Are Forest Standards and Certification Achieving Sustainable Development?

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Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any tertiary institution, and to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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Abstract

Forest certification is perceived as a new instrument to promote sustainable forest management (SFM). It developed widely after the Earth Summit in Rio in 1992 with the primary goal of achieving SFM. Expectations held for the certification systems included decreasing forest land degradation, the establishment of sound forest management policy, the promotion of public participation in management, a price premium for certified wood products and improved access to the 'green market'. The majority of certification systems aim to maintain or improve the ecological, social and economic functions of forest ecosystems. Certification is supposed to guarantee that forests are well-managed. Forest certification is categorised by function and geographical location. There are currently two types of functions 'management-system-based' and 'performance-based'. Management-system-based systems assess a company's management processes. On the other hand, performance-based systems evaluate a company's operations in the managed land. Currently, many certifications are management-system-based. From a geographic perspective, there is international certification and national certification. Many national certification schemes are members of international certification schemes. Certification can also apply to wood products that use wood material certified against the standard when all chain of production processes are evaluated, with respect to the environmental and social impacts. A single certification logo can be issued to the producer. Forest certification schemes can assess any type of forest against criteria and indicators (C&I) to assess if they have been implemented against standards at the national level. At least nine international initiatives and agreements for C&I forest certification systems have been developed. Six recognized forest certification systems are reviewed within. None of these certification systems have exactly the same C&I thresholds. Differences between schemes largely arise from the different expectations of the primary stakeholders of the schemes. Certification bodies are voluntary, independent, and non-government. An increasing number of certifications may bring confusion and complexity as various standards develop. The certification systems are not clear to the general public because targets and effects are not usually well defined. Different types of forests can be assessed at specific levels of the standard. However, dissimilar forests approved by the same certification can equally claim that their forest management practice is environmentally sound. Yet, different criteria, conditions, and systems for environmental sustainability are found in each standard. Nevertheless, all certification bodies seem to be developing towards socially and economically acceptable systems. Standards have been adapting to

the needs of the various stakeholders. This can make the different certification systems converge. Measures for ecological sustainability in certification systems seem to be less well-developed, in general, than measures to ensure social and economic sustainability.

Acknowledgments

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List of Acronyms

ABU	Accreditation Business Unit
AF&PA	The American Forest and Paper Association
AFS	The Australian Forestry Standard
ATO	African Timber Organisation
C&I	Criteria and Indicators
CAR	Corrective Action Requests
CBPP	Corner Brook Pulp and Paper Limited
CCFM	Canadian Council of Forest Ministers
CEPI	Confederation of European Paper Industries
CoC	Chain of Custody
CSA	The Canadian Standards Association
CSIRO	The Commonwealth Scientific and Industrial Research Organisation
EMS	Environmental Management System
FAO	The Food and Agriculture Organisation of the United Nations
FERN	Forests and the European Union Resource Network
FMU	Forest Management Unit
FSC	Forest Stewardship Council
GATT	The Uruguay Round of the General Agreement of Tariffs and Trade
GM	Genetically Modified
GMO	Genetically Modified Organisms
ILO	International Labour Organisation
ISO	The International Organisation for Standardization
ITTO	International Tropical Timber Organisation
JAS-ANZ	The Joint Accreditation System for Australia and New Zealand
MCPFE	The Ministerial Conference on the Protection of Forests in Europe
MTCC	The Malaysian Timber Certification Council
NGO	Non-governmental Organisation
OFI	Opportunities for Improvement
P&C	Principles and Criteria
PEFC	The Programme for the Endorsement of Forest Certification Schemes Council
PEOLG	The Pan European Operational Level Guidelines
QMI	The Quality Management Institute

SCS	Scientific Certification Systems
SD	Sustainable Development
SFB	The Sustainable Forestry Board
SFI	The Sustainable Forestry Initiative
SFM	Sustainable Forest Management
SLIMF	Small Low Intensity Management Forest
TBT	The Technical Barriers to Trade Agreement
TC 207	Technical Committee 207
UNECD	The United Nations Conference of Environment and Development
WI DNR	Wisconsin Department of Natural Resources
WTO	The World Trade Organisation
WWF	World Wildlife Fund for Nature

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Chapter 1   Sustainable Forest Management Aspects

Introduction

The concept of sustainability was central to discussions in the United Nations Conference on Environment and Development (UNECD) in 1992, which is also well known as the 'Earth Summit', at Rio de Janeiro. Since then, most forest certification systems have claimed SFM as the purpose of forest operations and company management systems. Certification of SFM provides assurance to the public that a particular standard, which promotes social, economic and environmental improvement in forest resource management has been attained. The quality of forest management practiced by a defined manager or group has to conform to specified standards verified by third-party inspection. Forest certification has been developed in response to market demands for forest products produced to high environmental and social standards (Bass, 1998a). Certifications are of two types: forest management certification that assesses a company's management against standards on the basis of sustainability criteria, and wood product certification that verifies standards at each stage from the source of wood to the production of a product for the consumer (Evans, 1996).

This chapter addresses the following questions: what is SFM, what is the understanding of SFM in international initiatives, and how did the initiatives affect forest certification?

What does SFM Mean? Sustainability and Predominant Management System

The general concept of SFM originated from 'sustainability' or 'sustainable development', as defined in the Brundtland Commission's report in 1987. The formal name of the commission was the World Commission on Environment and Development (Robertson, 1987). The report suggested establishing new processes for environmental protection in concert with development to the year 2000. It promoted the 'sustainable development' concept, described as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Natural resources had been utilized considering only the economic benefits. Economic policies and systems had not balanced the three aspects of sustainability. The economy had overpowered environment and society to produce the "weak sustainability" shown as "the rabbit model" (Peet, 2002) (Fig. 1.1). The UNECD idea of sustainability achieves a better balance between economy, society and environment. Sustainable

development is an integration of the three elements (Fig. 1.2) (Peet, 2002).
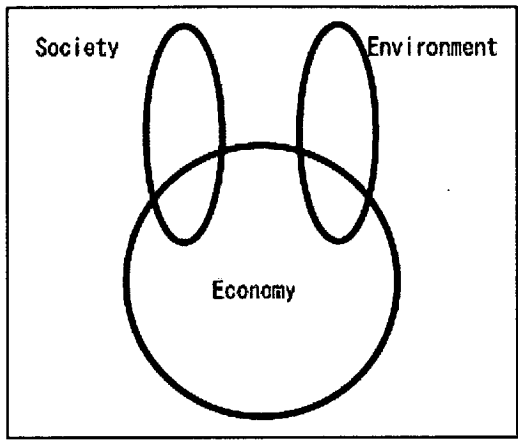
Fig. 1.1 The Rabbit Model (Peet, 2002)   **Fig. 1.2** Sustainable Development Concept (Peet, 2002)
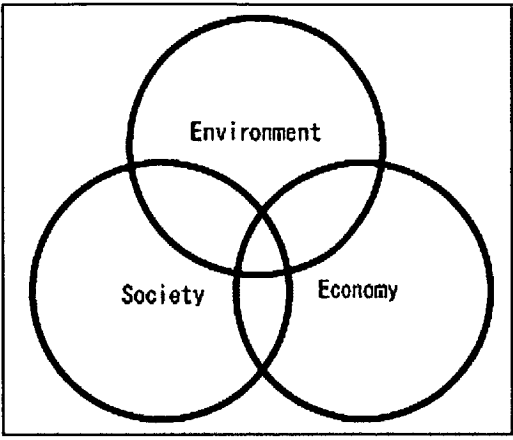
Unclear Definitions of Sustainable Forest Management

Since UNECD (1992) promoted the concept of SFM in the 11th Chapter of Agenda 21, (Combating Deforestation), activity directed towards the achievement of SFM has occurred at national and international levels. However, the term 'sustainability' is ambiguous and complex, requiring specific targets and methods for any implementation. A sustainable forest has yet to be precisely defined in a universally acceptable way. SFM is a philosophical discussion on how forests should be cared for and focuses on the concept of 'sustainability' more than a definable forest condition or acceptable management practices (Flasche, 1997). Thus, there can be no single definition of a sustainable forest (Table 1.1), given the varying interests and objectives of the world's nations, stakeholders, interest groups (Sedjo, 2002), and the national variation in forests and their environment.

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Table 1.1. Definitions of SFM/SD in six certification systems

(MCPFE, 1993, PEFC, 2004a, The State of Canada's Forests, 2001, CSA, 2002a, SFI, 2002, AFS, 2002).

Certification	Definition of SFM/SD
FSC	N/A
PEFC	"The stewardship and use of forests and forest land in a way and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and does not cause damage to other ecosystems."
ISO	The Brundtland Report "Our Common Future" as reported to the World Commission on Environment and the Development "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
CAS	"Management to maintain and enhance the long-term health of forest ecosystems, while providing ecological, economic, social and cultural opportunities for the benefit of present and future generations." "Long-term means at a minimum, twice the average life expectancy of the predominant trees, up to a maximum of 300 years; forest means an ecosystem dominated by trees and other woody vegetation growing more or less closely together, its related flora and fauna, and the values attributed to it; ecosystem includes complex of plants, animals, and micro-organisms and their non-living environment."
SFI	"To meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic that integrates the reforestation, managing growing maturing and harvesting of trees for useful products with the conservation of soil, air and water quality, biological diversity, wildlife and aquatic habitat recreation and aesthetics." "Reforestation means the reestablishment of forest cover either naturally or artificially; conservation means two stages – 1) protection of plant and animal habitat, 2) the management of a renewable natural resource with the objective of sustaining its productivity in perpetuity while providing for human use compatible with sustainability of the resource; and aquatic habitat means areas where water is the principal medium and that provide the resources and environmental conditions to support occupancy, survival and reproduction by individuals of a given species."
AFS	"Sustainable forest management or ecologically sustainable forest management, which is synonymous with "good" or "sound" forest management and well-managed forests."

SFM includes all forest values – social, economic, environmental, cultural and spiritual. Therefore, the definitions of SFM reflect multidimensional complexity in forest policy (Rametsteiner and Simula, 2002). The definition of sustainability is sufficiently vague that the phrase "harvested from a well-managed forest" has often been substituted (Flasche, 1997; Sedjo, 2002). The complex interpretation of 'sustainability' in forest management has been acknowledged by one internationally prominent forest certification

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agent, the Forest Stewardship Council (FSC). It has removed the term of 'sustainability' from the discourse related to its certification process (FSC 1996; Kneeshaw et al., 2000). The Food and Agriculture Organization of the United Nations (FAO, 2002) notes that even the understanding of the word 'forest' is not the same within international organisations coping with world forest issues although there is a lot of overlap or similarity (Table 1.2).

Table 1.2. Definitions and Parameters of 'Forests' in Different Organisations (FAO, 2002).

	UNFCCC*	UNEP*/CBD*/ SBSTAA*	FAO
Land use specification	Either closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground, or open forest.	Exclude agricultural and non-forest use.	Includes natural forests, production, protection, multiple-use, conservation and forest stands on agricultural lands.
Land area size (ha)	0.05-1.0 with tree crown cover	0.5 with a tree canopy	More than 0.5
Coverage of trees (%)	10-30	More than 10	More than 10
Minimum tree height (m)	2-5 at maturity	5	5
Young stands	Included	Included	Included
Plantation trees	Included	N/A	Excludes agricultural production, plantation harvesting and agroforestry.
Strip width (m)	N/A	N/A	20

*UNFCCC: United Nations Framework Convention on Climate Change

*UNEP: United Nations Environment Programme

*CBD: The Convention on Biological Diversity

*SBSTTA: Subsidiary Body on Scientific, Technical and Technological Advice

Ambiguous definition makes it difficult to determine targets for SFM. The 11th Chapter of Agenda 21, (Combating Deforestation), was intended to mitigate tropical forest deforestation. However, the focus shifted from tropical forests to temperate forests in later conferences. As a result, initiatives for sustainable development have developed in different types of forests and climates. Most of the certification activity is now occurring in the developed temperate countries, where forest management is practiced and allows relatively easy monitoring by existing institutions (Sedjo, 2002).

'Sustainable' forest management has been implemented at intergovernmental, national, and private levels. Many international understandings and declarations are issued as manifestos, forest practice policies have been amended in many countries, forests are being certified under auditing and certifying groups and some forest products bear labels (Sedjo, 2002).

International Development of SFM

Multilateral conferences pursuing clearer indicators of SFM have reflected a global consensus on its desirability. The important role of SFM has been widely accepted in most countries. The theme area of the Rio conference covered all types of forests in the 'Forest Principles', which related forest products, services and values to forest resources and forest management. The 'Forest Principles' avoided discrimination by forest types (Principle 4) (UN, 1992). They also confirmed the need for criteria and indicators (C&I), aimed at the management, conservation and sustainable development of forests, including incentives (Principle 13) (UN, 1992). C&I are considered as tools to identify the elements of SFM and for measuring and assessing progress toward it. Generally, assessibility is a common feature of criteria, while measurability refers to 'indicators'.

Castañeda (2000) explains the functions of criteria and indicators: criteria describe one or more indicators, which are assessed with consideration to the productive, protective and social roles of forests and forest ecosystems. Indicators are parameters of a particular criterion, which measure the status of forests in quantitative, qualitative and descriptive terms that reflect forest values as seen by those who defined each criterion. "Indicators at forest management level will be influenced by factors such as forest type and topography, in addition to social and economic considerations" (FAO, 2004).

There have been nine international conferences related to SFM since Rio. These have set principles, criteria and indicators to carry out the Rio conference objectives. The main focus in C&I development was 'sustainability' achievement at national level, but all initiatives have developed to be adapted to forest management unit level (Castañeda, 2000). Although there are different works listing C&I initiative settings, the following initiatives promoted internationally recognized C&I applicable to a regional focus of forest management.

1. International Tropical Timber Organisation (ITTO)

ITTO is an intergovernmental organisation established in 1986 when the rate of tropical forest degradation had been increasing steadily and unsustainably. The aim was to promote the conservation, sustainable management, use and trade of tropical forest resources (ITTO, 2004). In order to achieve the goal, a well-managed forest resource utilized for sustainable development was considered to be important in protecting natural forests from destruction and degradation. In 2004, ITTO has 58 member countries of which share 80% of the world's tropical forests and 90% of the global tropical timber trade (ITTO, 2004). The Tropical Timber Council consists of two membership categories: producing and consuming groups. Policy makers and forest specialists from NGOs were also important in the process of developing the C&Is.

The ITTO guidelines were adopted in 1992. Their development was pioneering work. It provided an example for later international conferences that further contributed to C&I development. A document, "Criteria and Indicators for the Measurement of Sustainable Tropical Forest Management" (1998), described seven national level criteria and 66 indicators and seven forest management unit level criteria and 57 indicators. There are three headings in the guidelines: policy and legislation; forest management; and socio-economic and financial aspects. The guidelines describe requirements for timber management, but ecological and social aspects of forest management are weak (Evans, 1996). ITTO focused on policy work at the international level, and the purpose was forest use capable of delivering the goods and services. The guidelines contained an internationally recognized set of principles and possible actions designed to guide the implementation of sustainable forest management in the tropics. However, they were limited to tropical forestry and largely designed by the member countries that manage the tropical timber trade. The ITTO guidelines and criteria are not legally binding on member countries. They were revised in 1998. The recent revision identified seven criteria and 61 indicators applicable at national and forest management unit level, allowing continuing C&I field testing and support for countries which had taken up the C&Is (Castañeda, 2000).

2. The Ministerial Conference on the Protection of Forests in Europe (MCPFE)/Helsinki Process

The MCPFE conference was held in Helsinki, Finland during 1993. The MCPFE involved 40 European countries and European communities. It was launched in 1990.

The conference made recommendations for forest protection and SFM in Europe (MCPFE, 2004). Four resolutions were issued. 'Resolutions 1' and '2' have been known as the Helsinki Process. The C&I were designed for the forest operational and national levels in European countries. The indicators were designed to protect biodiversity and, in particular, forest ecosystems (Evans, 1996).

3. Montreal Process

A conference on Security and Cooperation in Europe was held in 1993. Follow-up seminars were designed to explore the development of criteria and indicators for SFM in non-European temperate and boreal forests. A set of criteria and potential indicators, Conservation and Management of Temperate and Boreal Forests (the 'Montreal Process') was produced. As the result of the series of seminars, the 'Santiago Declaration' and the final version of the seven criteria and 67 indicators were developed in 1995. A common understanding of SFM was provided in the declaration, and a framework for management, description, assessment, and evaluation at the national level was endorsed (Evans, 1996).

The Santiago Declaration is the most comprehensive statement of criteria and indicators appropriate at a national level for boreal and temperate SFM. It developed more guidelines for socio-economic criteria than the Helsinki Process or the ITTO guidelines (Evans, 1996). However, the Santiago declaration is a non-legally binding set of C&Is, and not intended to directly assess forests at the management unit level. It is applicable to countries with diverse conditions and needs. The C&Is are being reviewed to be applicable to the forest management unit level (FAO, 2004).

"The six criteria deal with forest conditions, attributes or functions, and the values or benefits associated with environmental and socioeconomic goods and services. The seventh criterion addresses the social conditions and processes often external to the forest itself, but that support their sustainable management" (IISD Linkage, 2004). Scientists, policy makers and NGOs provided input to the process of document development. The importance of maintaining biodiversity and long-term forest health at the national level is strongly emphasized. Therefore, four out of the seven Santiago Declaration criteria and indicators relate to biodiversity conservation and ecosystem processes. There are indicators that relate to landscape processes relevant to biodiversity conservation. Forest sector production, consumption and investment, recreation and tourism, employment, and community needs are included in the indicators (Evans, 1996).

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4. Tarapoto Proposal

A workshop for the Amazon Cooperation Treaty was held in 1995 in Tarapoto, Peru with academics, technical experts, international NGOs and funding agencies. A set of 12 criteria and 81 indicators for SFM on the Amazon forests were completed. A large number of the indicators addressed the diversity of the Amazon forest and strong external demands for its conservation. The criteria are: sustaining forest productivity; sustaining biological diversity and ecological services; and providing direct and indirect socio-economic benefits. Some indicators such as forest type and status measures and the economic value of production are straightforward and applicable. Some indicators were difficult to apply because of the ambiguous definitions. Criteria addressed the national and forest management unit levels. The details of the Tarapoto proposal were not binding on signatory countries, although it comprises a political commitment to SFM (Evans, 1996).

5. Dry-Zone Africa Process

A joint experts organization meeting was conducted by the United Nations Environmental Programme (UNEP) and Food and Agriculture Organization (FAO) in Kenya in 1995. Fourteen representatives from western, eastern and southern African dry-zone countries and eight observers agreed on the need to develop, improve and adapt C&I for the sub-Sahara region of Africa. Seven criteria and 47 indicators at the national level were identified. The criteria were maintenance and enhancement of forest resources, including biodiversity, ecosystem, and socio-economic benefits. The institutional policy framework for forest protection was harmonized with forest management (Environmental Consulting Services, 2004).

6. African Timber Organisation (ATO) Process

The ATO's C&Is were field tested at the tropical forest management unit level. The ATO aimed to integrate economic development and forest management, because poverty and deforestation had been problems. Regional studies within some member countries of ATO were carried out in 1993 and 1994. The result of these tests were used to develop the first draft of the C&I. The ATO's C&Is were considered to be scientific tools for forest management. They were applicable for all the 13 member countries, and serve as policy guidelines. A set of five principles, two sub-principles, 28 criteria and 60 indicators were developed (FAO, 2004).

7. Near East Process

A Near East regional expert meeting on C&I was held in Cairo, Egypt in 1996. This was jointly organized by FAO and UNEP, and 30 countries in the Near East region were involved. Seven national level criteria and 65 indicators were identified, focused on the management of dry-zone forests and woodlands in the Near East region. Practical guidelines for assessment and implementation of C&I were discussed (Griffiths, 2001). These concerned: conservation of biological diversity in the forest areas; genetic indicators for the maintenance of seed provenances; forest-dependent species with reduced ranges; and population levels of key species across their range (FAO, 2001).

8. Lepaterique Process

An expert meeting on C&I for SFM in Central America was held in Tegucigalpa, Honduras 1997. The meeting was organized jointly by FAO, the Central American Commission for the Environment and Development and the Council for Forests and Protected Areas, and seven countries were involved. The name 'Lepaterique' comes from a small community close to Tegucigalpa, where sustainable forest management has been promoted and local communities have been involved in its development. The meeting resulted in four criteria and 40 indicators at the central American regional level. Eight criteria and 53 indicators at the national level were identified. Two sub-regional meetings defined five criteria and 50 indicators at the forest management unit level. Applicability and availability of data were reviewed and recommendations were discussed (Griffiths, 2001). The Lepaterique process set C&Is at the national and regional levels.

9. Asia Dry Forest Process

In December 1999, representatives from eight Asian countries launched an initiative to develop and implement C&Is for the dry forests of Asia at a workshop in Bhopal, India. The workshop was supported by FAO, UNEP and ITTO. The achievements were eight criteria and 49 indicators that were relevant to the dry forests region (MPCI, 2004). A national level C&I for sustainable management of dry forests in Asia/South Asia developed a regionally applicable national level set of C&I for SFM. C&I setting were expected monitoring progress. Follow-up actions with a time frame, technical support and a financial plan were identified (Castañeda, 2000).

SFM C&I and Certification

There is confusion about the relationship between C&I and certification because both

approaches to achieving SFM share commonalties including their commitment to data collection, reporting, and their inclusion of the three key elements of sustainability. C&I can assess SFM if it is introduced and implemented and it regularly monitors the effects of forest management. C&Is will help evaluate a degree of SFM achievement related to the three elements within a framework determined by the status of forest condition. C&Is provide a framework for measuring, assessing monitoring and demonstrating progress towards achieving the sustainability of forests in a specified forest area over a period of time (Castañeda, 2000). Similarities and difference between C&I and forest certification were listed by Washburn and Block (2001) (Table 1.3).

Table 1.3. Similarities and Differences between C&I and Certification

(Washburn and Block, 2001; Castañeda, 2000).

Similarities
1. Broad Goals: Both incorporate a common broad goal of SFM.
2. Contribution to Society: Both are intended to contribute to society's ability to understand conceptually, and achieve practically, SFM.
3. Key Elements of Sustainability: Both incorporate SFM elements of social, economic, and environmental consideration some of those elements include biodiversity, water quality, forest cover, long-term impacts and forest planning.
4. Focus on Data: Both stress the notion of better and consistent data.
5. Approach: Both are voluntary, non-regulatory approaches to understanding and facilitating SFM.
6. Use of C&I: Both use C&I for assessment against standards specific to the system or as a framework.

