in certified forest products markets, International Institute for Applied Systems Analysis, A-2361 Laxenburg, Austria, tel: +43 2236 807 233, fax: +43 2236 807 599, email: kraxner@iiasa.ac.at, website: www.iiasa.ac.at/Research/FOR.

Markets and Marketing. Dr. Catherine Mater,<sup>3</sup> President, Mater Engineering, Ltd. and Senior Fellow, The Pinchot Institute, Corvallis, Oregon, US, contributed to the North American analysis. Mr. Kraxner and Dr. Mater have presented CFP markets at the Timber Committee Market Discussions. We once again thank Dr. Toshiaki Owari,<sup>4</sup> University of Tokyo, for his perspective on Asian CFP markets. The chapter was reviewed by Dr. Ruth Nussbaum,<sup>5</sup> Director, ProForest, UK.

## 10.1 Introduction

The UNECE region's CFP markets have been analysed in a chapter of the UNECE/FAO *Forest Products Annual Market Review* each year since 1998. This year's chapter provides an in-depth statistical overview of the market and trade of CFPs. Special focus is placed on the topic of "green building", and the chapter also concentrates on policy-related aspects of certification in the forest sector. CFPs bear labels demonstrating, in a manner verifiable by independent bodies, that they come from forests that meet standards for SFM. Consumers may find labels on furniture and wood products, while manufacturers can verify the sources through the certification scheme's chain-of-custody (CoC) procedures. A section of this chapter looks into non-independently or non-third-party certified forests by systems such as the Indonesian Ecolabelling Institute<sup>6</sup> (LEI). The section also briefly discusses national certification schemes such as the Malaysian Timber Certification Council<sup>7</sup> (MTCC). Their CFPs are important since they are imported into the UNECE region. Process certification schemes such as ISO<sup>8</sup> 14001 are not included in this comparative analysis. The chapter continues to focus on certification systems based in the UNECE region.

While attempts are made to be impartial and objective, certification and CFP markets remain controversial within the forest sector. There is certainly

<sup>3</sup> Dr. Catherine Mater, President, Mater Engineering, Ltd, 101 SW Western Boulevard, Corvallis, Oregon 97333, US, tel: +1 541 753 7335, fax: +1 541 752 2952, e-mail: Catherine@mater.com, website: www.mater.com.

<sup>4</sup> Dr. Toshiaki Owari, Lecturer, Forest Business and Management, University Forest in Hokkaido, Graduate School of Agricultural and Life Sciences, University of Tokyo, Yamabe, Furano 079-1561, Japan, tel: +81 167 42 2111, fax: +81 167 42 2689, e-mail: owari@uf.a.u-tokyo.ac.jp.

<sup>5</sup> Dr. Ruth Nussbaum, Director, ProForest, South Suite, Frewin Chambers, Frewin Court, Oxford, UK, OX1 3HZ, tel: + 44 1865 243439, e-mail: info@proforest.net, website: www.ProForest.net.

<sup>6</sup> <http://www.lei.or.id/english/index.php>.

<sup>7</sup> <http://www.mtcc.com.my>

<sup>8</sup> <http://www.iso.org>

not consensus that certification is necessary. As noted in the analysis in section 4, the costs of certifying and maintaining certification on forestlands can be perceived as relatively high. This is especially the case when double certification by more than one system is needed to access different markets. When there are no price premiums for CFPs, as is common, the certification costs are absorbed by forest owners. The costs of CoC are borne by owners, as well as by the entire supply chain. Hence, there can be controversy when costs cannot be directly covered through higher prices. The weak markets and prices in 2007 and mid-2008 have further exacerbated the situation.

If costs exceed revenues, who benefits from certification and CFPs? Approximately 15 years ago when certification of SFM began, forest owners, including Governments and forest products companies such as retailers, regarded the initial costs as normal “start-up”. They assumed that the costs would be recaptured in the medium term. However, after 15 years without consistent or significant price premiums, there must be other benefits of certification that provide an incentive to bear the costs. For some forest industries, the certification costs are significantly less than advertising, and thus certification is a part of their corporate responsibility programme.

Section 4 presents the market drivers and benefits as summarized from the survey of the UNECE/FAO Certification Network. For example, market access is extremely important to penetrate environmentally oriented retailers and consumers. Corporate responsibility drives companies and their trade associations to promote environmental awareness and thereby opens markets for their products. Another reason may be to sell to Governments and organizations whose procurement policies specify CFPs. In summary, despite the lack of direct financial benefits, the indirect benefits justify certifying and marketing CFPs for some forest owners, manufacturers and retailers.

## 10.2 Forest management certification

### 10.2.1 Certification systems and forest area certified

By May 2008, the area of independently certified forest worldwide totalled 320 million hectares (ha), approximately 8.3% of the world's total forest area (3.9 billion ha (FAO, 2007)) (graph 10.2.1). This means a gain in certified area of approximately 26 million ha during the period from May 2007 to May 2008.

Since the first forest management certification in 1997, the certified forest area has increased every year,

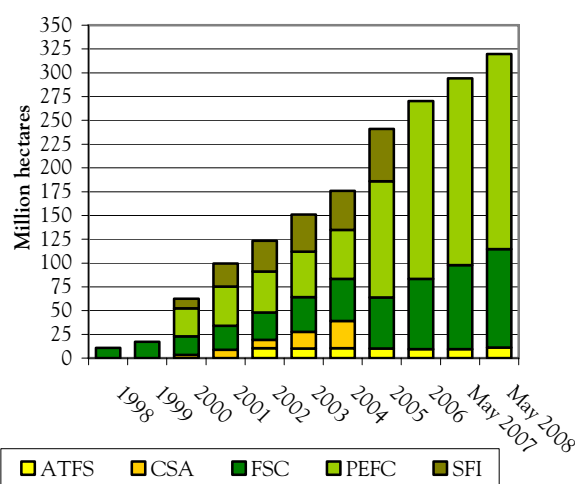
mainly due to the following principal systems within the UNECE region:

- ATFS, American Tree Farm System;
- CSA, Canadian Standards Association Sustainable Forest Management Program (endorsed by PEFC in 2005);
- FSC, Forest Stewardship Council;
- PEFC, Programme for the Endorsement of Forest Certification schemes, formerly known as the Pan European Forest Certification System; and
- SFI, Sustainable Forestry Initiative (endorsed by PEFC in 2005).

PEFC endorsed CSA and SFI in 2005. CSA and SFI cover the most certified forests in North America and their products can bear the PEFC label. Adding 76.7 million ha of CSA forests and a further 60.4 million ha of SFI-certified forests means that the PEFC umbrella totalled 205.3 million ha of certified forest area worldwide (as of May 2008).

GRAPH 10.2.1

Forest area certified by major certification schemes, 1998-2008



**Notes:** As of May 2008, approximately 2.6 million hectares have been certified by more than one scheme (mostly FSC and PEFC). These are not deducted from any scheme – the graph therefore shows a slightly higher amount of total forest area certified than exists in reality. FSC = Forest Stewardship Council; PEFC = Programme for the Endorsement of Forest Certification schemes; CSA = Canadian Standards Association Sustainable Forest Management Program (endorsed by PEFC in 2005); SFI = Sustainable Forestry Initiative (endorsed by PEFC in 2005); ATFS = American Tree Farm System.

**Sources:** Individual certification systems, the Canadian Sustainable Forestry Certification Coalition and author's compilation, 2008.