Differences
1. Scale: The C&I are frameworks for all forests, crossing ownership boundaries, while certification is a single ownership or group of ownership.
2. Outcome: The C&I contain no target standards or performance expectations, while certification provides an assessment against performance standards.
3. Orientation: The C&I address conditions and processes in a descriptive way, while certification addresses goals in a prescriptive way.
4. Audience: The C&I are framework approaching to policy-making community within a country in comparison with other countries, while certification is directed approach to the market place that companies/landowners and the products differentiating from others.
5. Participation: C&I benefit from and rely on collaboration among public agencies and private organizations, while certification standards are set privately, without the influence of the federal government.

Forest certification has occurred during and after C&I development and takes advantage of clear C&I to achieve SFM. Certification is a means of achievement of certain predefined standards of forest management in a given forest area at given point in time (Castañeda, 2000).

The Forest Stewardship Council (FSC), the Programme for the Endorsement of Forest

Certification Schemes (PEFC), ISO 14001, The Canadian Standard Association (CSA), the Sustainable Forestry Initiative (SFI), and the Australian Forestry Standard (AFS) are all certification systems. These six certification systems for forest management have occurred in relation to one or some of the nine C&I developments. In many cases, the objectives of certification are to report C&I feasibility at national levels. The FSC, PEFC, and ISO 14001 certification systems provide internationally recognized principles. Certifications have been approved by these schemes in various countries through accredited regional verifiers.

The FSC was founded, in 1993, as a pioneer certification movement. It was initiated by NGOs and other private organisations. Certification was intended to minimize deforestation, in particular, in the tropical timber trade, though FSC is now applicable to tropical, temperate and boreal forest worldwide. The FSC applied ITTO's C&Is (FSC, 2004g). The ITTO C&Is were appropriate for certifying well-managed forests on national and local scales.

The PEFC applied the outcomes of the MCPFE/Helsinki Process and the Montreal Process. Both defined C&Is at the international level. The PEFC used the Helsinki Process C&I for framework development, the establishment of principles, and for endorsement of national certification standards (Bass and Simula, 1999). Other international C&Is such as ITTO, FAO and ATO were considered as equivalent to the PEFC standard. The PEFC council assessed and approved them. The PEFC also used C&Is developed at the Pan-European regional level. The Pan European Operational Level Guidelines' (PEOLG) criteria interpreted the Helsinki C&Is for forest management (PEFC, 2002c). Pan European Criteria and Indicators have six criteria for SFM and 27 quantitative and descriptive indicators for national monitoring and reporting. The PEOLG was used as a reference basis for the endorsement of national certification bodies and the mutual recognition process (PEFC, 2003g).

The international standard, ISO 14001 Environmental Management System, was published in 1996 by the International Organization for Standardization (ISO). It was motivated by the Brundtland Report's 'sustainable development' and the Rio Conference. ISO 14001 is a standard established for system management objectives and it applies to any organizational operation. ISO 14001 has no initiatives that identify C&I specific to forest management because its standard can apply to any kind of business management, if it carries out 'sustainable development'. Because of this, ISO 14000 series,

environmental management standards, are widely used as guidance for effective management, including forest management. Forest certification systems that comply with the standard include the FSC, the PEFC, the CSA, the SFI, and the AFS.

The CSA requirements and guidelines for SFM were first established in 1996 based on the national level, Canadian Council of Forest Ministers (CCFM) criteria and elements. The standard was consistent with the international level C&I of the Montreal and Helsinki process (CSA, 2002a). CSA requirements were linked between national, local and regional forest policies.

The SFI programme was established in 1998 and the originated from the American Forest and Paper Association and the National Forest Products Association and the report system for the American paper industry was used in the guidelines. Its establishment was motivated by the Brundtland Report and the Earth Summit (SFI, 2002a). The forest management performance standard and the C&I have developed in accordance with the Montreal and the Helsinki processes (CEPI, 2001).

The AFS was set up in 2003. The standard applied the Montreal Process Criteria. The Montreal Process C&Is provided the framework of the AFS (Standards Australia, 2003), associated with national level forest management systems such as the National Forest Policy Statement (1992) and Regional Forest Agreements. They have provided an understanding of ecological and biological diversity as well as community benefits deriving from forest development (AFS, 2004a), the 'sustainability' elements in the Montreal Process and the outcomes of the Rio Conference.

All six certifications were affected by the 'sustainability' concept drawn from the Brundtland Report and the outcomes from the Rio Conference.

The geographical application levels of C&I are important when the relation between certifications and C&I is considered. Four sets of C&I have been used in these certification processes. These were from the Helsinki Process, the Montreal Process and the ITTO C&I for SFM applied to all certifications except ISO 14001. The ITTO C&Is were adapted by the FSC, in its initial application aimed at tropical forests at national and FMU level. These were used as normative C&Is in the PEFC standard. The Helsinki Process was applied to the PEFC, the CSA, and the SFI standards. These identified the target as European countries at the forest management unit (FMU) level. The Montreal

Process C&Is in non-European countries at the national level, were adapted to the CSA, the SFI and the AFS standards. The ATO C&I used the PEFC as the model, at the African national level and the forest management level.

Aims and Structure of Thesis

This thesis provides an interpretation of the significance of six recognised forest standards and schemes: FSC, PEFC, ISO 14000 series, CSA, SFI, and AFS. All six certification systems have distinctive features. The next six chapters investigate one of these standard systems in terms of its background, criteria, certification process, assessment, labeling programme and relationship to other schemes. To ameliorate widespread confusion in a world of multiple certifications, the following questions are addressed: Why was the certification scheme established? What were the criteria and standards? Who evaluated the forests? What were the evaluation procedures? How was certification accredited? And, What was the relationship to other certification schemes? Each standard feature is examined in detail. In the final chapter, all six standards and certifications are analysed, and their attempts to achieve SFM are discussed. This chapter also includes discussion of recent trends in certification, such as mutual recognition and harmonisation with other certification schemes. Finally, this research summarizes the effectiveness of the six standards and certification for SFM.

Research Approach

Most of the information in this thesis has been described from the literature and web sources. However, there is an imbalanced volume of information between the six schemes. Some informal interviews with forest owners and company executives were conducted in relation to schemes that had publicly little information.

Chapter 2   Forest Stewardship Council (FSC)

Introduction

FSC is a world-wide standard organisation that is also independent, non-governmental, and non-profit. At one stage, it was the only forest standard and certification scheme to operate in the world. It has two official languages, English and Spanish. FSC was founded in 1993 and now it has over 10 years history. FSC was the first organisation that used a standard system to evaluate, accredit and monitor wood and wood-product industries. The initiation of the standard followed successful food certification schemes established in the 1980s. These provided criteria and thresholds for voluntary systems (WWF, 1996). The establishment of the FSC was an initiative of environmental NGOs. They are still powerful and influential supporters. FSC is administered by various representatives from environmental conservation groups, the timber industry, the forestry profession, indigenous people, the forestry community and forest product certification organisations from 25 countries (Kern et al, 2001).

There have been frequent revision and amendments of the standard to satisfy demands by members and customers. Between 1990 and 1993, certification development and accreditation systems were discussed for all kinds of natural forests and plantations. In 1996, the FSC ratified a plantation principle. There are more recent changes: a chain of custody system and logo improvement; easing off on chemical and fertilizer use constraints, and national initiative setting and accreditation. A proliferation of certification has been a strong reason for these changes, including increasing number of national initiatives and standards accredited by FSC.

This chapter explains FSC's organisational structure, governance, accreditation principles and objectives. It also describes regional differences in application of the standard. Some recent changes and developments which have opened the certification to a greater variety of applicants are described. Another prominent improvement, the chain of custody (CoC) certification is examined as well. Lastly, mutual recognition and the FSC's position are discussed.

Background

FSC is an independent, non-profit and non-government organisation. Its mission is to provide environmentally appropriate, socially beneficial and economically viable forest management (FSC, 2005a). "Environmentally appropriate forest management means that

harvest of timber and non-timber products maintains the forest's biodiversity, productivity and ecological processes. Socially beneficial forest management ensures long-term provision of benefits to society and provides strong incentives to local people to sustain the forest resource. Economic viability means forest operations are sufficiently profitable to ensure stability of operations and genuine commitment to principles of good forest management" (FSC, 1994). To achieve this mission, FSC sets standards, approves use of its trademark, licenses certification bodies, accredits national/regional standards, and issues certification to applicants certified by third party certification bodies. It also communicates to its supporters, including certification holders, regional offices and national initiatives.

FSC has three decision-making bodies participating in governance of the organisation: the General Assembly; the Board of Directors; and the Executive Director. The General Assembly is the highest decision-making body. It consists of environmental, social and economic organisations which share equal voting rights (FSC, 2002a). Voting power is also equally divided between 'northern' developed country members and 'southern' under-developed country members (Kern et al., 2001). The Board of Directors consists of nine individuals elected from the environmental, social and economic chambers. Each of them has three-year term of service. The Executive Director runs the FSC with the support of professionals (FSC, 2005a).

The social chamber is constituted of social groups, institutions and individuals, including NGOs, indigenous peoples associations, unions, researchers, academic institutions and technical institutions which are concerned with social benefits from forestry. The environmental chamber comprises NGOs, researchers, academics and technical institutions, who have an active interest in the environmental aspects of forest stewardship. The economic chamber is formed by certification bodies, consulting companies, industry and trade associations, wholesalers, retailers and consumer associations who have commercial interest in the FSC commitment (FSC, 2005a).

Membership fees vary based on number of employees in the organisation and its turnover. A 'northern' country member is charged a higher membership fee for the same size of organisation (Table 2.1). The highest fees are paid by members with greater than 10,000 employees.

Table 2.1. FSC Membership Fees for 'southern' and 'northern' countries for 2004 (FSC, 2004c).

	South	North
Individual Members	$38 (US)	$100
Non-profit organisation Members		
Number of employees 1-10/or Turnover (US$) <15 million	$75	$150
101-200 employees/or $15-30 million	$500	$1,000
201-1000 employees/or $30-150 million	$1,000	$2,000
>1000 employees/or >$150 million	$2,500	$5,000
Profit-organisation Member		
Number of employees 1-100/or Turnover (US$) < 20 million	$100	$200
101-200 employees/or $20-40 million	$750	$1,500
201-1,000 employees/or $40-200 million	$1,500	$3,000
1,001-10,000 employees/or $200 million-2 billion	$4,500	$6,000
>10,000 employees/or >$2 billion	$7,500	$10,000

Business applicants need to demonstrate that they meet FSC's Principles and Criteria (P&C) in their operations. Non-profit organisational member applicants are required to submit their annual report, financial information, and other evidence of their activity. Two letters of support from FSC members are need for all new members. An individual member applicant has to show a curriculum vitae and citizenship certificate to decide whether southern or northern membership fees apply.

Regional Differences

FSC accredits a national certification programme when it satisfies FSC requirements. The term 'accreditation' indicates the approval by the FSC of national and regional forest stewardship standards. This replaced the term 'endorsement'. 'Endorsement' is now used for international standards developed by the FSC (FSC, 2003a). When a national standard is accredited by the FSC, the national certification body can use the FSC license and logo in the country. The FSC's Principles and Criteria (P&C) are the minimum requirements for such national standards. Each certification body is free to make more severe standards. The national initiatives can choose their own framework depending on local circumstances. Once a national initiative is accredited by the FSC, any certification body

must use the standard in their certification processes. Sweden was the first nation accredited in 1997. In March 2005, there were 34 national initiatives that were accredited (FSC, 2005a).

In 2003, regional offices of the FSC began to be established to support national and regional forest stewardship standards. Evaluation and approval of national and regional forest stewardship standards is a responsibility of the Accreditation Business Unit (ABU), and the FSC Board of Directors. The ABU verifies national initiatives against international standards. However, the ABU is not actively involved in international standards development. Instead, there are seven units that have different roles and responsibilities (Table 2.2).

Table 2.2. Roles in Different Units for National and Regional Standards Accreditation (FSC, 2003a).

Office or Operational Unit	Role of Units
Regional Offices	Advise technical know-how for standard setting
Regional Coordination Unit	Coordinate regional offices
Policy and Standards Unit	Oversee and coordinate standards development
Accreditation Business Unit	Evaluate standards and manage decision making process at the FSC Board of Directors
Marketing and Communication Unit	Support communications of operational units
Finance and Fundraising Unit	Financial service and fundraising support
Executive Director's Office	Coordinates and supervises all accreditation work at the FSC International Centre.

Criteria differ between nations and regions and these differences effect assessment. For example, artificial forest regeneration is permitted in some cases by FSC when seed or vegetative material is obtained from local provenance. Verifiers are selected from qualified local or indigenous people. Their local knowledge of high conservation values is used to determine applicability of indicators where FSC indicators are not suitable.

Criteria

The FSC is the only scheme requiring both system and performance criteria to address the three aspects of sustainability (FERN, 2001). Many criteria focus on ecological and social values. FSC standards consist of 10 principles and criteria (P&C) (Table 2.3). The P&C demand that ecological and social value should be respected in forest management, and

sets requirement for forest management systems that enhance ecologically sustainable management. For example, it identifies illegal logging, indigenous rights, long-term commitment, high conservation value forests, chemical use, and genetically modified organisms (GMOs) as areas of concern. These P&Cs are pioneers in imposing such requirements (FERN, 2001). However, there has been no lack of argument on some of these criteria, particularly the plantation criterion.

Table 2.3. FSC 10 Principles and Criteria (FSC, 2004a).

1. Compliance with laws and FSC Principles
2. Tenure and use rights and responsibilities
3. Indigenous people's rights
4. Community relations and worker's rights
5. Benefits from the forest
6. Environmental impact
7. Management plan
8. Monitoring and assessment
9. Maintenance of high conservation value forests
10. Plantations

Plantation Issues

The FSC standard divides forest management into three types for their application: plantation forests; a mix of plantation and natural forest; and natural forest. By 2004, 48.59% of the total certified area was natural forest. On the other hand, plantation forest was only 13.3% of the total of certified area. Mixed management forest was 38.18% of the total area certified (Information on Certified Forest Sites Endorsed by the Forest Stewardship Council, 2004). In developing countries, the certified plantation area has been increasing. Certified forests in Brazil are largely plantations, accounting for 73% (0.77 million ha) of FSC-certified forests (Atyi and Simula, 2002). Because plantation forest is poorer in biodiversity than natural forest, it has been argued that it should not be certified.

FSC sees its plantation criteria as enabling sustainable fibre production to create carbon sinks to lead to reduction of logging of native forest, and as a means to reduce chemical-dependent tree farming methods (FSC, 2005d). FSC believes that it is cost-effective and addresses social and economic sustainability. There has also been negative opinion on the category of mixed plantation forest with natural forest. The debate points out ambiguity of 'mixed'. FSC prohibited conversion from natural forest to plantation forest after 1994. FSC states that plantations have to be well planned, preferably using native species. Exotic species can be used only when their performance is greater than that of native species. Monitoring of mortality, disease or insect outbreaks

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and adverse ecological impacts is needed. The scale and proportion of forest have to be determined by the regional standards. Measures to minimize pests, disease, fires and invasive plant introductions have to be taken. Plantation management should make every effort to move away from chemical pesticides and fertilizers, including their use in nurseries. Plantations should have appropriate scale and diversity. Monitoring of plantations shall include regular assessment of ecological and social impacts. No species should be planted on a large scale on the site unless ecological impacts on other ecosystems are known to be highly unlikely.

Small Law Intensity Management Forest

Forest type and forest productivity vary between countries (FSC, 2003b). FSC set up new thresholds as the number of certifications increased. Small Low Intensity Management Forest (SLIMF), has been developed to allow more small and low intensity individual forest owners to access to the FSC certification by moderating requirements. Group members can also apply under SLIMF certification procedures. The thresholds are applicable to kinds of management styles such as timber, conservation, or non-timber forest management (FSC, 2003b). Certification bodies decide whether SLIMF is applicable. The certification body can choose to use this threshold or use normal evaluation threshold. A set of international criteria to identify land size and forest productivity types (Table 2.4) can be modified in each country where national standards or initiatives have not been developed. FSC allows these countries to develop eligible national criteria and thresholds.

When an applicant forest is identified as 'small' or 'low intensity' forest, a certification body uses different certification procedures. For example, for a single applicant, it is not necessary to pre-evaluate management eligibility, sampling size for group evaluation can be larger than for non-SLIMF size, the certification report can be simplified in a checklist format, and annual audits can be based on documentation without site audits (FSC, 2003c). There is no limit on the number of SLIMF that can form a group (FSC, 2004f).

Table 2.4. Small and Low Intensity Management Forest Category (FSC, 2003b).

Types of Forest Management	Threshold
Small Forest	Area is less than 100 ha. National initiatives can increase this value to reflect the national situation, up to a maximum of 1,000 ha.
Low Intensity Forest Timber	The rate of harvesting is less than 20% of the mean annual increment within the total production forest area of the forest management unit, AND The annual harvest from the total production forest area is no more than 5,000 m3.
Non-timber Forest Products	All natural forests being managed exclusively for non-timber forest products (with the exception of non-timber forest products, plantations) are considered 'low intensity'.
Group of SLIMFs	All group members are either 'small forests' or 'low intensity forests', as defined above. There is no limit on the number of members in a group of SLIMFs.

Group Certification

From 2002, FSC accepted group certification in two types of applications: group entity; and group members. The responsibilities of the applicants in the two implementations are different. A group entity can be a cooperative, an association or a management company. The applicant defines the group and indicates which of the members is responsible for fulfilling the certification. On the other hand, group members are individual forest owners or managers. The each member shares a part of requirement for a certification with other members within a forest unit (FSC, 1998).

There are benefits of group certification: it can widen participation; increase interest in FSC certified timber; and reduce cost for certification (FSC U.K., 2005). Each group participant has to be identified on a document. The certification body determines eligibility for group membership and evaluates sets of sample forest from the group. Samples must have some commonality in geography and/or management. Group members with large number of members require at least one visit from an auditor, and the certification body decides the number of samples. For group members with a small number of members, at least one third of separate forest areas have to be visited by an auditor.

Group CoC certification does not allow individual group members to use the FSC label without applying for additional individual CoC certificate. In addition, a group certification for forest management cannot provide group members with their own CoC certification (FSC, 1998). When a new member joins the certified group after issue of

certification, the member must complete a probationary period or he/or she has to have an initial inspection.

Chemical Use Thresholds

FSC limits the use of synthetic pesticides in P&C 6 and 10 (Table 2.3). FSC restricts use of chemicals by consideration of seven risks and effects: persistence; chronic toxicity; carcinogens, mutagens and endocrine disruptors; biomagnification; heavy metals; dioxins; and, other cases. Each has maximum thresholds (FSC, 2002b). FSC applied the World Health Organisation (WHO) thresholds 'extremely hazardous' and 'highly hazardous' to human health. Any additional pesticides bans at the international level will be applied to the FSC list (FSC, 2002b).

In 2002, exceptions were allowed under the title of 'derogation'. Derogation is a permission to use prohibited chemicals or pesticides for a particular purpose, under special conditions and for a limited time. Any forest owners who wish to use these pesticides are required to apply for permission to FSC in writing. FSC allows derogation when: use of chemicals or pesticides protects human health against disease; it is obligatory under national laws; there is no other way to control a specific organism; and it promotes environmental, economical, and social balance in forest management. A request for the use of chemical pesticides should be based on environmental, social, or economic reasons. Derogation in any instance must be supported by a majority of FSC members. It is also necessary to have national initiative exemptions, compliance with national or sub-national standards, stakeholder support and approval by the FSC Board of Directors. Examples of derogation are gradually growing for various exceptional reasons, such as avoiding cultivating the soil on slopes, reducing human health risk from potential Hantavirus transmission by rodents, and controlling introduced possums in New Zealand (Table 2.5) (FSC, 2004i).

There are some chemical pesticides FSC permitted to be used, but are prohibited now. Certifications given before these prohibitions are advised by FSC to take legitimate steps to eliminate the use of these chemical pesticides. The first is to stop using the FSC prohibited chemicals unless derogation is allowed. If the certification holder does not request a formal derogation, certification is withdrawn (FSC, 2002c). Threshold levels in national regulations for the FSC prohibited chemicals vary between different countries and FSC follows the national regulations FSC thresholds.

Table 2.5. Chemicals Exceptionally Approved as Derogation (FSC, 2004h).

Name of Chemical	Reason for Derogation	Place
Brodifacoum	Control of rodents	Chile
	Control of Chacma baboons	Zimbabwe
Bromadialone	Control of rodents	Chile
Difethialone	Control of rodents	Chile
Permethrin	Use with seedlings and young planted trees	Not specified
Simazine	Residual pre-emergent control of grass and broadleaved weeds in eucalypt plantation	State of Victoria, Australia
Sodium fluoroacetate, 1080	Control of exotic mammals where are causes of damage to native plants or animals	New Zealand
	Control of European fox (*Vulpes vulpes*)	Western Australia, Victoria and South Australia, Australia
Warfarin	Use against exotic mammal pests of native forests including grey squirrels in U.K.	Not specified

Assessment Process

FSC assessment procedure for certification begins when an applicant submits the application form to the FSC Secretariat. The procedures are:

1. Within the next seven working days, the applicant receives from the FSC Secretariat the specific requirements according to the type of application
2. The applicant submits all the required documents to the FSC Secretariat
3. The applicant receives a summary of the application status from the FSC Secretariat (documents received and, documents missing when applicable)
4. When documentation is complete, the FSC Secretariat submits the application to the Membership Committee of the FSC Board of Directors for evaluation
5. The FSC Secretariat notifies the applicant of the Membership Committee's decision.

After all procedures are completed, the FSC Membership Committee makes a decision in approximately four weeks (WWF, 1996).

Audit Process

FSC does not certify forest operations or manufacturers. Certification and assessment are the responsibility of accredited certification bodies. Only general assessment principles are described in the eighth P&C (monitoring and assessment). This states that forest management is assessed on forest condition, yields of forest products, chain of custody procedures, management activities, and social and environmental impacts (FSC, 2005a). Assessment includes: the pre-assessment or scoping visit; development of an interim standard applicable to the national condition where the national standard does not exist; the main assessment, in which the auditor collects objective evidence of compliance or non-compliance; and, the certification decision.

Auditors

According to the FSC (2004g), an auditor is "an individual who is qualified and authorized to undertake all or any portion of an evaluation within an accreditation or certification scheme". The FSC assessment is carried out by an audit team, which includes technical experts and auditors-in-training. The team has to have a team leader as defined in the ISO 14050. FSC describes the credentials for a lead auditor. However, there is no required educational background and experience for other auditors. In addition, there is no defined number of auditors.

Audit Price

Audit fees are all charged to a certification applicant on a real cost basis. When the organisation decides to apply for certification, the organisation purchases a set of all necessary information materials from the certification body. These include the accreditation manual, checklists, and the FSC logo guide. The payment of a deposit on the application fee commences the assessment. The assessment cost is mostly the auditors' fee (Table 2.6). The FSC has a set of price for the time of accreditation officers. It is EUR 450 per day and EUR 700 for the head officer in the associated business unit (FSC, 2004j).

Table 2.6. FSC Cost in Assessment Steps (FSC, 2004j).

Assessment step	Description of charge	Cost estimated (EUR)
Application information	Printed materials	200
Application fee	Printed materials	1,000
Document review	Staff time 10 days	4,500
Office audit	Staff time 10 days	4,500
Forest audit	Staff time 12 days	6,300
CoC audit	Staff time 5 days	2,250
Final report and follow up	Staff time 4 days	1,800
	Travel and accommodation	Depending on location
	Total	**EUR 20,550**

Case Study

Three case studies by one certification body show that there are different assessment processes, lengths of audit and auditor numbers in relation to forest size, types, and organisational operations in each country. All the information was sourced from a FSC accredited certification body, Scientific Certification Systems (SCS) in the U.S.A. that was prepared for public summary to the certification applicants.

The Hayami Forest, Japan

The Hayami Forest in Japan was certified for forest management and CoC. The certified plantation forest completed its fourth annual audit since initial auditing in 1999. The Hayami Forest has 1,070 ha of managed coniferous forest of which 820 ha area is in timber production (SCS, 2004a). The rest of the 250 ha is broad-leaved forest which is not managed for timber production (Hayami Forest, 2004). The initial field assessment for FSC license was conducted for six days in 1999.

Prior to a field evaluation, the lead auditor completed document evaluation. Three elements of forest management were evaluated: timber resource sustainability, forest ecosystem maintenance, and socio-economic benefits. One day of the audit was used for interview of the personnel of the company, and another day was used for public meeting with over 25 interested individuals. The assessment also included face-to-face and telephone interview with stakeholders, environmentalists, local government personnel, the public agency overseeing community forestry, and business operators. Field inspections were conducted. The purpose of field investigation was not only to evaluate the forest condition and confirm documentary evidence, but also to discuss forest

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management with company employees, contractors, members of local communities and public agency employees (SCS, 2004a). Scoring took one day. Parts of this assessment included CoC field inspection. For CoC certification, the shipment records and partial outsourcing process were evaluated.

The audit team consisted of four auditors and one facilitator. The lead auditor was a registered consultant from a FSC accredited certification body. The lead auditor selected two auditors as audit team member three months before the field assessment. They were associate professors from a graduate school in Japan, which specialized in forest management and forest products. Another team member was a professional consultant in forest ecology, conservation and engineering. A facilitator supported the lead auditor.

SCS's evaluation for FSC certificate was taken based on a scoring system for these elements, which were timber resource sustainability, forest ecosystem maintenance, and socio-economic benefits. For each standard criterion, the assigned scores were multiplied by their normalized weights and summed to generate three numerical index scores. The auditors scored on a 0-100 scale for each programme element based on collected information and judgement. Higher scores represented better performance. Each of the three programme elements has to reach at least 80 points to conform. If there are unsatisfactory evaluations, auditors can request improvements as: Major Corrective Action Requests (Major CARs); Corrective Action Requests (CARs); and Recommendations (SCS, 2004a). Major CARs have to be resolved prior to award of the certificate. These happen when the assessment score is less than 80 points or where there is non-compliance with a pre-emptive indicator. It is a 'fatal flaw' that precludes certification even when the overall requirement is satisfied, such as the requirement of no GMO use in Swedish FSC (SCS, 2004c). CARs are required to be removed within a specified time limit after the certificate issued. A nonconformance to CARs can result in suspension or revocation of a certificate. Recommendations are suggestions for improvement towards exemplary status (SCS, 2004a).

For the Hayami Forest assessment, the timber resource sustainability element was scored 88; forest ecosystem maintenance was 87; and socio-economic benefit was 93. The final evaluation of the initial assessment exceeded the minimum score. There was one requirement to complete by the next audit. This requirement was rehabilitation of the native vegetation within a broad-leaf forest area and improved information for the reserve area, including written policies, map displays and indication of prioritized forest types for

reservation. Six recommendations were also provided. Evaluation was successfully completed. As a result, official certification was issued in February 2000. The price for certification was over US $38,462 and $19,230 per 1,000 ha to maintain the required level and condition (Hayami Forest, 2004).

The log products from the Hayami Forests including Japanese cypress (Hinoki) and cryptomeria (Sugi) species were evaluated for CoC certification. These logs are processed for timbers for traditional home construction, lumber, and household products, such as cutting boards and paperweights.

Subsequently, four annual audits were conducted from 2001 to 2004. The FSC P&C 9 required annual audits to prove effectiveness and promotion of maintenance and conservation. Annual audits are generally simpler than the initial assessment. The number of auditors is reduced, evaluation days are decreased, the number of interviews is less, and criteria for evaluation are those with unsatisfied elements in the last audit (Table 2.7). Audit members were not the same as the initial audit team. The initial lead auditor faded away from the third audit, and no original member existed in the fourth surveillance. Each annual audit took one or two days. All audits carried out interviews with the company personnel. Field evaluations assessed changes and improvements Therefore, the first annual audit assessed only conditions required to corrective actions and recommendations in the initial audit of 1999. The second, the third and the fourth annual audits evaluated new recommendations that were issued in the previous annual audit and also checked continuous improvement for remained unsatisfied recommendations.

Emapa, Exportadora de Madeiras do Pará Ltda, Brazil

Emapa Exportadora de Madeiras do Pará Ltda (EMAPA) in Brazil has FSC certification for forest management. The company holds 12,000 ha of natural forest in the upland Amazon basin, of which 800 ha is wood harvest area. EMAPA is a medium sized company with 345 employees. It is located in Marajo Islands in Pará State. EMAPA produces sawn wood that is mostly exported to the U.S.A., Canada, Mexico, Dominican Republic, Argentina, U.K., and Japan (SCS, 2004b).

The EMAPA was certified in 2003 after only the first annual surveillance was completed. The annual assessment took place in two different seasons, because the field assessments were only possible by boat and depended on the conditions of the river. Pre-condition assessment was undertaken in 2001. It included interviews with the employees, document

Table 2.7. Three Assessments by SCS for the FSC Certification

(Source: SCS, 2004a; SCS, 2004b; SCS, 2004c).

Company	Hayami Forests, Japan		Emapa, Exportadora de Madeiras do Para Ltda, Brazil	Bergvik Skog AB, Sweden
Year of Certification	2000		2003	2004
Types of Certification	Forest management and CoC		Forest management	Forest management and CoC
Size of Certified Area	1,070 ha		12,000 ha	1,914,000 ha
Certified Forest Category	Plantation forest		Natural forest	Natural forest
Evaluated CoC Facilities	Japanese cypress and cryptomeria and cryptomeria logs, squared Japanese cypress timbers and cutting boards		N/A	Pulpwood and sawlogs of Pine, Spruce, Birch, Aspen and other broad leaves
Days of the Initial Assessment	6 days		6 days	10 days
Pre-condition evaluation	Conducted but length was unavailable		4 days	Eliminated
Number of Auditors for the Initial Assessment	5 auditors		2 auditors	4 auditors
Number of Auditors for Annual Assessments	1st	5+1 for CoC	1	N/A
	2nd	1+1 for CoC	1	
	3rd	2	N/A	
	4th	2	N/A	
Days for Annual Audit	1st	1 day	5 days	N/A
	2nd	2 days	5 days	
	3rd	2 days	N/A	
	4th	1 day	N/A	
Major CARs, CARs, and Recommendations	Certification	1 CARs and 6 recommendations	21 CARs and 20 recommendations	13 CARs
	1st	1 new recommendation	8 CARs including 4 new CARs	N/A
	2nd	3 new recommendations	5 CARs including 1 new CARs	N/A
	3rd	3 continuing and 1 revived recommendations	N/A	N/A
	4th	3 continuing recommendations	N/A	N/A

evaluation, and field visits to managing forests. The wood supply plan, and mapping were also verified. When the pre-condition assessment was completed, the company submitted documents to the audit team, fulfilling all the pre-conditions. About two months later, a field-visit assessment was conducted.

The audit team comprised two auditors with experience in Brazilian forest management. One auditor was a specialist in forest resources planning and management. The other auditor was a specialist in development sociology.

During the 6-day evaluation in December, both field assessment and interviews with employees were carried out. The final day was spent meeting with the EMAPA management staff and scoring against criteria. Discussions and interviews took place with the local leaderships and NGOs, and information was sent to representatives from public institutions and societies. With the completion of the field visit, the final documentation was submitted to the evaluation team and was sent to the company for a factual review. The certification was issued in September 2003.

EMAPA scored 81 for timber resource sustainability; 84 for forest ecosystem maintenance; and 81 for socio-economic benefits. Because the three elements exceeded 80 points, the certification was successfully issued. However, there were 21 conditions required to be satisfied with time limits and 20 recommendations for improvement.

After the initial audit for certification, annual audits were separately concluded in July and December 2003. The auditor who did the initial verification conducted the first annual audit. Out of 21 required conditions in the initial audit, 20 were evaluated as executed and one was not achieved. Four additional conditions were imposed. The other audit was from 8 to 12 December in 2003 by the same lead auditor. There were four conditions that were not fulfilled by this time, 14 improvements, and seven achievements. In addition, one new required condition was added in this assessment. In the both annual assessments, the EMAPA was evaluated as a well-managed forest and approved for certification.

Bergvik Skog AB, Sweden

Bergvik Skog AB in Sweden obtained both forest management and CoC certifications in 2004. Bergvik Skog manages 1,914,000 ha of boreal natural forest, and it is an affiliated company of two organisations, Stora Enso AB and Korsnäs Skog AB (SCS, 2004c).

Because Stora Enso Sweden was already certified by the Swedish FSC in 1997, some procedures were excluded in the pre-certification process. Ownership of Bergvik Skog was shared by Stora Enso (43%), Korsnäs Skog (5%), and other 15 different Swedish institutions (52%) (Stora Enso, 2005). Stora Enso and Korsnäs Skog AB managed 1,914,000 ha of boreal natural forest. Annual audits have been conducted since 1997. The auditing for Bergvik Skog covered two assessments: audit for a new FSC certification and a five-year re-certification audit. This audit provided CoC certification after evaluation of the company's product saw logs, pulp logs and bio-fuel woods. Bergvik Skog field audit took 10 days.

The Swedish FSC standard was affected by the Swedish Forest Act (1993) and 33 other laws and ordinances for forest management. Traditional forest use such as picking mushrooms, collection of flowers except for protected species, collection of dead branches and putting a tent for one night was protected under laws. Indigenous Sami people were permitted special rights for grazing reindeer during winter (SCS, 2004c). The Swedish FSC was the first nationally endorsed standard by the FSC in 1998. When Stora Enso was first assessed in 1997, there was a need for evaluation of the compatibility of the national standard against the FSC standard. As a result of this analysis, the natural standard was considered "akin to FSC Principles" (SCS, 2004c).

For Bergvik Skog AB Sweden certification, the audit team consisted of four auditors. The audit team included the team leader from the Swedish FSC certification body, a forest specialist, an ecologist owning a consultancy company, and a professional in logistics with experiences in FSC's CoC certification. Document audit was conducted between May and June in 2004. All the information collected from the two merged companies and Bergvik Skog was evaluated. Preparations for field assessment such as 30-day before public notice, document information reviews, and technical planning by the audit team were undertaken.

Stakeholders were involved in this assessment process. One to two-hour office discussions were held each day with district or regional personnel. In addition, evening meetings with stakeholders were carried out for four days. Stakeholder contact was implemented via telephone interview, face-to-face meetings throughout the assessment, and 20 individuals' opinions were collected. These were representatives of environmental and community groups, local residents, indigenous peoples, governmental organisations, employees and contractors. Their views on company management became one of

indicators of the assessment.

Bergvik Skog scored 91 for basic requirements; 84 for standards in the social sphere; 94 for montane forest; 84 for environment and biodiversity standards; 91 for standards for the areas of production and economics; and 90 for contents of plants and documentation (SCS, 2004c). Internal audit records, which were kept by Stora Enso and Korsnäs Skog for eight to 10 years were evaluated. However, there were 13 Corrective Action Requests (CAR) and four recommendations. The results of scoring authorized the organisation for FSC certification for another 5 years. As CoC procedures met the FSC principles, CoC certification was also issued.

Accredited Certification

There were 685 certifications of all types in January 2005. The total area covered was 51,320,494 ha. Countries with high certification numbers are: USA (99); Germany (69); Brazil (52); U.K. (44); Lithuania (37); South Africa (24); Sweden (23); Switzerland (23); and Canada (21) (FSC, 2005c).

Chain of Custody

FSC labels for chain of custody (CoC) are classified into two groups: on-products; and off-products. On-product labeling is for wood products or packaging of products that came from FSC certified forests (Anderson and Hansen, 2003), and a CoC certificate is required. The off-product label is used for procurement, point of sale materials, leaflets, advertising, promotions, company prospectuses, posters, and reports. Certificate holders and non-certificate holders can also use this label. A non-certificate holder does not necessarily require approval from an accredited certification body for the use of an off-product label (FSC, 2005a). Non-certificate holders fall into one of three groups: promotion users, FSC members, and media and educational establishments wishing to promote the FSC (Anderson and Hansen, 2003).

Non-FSC Certified Controlled Wood

The FSC wishes to reduce socially and ecologically unsustainable wood harvest, such as illegal harvesting, or harvesting from areas where traditional and civil rights are violated, high conservation values are threatened, genetically modified (GM) trees are used, and natural forest is converted to plantations or non-forest uses (FSC, 2005b). High conservation value is not limited to significance for biodiversity, ecosystem value or forest health. It also covers traditional cultural values in local communities. Wood and

fibres from these areas are considered as 'uncontrolled material', which should be kept segregated from FSC certified woods. This separation makes it possible for FSC to certify wood materials.

CoC Requirements

The use of the on-product label requires certification. FSC does not permit the use of logos of other forest certification schemes on FSC certified products. Any claim that wood and fibre comes from 'sustainable forests' is not allowed to be used on the FSC certified product because sustainability is not measurable (FSC, 2004d).

A new label system was launched as a result of a CoC certification review in 2004. This labeling system shows the percentage of FSC-certified raw materials used in wood products. The labels are divided into three types of certifications: 100% of new certified forest products (FSC-pure label); certified and recycled wood materials (FSC-mixed label); and recycled products (FSC-recycled label) (FSC, 2004d) (Fig 2.1). The FSC-pure label shows "100%" and "from well-managed forests". The FSC-mixed label identifies "mixed sources" and one of the three types of sub-claims: "product group from well managed forests and other controlled sources"; "product group from recycled wood or fibre, well managed forests and other controlled sources"; or "product group from well managed forests and recycled wood or fibre". The FSC-recycled label specifies "recycled", "supporting responsible use of forest resources" with a "Mobius loop". This label is used on 100% recycled wood sources (FSC, 2004d).

Wood, fibre or other materials used for manufacturing FSC products have to identify the source and specifications for receiving and storing materials. The specifications are: all FSC certified materials; FSC certified and non-certified mixed materials; post consumer reclaimed materials (recycled from end-use purpose); other reclaimed materials; or controlled materials. An organisation has to identify CoC procedure, personnel responsibility, and training records and to keep the records for at least five years. Products with the same proportions of types of material are classified in the same group (FSC, 2004b). This classification does not allow different tree species, quality and value within one product line. It also does not allow exchanging species of different quality and value within a product line. These have to be classified into separate product groups (FSC, 2004b).

Material source specifications are required in each stage. When purchasing wood

materials, a company needs to ensure that the product sources are the FSC certified materials, including, pure, mixed, and reclaimed FSC materials, or controlled wood according to written specifications. When a company generates materials, their origin needs to be clear. If any wood material source is unsure or non FSC-certified virgin material controlled wood, it needs to be defined as controlled wood, which should be segregated from FSC certified wood. When collecting or trading post-consumer reclaimed material, reclaiming wood is required. When receiving and storing FSC certified material, FSC certification and certification numbers needs to also be accompanied by shipping documents.

FSC-pure Label   FSC-mixed Label without Recycled Sources

FSC-mixed Label with Recycled Sources   FSC-recycled Label

Fig. 2.1. FSC Labels (FSC, 2004d).

On-product FSC-mixed labeling applies a threshold or volume system to determine the product quality. The system requires achieving 70% (by volume or weight) proportion of

FSC certified material in all products over the claim period. The minimum input of FSC certified material can be indicated in the classes' pure, mixed, or reclaimed material. The mixed category of label requires greater than 90% of certified material input (FSC, 2004e). A wood product company has to identify the percentage on the product accompanying an invoice. However, a new FSC-credit system will replace the threshold system starting from 2008. This will require identifying inputs of an FSC-credit factor for a product, which is calculated by dividing the output by the input and is applied to each individual component of a product group. The new system will still allow a minimum non-certified material input at an average of 10% for an on-product label (FSC, 2004e).

CoC certification

The CoC certification number has been rapidly increasing. In January 2005, there were more than 3,625 endorsed CoC certificates in 68 countries (FSC, 2005c). Countries which have a large number of certifications are: the U.S.A (417); U.K. (390); Poland (301); the Netherlands (225); Germany (293); Japan (224); Switzerland (199); Brazil (173); South Africa (121); and Canada (112) (FSC, 2005c).

Mutual Recognition

The FSC encourages increasing national initiatives for FSC members under the process of FSC endorsement. Therein, the FSC has developed procedures for national initiative accreditation, standard and certification bodies. In the process of endorsement, the draft standards have to be submitted by the FSC National Initiative Working Group. FSC calls this process 'harmonization'.

"Mutual recognition can only occur between world organisations carrying out similar activities which develop international forestry standards and/or is an international accreditation body" (FSC, 2005e). FSC also understands that there is an issue on national initiatives, which meet FSC requirements, but have been endorsed by other standard bodies. Another international standard body PEFC, designed for national standard accreditation, has accredited a great number of national initiatives and standards. In contrast, FSC was not originally established as a national standard organisation (Synnott, 2000).

Conclusion

The FSC is an international certification scheme that requires quality and management system conformity against FSC certification. Environmental and social groups favour the

FSC because they believe it is the only environmentally sustainable standard. It is also because the FSC has the highest social and environmental standards and allows for equal representation of all stakeholder groups (FERN, 2003). P&Cs address social and ecological elements of forest management, a reflection of the support of social and environmental NGOs in its establishment. Ten P&Cs address social and ecological element for SFM. However, their interpretation is difficult and can vary among accredited certification bodies. Changes to the standard have to more open to various forest owners and applicable to different types of forests in many countries. At the same time, thresholds are losing their rigidity.

The ABU was established to enhance accreditation of national initiatives and standards. There are some national standards endorsed by the FSC ABU, including accredited Malaysian national timber certification and Indonesian forest certification schemes (FSC, 2005a). National offices were also opened in four continents where certifications are expected to increase. However, because the FSC started as an accreditation organisation, it has not developed evaluation procedures (Evans, 1996). This character is still seen in the function of FSC, which shifted evaluation procedures to the ABU.

Assessment for FSC certification gives auditors the power to decide approval levels on a case-by-case basis. Three case studies of FSC assessment by the SCS showed variation in number of auditors, foci, and period of time spent on each assessment. Some adaptations to local conditions were found. The FSC does not provide any specific descriptions of annual audit procedures. FSC assessment generally follows ISO Guide 61 (general requirements for assessment and accreditation of certification registration bodies) and ISO Guide 65 (requirement for certification bodies) (FSC, 2005e). Adaptive management is required as one improvement. Targets on surveillance audits are focused on CARs against P&Cs and required improvement, and annual assessment processes are simpler than the first assessment.

Costs for certification include: the cost to an applicant in meeting the FSC requirements; the cost of being accredited; and the cost of annual monitoring (ProForest, 2002). FSC has a relatively high price for certification (ForestrySA, 2004b), and it is not cheap for every applicant. Cost can be a barrier for already certified companies. That certification cost can be a barrier for some forest owners and is shown by its lack of certification success in profit-seeking organisations. By 2004, 57.38% of the total FSC certified area was public forest and 38% was private forest. Only 4.61% was communal forest

(Information on Certified Forest Sites Endorsed by the Forest Stewardship Council, 2004).

The CoC certification system has been improved, and the minimum proportion of certified materials on labels has been upgraded. A group certification system was also developed for CoC. The CoC criteria require ecologically and socially viable forest management. The new system intends to provide clear identification of certified wood material source input on FSC products. Nevertheless, its complexity may make public understanding of its mechanism difficult.

Chapter 3   The Programme for the Endorsement of Forest Certification Schemes Council (PEFC)

Introduction

The PEFC is an international forest standard with the largest certified forest area and the highest number of members. It is an independent, non-profit and non-government organisation, as with most forest certification schemes. In recent years, the number of endorsed national standards and approved member countries have increased. The PEFC is described as 'a framework for the mutual recognition of credible national or regional forest certification schemes which have been developed to meet internationally recognized requirements for sustainable forest management' (PEFC, 2005b). The PEFC objectives do not set measurable criteria or indicators for national certification schemes but is a system of standard frameworks in which assessable measures can be relied upon at the national level.

Interestingly, the PEFC is compared with the FSC, and has been unjustly criticized by NGOs. The functions of the PEFC are misleading in that not all of the endorsement process is the responsibility of the scheme. The separate functions for certification and supervision at each stage are not accountable for by the PEFC. An increasing number of PEFC member schemes tend to have similar systems. This chapter provides basic information on the PEFC organisation: administration and management structure; the labeling system in chain of custody certification; the certification process; and implementation. The certification process is also discussed with respect to its implementation level, assessment system and rules. The final section provides details of mutual recognition with national bodies.

Background

The PEFC, established in 1999, was created in response to the dissatisfaction of interest groups in various European countries with the FSC certification process. The FSC did not address issues considered important to many small private European forest owners. A majority of FSC certified forests in Europe were owned by the state or large forest industry corporations (Rametsteiner and Simula, 2002). The PEFC criteria and indicators were applied to European regional forest management as part of the Pan European Process. The PEFC was initiated by forest owners and trade interests, and has been

governed and controlled mainly by these groups (Vallejo, et al., 2001). It is an international certification scheme, which provided a national certification endorsement and approval of a national standard once accepted. The PEFC uses internationally recognized accreditation and certification processes to ensure its independence of control, standard setting and delivery of sustainable forest management. Consequently, the development of certification standards is independent from certification or accreditation processes. Furthermore, the PEFC also provides a mechanism for certifying wood products by using the chain of custody certification. Table 3.1 shows seven objectives, and nine principles, which are used during the implement process.

Table 3.1. The Seven Objectives and Nine Principles of PEFC

(Source: PEFC, 1998; Vallejo, et al., 2001).