PEFC is a global umbrella organization for the assessment and mutual recognition of national forest certification schemes developed in a multi-stakeholder process. Globally, the organization has issued certificates for “SFM and the protection of forests’ functions for present and future generations” in 17 countries, 3 of which three are outside the UNECE region. PEFC was launched in 1999 and its Council currently consists of 33 member countries, of which 7 are outside the UNECE region. Currently, 24 (including 3 outside the UNECE) certification systems are endorsed by PEFC (Slovenia joined in August 2007 and Poland and Estonia in February 2008) and another 13 (4 outside UNECE region) national certification schemes are undergoing the PEFC endorsement process (including Belarus, Cameroon, Gabon, Latvia, Malaysia and the Russian Federation). PEFC runs three Promotion Initiatives with offices in Japan, Beijing and London.

FSC listed a total of 103.5 million ha of certified forest in May 2008. FSC is an international association of members consisting of a diverse group of representatives from environmental and social groups, the timber trade and the forestry profession, indigenous people's organizations, corporations, community forestry groups, and forest product certification organizations. Its certificates are linked to a label that “assures that products bearing it originate from forests managed to meet the social, economic and ecological needs of present and future generations”. Currently, FSC certificates are issued for SFM in 79 countries, 28 of which are outside the UNECE region. The certification scheme was officially launched in 1992 and has local offices (national initiatives) in 46 countries around the world.

ATFS forms the third major certification system of North America, accounting for 11.1 million ha certified forest area. Certification of tree farms through ATFS, under the oversight of the American Forest Foundation, is the oldest and largest voluntary, third-party verification process in the US. Since 1941, ATFS has been certifying the practice of sustainable forestry. Through the “power of private stewardship” an ATFS certificate assures “sustaining forests, watersheds and healthy habitats”. Currently, the ATFS system includes nearly 600 certificate holders in 45 states of the US. The American Forest Foundation, supported by SFI, has submitted the ATFS for PEFC endorsement where the system is currently undergoing recognition processes. Officially, the ATFS and SFI labels are already mutually recognized, which will allow for quicker endorsement negotiations with PEFC, which are expected to be finalized in August 2008.

Approximately 1.6 million ha in Europe (mostly in Sweden, Finland and Germany) and another 1 million ha

in North America (in Canada and the US) are double certified. This trend towards “double certification” or “dual certification”, i.e. the certification by two or multiple third-party schemes simultaneously for the same forests and the same products, originates from the desire by the forest industry for mutual recognition by the major certification schemes. For some forest owners and companies, double certification facilitates marketing to different CFP market segments (Purbawiyatna and Simula, 2008). Nevertheless, full or partial recognition between FSC and PEFC is not anticipated in the near future due to remaining controversies to be resolved.

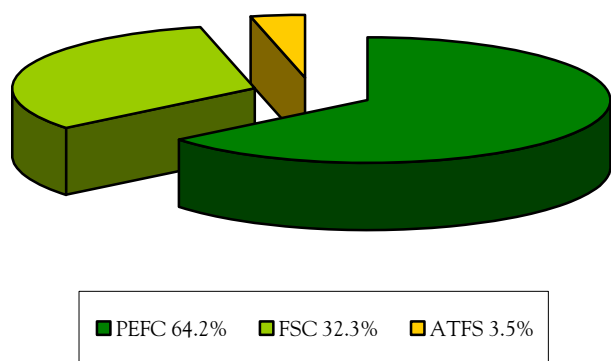
The Technical Commission of National Standardisation of Portugal, an independent body which ensures the representation of all forestry stakeholders, produced a gap analysis in 2007 between the Portuguese Standard for Sustainable Forest Management Systems of PEFC and the FSC standards. The Commission has started to work towards a possible harmonization between both standards. PEFC aims – through its mission and objectives – to provide a framework for the development and mutual recognition of national or sub-national forest certification schemes. By doing so, to date PEFC has achieved mutual recognition (endorsement) globally of 24 (national) certification systems. Outside the PEFC umbrella, full mutual recognition exists, for example, between two North American certification systems, the SFI under the PEFC umbrella and the ATFS. Consequently, under the SFI system, ATFS-certified (raw) material is considered equivalent to SFI-certified material, and vice versa.

### 10.2.2 Share of forest area certification

In terms of share of certified forest area, the market is clearly divided (graph 10.2.2). Due to the endorsement of SFI and CSA under PEFC, the number of major international certification schemes has been reduced to two, FSC and PEFC. The PEFC umbrella is the largest scheme with respect to forest area – it accounts for slightly less than two thirds (64.2%) of the area certified globally. However, the umbrella scheme had a reduction of a 3% share of the total certified area, compared to the previous survey period (May 2006 - May 2007). With a share of 32.3%, FSC is the second largest scheme. The ATFS share remained stable at 3% of the certified area worldwide. When ATFS and some other large national schemes are endorsed by PEFC, the past year's loss in share could be regained within the following year.

GRAPH 10.2.2

Share of certified forest area by the three major schemes, 2008



**Notes:** If a forest has been certified to more than one standard, the respective area has been counted in each of the certifying schemes involved. Total certified forest area in this graph therefore shows a higher amount – approximately 2.6 million hectares more – than exists in reality. Information valid as of May 2008.

**Sources:** Individual certification systems, Forest Certification Watch, the Canadian Sustainable Forestry Certification Coalition and author’s compilation, 2008.

10.2.3 Geographical distribution of certified forest area and certification systems

Within the UNECE region, North America has the largest area of certified forest, as it has had during the last five years (graph 10.2.3). Canada now has 138.7 million ha of certified forest, and the US 42 million ha. After a slowdown in the growth rate during the previous review period (May 2006 – May 2007), Canada and the US display an increasing growth rate of 9% and 14% respectively. More than half of PEFC-certified forest and almost one quarter of FSC-certified area were in Canada. Hence the growth is due to an incremental increase in both prevalent certification systems. In the US, mainly PEFC and ATFS contributed to the growth in the certified forest area.

Finland ranks third in the world and is the first European country in certified hectares of forestland. However, it had a slight reduction of 6.7% in PEFC-certified forest area. Some protected forest areas that had almost no harvesting were removed from the certified area, which now totals 21.1 million ha.

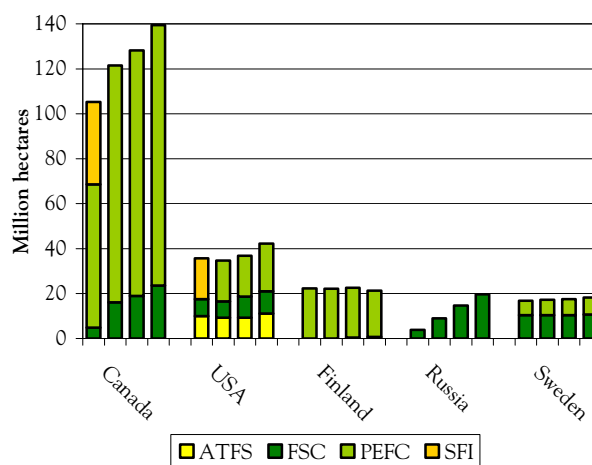
Russia, now ranking fourth after having overtaken Sweden, in 2009 could become third. Even though the growth rate in Russia slowed by half compared with the previous survey period, 34% is still the highest growth rate among the top-ranked countries within the UNECE region. The certified area in Russia is now 19.7 million

ha, and as of mid-2008 is certified only by FSC. However, PEFC may endorse a Russian scheme later in 2008.

Both major certification systems in Sweden demonstrated a slight increase in their certified forest area (17.1 million ha). However, the overall growth rate was slightly negative after the correction of the overlap from double certification. This, and the steep increase in Russia, led to a lower rank than during the previous review period. The slowing growth rates seem to be a western European trend, as most of the countries following the top five – such as Germany, Norway and Poland – reported negative growth rates, ranging from -2% to -24%.