Objectives
1. PEFC is a voluntary private sector initiative based on a broad view among relevant interested parties on SFM at the national or regional level
2. It offers a Pan-European framework for the establishment of comparable national certification systems and their mutual recognition
3. It aims to strengthen and improve the positive image of forestry and wood as a renewable raw material
4. It contributes to the promotion of economically viable, environmentally appropriate and socially beneficial management of forests
5. It gives assurance to customers and the general public that forests certified under the programme are sustainably managed
6. It is based on independent third party audit
7. It is based on regional certification levels and is open for other options if appropriate

Principles
1. Sustainable Forest Management as a goal
2. Credibility
3. Non-deceptiveness
4. Open access and non-discrimination
5. Cost-effectiveness
6. Participation that seeks to involve all relevant interested parties
7. Transparency
8. Subsidiarity
9. Voluntariness

The PEFC declares itself as 'a framework for the development of and mutual recognition of national or sub-national forest certification schemes that have been developed locally according to internationally recognized requirements for SFM' (PEFC, 2004e). The endorsement of a certification scheme states that 'the members of the PEFC Council have determined that the scheme meets the requirements of the PEFC Council. The schemes mutually recognize each other under the PEFC Council mutual recognition umbrella (PEFC, 2004d). An endorsed scheme can accredit a national certification to the applicant and it is automatically considered as a member of the PEFC under the umbrella. However,

when a national body is not endorsed by the PEFC, the body does not have authority to provide direct membership of the PEFC to the certification applicants. By December 2004, the PEFC had 17 endorsed national certification schemes and 30 membership countries (PEFC, 2005a).

The PEFC Council is administered by a Board of Directors, which is elected by the members at the highest authority of the PEFC, the General Assembly. The General Assembly consists of delegates and representatives from national governing bodies of the PEFC members (PEFC, 2003g). Membership is a reflection of the interested parties' geographical distribution and their diverse interests in the annual forest harvest. The ten board members consist of five from the respective forest owner's associations; two from the forest industry; two from NGOs; and one from an appropriate trade union. However, the board members have no voting rights in the General Assembly (INDUFOR, 2002). The PEFC scheme operates at two different levels of administration, internationally and nationally. National governing bodies include representatives from 29 countries and national or sub-national schemes operating within their territories. There are also extraordinary members from nine European forestry and timber industry sector organisations (PEFC, 2005a). Extraordinary members do not have voting rights in the General Assembly.

Regional Differences

The PEFC forest certification is applicable for all types of forest and management. Regional differences are responsible for the discretion applied to national standards that are approved by the PEFC. There are many differences in measures, thresholds, parameters and methods of relating other forest management rules or standards between countries. For example, some countries have system-based standards such as the PEFC in Germany and France. These countries do not require a field visit before the forests are certified. In contrast, a performance-based standard, the PEFC in Sweden, is given only after field assessment (FERN, 2001). The inconsistencies at both regional and national levels can be used to discredit PEFC certification. However, PEFC criteria are not measurement by themselves, leaving the standard to be interpreted in relation to factors such as rates of changes at regional levels, total volume of growing stock, age structure, nutrients and pH levels (Wood, 2000).

Chain of Custody Labels

The international PEFC chain of custody (CoC) standard has undergone recent

development. Therefore, the information presented in the present study is from a draft undergoing improvement. However, until its completion, accredited national certification bodies can issue CoC certification when they are satisfied that requirements of the ISO 9001 quality management system, ISO 14001 environmental management system or EC regulation for environmental management and auditing systems have been complied with (PEFC, 2003d).

When a wood processing company or retailer is certified for its chain of custody, the company can apply to the PEFC to use its logo for both on-product and off-product use. The on-product logo is 'a merchandising label attached to a product or a package of products' and the off product label is 'information conveyed by a supplier by documentary means other than an on-product label, concerning the nature or classification of the material in a batch' (PEFC, 2002a). The on-product use logo requires a registration number in conjunction with a logo. The off-product logo can be used without the registration number if written permission has been given. However, it is only allowable when placement of the registration number is impossible.

The PEFC has two types of conditions for labeling certified wood products: the percentage model; and the physical segregation model (Fig. 3.1) (PEFC, 2002a). The percentage model allows a company to use a PEFC logo when over 70% of wood raw material by volume or weight, which is sourced from a certified forest, is used for a product. The percentage-based logo identifies the raw material of products, the production site, and the time when the batch was produced, sold or transferred (PEFC, 2004c). A production batch definition has to be identified within a maximum of three months. The labeling logo includes the words, " promoting sustainable forest management." This is in contrast to a logo used for 100% certified wood, which contains the words "from sustainably managed forests" (Anderson and Hansen, 2003). The PEFC label uses the same logo design for the different labeling conditions (Fig. 3.2).

The physical segregation model allows a company to use a PEFC logo when a batch from certified forests is physically separate from all non-certified wood at all production processes including harvesting, transporting, storage and processing. The physical separation method is recommended for companies that can identify certified materials in their production process and not mix them with non-certified raw material (PEFC, 2004c).
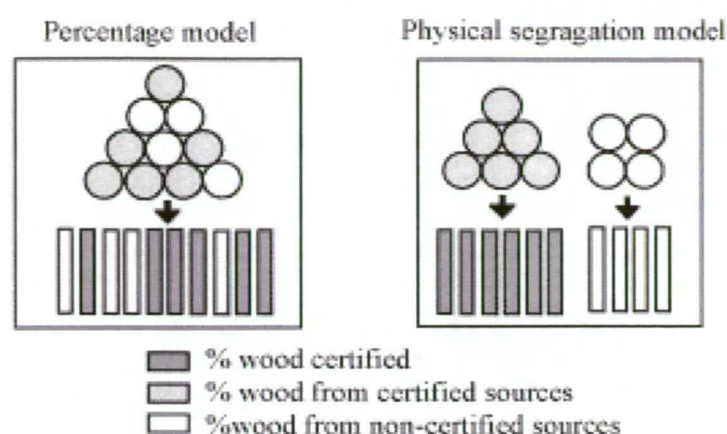
Fig. 3.1. Input Models of Raw Material of Products (Source: PEFC, 2002a).

Fig. 3.2. PEFC Label (Source: PEFC, 2003e).

When a product is made of wood and fibre, the content of wood is not set to any limit between natural and recycled woods (PEFC, 2003c). Any types of natural and recycled wood materials can be mixed with certified woods calculated by percentage, or completely separated from certified wood sources.

The purpose of criteria for CoC is to ensure that the origin of certified materials and finished products are verifiable before during, and after manufacturing, storage, and shipping (Anderson and Hansen, 2003). For example, a company's management policy and production procedures need to be documented, and periodic reviews are demanded in relation to the requirements. The requirements also demand that personnel, management, infrastructure and facility resource maintenance, and inspection control are included in the annual internal audit review (PEFC, 2004c). For chain of custody label certification it is essential to have a sufficient production system, continuous improvements through reviews and amendments, and a way to ensure the credibility of products from independent, transparent, consultative frameworks and pilot tests.

All logo users have to belong to one of three groups and need to sign a usage contract with the council. The three groups are:

1. PEFC national governing bodies;
2. Forestry industries certified by an accredited certification body against the PEFC forest management; and
3. Other groups whose purpose is not to conflict the PEFC objectives and principles (PEFC, 2003a).

The PEFC Council generally provides the logo use license to applicants through national governing bodies. In some other cases, use of the logo is directly permitted by the PEFC Council when: organisations wish to use the logo for direct educational or advertising purposes where the organisations are operating internationally; and where a country does not have a national governing body certified by the PEFC (PEFC, 2003a).

CoC certification has individual certification and group certifications the same as forest management certifications. An applicant for an individual certification with multi-sites can be applied in several factories of the organisation within a country. However, international organisations approaching CoC certification must apply for the certification in each country (PEFC, 2003b). In a group certification for a chain of custody, the applicant organisation receives certification for the whole group.

Although the license fee is only 20 euro, it is charged to forestry industries regardless of their annual turnover. National governing members and other users are not charged for a license acquisition. An annual fee for the use of a logo is also required for forestry industries. However, the amount increases as their turnover increases (Table 3.2).

Table 3.2. PEFC Logo Fee for Forestry Industries (PEFC, 2003a).

Amount of turnover in a forestry industry (EUR)	Acquisition fee (EUR)	Annual fee (EUR)
Up to 1 million turnover	20	500
1 million – 1 billion turnover	20	1,000
Over 1 billion turnover	20	2,000

Certification Process

Procedures for PEFC certification are based on ISO standards for quality management systems, environmental management system certification, and product certification. In

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addition, EC regulation for environmental management and audit scheme verification is to be compatible. "The PEFC does not set any requirements regarding the auditing and decision making in forest management certification or accreditation" (INDUFOR, 2002). The PEFC certification can be accredited to national bodies through five steps:

1. Application for certification;
2. Assessment process by an audit team;
3. Reporting (oral summary and written audit report);
4. Decisions on certification are made by a representative of the certification body who has not participated in the audits. The decision is based on the audit report; and
5. Re-auditing
   (Source: PEFC, 2003e; INDUFOR, 2002).

National Body Endorsement

National bodies, which are endorsed, need to meet qualifications of implementation. The conditions are:

1. Standards and rules developed in an open and transparent way;
2. Forests certified by an independent third-party organisation;
3. Wood traced from certified forests to the end consumer by chain-of-custody tracking; and
4. PEFC labeled products supporting an environmentally positive choice.

Criteria for Forest Certification

The PEFC states that its criteria are international and the basis for this is the Montreal Process C&Is. Other criteria and indicators are also taken from international criteria including the Near East Process, Lepaterique process, Dry Forests in Asia, ITTO Criteria and Indicators, Dry-zone Africa, African Timber Organisation Principles, and Criteria and Indicators for Sustainable Management of Natural Forests. The PEFC does not define precise criteria and they are left on national bodies allowing inclusion of indicators prior to the endorsement. Minimum criteria for forest certification at national levels are:

1. Compatibility and consistency with the Pan-European Criteria and Indicators for Sustainable Forest Management (PEOLG);
2. Management and performance requirements that are applicable at the level of a forest management unit and optionally at group and regional levels;

3. Compliance with national laws, programmes and policies, and these references; and

4. Compliance with the core International Labour Organisation (ILO) Conventions (PEFC, 2003b).

Requirements for forest certification are evaluated against each national standard of member countries that are endorsed by the PEFC. National laws and regulations are valued in conformance with the way national laws, programmes and policies have to be respected (PEFC, 2003f). Moreover, certification schemes do not override or violate national legislation when internal and external audits are undertaken. However, the PEFC does not require a full compliance to normative regulations and does not require that national schemes define the indicators for each criterion (INDUFOR, 2002).

Levels of Implementation

Three approaches are possible for PEFC certification: regional certification, which is a national or sub-national certification; group certification; and individual certification. Regional certification standards include criteria decided at regional and forest management levels. The area has to be managed as forest area and must represent more than 50% of the region (PEFC, 2004d). The forest owners can participate in the regional certification by entering into individually signed commitments or it may be based on majority decisions of a forest owner's organisation. Conversely, the conditions for a regional certification should be one of the following: compliance with all certification requirements; participants registered for certification; and implementation of the regional certification rules (PEFC, 2004d). However, sampling for regional certification audit covers the whole certified region, while surveillance audits implement the whole area (INDUFOR, 2002). A national or sub-national forest standard to be endorsed by the PEFC has to be practiced through a pilot study before endorsement and submission of application for a mutual recognition (PEFC, 2003e).

National or sub-national certification schemes have more implementation levels and operational options. Applicants have the right to choose the most appropriate options. These certification schemes are required to have compliance relevant the PEFC requirements, including identifying the authority and having recorded the total area certified.

Group certification places small and medium sized forest owner groups under one certification. All group members need to comply with the certification requirements

including rules for group certification, registration as group members, and identification of certified forest areas. Group certification allows equal access to certification for small and large-scale forest owners. It is also cost effective for monitoring, planning, silvicultural management, harvesting process forest owners and professionals (INDUFOR, 2002).

Individual certifications can be directly applied to individual forest owners who submit an application through a certification body. The certification applicants can have a commitment as an individual or by representing a region. The latter case is chosen by many forest owners and managers (PEFC, 2003e). However, there are negative points related to group certification of the PEFC. There is not enough follow up on continuing individual commitment to the PEFC requirements. This can lead to a lack of compliance with certification conditions. Therefore, group certification has a risk of 'free riders' (certified forest owners who do not comply with the criteria in regional certification), although internal audits and commitment among forestry professionals decreases the possibility of violation of the certification criteria (INDUFOR, 2002).

Auditor and Certification Body

The ISO criteria for environmental management auditing apply to the PEFC auditors. English language skills are also demanded for assessment reports. Other requirements, dependent on national forest certification schemes, include experience in forestry sector auditing, capability and framework of team members, and an understanding of the relevancy, scope and methods of assessment.

Audit Duration

Once a certification has been accredited, surveillance audits have to be conducted within a maximum period of one year. Reassessment audits have to be accomplished no later than five years for both forest management and chain of custody certifications (PEFC, 2003c).

Claims and Dispute

Dispute and complaints regarding a certification process can be lodged only by written communication (PEFC, 2003b). In order to deal with claims, national certification bodies are required to establish an independent dispute settlement body.

Accredited Certification

By the end of December 2004, 55,323,487 ha of forest were certified. The number of chain of custody certifications issued by December 2004 was 1,905 (PEFC, 2005a, PEFC Assembly, 2004). Atyi and Simula (2002) have indicated that the number of accreditations and endorsements by the PEFC exceeded those of the FSC, which had been dominating world forest certification. Consequently, in 2002, PEFC certified forest accounted for 36% of global accreditations, while the FSC was 23%.

PEFC audit reports are generally not publicly available and reports are usually considered to be confidential documents. The PEFC uses ISO guidelines, which state that the certification process is carried out by fully independent third-party bodies (PEFC, 2002b). At the same time, the PEFC technical document states that "an executive summary of assessments containing important results shall be made available to the public" (PEFC, 2003d), and this interpretation seems to be different for each certification body. Audit reports are available from the PEFC for Germany and Sweden (FERN, 2001). However, availability in PEFC Sweden is limited to certification bodies or accredited organisations (PEFC Sweden, 2005). PEFC France allows a certified company to disclose information (FERN, 2001). Thus, any misleading expressions and different interpretations in each national scheme can be disputed.

Mutual Recognition

The PEFC endorses national or sub-national standards with respect to national and sub-national certification schemes that wish to gain a mutual recognition with the PEFC. These have to meet the PEFC requirements and are also required to demonstrate the results of a pilot study prior to applying for endorsement. The PEFC assessment of a national certification body is conducted by a full independent body, which has an open and transparent process. The PEFC Board of Directors appoints the consultants with consideration of their experience, the assessment team scope and work methods, and price (PEFC, 2004g).

The PEFC has principles for endorsement of national or sub-national certification schemes. Endorsement or mutual recognition has to:

1. Be conducted by independent assessment;
2. Be a transparent and consultative in assessment and process;
3. Have publicly accessible results and assessment reports that are available to interested

parties; and

4. Be transparently assessed against the PEFC minimum requirements and widely communicated

(PEFC, 2004g).

The PEFC guidelines claim that the PEFC endorses both system-based and performance-based schemes. However, the PEFC endorsement system certifies national schemes only at system-based levels, not requiring a performance approach (Vallejo et al., 2001). Mutually recognized national standards schemes are likely to be very similar to the PEFC certification process. Therefore, minimum requirements for certification schemes are sufficient definitions, procedures and functions in a process of issuing certification (Table 3.3). It is assessed if a national scheme has a consensus objective and if there is a process of interested parties' participation, but the outcome of the consultation is not questioned, for example, how to identify interested parties (Vallejo et al., 2001). A system-based certification scheme does not have to claim to achieve a certain level of performance in the requirement, while a performance-based certification must include a performance approach to be achieved (Vallejo et al., 2001). The PEFC asks system-based requirements of any certification schemes accepted in PEFC mutual recognition to have the same characteristic as the PEFC.

Table 3.3. Minimum requirements for national and sub-national schemes (PEFC, 2004g).

1. The content of forest certification standards;
2. Standard setting procedures;
3. Scheme implementation procedures;
4. Chain of custody standards; and
5. Certification procedures.

Overview

The PEFC standard is an international framework without rigid measures for forest operation or management. This makes the PEFC criteria generic, and subsequently, is not identified as fixed requirements. The standard is flexible relying on national level standards to control it. Once the PEFC accredits a national body, the scheme owes the capability of meeting any of its requirements to the PEFC Council. The PEFC Council is also part of a framework in which administrative functions are dependent on each independent body. National forest certification schemes, certification bodies and national accreditation bodies individually have responsible roles and they are totally independent of each other. This can confuse consumers and the public because this characteristic is

dissimilar to the FSC, which is often compared to the PEFC as an alternative international certification scheme.

The PEFC initiation is comparative to that of the FSC standard. The stakeholders are largely forestry and timber industry interest groups with less NGOs input. The PEFC accredits and endorses national bodies, which are usually representatives from interested nations. Therefore, the PEFC standards can reflect the decisions of governments and industry. This imbalance can have the effect of selecting forest management plans that only concentrate on economic outcomes. The scheme does not provide a management strategy for ecological and economic objectives in the field, nor clear policy on indigenous people's rights (FERN, 2001). For example, PEFC Finland did not sufficiently alleviate conflict between indigenous people, the Sami, and the Finnish Forest and Park Service in the standard setting process. The PEFC Sweden was developed by forest owners and sawmill associations and there has been no participation of environmental or social NGOs in drafting the standard. The PEFC Germany had 75% of the votes in the German Forest Certification Council, half of whom were of private forest owners, about quarter of whom were market partners of the owners, and a quarter of whom were environmental and labour union stakeholders (FERN, 2001).

Chapter 4   ISO 14000 Series

Introduction

The International Organisation for Standardization (ISO) was founded in 1946 to develop manufacturing, trade and communication standards and was coordinated by the central secretariat in Geneva, Switzerland (ISO, 2005). The ISO 14000 standards were developed by Technical Committee 207 (TC 207) of ISO. The task of the TC 207 committee was to develop a standard for environmental management that was consistent with the outcomes from the Rio Conference in 1992. Consequently, the ISO 14000 series were designed to provide common environmental management standards for organisations throughout the world (Gunningham and Sinclair, 1999; Iezzi, 2001). The ISO 14000 series include seven major groups (Fig. 4.1) and the ISO 14001 standard is the centrepiece of the ISO 14000 series, which lays out requirements for environmental management system (EMS). All other standards and technical reports (TR) in the ISO 14000 series support and guide use of ISO 14001. The TR is an information document of one of three types: intended to become a standard but required levels of agreement could not be attained; describes either the direction of standardization in particular fields or an experimental standard for trial use; or a background document (ISO, 2005).

The ISO 14000 series cover all 'environmental management systems'. They were not specifically developed for the forestry and forest product sectors. Nevertheless, the ISO 14001 has been widely used as a forest standard for forest management certification. ISO standards were used in the development of forest standards. For example, ISO 14001 is the equivalent of forest management standards; the ISO 14020 function is similar to CoC certification in its guidelines for environmental labeling; and the ISO 14010 is comparable to auditing processes in forest certification. Thus, the ISO 14000 series are a set of generic tools for developing, implementing, maintaining and evaluating environmental policies and objectives (Hortensius, 1999).

This chapter will discuss these three series of standards. It also provides understanding of how the generic standards for environmental management system are used in sustainable forest management and how they relate to forest certification.

System related standards   Product related standards

<table>
<tr>
<td>
Environmental Auditing
ISO 14010
ISO 14011
ISO 14012
ISO 14015
ISO 19011

Environmental Performance
Evaluation
ISO 14031
ISO/TR 14032
</td>
<td>
Environmental
Management
Systems
ISO 14001
ISO 14004
ISO/TR 14061
</td>
<td>
Life Cycle
Assessment
ISO 14040
ISO 14041
ISO 14042
ISO 14043
ISO/TR 14047
ISO/TR 14048
ISO/TR 14049
</td>
<td>
Environmental
Labelling
ISO 14020
ISO 14021
ISO 14024
ISO/TR 14025
Environmental Aspects
in Product Standards
ISO 14062
ISO Guide 64
</td>
</tr>
</table>

Environmental Management Vocabulary
ISO 14050

Fig. 4.1. Seven Major Groups of ISO 14000 Series (Source: Hortensius, 1999 (modified)).

Background

The ISO 14000 series primarily emerged as a result of the Rio Summit on the Environment in 1992 and the Uruguay Round of the General Agreement of Tariffs and Trade (GATT) negotiations. The Rio Summit generated a commitment to the protection of the environment across the world, whereas, GATT concentrated on the need to reduce non-tariff barriers to trade. ISO standards were developed by international market and trade industry interests (ISO, 2005). They aimed at facilitating the efficient exchange of goods and services (Tibor and Feldman, 1996). A consensus of the interests arose from: manufactures, vendors and users, consumer groups, testing laboratories, governments, engineering professionals, and research organisations (ISO, 2005).

ISO members are national bodies responsible for standards and in 2005, ISO had a network of 148 countries (ISO, 2005). There are three types of members: member bodies; correspondent members; and subscriber members. Member bodies are generally national standard bodies, each of which has full voting rights on the technical committee and the policy committee. Only one body from a country is allowed to accredit and issue standards. Correspondent members are usually organisations from countries without fully developed standard bodies. Correspondent members do not actively participate in the technical and policy development. Subscriber members are poor countries that have no voting rights because of a lack of a standards body but participate in international standardization (ISO, 2005). Because ISO is a non-government body, the members are not representatives of national governments, although most of the members are representatives of national bodies setting standards, and the use of the ISO standard is voluntary. These characteristics give ISO a special position between the public and private sectors (ISO, 2005).

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Special Guideline for Forestry Sector

The ISO Standard Councils of Canada and Australia proposed a technical committee of TC 207, a "Guide to the Application of ISO 14001 in the Forestry Sector for Sustainable Forest Management" in 1995 (Hortensius, 1999). The guide provides an international framework for use of ISO 14001 in the certification of the environmental management systems of forestry organisations (Hortensius, 1999). The guide described how to implement requirements of ISO 14001 and the principles of sustainable forest management in the forestry sector. This guide resulted in establishment of an "international study group to consider the potential use of ISO standards for achieving SFM." The proposal was withdrawn after much opposition, because a standard for a specific sector was inappropriate to a new and untested EMS standard (Evans, 1996). As the result, ISO/TR 14061 was developed in 1998 for forestry organisations and provided 'informative reference material to assist forestry organisations in use of the ISO 14001 and the ISO 14004 (Jensen, 2000). ISO/TR 14061 gives definitions and background information on the ISO 14000 series of standards. It is mainly a list of reference materials for forest organisations but also describes the relationship between SFM principles, C&Is and a forestry organisation's EMS. The annexes show various levels of initiatives, such as inter-governmental, non-governmental, national and international initiatives for SFM. Case studies of ISO 14001 implementation in the forestry sector introduce large and small-scale operations (Hortensius, 1999).

Regional Difference

ISO standards can be used as international standards or adopted as national standards, either verbatim or with modifications (ISO, 2005). ISO member countries can also develop their own standards to be acceptable to a national standard. For example, in Australia, Standards Australia is a national accreditation body for the ISO 14001. Standards Australia develop criteria for certification bodies and need to be accredited by Standards Australia to have official recognition for providing ISO 14001 certification to organisations. In the same way, the Standards Council of Canada and the American National Standards Institutes are accreditation bodies in each country. ISO standards differ in their legal status between countries. However, some countries directly refer national laws to the ISO standards giving them a mandatory status (Vallejo and Hauselmann, 2000).

Standard Revision: ISO 14001 and 19001

The ISO 14001 was launched in 1996 and the revised standard was issued in November 2004. The new version was easier to understand and use than the first standard. In addition, compatibility with ISO 19001 (quality management system standard) was also increased (ISO, 2005). ISO 19001 replaced and combined with ISO 14010, 14011 and 14012. For those companies that had already acquired the first standard, a transition period to the new version was set at 18 months from publication of the new version. A joint international association for the transition work will be carried out in cooperation with ISO and the International Accreditation Forum (ISO, 2005).

Certification Process

The ISO 14001 standard is applicable to all types and sizes of organisations with any activities, products, and services (Conway, 1996; Huang, 2001). This standard does not demand absolute levels of environmental performance but does require compliance with legislation and continual improvement. This allows differences in environmental performances. ISO 14001 also allows companies to determine the actual targets and levels in establishing their environmental management systems. This approach encourages creative and relevant solutions from the organisation itself (Darnall et al. 2000; Fredericks and McCallum, 1995; Johnson, 1997; Martin and Sleeman, 1997; Pringle and Leuteritz, 1998; Haung, 2001). Requirements related to ISO 14001 differ between companies, for example, the frequency of monitoring and checking are able to be determined by the company. The standard's application also differs in each company because they have different purposes and different interested parties.

Requirements

The main character of ISO 14001 is its flexibility in application. The standard was designed for use by any organisation of any size and in any field, so does not require specific environmental goals. Instead, it provides a general framework for effective environmental management (Huang, 2001). Therefore, the standard does not itself have environmental performance criteria (Standards Australia/Standards New Zealand, 1996a). Requirements in the standard are integrated into the environmental management system, and they are cyclical processes of "plan, implement, check and review" (Fig. 4.2) (Standards Australia/ Standards New Zealand, 1996a).

Continual Improvement

Fig. 4.2. Environmental Management System for Contiguous Improvement

(Standards Australia/Standards New Zealand, 1996a (modified)).

The development of environmental policy shows that the organisation has a commitment to conforming to relevant environmental legislation and regulations. It can also show that the organisation works for continual environmental improvement. The organisation details its activities, products or services in relation to an appropriate scale of impacts on the environment. Policy needs to be documented and also be publicly available to communicate to employees. ISO 14001 requires communication, including documentation of environmental policies, objectives, targets, key roles and major responsibilities. These documents are necessary for regular monitoring, measurement and checking procedures. They also expose the company's EMS to interested parties and encourage understanding of the organisation's operations. In the case of the forestry sector, interested parties include the community, environmental groups, Aboriginal people, consumers, and government organisations.

A company identifies environmental aspects and environmental impacts in the planning process. The ISO 14004 (general guidelines on principles, systems and supporting techniques) suggests a procedure for their identification: select an activity or process; identify all possible environmental aspects of the activity or process; identify potential or actual impacts associated with the aspect; and evaluate the significance of impacts. The scale of the impact, its severity, the probability of its occurrence, and the duration of its

impact can be factors to consider in a company's plan. An environmental aspect is an 'element of an organisation's activities, products and services which can interact with the environment' (Standards Australia/Standards New Zealand, 1999). Whereas, environmental impacts are 'any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products and services'. A relationship between the two has been recognized as cause and effect (Tibor and Feldman, 1996). In addition, objectives and targets are indicated in the environmental management programme, with sets of timeframes. In all these plans, legal and other requirements need to be met.

In the process of implementation and operation, the company ensures the existence of appropriate structures and management responsibilities. However, the ISO 14001 does not focus on evaluating and selecting subcontractors, but does require the establishment of procedures for emergencies and accidents. Training should be identified as necessary by the organisation, which raises workers' awareness of environmental management and increases their ability to undertake it. The ISO 14001 requires setting up a procedure for training and that all employees have responsibility in environmental performance. Members of the organisation should be aware of their roles and responsibility to the EMS, significant environmental impacts in their work, the need to conform with environmental policies, procedures and EMS requirements, personal performance and its benefits to the environment, and environmental harm that could result from violating procedures.

Checking and monitoring the system is another requirement. However, it excludes monitoring of the effectiveness of employee training, although the standard recommends this. The ISO 14001 requires all employees to inform themselves about the company's environmental policy.

A company is required to correct nonconformance by identifying the cause, implementing the necessary corrective action, modifying controls to prevent repeating the nonconformance, and recording written procedures resulting from the corrective action. The time period for the corrective action depends on the complexity and degree of the performance. The company's environmental management system is evaluated within the organisation and/or by external audit. Therefore, management reviews are required over a period of time. This evaluates the effectiveness of the EMS. The reviews also include evaluation of audit results, objectives and targets, and the continuing suitability of environmental management systems to the needs of relevant interested parties.

Conformity Assessment: ISO 14010 and 14011

The ISO 14001 standard allows both self-certification and third-party certification. However, it was designed for third-party registration. It also offers processes to achieve continuous improvement in a company's environmental management system which includes "a cyclical process of plan, implement, check and 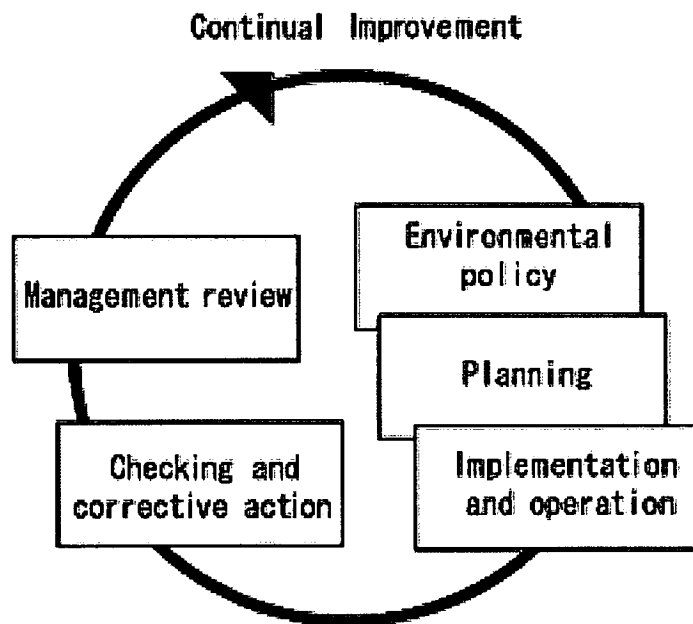review" (Standards Australia/ Standards New Zealand, 1996a). This 'loop' system (Fig. 4.2) is a core concept of this standard for continual improvement on environmental management, and evaluation and auditing are carried out in its framework.

The ISO does not carry out conformity assessment by itself but is assigned to accredited certification bodies. The ISO 14010, 14011 and 14012 standards were designed for guiding audit procedures by qualified auditors. When a third-party certification is provided, an independent auditor from a registered certification body performs the conformity assessment. The auditor evaluates environmental management systems against the ISO 14001 criteria in accordance with auditing general principles of the ISO 14010 and guidelines for environmental auditing procedure, ISO 14011. The organisation is assessed on whether it has measures to prevent or reduce environmental impacts by assessment of the document review and at least two site visits.

Document reviews are done at in the beginning of the audit and include the organisation's environmental policy statements, programmes and records or manuals for EMS, which can support audit evidence and audit findings. Assessed organisations must identify environmental aspects that can significantly influence air, land and water, but can be controlled (Robson and Gould, 1999). The audit plan reflects this information. The lead auditor decides the audit scope with the assessing company, assigns a procedure to each auditor and changes his or her assignment according to circumstances for the best audit outcome. Auditors for ISO 14001 are categorized into three types: provisional auditor, those who have little EMS experience and conduct an early audit; environmental management system auditor who is qualified to conduct environmental management system audits as part of an audit team; and environmental management system lead auditor who manages and coordinates EMS audits as the audit team leader (Standards Australia, 1996a; Wilson, 1998; Huang, 2001).

After document review, there are two steps in site visit assessment: assessment of an organisation's environmental management system evaluates environmental performance

on its operations; and site visits check the organisation's environmental aspects and impacts. Use of the ISO 14001 and criteria are necessary. The first step evaluates whether all environmental aspects and impacts are identified in the EMS. However, there is no prescribed method for this assessment, and the methods used are diverse (DPIE, 1996). The field examination assesses management implementation and effectiveness. It evaluates the system introduction, procedures and work instructions.

In the beginning of an audit, an opening meeting is held in order to introduce audit members, to review the audit scope, audit plan and the audit timetable, to communicate audit methods and procedures, and to confirm the audit schedule. The collection of audit evidence is carried out through interviews, documents and observation of activities and conditions. Nonconformity indicators are recorded. The audit team reviews all evidence, and the auditee manager also reviews them in order to check the factual accuracy of non-conformity. At the end of the audit, a closing meeting is held with the auditee's representatives and the auditors. Main findings are presented and the accuracy of the result is ensured. If there is disagreement with the findings, they should be resolved before the audit report is issued. The lead auditor can make a decision even when the auditee still disagrees with the findings. The lead auditor prepares the audit report. The topics to be addressed are determined in the audit plan and if there is any change, they have to be agreed to by all parties during the audit preparation.

The audit report contains the findings, summary, and the evidence. The report also includes identification of the organisation: the objectives, scope and plan of the audit; the criteria, a list of reference documents; the period of the audit and dates; the auditee's representatives participating in the audit; the audit team members: any confidential content; a list for the audit report; a summary of the audit process; and the audit conclusion. The lead auditor sends this audit report to the client by an agreed time. The audit report is the property of the client and its confidentiality is respected. Therefore, any distribution requires the auditee's permission. All audit documents including draft and the final audit report are retained, based on an agreement between the client, the lead auditor and the auditee.

Audit Duration

The ISO 14001 requires a certified organisation to continually review, update, improve and validate their EMS to ensure its continuing suitability, adequacy and effectiveness. The certified organisation must have regular surveillance visits by their certification body

at six to 12 monthly intervals and a complete audit of their EMS at three yearly intervals (Hammerschmid and Uliana, 1998; Iezzi, 2001).

Auditor: ISO 14012

The qualifications of an auditor are described in ISO 14012. Certain levels of education or work experience, and formal on-the job training, is required to develop competence for environmental audits. The training covers a range of environmental knowledge, technical operations, regulation, management systems which audits are performed, and audit procedures. On-the-job training should be 20 equivalent workdays of environmental auditing and a minimum of four audits, including involvement in the entire process under a lead auditor (Hemenway, 1995; Huang, 2001).

Logo Labeling: ISO 14020 and 14021

There is no officially approved logo label for ISO 14001 certification for wood products from certified forestry companies. Although a certified organisation can self-accredit its status as the ISO 14001 holder, the ISO does not allow the use of its logo. In consideration of a product claim, the ISO 14020 series are compatible with a specification for environmental labels and declarations (Vallejo and Hauselmann, 2000), including CoC certification.

The ISO 14020 series contain generic principles for the development and use of environmental labeling and declarations. These are applicable to various industries, allowing self-declared or third party assessment, and three types of claims. As audit compatibility with forest certification, the ISO 14011 (audit procedures), 14020 (environmental labels and declarations – general principles), or 19011 (environmental management systems auditing) play similar roles in checking and evaluating the company's eligibility against the standard (Fig. 4.3). The ISO 19011 is a new auditing guide for EMS on principles, programmes, conduct and competence of auditors, which was issued in 2002 (ISO, 2005). The classifications of label types are determined based on the assessment methods. Type I (ISO 14024) requires life cycle assessment by a third party, which assesses whether a product meets the type I criteria within a particular product category. Type II (ISO 14021) is a self-proclaimed environmental label. Type III (ISO 14025) is qualified product information profiles, which are developed by a third party (WTO, 2003). Forest certification does not fall into any of the label types (Vallejo and Hauselmann, 2000). It most closely relates to type I of eco-labeling. Some CoC certification for forest products refers to ISO 14020 and 14021.
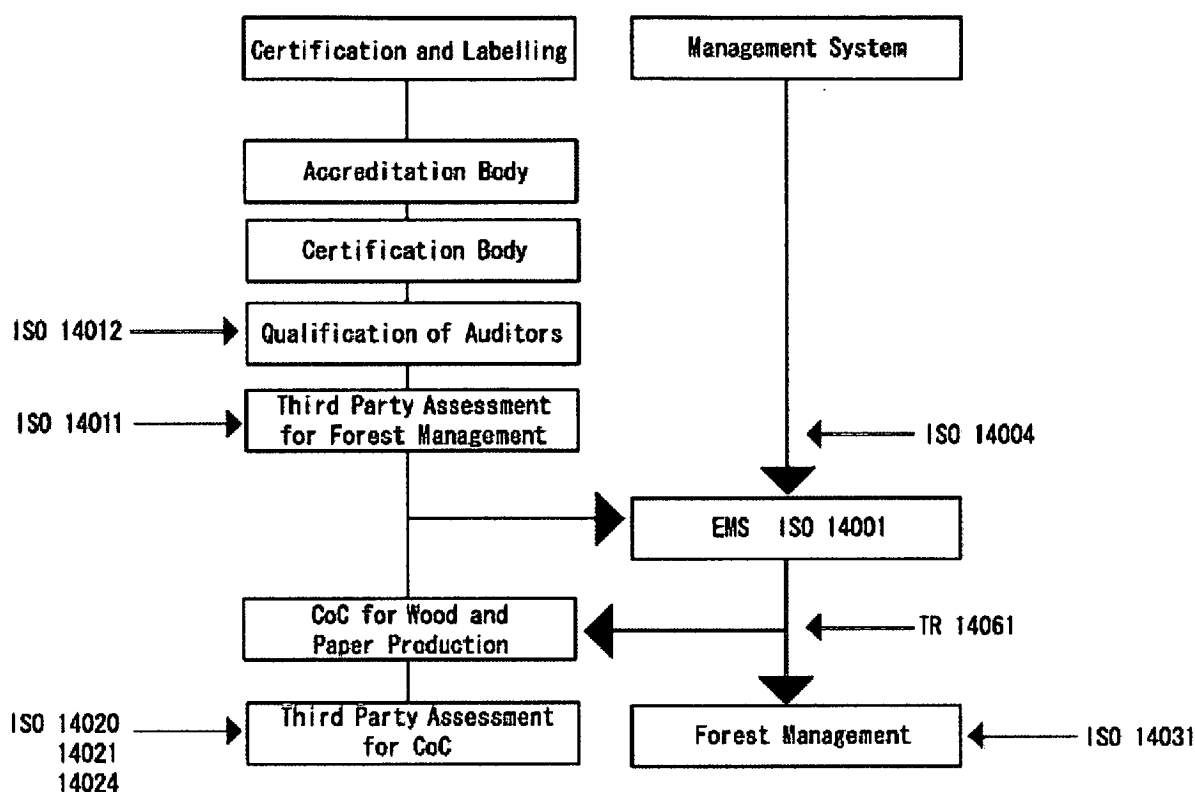
Fig. 4.3. Use of ISO Standards for Labeling and Forest Management

(Source: Uption, 1999 (modified)).

The nine principles of ISO 14020 for environmental labels and declarations are:

1. Be accurate, verifiable, relevant and not misleading;

2. Not be prepared, adopted, or applied with the view to, or the effect of, creating unnecessary barriers to trade;

3. Be based on scientific methodology that is sufficiently through and comprehensive to support the claim and that produces results that are accurate and reproducible;

4. Make the information concerning the procedure, methodology, and any criteria used to support the claim available upon request to all interested parties;

5. Take into consideration all relevant aspects of the life cycle of the product in their development;

6. Not inhibit innovation that maintains or has the potential to improve environmental performance;

7. Limit any administrative requirements or information demand to those necessary to establish conformance with applicable criteria and standards of the labels and declarations;

8. The process of developing environmental labels and declarations should include an open, participatory consultation with interested parties. Reasonable effort should be

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made to achieve a consensus throughout the process;

9. Make sure that information on the environmental aspect of products and services relevant to an environmental label or declaration is made available to purchasers from the party making the claim

(Source: Vallejo and Hauselmann, 2000).

As a product claim, the ISO is closely associated with the Technical Barriers to Trade Agreement (TBT) and the World Trade Organisation (WTO). The agreement was accepted during the Uruguay Round in 1995. Because the ISO is recognized as an international standard setting body, the organisation can make formal presentations at TBT meetings (National Resources Institute, 1999) unlike any other international forest standards body. The WTO understands that the use of international standards for products can facilitate trade (Ravier, 2000).

With regard to forest certification, the WTO sees forest certification as eco-labeling, which can be an effective instrument to encourage the development of an environmentally conscious public. The WTO states "well-designed eco-labeling schemes/programmes can be effective instruments of environmental policy to encourage the development of an environmentally conscious public" (WTO, 1996).

Eco-labeling is regulated by the WTO when applied to commercial products for the purpose of facilitating international trade. WTO views eco-labeling not to be a product (FERN, 2003).

Cost of Implementation

The cost of implementation of the ISO 14001 includes implementation, certification and maintenance of the standard. It depends on the scale of the EMS, and can be international, national, or limited to an individual plant. Certified companies are finding that the major cost is employee time (Huang, 2001). The approximate hours of work attributed to the ISO 14001 by all staff, ranged from 100 hours to 10,000 hours with a mean of 1,342 hours and median value of 500 hours (Huang, 2001).

According to a study by Iezzi (2001), a relationship was found between implementation costs of ISO 14001 and the number of employees in the company. The higher the number of employees, the higher the cost. Implementation and certification costs were estimated by a multinational corporation to range from AU$100,000 to $1 million for individual

plants. Whereas, the cost in small or medium-sized plants ranged between AU$10,000 and $100,000 depending on the company's individual needs and circumstances (Stenzel, 2000; Huang, 2001).

Cost is generally higher for the initial certification than for surveillance audits. Average cost of the initial certificate by internal audit in seven Australian companies was approximately AU$10,000, and each surveillance audit cost between AU$3,000 and $5,000. The initial third-party audits cost AU$5,000 to $20,000, though, this depended on the size and complexity of the company (Hammerschmid and Uliana, 1998; Iezzi, 2001).

Accredited Certification

There were 37,000 organisations in 112 countries certified for the ISO 14001 in 2001, 117 in 2002 and 113 in 2003 (ISO, 2005). These numbers are not limited to the forestry sector; however, it is not possible to obtain data on certification of other forest-related companies. Certification bodies collect such information but the ISO is not responsible for disclosing and maintaining the information. The ISO 14001 does not require the provision of information to the public, because information is considered as confidential.

Relation to Other Standards

The ISO 14001 standard aligns the EMS with other management elements, such as operational controls, resource allocation, information systems, training and development, management and monitoring systems, and communication and reporting programmes. The ISO 14001 also provides companies with international credibility for decent environmental management systems. In many forest sectors, the ISO 14001 standard is used in association with forestry standards, particularly national level standards. The ISO 14001 requires multinational companies to apply the same standards as the host country, and this means the standard can be different between countries (Benchmark Environmental Consulting, 1995; Huang, 2001).

Conclusion

The ISO 14000 standards have different characters than other forest standards. The standards are applicable to any business organisations. However, many companies in forest industries apply ISO 14001 for forest management in conjunction with forest standard and certification. It provides the companies with consistency in environmental policy, planning, operation, corrective action and review by auditing. Interestingly, the original development of ISO standards was in response to international market and

industry interest. ISO 14001 was initiated after the Rio summit and the purpose was to facilitate organisations' environmental management in relation to international trade development. In this sense, this standard was intended to promote economic sustainability, more than other sustainable elements, through providing a management system with environmental elements.

ISO standards have been a model for many other forest standards. However, there are no specific C&Is, instead, the system requirements cover performance requirements, allowing companies to make a self-determination and self-declaration for their performance. This allows widely applicable levels of conditions in a certification system that has separate functions of auditing and accreditation. The third party audit process for ISO 14001 and the audit information limitations correspond to other forest standards, which have applied the ISO certification system.

Chapter 5   CSA (Canadian Standards Association)/CSA Z809

Introduction

Canada has 417.6 million ha of boreal forest land. This covers about half of the total land area in Canada (927 million ha) (CSFCC, 2002). Ninety four percent of the forest land is publicly owned and six percent is private owned. The total forest land includes 56% of commercial forests that contributes 70 billion Canadian dollars to the economy (Natural Resources Canada, 2003b). Forest certification was believed to encourage this business by encouraging sustainable forest management and by improving the market access of international wood products. Four certification systems for forest management had been used in Canada by the end of 2002. They were ISO 14001 (113.8 million ha), CSA (14.4 million ha), SFI (12.7 million ha), and FSC (1.0 million ha) (CSFCC, 2002). In Canada, the national adaptive certification was demanded by the forest industry. A new forest standard was expected to reflect their interests and the close relationship between the government and the forest industry (Cashore et al., 2004). Since its beginning, the CSA standard has exceeded SFI and FSC certification numbers in Canada. The certified area under CSA more than tripled between 2002 and 2004 (CSA, 2004).

This chapter describes the certification process of the CSA standard. A case study of Corner Brook Pulp and Paper Limited is presented. The relationship of the CSA with other forest certification systems is reviewed.

Background

The Canadian Standards Association's Sustainable Forest Management Standard (CSA) was initiated by the Canadian Sustainable Forestry Certification Coalition, which is comprised of 22 forest industry representatives. The coalition developed a national certification programme specific to Canadian forest conditions. The CSA established the standard CAN/CSA-Z809 in 1996. Establishment of the CSA was encouraged by a spurt of FSC promotion in Canada, which involved the setting up of a Canadian national coordination office in 1996 (Cashore et al., 2004). In development of the standard, the Canadian Standards Association worked as accreditation body and the Standards Council of Canada worked as the coordinator. The Canadian Standards Association is a non-profit membership-based association for standard development, which has developed more than 2000 standards accredited by the Standards Council of Canada. The CSA was led by the Canadian government's commitment to SFM. The criteria and indicators were developed

by the Canadian Council of Forest Ministers (Auld and Bull, 2003). According to the State of Canada's Forests, SFM is "a management (system) to maintain and enhance the long-term health of forest ecosystems, while providing ecological, economic, social, and cultural opportunities for the benefit of present and future generations" (Natural Resources Canada, 2003b). This standard was intended to maintain and enhance the long-term health of forest ecosystems (CSA, 2004).