GRAPH 10.2.3

Five countries’ certified forest area, within the UNECE region, 2005-2008



**Notes:** Bars for each country represent years from 2005 to 2008. The graph contains no overlap from double certification. Information valid as of May 2008.

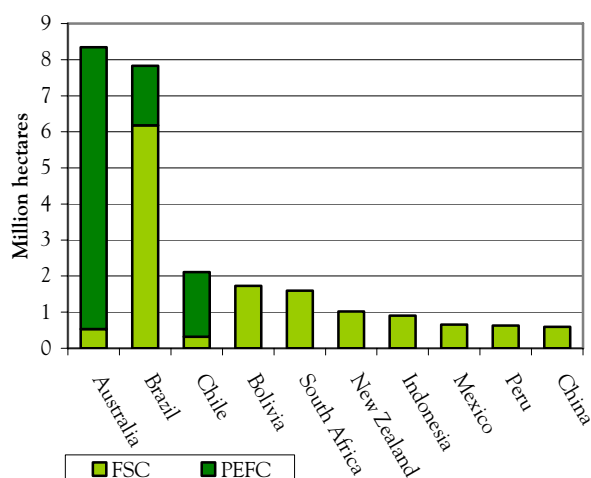
**Sources:** Individual certification systems, country correspondents, Forest Certification Watch, Canadian Sustainable Forestry Certification Coalition, author’s compilation, 2008.

Outside the UNECE region, the country ranking for certified forest area is clearly led by Australia and Brazil. Australia has certified 8.3 million ha, of which more than 90% is by PEFC. Brazil accounts for 7.8 million ha, of which almost 80% is certified by FSC (graph 10.2.4). In the global ranking, Australia would rank sixth and Brazil seventh. In sub-tropical and tropical areas, FSC has issued most of the certificates, totalling approximately 4 million ha in Africa, Latin America and Asia.

Most countries inside and outside the UNECE region choose a single certification scheme. Australia, Canada, Finland, France, Germany and Norway, are clearly dominated by PEFC or PEFC-endorsed systems. In Brazil, Poland and Russia, FSC is the predominant system. Sweden and the US have several schemes certifying almost equal amounts of forest.

GRAPH 10.2.4

Certified forest area in ten countries outside the UNECE region, 2008



**Notes:** The graph contains some overlap from double certification. Information valid as of May 2008.

**Sources:** Individual certification systems, country correspondents, Forest Certification Watch, Canadian Sustainable Forestry Certification Coalition and author's compilation, 2008.

#### 10.2.4 Certified forest, total forest and the wood market

Although the certified forest area in some countries in western Europe is slightly declining, more than half (54%) of the total forest area is certified (graph 10.2.5). This is the highest share when comparing the regions, followed by North America, with more than one third (39%). Apart from western Europe and North America, Oceania (4.8%) and eastern European countries and CIS (2.7%), as well as Latin America (1.6%) exceed 1% of their total forest area under certification. However, Africa and Asia, with their vast forest areas, still show at most 0.5%.

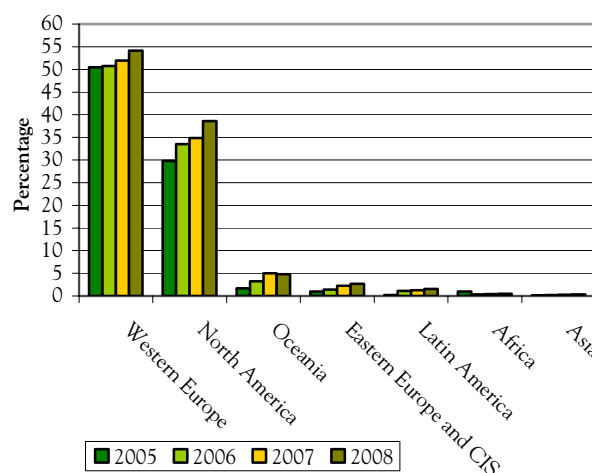
The rate of increase in percentage of certified area to the total forest area – if positive at all – is relatively small in all regions. The steepest increment rate since 2005 features North America – its share in the relative certified area grew by some 30% over the last four years. During the present review period (May 2007 to May 2008), western European countries faced an average growth rate of approximately 5% (10% since 2005).

The low shares in Africa and Asia also mirror statistical developments or the non-extension of their certificates. Some African forests experienced delays in gaining certification, or have not had their certificates extended, due to mismanagement or other problems. However, two national certification schemes in Africa and one in Asia are undergoing PEFC endorsement processes that may boost the share upon successful endorsement.

One general reason for the rather marginal overall increase, for instance in the case of Europe, is that the commercial forest areas in these countries are mostly certified, and significant further certification can be realized only by double certification. However, dual certification will not be visible in the statistical calculations.

GRAPH 10.2.5

Certified forest as a percentage of total forest area, by region 2005-2008



**Notes:** The forest area is based on FAO's *State of World's Forests 2007* data, excluding the category "other wooded land". Eastern Europe includes only non-EU countries. CIS is the Commonwealth of Independent States. Information valid as of May 2008.

**Sources:** Individual certification systems, Forest Certification Watch, the Canadian Sustainable Forestry Certification Coalition, author's compilation, 2008 and FAO, 2005.

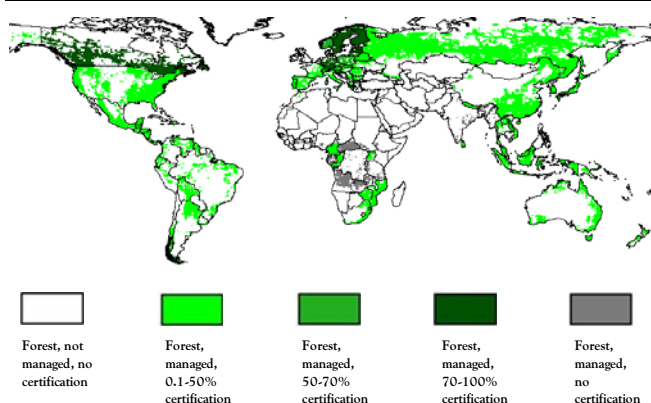
To date it is still a rather complex and multi-levelled procedure to obtain exact data on global forests, including their total area, productivity and detailed shares by function and use. While FAO has universally applicable definitions, some countries do not record data pertaining to their certified forests with the same classifications. The best available data on global forest resources is nonetheless provided by FAO, from which the 8.27% share of third-party certified forest area – relative to the global forest area – is derived. As certification is also seen as a market tool and hence will be applied in most of the cases on managed forest(s), this calculation needs to be improved and the certified area calculated in relation to the actual "managed forest" area by country.

FAO data, together with data published by the certification schemes, have been combined with Human Influence and Footprint Indices (including human population pressure, human land use and infrastructure, and human access) by the Center for International Earth

Science at Columbia University<sup>9</sup>. This enables compilation of the geographic area of forest under management and human influence (figure 10.2.1). The four colours in the legend indicate the different intensity, with up to 100% certification indicated in dark green. The intermediate green colour represents 50-70% certification. White indicates that these areas either have no certification or have no forest cover at all. The grey-shaded area indicates that the managed forests have no certification.

FIGURE 10.2.1

#### Certification intensity of forest area under management, 2008



**Notes:** Forest area certified relative to the forest area under management by countries. It is assumed that managed forest is at least 55% influenced by human activity. The human influence map was taken from CIESIN (2002). As of May 2008.

**Sources:** ATFS, 2008, FSC, 2008, PEFC, 2008, authors' compilation 2008, Kindermann et al., 2008, FAO/FRA, 2005, CIESIN 2002.

The map shows that countries with managed forests tend to have certification. The highest certification of managed forests is in central and northern Europe, Canada and the US. The greatest potential for more certification by international systems exists in the other forested regions, especially the grey-shaded areas, most often in Africa and the Indian sub-continent, as well as some forests in central and southeast Asia, the Near East and South America.

Assuming that approximately 2.3 billion ha of the world's total forest area of 3.9 billion ha are under management, or at least under active human influence (Kindermann et al., 2008), the certified share among managed forest totals approximately 13.4%. This percentage is approximately 60% higher than when compared with the total global forest area (3.9 billion ha), and is more realistic in terms of a market assessment.

There is a need to more accurately calculate the production of CFPs as the current data situation is not satisfactory with regard to managed forest and certified products deriving from certified forest area.

The potential roundwood supply from the world's certified forests in 2008 is estimated at approximately 416 million m<sup>3</sup>. This is approximately 8% more than reported in the previous review period (table 10.2.1).

This potential production equates to slightly more than one quarter of the world's production of industrial roundwood, or slightly less than half of the industrial roundwood production of North America and western Europe, where 84% of certified forests are situated. Concerning roundwood production from certified forest area, the UNECE region's average annual removals on forests available for wood supply are multiplied by the percentage of the region's certified forest area. According to the UNECE/FAO definition, roundwood is composed of industrial roundwood and fuelwood; however, the latter was not considered in this estimate.

#### 10.2.5 Certification systems in tropical countries

Globally, approximately 2% of the forest area is certified by national systems rather than the previously analysed international certification systems. However, most of the tropical countries are lacking any kind of national or third-party certification scheme. FSC is the most prevalent scheme in the southern hemisphere, especially in the tropical region. Although the southern hemisphere produces one third of the world's roundwood, most of this is used locally as fuelwood. By 2007, FSC had a share of approximately 60% in the tropics. Additionally, Malaysia's MTCC had certified some 28% of the total area certified in the tropics, Indonesia's LEI had a share of 6% and the Dutch Keurhout system in Gabon and Malaysia also totalled 6%. PEFC has the smallest share (4%) of the systems active in the tropical countries, and was mostly plantations. However, PEFC is the only other major international independent certification scheme, in addition to FSC, in the tropical forests (graph 10.2.6).

The market shares of the systems are undergoing a rapid change, which is not necessarily the case for the total forest area certified in the tropics, as indicated in section 10.2.3. By endorsing CERFLOR<sup>10</sup>, a national Brazilian system, PEFC became active in tropical countries. The Malaysian MTCC is also undergoing the accreditation process with PEFC, which would result in an increased tropical share by PEFC.

<sup>9</sup> CIESIN: [http://www.ciesin.columbia.edu/wild\\_areas/](http://www.ciesin.columbia.edu/wild_areas/)

<sup>10</sup> Brazilian Program of Forest Certification - Cerflor

TABLE 10.2.1  
Global supply of roundwood from certified resources

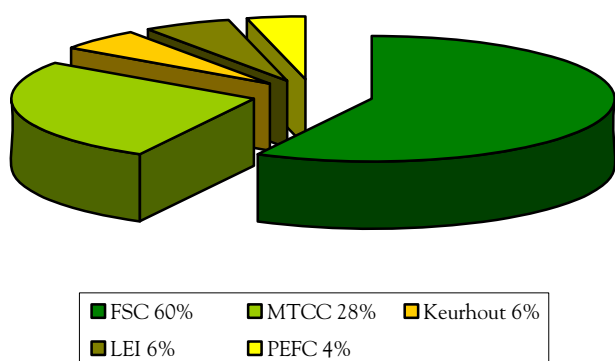
Region	Total forest area (million ha)	Total certified forest area (million ha)			Total forest area certified (Percentage)			Estimated industrial roundwood produced from certified forests (million m <sup>3</sup> )			Estimated industrial roundwood from certified forests, from global roundwood production (percentage)		
		2006	2007	2008	2006	2007	2008	2006	2007	2008	2006	2007	2008
North America	470.6	157.7	164.2	181.7	33.5	34.9	38.6	201.8	210.1	232.5	12.7	13.2	14.6
Western Europe	155.5	78.9	80.8	84.2	50.7	52.0	54.1	162.5	166.4	173.4	10.2	10.5	10.9
CIS	907.4	13.0	20.6	24.6	1.4	2.3	2.7	2.3	3.6	4.3	0.1	0.2	0.3
Oceania	197.6	6.4	9.9	9.4	3.3	5.0	4.8	1.6	2.5	2.4	0.1	0.2	0.1
Africa	649.9	2.1	2.6	3.0	0.3	0.4	0.5	0.2	0.3	0.3	0.0	0.0	0.0
Latin America	964.4	11.1	12.1	15.0	1.1	1.3	1.6	1.9	2.1	2.6	0.1	0.1	0.2
Asia	524.1	1.1	1.6	2.0	0.2	0.3	0.4	0.5	0.7	0.8	0.0	0.0	0.1
World	3 869.5	270.3	291.8	319.9	7.0	7.5	8.3	370.8	385.7	416.4	23.4	24.3	26.2

**Notes:** The reference for forest area (excluding “other wooded land”) and estimations for the industrial roundwood production from certified forests are based on FAO’s *State of the World’s Forests 2007* data. Concerning roundwood production, the subregions’ annual roundwood production from “forests available for wood supply” is multiplied by the percentage of the regions’ certified forest area (i.e. it is assumed that the removals of industrial roundwood from each ha of certified forests is the same as the average for all forest available for wood supply). However, not all certified roundwood is sold with a label. 2008 includes May 2007 through May 2008, and 2006 and 2007 are also from May to May. “World” is not a simple total of the regions.

**Sources:** Individual certification systems, Forest Certification Watch, the Canadian Sustainable Forestry Certification Coalition, 2008, FAO, 2005 and authors’ compilation. Information valid as of May 2008.

GRAPH 10.2.6

Certified tropical forests by system, 2007



**Notes:** Shares of certification systems (third-party and non-third-party) in the tropical region. As of 2007.

**Sources:** Based on data from FSC and national systems elaborated by Indufor. Modified after Purbawiyatna and Simula, 2008.

## 10.3 Chain of custody certification

### 10.3.1 Recognition of and demand for CFPs

Some major European wood-producing countries such as Austria, Finland, Germany, Sweden, as well as Canada, have already reached 70-100% certification of their managed forests. This means that the entire production of roundwood in these countries could bear a certification label from one of the major certification systems. This assumption is supported in the table above. However, due to low consumer awareness and frequent resulting lack of demand by final consumers, lack of sufficient CoC certification down the production chain, as well as low incentives for producers (i.e. no clear market advantage such as price premiums), the vast majority of these products – as in previous years – has been marketed without reference to certification. Nevertheless, some countries reported an increase in awareness of certification. Especially after targeted campaigns (e.g. the “Strike a blow for FSC” campaign), awareness of certification and SFM could be rising steeply. In Denmark, for example, FSC carried out a survey of Danish municipalities in May 2008, after having presented FSC certified hammers and toolkits containing a variety of FSC products and information to mayors, purchasers, politicians and employees. Of the 200



respondents, recognition of the FSC label and knowledge about FSC increased to 65% from just 5% in 2005 (FSC Denmark, 2008). Also FSC Netherlands and FSC Switzerland reported a 67% and 56% (respectively) (prompted) recognition of the FSC label. The UK reported 23% unprompted recognition of the FSC label, especially from respondents under 25 years of age.