Public participation occurred in the CSA standard establishment process. A technical committee, which consisted of academics, research institutes, ministries and forest industry, developed the CSA standard. One quarter of the committee consisted of forest producers including wood lot owners. The remainders were scientists, academics, and representatives from environmental groups, consumers, union and indigenous groups (CSA, 2004). The foundation of the committee and the standard setting process was subsidized by forest industry associations, including the Canadian Pulp and Paper Association. As a result, NGOs and First Nation groups criticized the standard setting process as being dominated by vested interests (FERN, 2001).

Standard Revision

The CSA was required by the standard regulator to undergo a review in 2000. The first amendment to the initial standard was completed. The process of review involved public participation, meetings, consultation and setting a period for public review. Two guidelines of the previous standard were combined into one document and the revised standard was published in 2002 as CAN/CSA-Z809-2002. The foci of the standard changes were quality elements, such as conserving the diversity of forest ecosystems, native species, and genetic variation. It also focused on forest ecosystem resilience and maintaining forest ecosystem productivity. The targets ranged over soil and water as well. The changes also emphasized system elements of the public participation process, indigenous input, providing information to interested parties and carbon storage processes in forests. Stakeholders' participation was more specified in the second edition of the standard. The stakeholders include the forest industry, wood lot owners, governments, academics, scientists, technical experts, indigenous peoples, unions, consumer groups and conservation, environmental and social organisations (CSA, 2002a). New terms and revised definitions were added to the standard. These included: aboriginal rights; aboriginal title; accreditation; conformance; corrective action; deforestation; element; forecast; independent; preventive action; private plantation land owner; protected area; short-term operational plans; standard; target; top management; and,

worker.

The standard revision affected CSA certification holders who were already accredited or certified against the original standard of 1996. The Standard Council of Canada (SCC) requested that those certification holders to be evaluated by certifiers against the new standard and be registered again within three years. The original standard certification remains valid for three years from when the new standard was issued. Standard accessibility has recently improved and a free form is partly available online (http://www.sfms.com/csa.htm#implementation). The CSA documents were charged for and not available on the web site (Gale, 2002).

Levels of Implementation

Areas that are certified against the CSA standard have to be specified, including land and water. Forests are certified at management unit level as a form of 'defined forest area'. CSA is applicable to all forest types and sizes of operations. There is no geographical and ownership limit on defined forest area. Therefore, the areas can consist of contiguous blocks, and be privately owned, publicly owned land or a combination of the two. CSA also accepts a cooperative certification with other organisations in the case of volume-based tenure. However, there is not a clear explanation of the mechanism and the system. The CSA cannot force forest owners to become certified. Certified forests, to date, are mostly individual large companies forest holdings (FERN, 2001), and specific arrangements for small and medium sized enterprises are absent (Gale, 2002).

Requirements

The SFM requirements of the CSA consist of major three main aspects:

1. The public participation requirements;
2. SFM performance requirements, which comprise CCFM SFM criteria and CSA SFM elements; and
3. SFM system requirements for a continual improvement loop
   (CSA, 2004).

Local values and associated objectives, indicators and targets that emanate from a public participation process must be addressed (CSA, 2002a). The performance measures should involve continuous improvement, and should progress towards targets. The Canadian Council of Forest Ministers (CCFM) Criteria and Indicators of Sustainable

Forest Management were applied as performance requirements for the CSA certification. The C&Is are designed for sustainable management of boreal forests based on the Montreal process. The CCFM has six criteria (Table 5.1). Some suitable elements from 83 indicators were used for the CSA (CCFM, 2004). These require the maintenance of diversity of ecosystem, species, and genetic variation in defined forest areas, protected areas and sites of special biological significance. The CCFM stated that their indicators were not intended to assess sustainability directly at a local or forest management unit level. However, the CCFM C&I framework has been developing sub-national C&I frameworks (Natural Resources Canada, 2003a). The CSA standard does not have a defined set of criteria or minimum performance thresholds for forest management. The requirement settings are determined by an applicant consulting with a Public Advisory Group, and the levels of performance against criteria in defined forest area are decided by the applicant (FERN, 2001). "The CSA sets no requirement in the criteria and critical elements that specify how managers are to deal with either adoption or quality" (Auld and Bull, 2003).

The standard is characterized as a system and performance based requirements standard. One third of the standard's requirement is a system requirements compliance with ISO 14001 system requirements (CSA, 2002b). An organisation is required to have a continual improvement model for SFM, which follows a loop process: to establish forest management policy, planning, implementation and operation, checking of corrective action, and management review of continual improvement for achieving SFM (CSA, 2002a). The CCFM criteria and CSA SFM elements have to be addressed in compliance with relevant legislation, appropriate values, objectives, indicators, and targets on the defined forest area throughout the process of the model (CSA, 2002a).

Table 5.1. CCFM Criteria and elements for CSA certificate (Source: CSA, 2002d).

CCFM Criteria
1. **Conservation of biological diversity** Ecosystem diversity Species diversity Genetic diversity Protected areas and sites of special biological significance
2. **Maintenance and enhancement of forest ecosystem condition and productivity** Forest ecosystem resilience Forest ecosystem productivity
3. **Conservation of soil and water resources** Soil quality and quantity Water quality and quantity
4. **Forest ecosystem contributions to global ecological cycles multiple benefits to society** Carbon uptake and storage Forest land conversion
5. **Multiple benefits to society** Timber and non-timber benefits Communities and sustainability Fair distribution of benefits and costs
6. **Accepting society's responsibility for sustainable development** Aboriginal and treaty rights Respect for Aboriginal forest values, knowledge, and uses Public participation Information for decision-making

Certification Process

The term 'auditor' is used for "a person qualified to undertake audit". He or she has to be qualified according to the requirements set by Standards Council of Canada. Whereas, a 'certifier' or 'registrar' indicates "an independent third party that is accredited by the Standards Council of Canada as being competent to register organisations with respect to nationally and internationally recognized standards" (CSA, 2002a). The CSA audit is conducted by an independent third-party, which is accredited by the Standards Council of Canada (or their delegate registrar). There are three auditing bodies for the CSA's third-party audit (Johnson, 2003), and the auditors are certified by the Canadian Environmental Auditing Association. A third-party audit for CSA certificate takes the following nine steps:

1. Application

2. Preliminary assessment/documentation review

3. Certification audit

4. Certification

5. Surveillance audits

6. Re-certification audit

7. SFM audit reports (initial certification and surveillance)

8. Dispute resolution

9. Objectivity, independence, and competence

(Source: CSA, 2002a).

CSA requires a documentation audit and a field assessment of a defined forest area. For both assessments, an organisation is required to submit necessary documentation including the organisation's SFM plan. Forest practice and management is evaluated against the SFM plan and the CSA standard. The audit also determines if the organisation has fully prepared for the audit (CSA, 2002c). The document judges the reliability of the performance requirements to be met with the local certification standard. Criteria for the document audit are: there is an adequate SFM plan for the defined forest area; the SFM plan is effective; there are accurate measures of changes in forest values and indicators; and the difference between performance and objectives is minimized (FERN, 2001). However, it is not clear which tasks were verified in field visits and which were verified in the documentation audit (FERN, 2001).

Field audits generally focus on forest condition, operations, and the field interpretation and implementation of values, objectives, indicators, and targets (CSA, 2002c). When the audit finishes, the audit team makes recommendations for certification. When an applicant is judged to have major nonconformances, it disallows certification or it is de-certified. A major nonconformance can occur when one requirement of the standard has not been addressed or implemented. A major nonconformance can also occur when there are several nonconformances, or one requirement has not been addressed (CSA, 2002a).

However, "there are no independently determined criteria and indicators against which performance at the level of the forest management unit is audited" (FERN, 2001). Nevertheless, the CSA says "it is the responsibility of the auditee to make the audit report

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available to the public" (CSA, 2002c). CSA audit reports are not provided to the public.

Auditors visit the operation six months after the initial audit. Hereafter, audits are annually conducted, including field visits and documentation audits. Three years after the initial certification the operation has to be audited in the same audit process as used in the initial certification.

Complaints from any interested party about certification are filed. If the complaint is about the standard content, the Canadian Standards Association is responsible for the response. If the complaint is from a certified organisation, the certifier should be contacted. If the complaint is not about any of these or is not satisfied by the above processes, the Standards Council of Canada should respond to it (CSA, 2002c).

Chain of Custody

The CSA chain of custody (CoC) programme for forest products is a method of tracking a product from a certified forest to the end consumer providing them assurance that their products are derived from a certified forest. Certified forest products are not limited to wood products, but also include special forest products such as blueberries, mushrooms and Christmas trees (CSA, 2001).

CSA has three labels: input/output system for solid wood; minimum average percentage system for composite products; and physical separation (Fig. 5.1). A company can choose a suitable approach from the three of CoC labels. The first and the second systems are classified as inventory control and accounting of wood flows approaches and they have to be monitored through the processes of material flows. The input/output system label shows the percentage of raw material input in the total batch of products. The minimum input from CSA certified forest is required to be 70 % of the total product by volume or weight. The rest of the raw wood material should not be from sources that would raise public controversy. The label is 'product line from a certified forest'. The conditions for any labeling composite products are the same percentage. The only difference is whether the product is solid wood or a composite product, and the labels indicate 'content from a certified forest'. Solid woods include unprocessed logs, lumber or plywood, and composite products are "produced through the combination/manufacturing of more than one forest product" such as paper, doors, window frames, and furniture (CSA, 2001). When CSA certified wood, raw materials, and wood products are segregated from other non-certified woods in transporting, handling, processing, and manufacturing processes,

the label is '100% from a certified forest' and is used on packaging and/or directly on the products.

Input/Output System for Solid Wood

Minimum Average Percentage

Physical Separation System for

Composite Products

Fig. 5.1. Three CSA labels (CSA International, 2005b).

CoC Requirements

The CSA's requirements for CoC explain the conditions for the tracking system for forest products from the defined forest area to the end consumer. A record relating to the chain of custody is required to be kept in paper or electric format. CoC records, such as production procedures, maintenance and disposition, need to be kept for a minimum of five years. The requirements also describe human, technological and financial resources

that need to be continuously controlled for the CoC. The origin of the wood, raw material and wood products needs to be shown. When an organisation buys and receives wood products, a document has to be provided that shows that it comes from a certified defined forest area. When products are mixed with non-certified products, the data need to be presented to a certifier to verify mixes in certain periods selected by him. This information should be attached to certified wood, wood raw materials, and wood products. If there is a doubt of the validity of the certificate or documentation, the CSA forest products group or the supplier checks the validity.

Internal checking of the chain of custody is required, but the applicant company determines the frequency. A third-party independent audit is also required for the chain of custody certification. Annual surveillance by the third-party auditor is needed during the licensing processes. When products satisfy requirements, a company can use self-declared product claims or labels, which is consistent with requirements of ISO 1420 (environmental labels and declarations, general principles) and 14021 (environmental labels declarations, self-declared environmental claims).

Environmental management policies are required for CoC certification. These must be compliant with all relevant environmental legislation. As such, ISO 14001 implementation is recommended. CSA (2001) advises that it is desirable to consider the full chain of custody. For example, effective fuel consumption, minimizing emissions resultant from trucking, and the use of recyclable packaging. This may improve environmental performance in the transport and purchasing stages.

Certification

The number of certifications is rapidly changing. Currently there are 36 forest management certifications of nine companies and three CoC certifications by two companies according to the Forest Certification Resource Centre (2005). However, another source shows 48 CoC certifications in February 2005 (CSA International, 2005a). The Canadian Sustainable Forestry Certification Coalition's web site (http://www.sfms.com/status.htm) has a three-year time lag in showing the total size of certified area.

Case Study, Corner Brook Pulp and Paper Limited, Newfoundland Canada

Corner Brook Pulp and Paper Limited (CBPP) is an accredited company under the CSA

standard on its Woodland Operations. The CBPP Woodland Operation was certified by the Quality Management Institute (QMI) third-party auditing body in 2004 July. There are 600 employees in harvesting and silvicultural operations and 700 employees at a mill in CBPP (CBPP, 2005). The forest is located in western Newfoundland Island off the east coast of Canada. Mill construction started in 1923, and was taken over by the Kruger organisation in 1984 (CBPP, 2005). This organisation is one of Canada's biggest pulp and paper industry manufacturers. The major product is tissue for national and international customers. The defined forest area for the standard has been producing pulp chips and pulpwood. However, the company is also producing larger-sized logs, and believes that it provides sustainability along with continued operation in small communities where their sawmills are located (QMI, 2004). CBPP manages approximately two million ha of forest land in Newfoundland including environmental reserves and inaccessible areas. Only 750,000 ha are timber production forest for the mill. The management area supports various uses including: hunting, trapping, fishing and berry picking on productive forests; and tourism, recreation, mining, agriculture, hunting and angling on all other land (QMI, 2004).

The defined forest area for certification includes all operations for pulp and paper mill operations such as management planning, road construction and maintenance, harvesting operations, transportation of fibre, silviculture and support services (QMI, 2004). The defined forest area is covered by primary conifers intermixed with hardwood but the variety of species is limited because of repeated fires, which hasten the growth of black spruce and Balsam fir throughout the forests (QMI, 2004).

Certification Process

An audit team comprised one lead auditor and two other auditors from the QMI. The regulatory criteria were those of ISO 19011 (provides guidelines for quality and/or environmental management systems auditing) and the company's SFM documentation. The audit was conducted on 5 to 9 July 2004. The audit relied on interviews and these were selected from the company's operational and management and from contractors in the field. The public participation process involved interviewing attendees to the CBPP Public Advisory Committee meeting. Terms of reference of the Public Advisory Committee and the member involvement were audited. Provincial government personnel responsible for management of part of the defined forest were interviewed. Other interested parties, a national park planning manager and a biologist, were also interviewed. The field audit on 'cut-blocks' was conducted in six management districts.

Audit Results

The CSA evaluation is not a numerical scoring system but has three evaluation levels for conformance: nonconformance; opportunities for improvement (OFI); recommendations. CBPP had no nonconformances, 10 OFIs for system weakness, and 11 recommendations. Some positive aspects of the management system were found and the company's internal audit was evaluated as effective.

The CSA audit report clearly defined the next audit schedule, purpose and auditor numbers: the surveillance audit is scheduled one year after the initial audit (11 to 15 July, 2005) for 10 days by two auditors. The mandatory annual reviews will include document review and spot-checks in the field for the CSA SFM requirements.

Mutual Recognition

SFM Certification Standards in Canada considers that three forest certifications and standards are sufficient to uphold SFM. They are CSA, SFI and FSC (FPAC, 2002). It is also noted that these standards have different approaches. The CSA certification process illustrates a partnership between the government and forest industry as a way of securing market access (Elliott, 1999; Cashore et al., 2004). There is an increasing trend for large forest to product buyers and retailers in Canadian procured forest products certified by one of the three standards (Absow, 2004). The Forest Products Association of Canada (2002) suggests that differences between the several forest standards should be celebrated, because the differences allow for diversity in forest landscapes, in terms of not only ecosystem diversity, but also important realities with which companies contend. The CSA scheme is favoured by development of other certification schemes in Canada, and thus, it became a member of the PEFC Council in 2001 and has been undergoing endorsement processes (PEFC, 2005b).

Conclusion

The CSA is a national certification and a voluntary and non-profit purpose programme, which was authorized by a not-for-profit private sector organisation, the Canadian Standards Association. Establishment of the standard was strongly supported by the national forest industry sector. Compatibility with international agreement was promoted by applying The Montreal Process C&Is and ISO standards to the CSA standard. The CCFM's C&Is for the CSA performance measures also derived from another international consensus, on biodiversity conservation, which came from the Earth

Summit in Rio (1992).

Public participation and continuous improvement framework are outstanding in the CSA standard. Public participation is considered important because the majority of forest land in Canada is publicly owned. It was reinforced in the second version of the standard. Continuous improvement in forest management was also applied to certified organisations through enforcing annual review. This adaptive management was driven by the ISO 14001 standard, which was also recommended as a stepping stone to the CSA standard.

The audit report is not precisely described and this made it difficult to see the actual audit, which was only outlined as an assessment flow. How the CCFM C&Is were applied to a particular region was not sufficiently clear. Assessment for certification and the standard seem to highlight the company's forest management systems or frameworks. Audit reports exposed that communication to various groups was adequate. Industry personnel, community people, and local governments joined the certification process and the standard evaluated their involvement in forestry management.

Chapter 6   The Sustainable Forestry Initiative (SFI)

Introduction

In the U.S.A. 21,043,653 ha (52 million acres) of land are covered by non-commercial forest and 203,961, 563 ha (504 million acres) are used for wood production. Softwoods account for 45% of timberlands in the U.S.A. (AF&PA, 2001b). The SFI is a nationally used forest standard in the U.S.A., and the certified forest area has been increasing in this country. In the U.S.A., there are four major forest certifications: ISO 14001, FSC, American Tree Farm Systems and SFI. SFI is sometimes compared with FSC, though SFI was originally used nationwide, while FSC is an international certification. In recent years, the SFI certified area has been expanded to Canada. In 2002, Canada had 12.7 million ha of SFI certified forests. Both certification verifications are described as severe verification system and require demonstration of achievement of performance measures. Because of this, SFI is understood as a performance-based standard (Fletcher, et al., 2002) to assess operations and impacts of organisations by sets of performance criteria, which specify certain actions, and acceptable levels of practice. SFI is also considered as an ISO-based system standard (Kiekens, 2004). System standards assess company's policies, management systems and processes (Bass, 1998b). Bass (1998b) also describes another type of certification that is between performance and process standards. This type of standard does not apply single sets to performance targets on applicant companies. Instead, it stresses the need for process rather than performance, as is seen in the ISO 14001.

This chapter investigates SFI characteristics by describing administration, stakeholders, recent developments and the standard revision. It also discusses the transparency of the certification system and third-party certification. The certification process is illustrated by a case study of Wisconsin Department of Natural Resources State Forest. Chain of custody label, the requirements and new four labels are also introduced. Lastly, the relationship with PEFC is explained.

Background

The SFI programme started in 1995 with many stakeholders from the forest and wood product industry, government agencies, conservation groups and academic institutions involved in its inception. Its aims included providing rewards for innovation, creating jobs and extending sound forest management (SFI, 2004a). Although the programme

opened to non- AF&PA member companies, landowners and organisations in 1998, the standard was a programme for the AF&PA members. The participants comprised corporations, individuals, associations or organisations engaging forest-related business. Therefore, the forestry and wood product industries were the drivers of the standard development process. The standard was designed to respond to public concerns about the forest product industry's environmental performance. The public had negative feelings on the industry's environmental practice in wildlife protection and water quality, the preservation of wilderness, and sustainability (FERN, 2001).

The SFI is administered by the American Forestry and Paper Association (AF&PA) which is the national trade association of the forest, pulp, paper, paperboard and wood products industries (SFI, 2004a). The members account for over 80% of paper, wood and forest product manufactures (SFI, 2004a), and they control 90% of US industrial forest, 84% of paper production and 50% of solid wood production (Heaton, 2001).

Forests in the U.S.A. are mostly private owned. Small privately owned forests, such as family forests, account for 60% of the commercial forests in the U.S.A. (SFI, 2004c), and the sustainable forestry in the SFI programme was focused on these private lands. However, the SFI standard was also designed for large land of private properties as a means of providing a system benefits to these forestry managers, landowners and communities. The standard states that sustainable forestry provides "a partnership among landowners, wood producers, contractors and the product consumer companies that purchase wood" (SFI, 2002a). Sustainable forestry provides benefits to society such as employment and supporting communities through the provision of taxes, facilities and recreational and other facilities. The SFI principles aim at protecting forest conditions, wildlife, plants, soil and water quality. The programme assumes that all the stakeholders will benefit from good environmental and business practices by providing forest products to meet market demands at an affordable price while providing continual improvement in SFM. However, the Meridian Study (2001) has argued that, as most of the SFI stakeholders belong to industry groups, the SFI standard does not address social concerns. The Study reported that the SFI programme aims to make continuous improvements that provide benefits to landowners and wood producers (AF&PA, 2001a).

Recent Developments

The early verification system of the SFI programme did not embody a third-party assessment framework. In 1998, the SFI programme developed voluntary verification

options, by which the participant can choose either first, second, or third party verification to declare their conformance with SFI standards. However, "only third-party verification can be called certification" (FERN, 2001). Loss of membership can occur when the conditions of land do not meet the SFI standard. In July 2000, the Sustainable Forestry Board (SFB) was established to manage the SFI standard, including the third-party verification procedures and compliance against the qualification for auditors. The SFB is an independent and non-profit multi-stakeholder body, which consists of 15 directors; one-third representing SFI programme participants; one-third from the conservation and environment community; and one-third from the broader forestry community (AF&PA, 2001b). All of the members are volunteers. This equal ratio resulted from criticisms by environmental groups based on the Meridian Study (2001). They claimed that the SFB membership structure was uneven: 75% AF&PA or forestry landowner interests; and 25% environmental interests (AF&PA, 2001a). The change strengthened the influence of various third-party stakeholders thereby leading to changes in standards, such as, avoiding use of exotic tree species and minimizing use of chemicals.

The External Review Panel (ERP) is another recent development. This provides independent review of the SFI programme and it consists of 18 independent experts from conservation, environmental, professional, academic and public organisations (SFI, 2004a). They oversee the implementation of the programme by conducting field visits to places where the SFI certification is operating. They do not verify practice or access company data, but do observe the practices of the SFI members. The ERP also reviews the programme in their annual report (SFI, 2004b).

Standard Revision

The SFI has been flexible by revising the standard in response to criticisms, changing environmental conditions and demands. In particular, the SFI is adapting as a result of its system assessment of the appropriateness of the thresholds. The SFI has improved the criteria that relate to water quality, soil protection, fire management, pathogens and disease, cultural protection, and archeological and historic sites (Oliver, 2002a). A driving force of revision is adaptation to global market conditions.

The SFI has also been changed to require three years of reverification after the initial verification date, reverification every five years thereafter, and annual surveillance audits where a programme participant wishes to use SFI on a product label. External audit

requirements in areas such as audit scope, process, indicators used and summary of findings make the audit more transparent than in the past. Every auditing team is now required to include professional foresters. Auditor qualifications and certification procedures have also been reviewed, and required to be accredited by a national standards body.

Transparency of the System

Much of the information gained during SFI certification is not publicly accessible. Only general information about administration and verification can be obtained, largely through the means of an annual report. The annual report, using a standard form, is compulsory for AF&PA members including wood producers, landowners and senior industry representatives. The reports document improvements and programme progress (FERN, 2001). The public review and comment process is another means of disclosing the standard management system. The SFI allows appeals by a landowner or an organisation when certification is denied, and the claimed certification is investigated through a process. The Sustainable Forestry Board has established other measures for ensuring the credibility of certification. It conducts a three-year review with the latest review conducted in 2004. Any changes or improvements resulting from the review have to be completed within one year of adoption. In addition, a few audit summaries are available, but only in cases in which conformity with the standard is proven. Audit summaries generally provide confirmed results and minimum information (FERN, 2001).