Downstream industries do not usually need commodity products to be certified; hence, the potential supply of CFPs exceeds demand in many markets, especially for PEFC-certified CFPs. However, CFPs are increasingly appearing on the shelves of do-it-yourself and business-to-business retailers. FSC CFPs from tropical wood such as garden furniture are often found in department-store chains in western and central Europe.

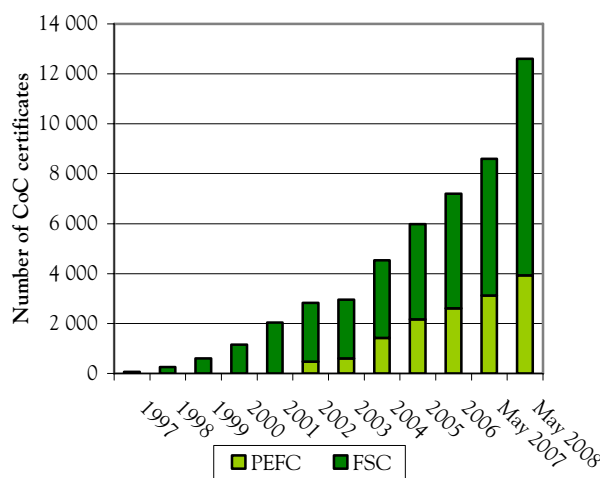
CFPs remain difficult to quantify due to the lack of official figures and trade classifications. The fundamental issue of independent, compatible and accurate data collection and management as a tool for reliable market assessment is stressed in most scientific and policy-level meetings. So far, only estimates – such that by FSC Netherlands to have a share of 17% in the domestic wood products market (2007) - can be found in the literature. Nonetheless, one practical tool for describing market characteristics and development of CFPs in business-to-business markets is the number and type of CoC certificates, which serves as a crucial market indicator.

### 10.3.2 Supply of CFPs

Since 1997 there has been more rapid growth in CoC certificates than in forest management certificates. A gain of 4,004 certificates means that the highest growth occurred during the past year. By May 2008 the number of certificates worldwide totalled 12,604, of which two thirds (68.8%) were by FSC and approximately one third (31.2%) by PEFC (graph 10.3.1).

Using the total number of CoC certificates issued per country as an indicator for business-to-business demand for CFPs, within the UNECE region the UK (1,878 certificates) took over the lead from the US (1,636 certificates). The other major holders of CoC certificates, of which most are FSC-certified, have also experienced a spurt in growth in 2008 (graph 10.3.2).

GRAPH 10.3.1  
Chain-of-custody certification trends worldwide,  
1997-2008

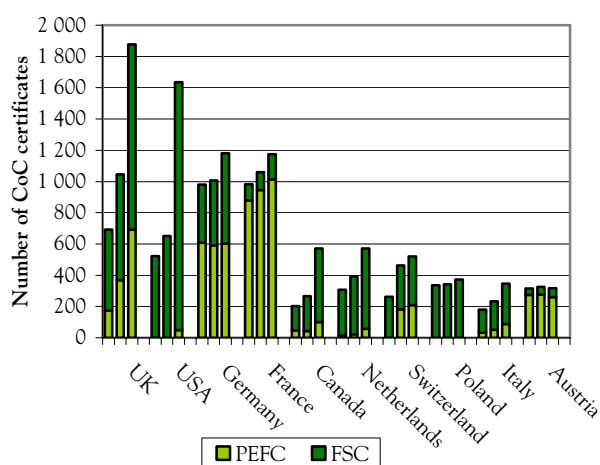


**Notes:** The numbers denote CoC certificates irrespective of the size of the individual companies or of volume of production or trade. Information valid as of May 2008.

**Sources:** FSC and PEFC, 2008.

GRAPH 10.3.2

Chain-of-custody certificate distribution within the UNECE region,  
2006-2008



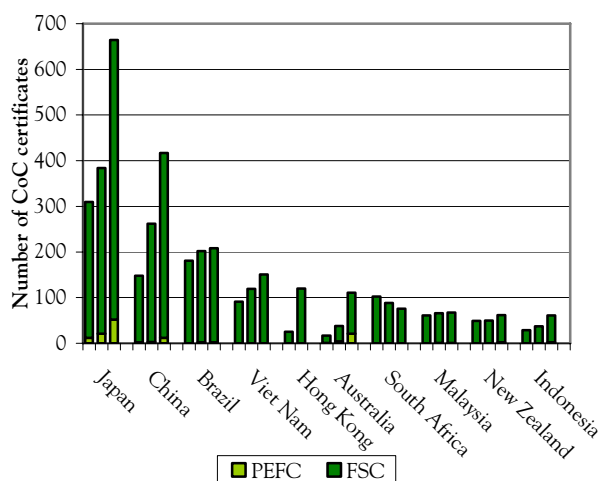
**Notes:** Bars for each country represent years from 2006 to 2008. Countries with fewer than 300 CoC certificates are not shown. The numbers denote CoC certificates irrespective of the size of the individual companies as of May 2008.

**Source:** FSC, PEFC and authors' compilation, 2008.

In countries outside the UNECE region, almost all companies holding a CoC certificate obtained these certificates from FSC. As in the previous survey periods, Japan leads with 6,644 certificates (graph 10.3.3). At an increasing rate of more than 85% annually, Japan almost doubled the CoC certificates issued during the present review period (May 2007 - May 2008). This positions Japan fifth behind the UK, US, Germany, France and Canada in the global ranking. Similar to the past year, Japan is followed by China (417 certificates), Brazil (208 certificates) and Viet Nam (151 certificates).

GRAPH 10.3.3

#### Chain-of-custody distribution outside UNECE region, 2006-2008



**Notes:** Bars for each country represent years from 2006 to 2008. The graph only includes countries with 60 or more CoC certificates. The numbers denote CoC certificates irrespective of the size of the individual companies as of May 2008. As of May 2008, neither SFI, CSA nor ATFS have CoC certificates.

**Sources:** FSC, PEFC and authors' compilation, 2008.

New among the top 10 economies with most CoC certificates outside the UNECE is Hong Kong SAR (120 certificates), which, together with Australia (111 certificates) showed the highest relative growth. South Africa, with 76 certificates, is the only African top-10 country and simultaneously, the only ranked country that has lost certificates since 2006. Malaysia, New Zealand and Indonesia are rated eighth, ninth and tenth – between 61 and 67 certificates each. Out of the ten countries highlighted, six are from Asia. This important market growth for CFPs in Asia has been illustrated in recent years by the dominant positions of Japan, China and Viet Nam.

Yuan and Eastin (2007) surveyed experiences and perceptions of the FSC CoC certified companies in China. Out of the 200 certified companies, 41 usable

responses were obtained. Results indicated that the US was the most important source of certified wood raw materials for Chinese wood products manufacturers, followed by New Zealand, Brazil, and European countries. Europe and the US were the two biggest export markets for certified wood products, in which the large DIY chain stores are important customers. Certified companies perceived positively that certification was helpful in entering new export markets, maintaining existing markets, and enhancing their competitiveness and public image.

Brazil and other Latin American countries are rapidly increasing their CFP production and exports. Most companies outside the UNECE export their CFPs to North America and Europe due to lack of domestic markets.

## 10.4 Policy issues

Most of the following information comes from a survey conducted in May 2008 of the officially nominated UNECE/FAO Network of Country Correspondents on Certification of Sustainable Forest Management and CFPs (the Certification Network). The Certification Network was established by the UNECE Timber Committee and the FAO European Forestry Commission to provide an objective source of country information on certification and CFPs for this annual chapter, and for other UNECE/FAO market analyses.

### 10.4.1 The impact of green building policies on CFP markets

#### 10.4.1.1 Green building standards and CFPs

Buildings have a profound effect on the environment, since they account for considerable usage of land, energy and water. Depending on the varying subregional construction practices, buildings consume a considerable amount of wood.

There are green building systems and standards operating in approximately 15 countries globally. Some of these schemes require, recommend or approve the use of either FSC or PEFC CFPs, such as schemes in Canada and the US (e.g. the Leadership in Energy and Environmental Design (LEED) system) and the green building schemes in the UK. It should be noted that systems such as LEED, which require and allow only one certification scheme, in this case FSC, have been criticized by holders of other systems' CoC certificates. European countries with green building systems include the UK, the Netherlands, Germany and Italy. Outside the UNECE region, green building standards exist in Japan, Singapore and Australia. Most of the standards aim mainly at energy efficiency and bring together a vast array

of practices and techniques to reduce and ultimately eliminate negative impacts of buildings on the environment and human health. Additionally, the different standards often emphasize taking advantage of renewable resources, e.g. using sunlight, or (certified) wood for construction.

The environmental impact of buildings is often underestimated, whereas the perceived costs of building green are overestimated. A survey by the World Business Council for Sustainable Development finds that costs for green building are overestimated by 300%. Key players in real estate and construction estimate the additional cost at 17% above conventional construction, more than triple the true average cost difference of approximately 5% (World Business Council for Sustainable Development, 2008).

#### 10.4.1.2 Green building in Europe

Compared with North America, the situation of CFPs in the construction sector for green building in Europe is quite divergent among countries. The survey of the UNECE/FAO Certification Network indicated that green building is not yet a major topic in some countries with a high share of forest area certification such as Norway, Finland and Luxembourg. One of the reasons may be that due to the high share of certification, the use of certified wood in the construction (housing) market is self-evident. Consequently, green building is concentrating on topics such as energy efficiency rather than just on the use of certified timber.

Switzerland, Slovenia, the Czech Republic and Liechtenstein have a relatively well established CFP market in the do-it yourself retail sector. Activities are under way to strengthen the role of certification in the construction sectors of these countries. In Switzerland, the "Minergie" standard is equivalent to the LEED standard in the US and requires certified wood (Minergie-Eco). In the Czech Republic, a competition for green building focusing on sustainability and energy efficiency should draw attention to this market. In Switzerland and Liechtenstein, certified wood is promoted and specified in the planning and contracting processes for public buildings.

Germany and the UK reported that certified timber is becoming established as a kind of quality assurance mechanism. Many products in the construction sector are starting to carry certification labels. Nevertheless, the private green building sector has only a minor share in the construction sector, mainly due to the low level of interest of private homeowners in certified wood products. In both countries, the current public procurement policies are starting to have an impact on

the preferred use of certified wood, which is also expected to raise interest in the private sector.

Similarly in France, where even though the use of wood in house construction is currently rather low (10%), the goal is to increase that share to 12.5% by 2010. Certification plays a certain role only in the construction of wooden (log) houses or in high-quality environmentally friendly constructions. A clear link to green building exists in public procurement policies, which require all wood used in public construction to be certified or to be from guaranteed sustainable origins by 2010.



Source: Homestead Timber, 2008.

Belgium, Denmark, Germany and the Netherlands have similar initiatives. Certification in the construction sector is of increasing significance, which is highlighted by the increasing number of CoC certified companies in the building industry. This trend is expected to increase due to the public purchase policy being established in 2008 by the Government of the Netherlands, which is completely based on the SFM process. Both major certification schemes are active regarding green building in the Netherlands. FSC expanded its market share by increasing the number of agreements with housing associations, banking organizations, municipalities, and building companies (86 partners signed the FSC covenant agreeing only to use FSC products), accompanied by many promotional actions throughout the year.

Italy appears to be especially active in the construction and green building sector, although, the potential of forest certification in the building sector, though high, is still mostly unrealized. Around 5.3% of FSC-certified national companies are directly connected with this sector by producing value-added CFPs such as doors, windows frames and flooring. Moreover, timber trade and sawmills are indirectly connected to the same

sector, adding another 18% of all certified companies. Also, the potential for PEFC certification could be relevant considering that the largest part of PEFC timber on the market is primary processed material (e.g. sawn softwood) which could be suitable for structural components of buildings. Despite the demand for certified wood in the national building and construction sector being still low, there are positive signals such as the construction of the headquarters of the most import bank dealing with ethical financing in Italy (Banca Etica) in Padova. This positive example is expected to set trends in the public and private construction sector – together with initiatives such as “Sistema casa Fiemme”, a network of 25 companies from the Fiemme Valley, engaged in green building and using FSC certified wood from local forests, which has also successfully passed earthquake testing in Japan.

Projections by Assolegno (National Association of Forest and Wood Industries) indicate that in coming years the percentage of wood used in construction could grow from 0.4% to 5%, i.e., from 1,600 to 16,000-20,000 buildings per year.

In the Italian public sector, recent laws support green building and energy savings in the construction sector. These laws are aligned with EC Directive 2002/91 on compulsory energy certification for buildings, and include tax reductions for green building and energy savings. Officially, there is no link between green building and certification in Italy as yet, but in some certified forest areas in northern Italy, the local administrations have recommended certified wood for its buildings.

The process for establishing the Green Building Council in Italy, a body in charge of supporting the LEED Programme in Italy and developing LEED standards at national level, was initiated in 2007. It addresses the issue of encouraging environmentally responsible forest management by requiring use of a minimum of 50% of FSC-certified forest products.

#### 10.4.1.3 Green building in North America

Despite the slump in US construction in 2007-2008, the US market for building “green” is growing. In 2007, with the introduction of LEED certification for residential construction, the markets have notably increased. According to a 2007 study released by McGraw-Hill Construction on consumer attitudes and preferences for remodelling and buying green homes, the market for green homes was less than 1% of the total construction market in 2005 and worth almost \$2 billion. In large part due to the increase in energy costs, green building construction is now projected to reach \$20 billion by 2010. The report states that 66% of US homeowners are aware of green building, and in 2007 almost 40% of home

remodelling met green building requirements. By May of 2007, LEED initiatives were being undertaken in 22 states – all focused on government and institutional construction. In April 2008, the US Green Building Council announced that one new school a day is registering for LEED certification. In the Pacific Northwest, energy-efficient homes are reported to be a bright spot in a depressed real estate market. Environmentally certified homes are being sold at a 10.5% premium on a square metre basis and are spending 24% less time on the market before being sold than non-certified homes. From September 2007 to March 2008, 20% of all home sales in Seattle were environmentally certified by one of three programmes, LEED for Homes, Built Green or Energy Star.



Source: Christian & Son Inc, 2008.

In 2008, LEED for Homes began on a national basis. The LEED for Homes Rating System assigns points for green features such as energy efficiency, enhanced indoor air quality, water efficiency, and sustainable use of materials – including FSC-certified wood. The LEED Building Council reported that one third of the 1,200 certified buildings were rated as such because of their use of certified wood. In 2006, NAHB reported that 50% of builders were focusing their attention on green building issues. By March of 2007, NAHB was predicting that 40-50% of homes built in 2010 would be green certified, while other projections estimated 10% by that time. In January 2007, Green Building Media released results of a survey of 250 residential builders across the US, stating that 51% of homebuilders reported that buyers were willing to pay a premium of between 11-25% for green-built homes. By May of 2008, almost 700 homes in 31 states across the US had been LEED-certified, with 12,000 additional homes registered for certification in the near future. More importantly, and possibly an indication of the market “staying power” for LEED-certified homes,

only 17% of the certified homes are classified as custom homes in the market. Forty-two per cent of certified homes were “spec” (production homes constructed to the specifications of builders rather than homeowners), and 37% were homes built for the affordable housing market.