Certification Process

The SFI certification can be issued when all required indicators are evaluated to be satisfactory against the standard. The indicators are characterized as performance and system based measures (SFI, 2002c). The performance indicators are explained in the standard. Eleven objectives and system indicators were described in the verification procedures and the criteria for verifiers. The SFI programme's 11 objectives consist of 37 core indicators and other indicators for each objective, and the core indicators have to be met in the third-party verification. The assessment is based on the ISO procedures for environmental auditing. This assessment starts with evaluating documentation of internal plans, such as environmental management plans. A field assessment is also carried out. In addition, interviewing of personnel in the organisation or community is required. Compliance with federal and State laws is assessed. This covers: civil rights, equal employment opportunities, anti-harassment measures, worker's compensation, Native American rights, and various workers and community rights including working

conditions, health and welfare issues (SFI, 2002a). To conclude the assessment process, the record of compliance and monitoring is verified.

The SFI assessment is distinctive in involving verification from first, second or third-parties. The first-party verification or self-verification is conducted from within the organisation by individuals with appropriate skills, ability and experience, but who are not directly responsible for the subject matter being verified. The second-party verification is verification conducted by an affiliated or interested group such as a forest products trade association, another forestry enterprise or a customer. The third-party verification is conducted by an independent organisation. However, third-party verification is mandatory if SFI certification is to be given.

Performance Measure Indicators

The SFI standard has 11 performance indicators, including seven objectives for sustainable forestry achievement, one objective for wood and fibre procurement, two objectives for public reporting and involvement, and one objective for continuous improvement (Table 6.1) (SFI, 2002c). The indicators do not address social and economic issues (FERN, 2001). They are rules for ecological management for conservation and biodiversity. However, the SFI performance indicators allow some management practices regarded as environmentally unfriendly by NGOs. These include: planting exotic trees and genetically improved stock; chemical and toxic pesticide use; the use of fertilisers; insufficient funding for research to improve productivity; road construction; and clearcut harvesting (SFI, 2002c).

Table 6.1. Performance Measure Indicators in the SFI Programme (SFI, 2002a).

1.	Having a written sustainable forestry policy with long-term management planning appropriately to the size and scale of operation.
2.	Ensuring long-term forest productivity and conservation of forest in promotion of reforestation including soil conservation, afforestation and other measures.
3.	Water quality protection in streams, lakes and other waterbodies.
4.	Managing wildlife habitats and contributing to conservation of biological diversity at stand- and landscape-levels.
5.	Visual impact on harvesting and forest operations.
6.	Managing special qualities of ecologic, geologic cultural or historic significance acceptable to community.
7.	Efficient use of forest resources.
8.	Cooperative management with landowners, wood producers, foresters and employees.
9.	Public reporting
10.	Providing opportunities for public and forestry community to participate in SFM.
11.	Promoting continual improvement for SFM in practice of monitoring and reporting performance.

Document Verification

Verification starts with a decision on its scope by the programme participant and the lead verifier. Programme participants are people who work for the verification team. A verified company provides appropriate personnel, necessary resources and assistance, access to information, and records as well as to the field operations, organisation staff contractors and loggers. The location and activities of the organisation are evaluated as well. The lead verifier investigates all records, data and other documentation. An adequate amount and a high quality of evidence is required for documents to prove conformance to the standard, and sufficient information has to be provided before verification proceeds. Information prepared for document verification generally includes: operating procedures, forestry practices study, field performance, sampling and measurement procedures, meetings with employees, contractors and other third-party organisations (SFI, 2002d). The records are kept as confidential during the verification, and are returned to the programme participant, or destroyed, when the verification report is completed.

The lead verifier develops the verification plans in consultation with the programme participant. The verification plan describes: auditing objectives and scope; appropriate verification criteria and indicators; priority aspects of the SFI programme; the SFI verification procedures; verifiers having direct responsibilities for the SFI programme including the verification team members; timeline of the verification, including places of meetings; expected date of the verification publication and the distribution date of the report; and any confidential agreements (SFI, 2002a). If there are any objections from the programme participant, they have to be resolved before the verification starts. The lead verifier is allowed to change the verification assignments (SFI, 2002d).

Field Verification

Verification findings are based on both review of documentation and field assessment. The verification team approves certification when: 1) there are no nonconformances; 2) there are minor nonconformances which have been solved or addressed on a document of plan and the correction is approved by the verifier; and 3) all major nonconformances have been rectified (SFI, 2002d). When a field-verification is completed, the verifiers, the management of the programme participant, and other relevant parties participate in a closing session where the verifiers' findings are discussed (SFI, 2002d). Assessment findings on conformance and nonconformance are required to be reported in a document. If there are any disagreements on this document, they are resolved before the verification

report is issued (SFI, 2002d). The auditing team decides on any major nonconformances, or minor nonconformances, and if there is a minor nonconformance, resolution schedules are decided before a conformance decision is made.

Reporting, Document Distribution and Retention

The lead verifier has responsibility for the verification report. The parties decide on the subjects in the report in the verification plan, and an agreement is necessary before any changes are made. The report includes findings, relevant supporting materials and agreements between the lead verifier and the programme participant (SFI, 2002d). The final verification report is delivered to the programme participant by the date set in the verification plan. However, when there is a delay in delivery of the report, the programme participant is notified and a new date is established. The programme participants determine the date of the verification report distribution in the verification plan. Any distribution beyond programme participants requires written permission from the lead verifier.

For the third-party certification, the verifying organisation needs to make a formal certificate of conformance with the SFI. The certificate of conformance includes the programme participant's name, scope, the date of certificate, verifier's name, logo and signatures. When all verification described in the verification plan is completed, the verification report or summary is submitted to the programme participant.

Verification reports and certificates are confidential because they are considered as company property, and other documents used for the audit are kept only if the programme participant and the lead verifier agree to do so in writing (SFI, 2002d). An audit summary is published when all verification finishes, and the expected date of publication is notified prior to third-party verification. Verifiers are not allowed to release information regarding verification without written permission from the programme participant (SFI, 2002b).

Reverification

The initial reverification is conducted within three years of the date of the verification, and reverification occurs every five years thereafter. However, it is not equivalent to an initial verification team (SFI, 2002d). Periodic surveillance audits are required for all SFI certifications on product labels, which can keep in conformance with the SFI standard, and maintain a current SFI verification. The programme participants and the lead verifier agree on a schedule for the reverification. Surveillance audits are intended to provide

information regarding the programme participant's on-going commitment to the standard. The difference between the initial audit and the reverification is that reverification audits are focused on action plans to address nonconformances, formal reports of inconsistent practices, changes in condition or operations and changes in the standard. Any nonconformances in the reverifications are addressed in the same way as in the initial verification (SFI, 2002d).

Public Communication and Claims

A copy of the audit summary needs to be available for a public claim or statements not less than two weeks before the action is made, if the company wishes the third-party certification or re-certification (SFI, 2002d). The programme participants and the verifying organisation prepare an audit summary for public disclosure. Furthermore, support for obtaining information is provided from the Federal Trade Commission which oversees public communication and claims, national accreditation bodies, and national consumer protection laws (SFI, 2002d).

Feedback, and Disputes/Appeals

Any uncertainty on verification findings, evidence and result can result in a request for the interpretation and feedback to the Sustainable Forestry Board. Written requests are responded to within 45 days of receipt (SFI, 2002d). The SFI programme keeps a record of opinions and concerns which is available to programme participants and verifiers to help verification planning. If the complaint relates to certified programme participants, the participant provides a copy of the allegation and a response to the programme participant's verifier for future review via surveillance or certification audits. However, when the response is not enough to solve the issue, the claimant is provided with the original documentation, and any programme participant response, for review and consideration.

The Sustainable Forestry Board periodically reviews these records, and recommends of changes to the SFI standard. In a case of internal dispute, verifiers conducting certifications are similarly guided. Any claim about individual practices of any programme participant that are believed to be non-conforming is investigated. An ad-hoc certification review group looks at all relevant information and, if necessary, conducts a field-visit. If they find any merit in the complaint corrective actions are taken. However, if the programme participant fails to take appropriate corrective measures or any action that would be insufficient to remedy the situation, the certification may be suspended on

the consensus of the review team.

Qualification of Verifiers

Verifiers have to possess a suitable level of education, training and experience. A secondary education or equivalent is required but verifiers who do not have a professional degree must have a minimum of five years' work experience as work experience can be substituted for the period of a professional degree. At least two years' relevant work experience is necessary for verifiers who have a professional degree. Internal on-the-job training is provided by the SFI programme or other consultants for the SFI programme audits.

Personal skills are also outlined in the requirements. The SFI programme asks for sufficient communication skills including oral, writing, and language skills that are likely to be strongly demanded. The personal competencies and skill requirements are: ability to explain, including oral and written modes; communication skills; enthusiasm; objective implementation; sensitivity in relation to regional and cultural issues; and organisation and analysis skills in using a large quantity of data to make decisions (SFI, 2002b). Verifiers are required to understand: natural resource management; wildlife; fisheries and recreation; environmental regulation; international and U.S.A. SFM systems and performance standards; and, the SFI verification requirements (SFI, 2002b).

Lead Verifiers

Lead verifiers are persons who have completed an auditing course in the SFI offered by national accreditation standards organisations or qualified firms. The course teaches principles and procedures of auditing for first-and the second-party audit conformance to the SFI.

Lead verifiers have to be able to conduct verifications in conformance with the SFI. They are required to undertake continuous training or professional development. The SFI assigns additional requirements to lead verifiers for the third-party audit. The lead verifier has to have a national accredited environmental management system auditor certification such as those given by the Registrar Accreditation Board, the Canadian Environmental Auditing Association or equivalent. In addition, a consultant company or organisation to which a lead verifier belongings should be accredited to conduct ISO 14001 certification/registration by the American National Standards Institute/Registrar Accreditation Board or equivalent (SFI, 2002d).

Verification Teams

A verification team consists of a lead verifier and other verifiers who meet selection criteria of the SFI standard for verifiers. The verifiers are selected on the condition that they have suitable qualifications as SFI verifiers. They include ability to work with forestry organisations, communication and language skills, no joint interests with the programme participant, qualifications from national accreditation standard bodies such as American National Standards Institute/Registrar Accreditation Board in the U.S.A. (SFI, 2002d). Verifiers cooperate with the lead verifier and are responsible for assigned verification processes. They gather information, analyse it, reach conclusions from information collected and make a final verification report.

The programme participants work with the verification team to achieve the verification objectives. The participants provide necessary information, records, organisation staff and other resources, including the field operation, administrative staff, contractors and loggers, who assist to the verification team to conduct the SFI verification (SFI, 2002d).

Certification Case Study, Wisconsin DNR State Forests

Wisconsin Department of Natural Resources (WI DNR) State Forest is a certified forest by third-party audit based on the SFI standard accredited in 2004. The certified forest covers 198,295 ha under public ownership. Four sites were selected for on-site verification on the basis of discussion between the lead verifier and the participants (NSF-ISR, 2003). The SFI verification guideline and the audit agency process were consistent with the ISO series of standards for environmental auditing and the environmental management system standard (SFI, 2002d). The audit involved four auditors: the lead auditor; a wildlife biologist and a forester as an audit team; and one auditor as witness and co-lead auditor. The third-party audit report shows details of the verification process, the schedule, and the result.

Off-Site Document Review

The WI DNR off-site document review took one day, October 4th 2003 (NSF-ISR, 2003). Two indicators, on the SFI standard performance measure descriptions, were evaluated as 'not addressed', and the WI DNR management programme was required to rectify these. Three performance measures were decided to be not relevant to this assessment, being evaluated as 'does not apply' on the report. Another 33 categories were evaluated as 'addressed'. However, several performance measures involved uncertainty and these

were earmarked to be reviewed in the next step of the audit, the on-site readiness review (NSF-ISR, 2003).

The On-site Readiness Review

A two-day on-site readiness review was held at the office of the applicant (NSF-ISR, 2004). It was a document review and confirmed the audit plan, including the audit's objectives, responsibilities of each participant, and audit schedules. A number of potential field-visit sites were examined, and the lead auditor and the programme participants selected four. Loggers and employees in the WI DNR and other interviewees who could evidence of conformance were also selected. This review step ensured that the programme participants provided necessary documentation for a full SFI certification audit and that the lead auditor could undertake the assessment as outlined in the audit plan. The on-site Readiness Review also made sure that the lead auditor and the participants agreed on the indicators for judging conformance with the SFI standard, auditing additional or modified indicators during the field audit (NSF-ISR, 2003).

The SFI Certification Audit

The actual audit occurred over six days. The certification agency, NSF International Strategic Registrations, Ltd. (NSF-ISR) conducted the independent audit on November 10 to 15 in 2003 (Table 6.2), which involved visiting the office of the applicant and visits to field sites. The opening meeting of the audit was at the WI DNR office. The purpose of the meeting was to introduce all parties, to review the SFI certification indicators, to confirm the audit plan and responsibilities, and to attend to outstanding issues. The lead auditor explained the audit process, including the SFI certification audit matrix and the appropriate lines of communication between the audit agency and the programme participants' management representative. The audit schedule, the dates, times and locations of meetings were reviewed. The SFI audit had a brief opening meeting each day. A brief closing meeting was held in the end of each day to review findings on the day, to confirm plans and to plan for following activities.

The auditors visited six to eight sites each day of the audit. Four sites were harvested within the previous five years. All harvest treatments and activities were recorded. The audit team had the major role in selection the harvesting sites. Sites selection was discussed between the audit team and the WI DNR in the daily meeting. Site visits took half to three-quarters of the allocated time for field audits (NSF-ISR, 2003). Auditors took verification responsibility in their special subjects. The field visits investigated:

"management practices in relation to important habitat; special sites of geologic, historic or cultural significance; recreation sites; natural areas; reserves; big-tree silviculture areas; site preparation activities; pre-commercial treatments; forest health treatments or forests with health issues; and road construction, maintenance, or bridges and other stream crossings" (NSF-ISR, 2003).

Table 6.2. Schedule and timeline for WI DNR certification (NSF-ISR, 2004).

Audit process	Date or required schedule
Off site review	4 Oct. 2003
On-site readiness review	16 & 17 Oct. 2003
Site audit	10 – 15 Nov. 2003
Recommended surveillance	18 month after the audit completion
Re-certification	3 years after
Corrective action plan submission	up to 10 weeks from the audit (usually within 30 days)
Final audit report	16 Feb. 2004
Certification	within 30 days of receiving the final report

An audit-closing meeting was held on the final day. The audit team and the WI DNR team for the SFI certification attended the meeting. Audit findings were presented, including a review of minor and major nonconformances. Recommendations of the auditing regarding conformance were also reported. Minor or major nonconformances need to be documented in the SFI certification audit matrix and corrective action requested. Minor and major nonconformances were also required to be presented to the programme participant for review and discussion. The programme participants could discuss and clarify any issues regarding Corrective Action Requests (CARs) and other issues of the audits. Based on the discussion, CARs were agreed and signed by the programme participants' representative. All questions and issues should be resolved before the end of the closing meeting. The audit team explained the next steps of certification to the WI DNR team such as producing a draft, summary and the final audit report with timeframes.

The lead auditor presented the unofficial draft of the final audit report to the participants for the audit closing meeting where factual accuracy is examined. The WI DNR

participants were given up to four weeks to submit comments to the lead auditor. The final report, incorporating the comments and suggestions, was submitted to the audit manager of the audit agency, which was provided to WI DNR within six to eight weeks of the completion of the field audit. The audit manager forwarded the final report to the WI DNR participants.

The audit summary report was prepared for public disclosure in cooperation with the lead auditor and the management representative. Consistent with the SFI verification requirements, the programme participant also need submit a copy of the summary report to the sustainable forestry board and AF&PA. The summary included the audit scope, process, auditors' names, the indicators used, and a summary of relevant findings. The summary was provided to the SFI Sustainable Forestry Board at least two weeks prior to public claims or statements.

Audit Results

The audit results for certification could be classified as: full conformance; major nonconformance; minor nonconformance; Opportunities for Improvement (OFI); Corrective Action Request (CAR); and practices that exceeded the basic requirements of the SFI. The WI DNR state forests were identified: no major nonconformance; five minor nonconformances; thirteen OFIs; and other conformances including some non-applicable conditions (NSF-ISR, 2003). The WI DNR state forests were found to be in full conformance with the SFI standard of 2002-2004 edition.

Some operations were found to exceed the SFI basic requirements. These included public recreation and education opportunities; reforestation after harvest; riparian area protection; scientific methods application to biodiversity management; visual management of harvest or other forest operation impacts; and ecologic, geologic, cultural or historic significance management (NSF-ISR, 2004). In consequence, the evaluated forests were relevant to the SFI SFM aspects by demonstrating responsible practices to other forest landowners, protecting forest health and improving its productivity, protecting sites with unique and special value, abiding by laws and regulations, and improving continuous forest management practice (NSF-ISR, 2004).

Certification

The WI DNR provided the assessment information to the Governor's Council on Forestry and the Natural Resources Board, and the audit report was claimed as the sole property of

the WI NDR (NSF-ISR, 2003). The WI NDR accepted public claims regarding the independent certification conformance. The final statement of conformance could be given only when a formal decision on the SFI certification was made.

The WI DNR did not undertake product label surveillance. Therefore, periodic surveillance audits were not compulsory, but it was recommended that approximately 18 months after the certification, an annual surveillance audit be carried out for customers interested in seeking labels (NSF-ISR, 2003). However, because the WI DNR holds FSC certification, timing of the surveillance audit was allowed to be in conjunction with the FSC annual audits.

Periodic surveillance cost for certification will be: $2,300 (US) for each surveillance audit; $650 for registration fee to the audit agency; $500 annual for a programme participation fee; and $30,000 to $32,000 for re-certification in three years.

Accredited Certification

The SFI programme participant number is increasing. The certified area is expanding in Canada (Oliver, 2002b). In the U.S.A., there were 37.7 million ha (93.3 million acres) of forests which were certified by third-party in the end of 2003 (SFI, 2004c). In 2004, 455 million ha of forests in the U.S.A. and Canada had been certified by third parties. They were 102 sites owned by 69 companies, of which 25 were ISO standard holders and six were FSC certification holders (SFI, 2004a).

Chain of Custody

The SFI programme did not have a labeling system for forest products and no chain of custody, tracking process certification. In 2001, the SFI started a label system in response to market demand. There are four labels identifying different types of forest operations, and they are classified for two different users; one is for the primary producer and the other is for the secondary producer (Fig. 6.1 & 6.2). A primary producer label can be used for materials when 50% or more of the raw materials in the product come from the manufacturers own certified forest. Furthermore, a primary producer has to satisfy four additional requirements (Table 6.3) (SFI, 2004a). For the secondary producer, three labels can allow to use for each defined business enterprises: participant manufacturer label; participant publisher label; and participant retailer label. The participant manufacturer label is for completed manufactured products makers such as plywood, furniture, windows, doors and cabinets. The participant publisher label is made for publications,

magazine, and catalogue products companies. The participant retailer label is for retailers of wood and paper products that have been certified to the SFI (SFI, 2004a). The criteria for labeling have five conditions (Table 6.3). By 2004, there were 20 companies approved to use SFI labels (SFI, 2004a).

Fig. 6.1. Primary Producer Label (SFI, 2004b).

Participating Manufacturer Label   Participating Publisher Label   Participating Retailer Label

Fig. 6.2. Three Secondary Producer Labels (SFI, 2004b).

Mutual Recognition

The SFI programme has mutual recognition with other certification schemes. The mutual recognition framework is necessary to avoid customer confusion and restraints on trade. It is also considered to encourage SFM, increase certified products and their competitiveness, and build-up pressure against illegal logging or non-sustainable forest practices (SFI, 2004b). Mutual recognition is agreed upon with other certification schemes, such as the Canadian Standard Association (CSA) and the Pan-European Forest Council (PEFC) at the International Forestry Industry Roundtable (SFI, 2004b). The PEFC recognizes the SFI programme as a standard, meeting its requirements as a PEFC member (PEFC, 2004).

Table 6.3. The SFI Label Requirements (SFI, 2004a).

Requirements for a Primary Producer Label
1. A manufacture has to be approved by the third-party assessment.
2. The certified procurement system may include material sources from overseas where the national level of certification system by third party has not been established. However, the sources have to be harvested from forest plantations or other well-managed forest in compliance with relevant laws and regulations.
3. At least one-thirds of the total wood fibre weight has to contain certified forest material (but it is not necessary to have third-party verification).
4. The product sources must be certified by the SFI, or through a third-party certification system.
Requirements for a Secondary Producer Label
1. At least two-thirds of wood product weight must be from wood secured from certified forests under the SFI or American Tree Farm System, or from area potentially practicing sustainable management.
2. In addition, at least one-thirds of the weight of products must come from certified wood sources (SFI standard or American Tree Farm System).
3. Documentation of independent third-party certification has to be provided.
4. If materials are from outside the U.S.A., the materials have to make clear that they are harvested from forest plantation or other sustainably well-managed forest in compliance with relevant laws and regulations.
5. When less than 5% of small amount of raw material is used for processing products, the SFI may license the label without the producer becoming a participant. However, this does not mean that it is certified against the SFI standard, but can be considered as compliance with the label use guideline by the independent third-party.

Conclusion

The SFI has a rigorous verification system with clear requirements and a process for continuous improvement. It has detailed requirements for verification processes and the qualifications of verifiers. Christianton (2003) who was the editor of the Wood & Wood Products, stated that "the SFI certification was a clearer and better-coordinated certification process than FSC" both of which are popular certification schemes in the U.S.A. Its verification procedures, rules and requirements are documented to strict deadlines and many sites audits are carried out.

However, the SFI programme was established by the forestry and wood product industries. This origin seems to negatively affect the standard requirements because the main initial aim for development of the standard was industrial development, non-wood industry stakeholders were not involved and community participation in certification largely absent. In addition, it is easier for large sized organisations to acquire certification than small organisations as some requirements can be easier to achieve because of their capital and staff resources providing sponsorship of research organisations, practicing carbon emission offset project, compliance with ISO 14001, conducting surveillance audits, and paying annual fees and other expenses for certification.