The green building boom is expanding to Canada from the US. Due to a great deal of attention by the media, some provincial governments are establishing green building standards for government buildings. Hence, each year green building is playing a larger role in the Canadian construction market.

A major driver of development in Canada is the number of green building systems that recognize certification under the Canadian Green Building Council, which follows the lead of the US Green Building Council (LEED standard) and continues to award points for CFPs, but only for FSC-certified products. However, the Council is currently re-assessing all other certification standards and how they might be included in the future. BOMA Go Green (Green Globes Canada) already includes all forest certification standards for credits in their programme.

The Canadian Home Builder’s Association has also shown interest in green building standards, and commissioned a study on the major certification systems used in Canada and the impact of the US Green Building Council preference for FSC-certified wood in its LEED standard. Results from this study argue against restrictions to single certification systems in Canada’s home building sector because builders would be unreasonably denied recognition for environmentally sound construction based on other SFM wood, which could mislead customers into thinking that homes built with other SFM wood are not environmentally sound (Canadian Home Builder’s Association, 2008).

Certified wood products provide the building sector and consumers with the assurance that a product comes from a well-managed and legal source. This is a message that builders, architects and others can pass on to the end user. As a result, these groups are increasingly specifying certified wood products – especially in the value-added sectors of windows, doors, and beams. On the other hand, there is little awareness of forest certification in the residential sector because there is little demand for certified products. Homes are often built with wood from certified forests without the knowledge of the consumer. As a result, few residential builders specify certified products.

While forest certification, certified products and chain-of-custody continue to gain traction with architects and builders, these have not yet been incorporated into current building codes either at the national or provincial levels. However, positive examples include the

Government of Quebec, which passed a bill in December 2007, with articles that specifically address the issue of certification. This has enabled the Minister to make certification mandatory on public land for any company with harvesting rights. In addition, British Columbia’s (BC) bill for 2008 included measures to address climate change, reduce greenhouse gas emissions, and increase the energy efficiency of buildings through the development of green provisions for the BC Building Code. This is seen as an important move, since credible forest certification also contributes to carbon sequestration and thus has a link to the important contribution being made by green buildings on the climate change front.



Source: Stora Enso, 2008.

Additionally, BC’s government insists that all new government structures, including schools and government buildings, be built according to leading green building rating systems currently available in North America (LEED or equivalent). It has also adopted a Wood First policy to help promote the use of sustainably managed BC wood products in construction.

#### 10.4.1.4 Green building in Asia

The green building movement is gaining ground among Asian countries as well. Current members of the World Green Building Council include India, Japan, and Taiwan Province of China. China, Hong Kong SAR, the Republic of Korea, Philippines and Viet Nam are not yet members of the Council, which is still in the early stages of development (World Green Building Council, 2008).

The Indian Green Building Council has adopted the LEED rating system for India (Indian Green Building Council, 2008). The Council launched LEED India for New Construction and for Core & Shell in 2007. Like the US, LEED India only allows credits for using FSC-certified wood. By March 2008, more than 160 buildings had been registered under the LEED system (Confederation of Indian Industry, 2008).

The Japan Sustainable Building Consortium has developed the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) in Japan (Japan Sustainable Building Consortium, 2008). CASBEE includes four assessment tools corresponding to the building lifecycle: CASBEE for Pre-Design, New Construction, Existing Buildings, and Renovation. Among the expanded assessment tools for specific purposes, CASBEE for Homes (Detached Houses) was launched in September 2007. CASBEE allows a higher rating in using wood from thinning forests, wood from sustainably managed forests (following the guidelines by the Japan Forestry Agency), and domestic softwood. The use of locally produced wood is also rated positively. Unlike the LEED system, CASBEE is not selective in its choice of forest certification programmes. As of March 2008, 24 skyscrapers with a floor space of 1.5 million m<sup>2</sup> were CASBEE-certified. Several major local governments, including those of Nagoya, Osaka and Yokohama, require building owners to report the CASBEE's result when they construct new buildings. By September 2007, more than 2,000 reports had been submitted to the local governments.

The Chinese Ministry of Construction published the Evaluation Standard for Green Building in June 2006, which is also similar to LEED. The Ministry assesses the energy performance of buildings based on the standard, and issues the appropriate certification (Hong et al., 2007). The Green Olympic Building Assessment System (GOBAS), published in 2003, is another green building rating system, which is modelled primarily on Japan's CASBEE. Among resources and environmental impacts involved, energy consumption and system performance are the most important elements of GOBAS (Nakahara and Shimizu, 2007). Ten Chinese building projects were certified under the LEED, with another 53 projects registered by April 2008 (US Green Building Council, 2008).

## 10.4.2 CFP market drivers and constraints

### 10.4.2.1 Driving factors in North America

Widespread and increasing concern for the environment is a principle driving factor for CFPs. Companies and their trade associations want to demonstrate their corporate responsibility, both social and environmental, through a commitment to forest certification, in order to send a clear signal to their customers. Market pressure by environmental NGOs also remains a driving factor. The pulp and paper industry in the US remains the key driver of forest certification in that country for both forest area certified and production facility CoC certifications.

An additional driving factor is likely to be the June 2008 extension to the Lacey Act, which makes possession of

timber obtained, traded or sold illegally, even where the illegal act was outside the US, a criminal offence in the US.

### 10.4.2.2 Driving factors in Europe

A principal driving force is the demand of business-to-business markets, such as the strong demand by the retail sector for paper and newsprint in France and Switzerland. Governmental and organizational procurement policies are stimulating CFP demand. In the private sector, companies and trade associations are under pressure to demonstrate that their timber is from legal and sustainable sources. FSC runs intensive promotion campaigns, which are seen as a driver for certification in some countries, such as the Netherlands. In Italy, both major certification systems are active in promotional and educational events, while strong growth of PEFC certification was reportedly due to strong political and financial support by local governments.



Source: Finnish Forest Industries Federation, 2008.

### 10.4.2.3 Factors constraining CFP markets in North America

Cost is a major limiting factor for either SFM certification of forest management or CoC certification, especially when market benefits are perceived to be limited. The complex process is perceived to be costly to establish and to maintain. The absence of marketing leads to a lack of consumer awareness and demand. Some stakeholders view the exclusive promotion of one certification system – especially in some procurement policies and green building systems – as a major factor limiting the choice of supply.

#### 10.4.2.4 Factors constraining CFP markets in Europe

In Europe, lack of information and the absence of consumer awareness about forest certification and CFPs is a major limiting factor. In addition to lack of knowledge of final consumers, certification is not widely known by private forest owners, small companies and lower levels of government. One negative factor is the direct and indirect costs of certification and especially dual certification by both FSC and PEFC, such as in Switzerland. The request for certified timber on the Dutch market resulted in higher prices for tropical hardwoods because of limited supply.

#### 10.4.3 Market benefits through forest certification

##### 10.4.3.1 Market benefits in North America

The chief benefit for CFPs is improved market access, especially to green building markets. FSC appears to achieve price premiums in Canada, especially for value-added products. For some companies, certification has become a necessary cost of doing business. Some companies benefit from brand recognition and their reputations are enhanced when certified raw materials are used.

##### 10.4.3.2 Market benefits in Europe

While many countries reported that market benefits are small or nonexistent, there are some countries receiving a market benefit in terms of market access, for example, retailers in Switzerland. As in North America, value-added products seem to gain some price premiums and in Portugal there is also a premium for certified roundwood. However, overall, consumers are not willing to pay more for certified products. Certification facilitates gaining contracts when Governments have public procurement policies specifying CFPs, such as in Italy. In addition, certification is often a good marketing tool, enabling branding for commodity products.

## 10.5 References

- AF&PA. 2008. Sustainable Forestry Initiative. Available at: [www.afandpa.org/Content/NavigationMenu/Environment\\_and\\_Recycling/SFI/SFI.htm](http://www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm).
- American Forest & Paper Association. 2008. Available at: [www.afandpa.org](http://www.afandpa.org).
- American Tree Farm System. 2008. Available at: [www.treefarmssystem.org](http://www.treefarmssystem.org).
- Canadian Home Builders' Associations (CHBA). 2008: Sustainable Forest Management and USGBC-LEED. Prepared for: The Canadian Home Builders' Associations. Prepared by: Rowena Moyes.
- Canadian Sustainable Forestry Certification Coalition. 2008. Available at: [www.sfms.com](http://www.sfms.com).
- Canadian Standards Association. 2008. Available at: [www.csagroup.org](http://www.csagroup.org).
- Center for International Earth Science Information Network (CIESIN). 2008. Last of the Wild Project, Version 1, 2002 (LWP-1): Global Human Footprint Dataset (Geographic), Version 1, Wildlife Conservation Society (WCS) and CIESIN. Available at: [www.ciesin.org/wild\\_areas](http://www.ciesin.org/wild_areas).
- Center for International Forestry Research. 2008. Available at: [www.cifor.cgiar.org](http://www.cifor.cgiar.org).
- Confederation of Indian Industry. 2008. GreenHabitat -A newsletter on Green Buildings, March 2008. Available at: [www.igbc.in/igbc/mmbase/attachments/4995/GH\\_Mar\\_2008.pdf](http://www.igbc.in/igbc/mmbase/attachments/4995/GH_Mar_2008.pdf), accessed 9.4.2008.
- FAO. 2007. State of the World's Forest 2007. Rome, Italy. Available at: [www.fao.org/forestry](http://www.fao.org/forestry).
- FAO. 2005. Global Forest Resources Assessment. Rome, Italy. Available at: [www.fao.org/forestry](http://www.fao.org/forestry).
- Forest Certification Resource Center. 2008. Certification Systems. Available at: [www.metafore.org](http://www.metafore.org).
- Forest Certification Watch. 2008. Available at: <http://certificationwatch.org>.
- Forest.ru. 2008. Available at: [www.forest.ru](http://www.forest.ru).
- [www.forest.ru](http://www.forest.ru)/eng/sustainable\_forestry/certification/fsc-russia.html.
- Forest Stewardship Council. 2008. Available at: [www.fscoax.org/coc/index.htm](http://www.fscoax.org/coc/index.htm).
- Forest Stewardship Council – Canada. 2008. Available at: [www.fscCanada.org](http://www.fscCanada.org).
- Forest Stewardship Council – Germany. 2008. Available at: [www.fsc-info.org](http://www.fsc-info.org).
- Forest Stewardship Council. 2008. FSC certified forests (March 2008). Available at: [www.fsc.org](http://www.fsc.org).
- Forest Stewardship Council – US. 2008. Available at: [www.fscus.org](http://www.fscus.org).
- FSC Facts and Figures on FSC growth and markets, FSC Presentation February 25, 2008. Available at: [www.fsc.org/fileadmin/web-data/public/document\\_center/powerpoints\\_graphs/facts\\_figures/2008-01-01\\_FSC\\_market\\_info\\_pack\\_FINAL.pdf](http://www.fsc.org/fileadmin/web-data/public/document_center/powerpoints_graphs/facts_figures/2008-01-01_FSC_market_info_pack_FINAL.pdf).
- Hong, W., Chiang, M.S., Shapiro, R.A., Clifford, M.L.. 2007. Building Energy Efficiency. Asia Business Council,. Available at: [www.asiabusinesscouncil.org/docs/BEE/BEEBook.pdf](http://www.asiabusinesscouncil.org/docs/BEE/BEEBook.pdf).
- Indian Green Building Council. 2008. Available at: [www.igbc.in](http://www.igbc.in), accessed 10.4.2008.
- Indonesian Ecolabelling Institute (LEI). 2008. Available at: [www.lei.or.id/english/index.php](http://www.lei.or.id/english/index.php).
- Industrial Standard Organization. 2008. Available at: [www.iso.org](http://www.iso.org).

- International Tropical Timber Organization (ITTO). 2008. Available at: [www.itto.or.jp](http://www.itto.or.jp).
- Purbawiyatna A. and M. Simula. 2008. Developing forest certification. Towards increasing the comparability and acceptance of forest certification systems worldwide. ITTO Technical Series No. 29. International Tropical Timber Organization. Available at: [www.itto.or.jp](http://www.itto.or.jp).
- Kindermann G.E., I. McCallum, S. Fritz, and M. Obersteiner. 2008. A global forest growing stock, biomass and carbon map based on FAO statistics. *Silva Fennica*, 42(3).
- Leek, N. and Oldenburger, J. 2007. Sustainable timber on the Dutch market in 2005. Stichting Probos. Available at: [www.probos.net](http://www.probos.net).
- Japan Sustainable Building Consortium. 2008. CASBEE website. [www.ibec.or.jp/CASBEE/english/index.htm](http://www.ibec.or.jp/CASBEE/english/index.htm).
- Malaysian Timber Certification Committee. 2008. Available at: [www.mtcc.com.my](http://www.mtcc.com.my).
- McGraw-Hill Construction. 2007. Greening of Corporate America SmartMarket Report. Available at: [http://construction.ecnext.com/coms2/summary\\_0249-238822\\_ITM\\_analytics](http://construction.ecnext.com/coms2/summary_0249-238822_ITM_analytics).
- Nakahara, N. and Shimazu, M. 2007. Overview on Activity of Building Commissioning in Asia and Japan. National Conference on Building Commissioning, May 2-4, 2007. Available at: [www.bsca.or.jp/english/nbc2007.pdf](http://www.bsca.or.jp/english/nbc2007.pdf).
- PEFC Czech Republic. 2008. Available at [www.pefc.cz/register](http://www.pefc.cz/register). PEFC, 2007: Annual Review. Available at: [www.pefc.org/internet/resources](http://www.pefc.org/internet/resources).
- PEFC Asia. 2008. Available at: [www.pefcasia.org/english/pdf/PEFC\\_FAQ\\_English.pdf](http://www.pefcasia.org/english/pdf/PEFC_FAQ_English.pdf).
- PEFC China. 2008. Available at: [www.pefcchina.org/index.aspx](http://www.pefcchina.org/index.aspx).
- PEFC Members scheme. 2008. Available at: [www.pefc.org/internet/html/members\\_schemes/4\\_1120\\_59.htm](http://www.pefc.org/internet/html/members_schemes/4_1120_59.htm).
- Programme for the Endorsement of Forest Certification Schemes (PEFC). 2008: Available at: [www.pefc.org](http://www.pefc.org).
- Sustainable Forestry Initiative. 2008. SFI Update January 2008. Available at: [www.sfi.org](http://www.sfi.org).
- Status of FSC Certification – Canada. 2008. Available at: [www.fscCanada.org](http://www.fscCanada.org).
- Sustainable Green Ecosystem Council. 2008. Available at: [www.sgec-eco.org](http://www.sgec-eco.org).
- US Green Building Council (2008) LEED Projects Directory. Available at: [www.usgbc.org/LEED/Project/RegisteredProjectList.aspx](http://www.usgbc.org/LEED/Project/RegisteredProjectList.aspx).
- World Green Building Council. 2008. Available at: [www.worldgbc.org](http://www.worldgbc.org).
- Worldwide Fund for Nature. 2008. Available at: [www.wwf.org](http://www.wwf.org).