Chapter 7   The Australian Forestry Standard (AFS)/AS4708

Introduction

It is generally believed that national standards reflect national and regional issues that are important to local stakeholders more than international standards. Issues differ between regions. For example, GMO issues are more intensely argued in Europe than the U.S.A. The use of fertilizers and pesticides is debated in northern and western Europe, and restrictions have been imposed. Clear cutting is regarded very differently in different countries, depending on the size of land (Rametsteiner and Simula, 2002). There are numerous issues in forest management in Australia. These include fire management, the right of indigenous people, clear cutting, the use of fertilizers, natural resource degradation, including biodiversity loss and old growth conservation. Addressing these issues, the AFS was built for facilitating access to national and international markets for timber from certified forests. Its focus was on SFM for wood production (Certification Watch, 2005). It was also believed that the AFS would promote value-adding, and thereby provide benefits to communities. Forest certification is still not common in Australia.

This chapter will provide a description of the structures and processes related to the new standard. A case study of successful certification under the AFS is presented. Finally, mutual recognition in relation to the PEFC standard is discussed.

Background

The AFS development process was initiated in December 1999. The standard was launched in October 2002. The primary aims of the AFS standard were to enable participation in international 'green' markets and to conform to international forest standards. The AFS was initiated by the forest industry, including the major national organisation for private forest growers, the Australian Forest Growers (JP Consulting, 2004). Three organisations were involved in the standard setting: the AFS Steering Committee; the Technical Reference Committee; and the Technical Committee. The AFS is now managed by the Australian Forestry Standard Limited (AFSL).

The Steering Committee was responsible for management and development project governance providing necessary resources and appointing the member of the Technical Reference Committee. The Steering Committee has conjoint memberships together with Ministerial Council's Natural Resources Management Standing Committee and the

Australian Council of Trade Unions, and other representatives from the Primary Industries Ministerial Council (through the Forestry and Forest Products Committee of its Primary Industries Standing Committee), the National Association of Forest Industries, the Plantation Timber Association of Australia and the Australian Forest Growers (Standards Australia, 2003a). The Committee has been accredited by the Standards Accreditation Board of Standards Australia which is an organisation representing the ISO in Australia (Standards Australia, 2003a), to oversee the development of this standard and to audit development processes and their adherence to published guidelines for transparency and openness.

The Technical Reference Committee is responsible for developing a draft standard following consultation with stakeholders. Community groups, consumer groups, independent scientists, professional bodies, regulatory or controlling bodies, and forest owners and processors are members (Standards Australia, 2003a). The Technical Reference Committee is also responsible for assessing public comment on the draft of the standard and ensures the standard is addressing stakeholder consensus on performance element.

The Technical Committee prepared, and is responsible for the Chain of Custody Standard. It monitors public comments and remove inadequacies. The Chain of Custody standard will be explained more in a later section.

Criteria

The AFS consists of nine criteria and 40 requirements. These requirements are derived from ISO 14001, the Montreal Process C&I, and the FSC and the PEFC requirements for temperate and boreal forests (Standards Australia, 2003a). The nine criteria are focused on the conservation values of forests, which cover biological diversity, productive capacity, soil and water, and cultural heritage (Table 7.1). Each criterion has sub-criteria. Indicators for guiding verification and implementation are also explained in the supplements to the standard. However, the standard does not have a fixed set of thresholds because of variability in legal requirements between jurisdictions, and variability in appropriate thresholds related to forest attributes. The AFS does not override the regulatory framework within which Australian forest managers operate (Standards Australia, 2003a). A systematic manner of forest management within a framework is a major requirement to obtain the AFS certification.

Table 7.1. The AFS Criteria (Source: Standards Australia, 2003a).

Criterion	Description
1	**Forest management shall be undertaken in a systematic manner that addresses the range of forest values.** The intent of the requirements under this criterion is to ensure that forest management is carried out within a framework that enables the forest manager to address the organisation's management activities relevant to the forest management performance requirements, and is commensurate with the nature and scale of its business. It is designed to be compatible with the ISO International series of AS/NZS ISO 14001:1996 EMS standard. The management system framework is to be flexible and adaptable for forestry enterprises at all scales, and to provide for continual improvement in management.
2	**Forest management shall provide for public participation and foster on-going relationships to be a good neighbour.** The intent of the requirements under this criterion is to facilitate effective and cooperative participation to support the implementation of the AFS by an informed and active stakeholder base.
3	**Forest management shall protect and maintain the biological diversity of forests, including their successional stages, across the regional landscape.** The intent of the requirements under this criterion is to protect and maintain the elements of the biological diversity of forests, including where relevant: • ecosystem diversity, by maintaining the range of ecosystems across the landscape; • species diversity, by maintaining forest dependent species; and • genetic diversity, by maintaining representative species populations across their range. While the criterion is largely focused on native forest management, it is relevant to some aspects of plantation management such as planning and establishment. Other issues relating to biological diversity are addressed under Criterion 5, which addresses forest ecosystem health and vitality.
4	**Forest management shall maintain the productive capacity of forests.** The intent of the requirement under this criterion is to ensure that harvesting and utilisation of wood products is consistent with the objective of maintaining the long-term productive capacity of the land. Other issues relating to maintaining productivity in perpetuity are addressed under Criterion 5, which addresses forest ecosystem health and vitality, and Criterion 6, which addresses soil and water resources.
5	**Forest management shall maintain forest ecosystem health and vitality.** The intent of the requirements under this criterion is to protect and maintain the health and vitality of forest through the good management of both external and internal damaging agents, such as insects, disease, vertebrate pests and competition from non-endemic species that can affect basic ecosystem processes and cause significant changes to the nature and condition of forests. Ecosystem health is the state of processes and natural cycles which maintains the forests vitality, or capacity to perpetuate itself.
6	**Forest management shall protect soil and water resources.**

	The intent of the requirement under this criterion is to maintain the protective and productive functions of forests and their ecosystem services to society through good management of factors, such as erosion, vegetation cover, and chemical pollutants and contaminants that affect a range of important soil and water properties, such as soil biology, structure and fertility, water quality and water flows. Other issues relating to protection of soil and water resources are addressed under Criterion 4, which addresses maintenance of long-term site productivity.
7	**Forest management shall maintain forests' contribution to carbon cycles.** The intent of the criterion is to maintain the capacity of forests to act as a net carbon sink and to minimise the emission of greenhouse gases resulting from forest activities by good management of the forest ecosystem biomass and carbon pool (including standing vegetation, coarse woody debris, peat and soil carbon). The criterion also recognises the possible future emergence of economic, social and environmental criteria in schemes to give credit for carbon sequestration in forests and provides a linkage to programmes and activities that may emerge to address this. Other issues relating to forests' contribution to the carbon cycle are addressed under Criterion 4 which addresses productive capacity, including the forests' capacity to act as a carbon sink.
8	**Forest management shall protect and maintain, for Indigenous and non-Indigenous people, their natural, cultural, social, religious and spiritual heritage values.** The intent of the requirements under this criterion is to recognise rights of forest users and to ensure protection of: • sites of cultural heritage, ceremonial and spiritual affiliation, aesthetic and religious value (that is, cultural, religious, spiritual, and social heritage values); and • other natural heritage values not already catered for at Criterion 3 (biodiversity) and Criterion 6 (soil and water). The requirements recognise that there is a connection between management of forests and forested lands and these values for the benefit of society.
9	**Forest management shall maintain and enhance long-term social and economic benefits.** The intent of the requirements under this criterion is to addresses the management of forests in meeting community needs, including the value and volume of wood production, recreation and tourism, employment, income, and social well-being, in particular for regional communities with a high economic and social reliance on forests and forest-related industries.

Scale of Requirements

Land size, scale and management types are important factors for AFS audit, and can affect the determination of indicative thresholds. Scale varies from large contiguous forest blocks of single-species plantations to fragmented areas under common management, such as in estates with several blocks of forest. In large forests, some requirements can be met within a part of the forest. Again in fragmented holdings, requirements should be met over the holding as a whole and not in each individual block.

When a forest is of a large size, it is assessed on the basis of sample sites. All sampling take place under the following conditions:

1. Part of the sample shall be random;
2. The full range of sites shall be formed into subgroups on the basis of ecosystem, size, and tenure;
3. A sample of the site shall be chosen from different subgroups; and
4. The minimum but sufficient number of sites shall be audited to provide an appropriate statistical level of significance
(Source: AFS, 2004a).

Furthermore, fragmented blocks located in the same landscape unit that have different implementation requirements, need to meet the purpose of any requirement as a whole under a suitable design plan (Standards Australia, 2003a). If fragmented forest blocks do not have the same implementation plan, they can be evaluated against the criteria based on the purpose of the requirement.

One unique feature of the AFS is that a single guideline for the standard does not apply to all forests types and sizes. The standard has supplementary guidelines for three types of forest scales and operations. Each guideline shows verification requirements and the basis of assessment against the standard indicators. They are divided into: medium and large native forest owners; medium and large plantation forest owners; and small plantation owners. These categories are based on three levels of land size described as:

- Small – usually a privately-owned forest managed by the owner or a manager, typically less than 1,000 ha in size;
- Medium – a forest area typically between 1,000 to 10,000 ha in size or an independent forest manager managing a similar area on behalf of several clients; and
- Large – a forest area greater than 10,000 ha or a management company managing large areas of woodland or forest on behalf of clients (AFS, 2004a).

Small land blocks are not required to have the same level of documentation or management systems as larger blocks of land. The assessment determines whether the forest management performance meets requirements at the existing levels of documentation or system development.

The whole of large forest management unit can be certified on the basis of site sampling. At least a 25% sample of forest management units is randomly chosen. The rest of the sample is selected subjectively to cover variations in: ecosystems, geographical location, sizes of forest, tree maturity, sensitive environmental features, modification activities since the last audit, tenure, the views of interested parties, and working procedures (JAS-ZAN, 2003). The size of sampling differs between kinds of assessment and according to the size of the organisation. The initial audit requires a larger sample size than the annual audit. Conversely, the annual audit requires the smallest sample among the initial and reassessment audits. Reassessment sample size is generally the same as the initial audit, but if a company has maintained its certification over the previous three years, the sample size can be smaller than in the initial audit. Levels of organisation can be a factor in deciding the number of visits for audit. For example, if an organisation has a central office, auditors visit there at each audit. If an organisation has four branch offices, auditors visit two samples, one of which is chosen at random. If an organisation has 27 forest management units, auditors visit six samples, of which two are chosen at random. If an organisation has 1,700 active sites, auditors visit 42 samples and of which 11 are chosen at random (JAS-ANZ, 2003).

Defined Forest Area

The area of forest that is to be assessed for certification needs to be defined. The AFS sees the defined area to include productive and non-productive forest areas, bushland, streamside reserves, conservation areas, roads and any other registered area under management control. The defined area does not need to be a contiguous block or parcel of land, but it has to be demonstrated that there is sufficient management control to ensure satisfactory performance against the requirements of the AFS. The defined forest could belong to five different types of operation and ownership:

1. A single forest management unit, which is defined as a discrete, contiguous forest managed by one owner, manager, or agency;
2. A group of forest management units under a single land tenure arrangement that are managed by a single forest manager using single overall management system or process;
3. A group of forest management units under multiple land tenure arrangements that are managed by a single forest manager using a single overall management system or process;

4. Forest management units covering both native and plantations (exotic and native species) under the arrangements described above; and

5. A group of individual growers with specific joint interests
   (Source: AFS, 2004a).

A group certification is possible when all group members commit themselves to complying with the requirement of the standard. Group members need to be registered as part of a legal entity with the land to be subject to the standard being defined. Group certification is beneficial for small forest owners. Small landowners can exchange to information on certification and its requirements, and the appropriate certification bodies (Australian Forest Growers, 2003). The costs of implementing and preparing certification as a group are less than the sum of the cost for individual small forest owners.

Monitoring

The AFS requires that monitoring and auditing protocols are developed. These involve reporting impacts on environment and social values. Monitoring should provide potentially statistically significant measures of forest management. Two purposes of monitoring are explained in the AFS: to prevent worsening a problem by avoiding over-confidence in existing management; and, to confirm that the management practice is not causing a problem. The AFS states that quantitative monitoring is important in environmental protection, and that "monitoring protocols that do not report statistical power may violate AFS standards" (Standards Australia, 2003a). However, no detailed guidelines for monitoring are given. Requirements, procedures, specific targets, frequency, and reporting are not prescribed. These are given in details the reports of forest managers and certifiers.

Chain of Custody

The AFS Chain of Custody standard is being developed by the Technical Committee, which is a Standards Board-based stakeholder group. The Board has stakeholders from "forest managers and owners; employee representatives and contractors; primary and secondary wood processors; retailer and wholesaler interests; and regulatory or controlling bodies" (AFS, 2004a). The Chain of Custody (CoC) Standard is expected to allow certification at a national level of the chain from the forest to the end consumer. To achieve this outcome, the Technical Committee seeks stakeholders' views. The Committee works towards consensus, considering public comments to be embodied in the performance elements of the CoC Standard.

The AFS CoC standard is still under development. It will be officially published in 2005 when the draft standard expires after two years of public comment and is confirmed. The draft standard has three types of CoC evaluation: percentage input/output system; minimum average percentage system; and physical separation. The percentage input/output system is applicable only when the input of certified forest material is the same as the output of product. The percentage of input and output should be averaged over 12 months. This system is appropriate for a company that has a separate batch of certified forest product to be processed and the batch does not represent all of the production. Whereas, the minimum average percentage system is used when the amount of certified material in the input batch exceeds the set minimum average threshold, and the minimum percentage is 70% by volume or weight. The total batch of products is considered as satisfying the minimum average. Physical separation segregates certified wood or forest product from non-certified product in all processes including forests, processing, production line, and storage. In the logistic and sales process, certified woods are distinguished by marking or labeling. The AFS requirements for CoC certification are likely to be as follows:

1. Management policy commitment to CoC
2. Documented control system
3. Personnel training and development
4. Verification of origin
5. Final inspection
6. Record keeping
7. Use of certificates
8. Continuous improvement
   (Source: Standards Australia, 2003b).

The Certification Process

The AFS is a voluntary certification system requiring compliance with law, but the AFS certification scheme does not have a mechanism for auditing, or legal and other obligations, though "the main step in the certification process is the audit" (JAS-ANZ, 2003). The audit system was separated from the standard development process and is the responsibility of an independent organisation. The AFS audits are undertaken by third-party certification bodies under the Joint Accreditation System for Australia and New Zealand (JAS-ANZ). The JAS-ANZ is a third party certification body accredited by

the AFS. The JAS-ANZ assigns its accredited certification bodies to audit and certify quality. An audit team consists of a lead auditor and other auditors with suitable experience. In addition, experts in the assessed area are usually added to the audit team as advisers. Auditors are selected by consideration of assessment site conditions and characteristics, including forest area size and type. Members of the auditor team must have skills determined by the JAS-ANZ. Skills include: general auditing; forest auditing; forest management; forest ecology; and soil and water conservation. However, the qualification and minimum experience of the lead auditor and other auditors are not defined precisely.

Actual auditing for certification acquisition generally starts with a pre-assessment, in which a certification body looks at an applicant's competence (the stage one audit). In the initial audit, the certification body evaluates the forest management of the applicant against the standard requirements (the stage two audit). It involves three types of assessment: "examination of documents, such as management plans, monitoring records or data from surveys; observations of actual practice and conditions in the forest; and, interviews with staff, contractors and interested parties" (JAS-ANZ, 2003). Audit for the AFS certification takes the following steps:

1. The forest manager gives basic information to a certification body about the forest;
2. The certification body carries out pre-assessment, visiting the forest and checking if the site meets the requirements (not essential);
3. The forest manager completes a formal application form and negotiates a fee with the certification body;
4. The certification body visits the forest;
5. The forest is audited;
6. Certification is issued;
7. The site is audited to ensure compliance with auditing outcomes;
8. Periodical re-evaluations are conducted once in every twelve months and reassessment is required after three to five years of the initial audit
   (AFS, 2004a).

When an applicant fails to meet the criteria, they have to demonstrate that they are taking active measures to attain the criteria in their management planning documentation, design plans and on-going activities. A timeframe for achieving full conformance is also required. The AFS requires the criteria to be considered in short, medium and long-term

management plans (AFS, 2004a). The AFS refers to the importance of long-term management strategies because forest growing is a protracted process.

Annual surveillance and reassessment are required for those organisations, which successfully acquired a certification. Audit duration is decided, based on the size of forest and types of forest (whether it is native forest or hardwood/softwood plantations) (Table 7.2). Satisfaction of another relevant standard, such as FSC and ISO14001, can reduce audit days by a maximum of 25% (JAS-ZAN, 2003). When nursery or propagation facilities are included in the certified area, additional audit days may be needed. However, if a certified forest has both plantations and natural forest, the days shown for each in Table 7.2 are not added. The initial audit completion requires the followed annual surveillance within no less than 12 months from the accreditation. Reassessment is also demanded three years after the first audit when the certification expires.

Table 7.2. Days of Audit for Native and Plantation Forest by Defined Forest Sizes (JAS-ANZ, 2003).

* The top numbers in each category are for native forest estates, and numbers in the bottom are for hardwood/softwood plantations.

Defined forest size	Stage 1	Stage 2	Surveillance	Reassessment
Single site, small forest	1	3	1	3
<1,000 ha	1	3	1	2
Multiple site, small forest	2	4	2	4
<1,000 ha	2	4	2	4
Medium forest	3	5	4	5
1,000-10,000 ha	2	5	3	4
Large forest	3	7	4	7
<10,000 ha	2/3	5	3	5

The auditing result of the AFS is not expressed numerically (ForestrySA, 2004b; WAPRES, 2005). Instead, the result is evaluated by three judgements on condition and whether a certification can be issued or not. The judgements are classified into: major nonconformance; minor nonconformance; and recommendation (ForestrySA, 2004b). A major nonconformance occurs when forest management is failing to meet a relevant requirement. A minor nonconformance is judged when forest management is partially failing to meet a requirement, or where there is significant risk of a requirement not being met (Standards Australia, 2003a). In the case of major nonconformances, certification cannot be provided until the requirement is met, and, if there is a time-lag before the major nonconformance is certified, a new audit is required. When minor nonconformances are found, the certification body can still provide a certificate. However, the forest manager is asked to identify the cause of the nonconformance, and provides a

plan to achieve the requirement within a set time, which is determined by the certification body. The certification body confirms certification if the requirements are completed by the deadline.

Certifications

By December 2004, there were five forest certifications for forest management under the AFS (PEFC, 2004a). Most consist of landholdings over 10,000 ha under the standard category of large forest areas. No chain of custody certification had been issued (Table 7.3).

Table 7.3. AFS Certification Holders

(Source: AFS, 2004b; AFS, 2004c; ForestrySA, 2004b; PEFC, 2004f;

Pinebank Pastoral, 2005; WAPRES, 2005).

Name of Certification Holder	Size of Certified Land (ha)	Accredited Year	Type of Forests	Type of Certification	ISO Holding	Cost for a Certification ($) AUD
Gunns Ltd.	226,278	Nov. 2003	Native and Plantation	Forest Management	ISO14001	N/A
ForestrySA	133,000	Sept. 2004	Plantation	Forest Management	ISO14001 ISO 9001	12,000 plus
Pinebank Pastoral Co.	400	Sept. 2004	Native	Forest Management	No	800 plus
WA Plantation Resources Pty Ltd.	33,000	Jan. 2005	Plantation	Forest Management	ISO14001	15,000 plus
Forestry Tasmania	700,000	Dec. 2003	Native and Plantation	Forest Management	ISO 14001	N/A
Total Size of Certified Land	1,092,678					

Case Study, ForestrySA

ForestrySA is the South Australian Government agency responsible for management of 125,000 ha of plantation and native forests, of which native forest reserves account for 23,900 ha (ForestrySA, 2004a). ForestrySA acquired AFS certification in September 2004. An auditing team spent four days gap auditing in June to July 2004, and took another four days for the actual audit (ForestrySA, 2004b). Two auditors carried out the audit. One is a forester from NSW; and the other is a lead auditor from an accredited certification body. The auditors evaluated the management policy of the company against the C&I of the AFS. They concluded that there was sound environmental management.

This was largely because previous ISO 14001 implementation required the organisation to communicate to various stakeholders, including 60 local groups, government agencies and indigenous people. Conformance to ISO 14001 facilitated the AFS certification (ForestrySA, 2004b). The regional forest agreement process did not affect South Australia, which has strict management rules, such as prohibition of all native forest harvesting. This has given the agency the confidence to obtain AFS certification.

The major reason why ForestrySA wished to obtain certification was to respond to a customers demand (ForestrySA, 2004b). As the customer did not mention a particular standard, the agency was able to choose between the FSC or the AFS. Relative implementation costs made ForestrySA choose the AFS. ForestrySA preferred the communication approach of the AFS. The AFS allows a consultant to act as an agent when an organisation applies for the standard. The prescribed criteria in the FSC standard, in particular for pesticide use, were considered inappropriate for ForestrySA (ForestrySA, 2004b). Their pine plantation forests nominated for certification were managed using pesticides. Fertiliser use as a means of providing higher production had also been encouraged by joint research with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Green Triangle growers, including ForestrySA (CSIRO, 2004). The AFS cost $12,000 (AUD) while the FSC increased the cost to more than $80,000 (AUD) (ForestrySA, 2004b).

Mutual Recognition

The AFS was recognized as a qualified national standard by the PEFC. The AFS was accepted to PEFC membership in November 2002 (PEFC, 2004b). Since the AFS was also endorsed by the PEFC in October 2004 (PEFC, 2004b), a certification accredited by the AFS is counted as PEFC certification. Therefore, the AFS needs to meet the required levels of PEFC standards. However, this mutual recognition, may limit the independence of the national standard. The system and the quality of AFS rely on the PEFC. For example, forest numbers, sizes and other individual accredited certification information is found only in the PEFC information resource. The requirement for public access to forests within the PEFC and the AFS is based on the European historical notion of public access to forests. Such access does not legally apply to the Australian private forests (Forestry Tasmania, 2005). However, this requirement still needs to be addressed to comply with the PEFC standard, regardless of the national circumstances.

Conclusion

By the end of 2004, five organisations had been accredited by the AFS certification for forest management. The AFS was developed to be suitable for Australia's forest conditions. It takes into account variety in land size, ownership, and management. The four companies with certified forests are in the category of large-sized forest owners. Consequently, the size of forest affects audit conditions by setting different audit periods and allocation of sampling rules.

Most of the certified companies conform to the ISO 14001 standard. The AFS encourages consistency with ISO 14001: describing that "the AFS can be used either by itself or in conjunction with ISO 14001" (Standards Australia, 2003a). Four companies out of five had implemented the ISO 14001 before their AFS certification. They were mostly evaluated by the same certification bodies used for their AFS certification. This made the AFS application easier and faster. Three accredited companies commented in interviews that their environmental management policies had not changed for AFS certification since they had obtained the ISO 14001 standard. A large or a medium sized company usually has adequate professional personnel to prepare for certification. It can make environmental policy, review management procedures, and has enough capital to react to problems.

The AFS was intended to promote timber market development as well as SFM. Social and economic interest groups in the timber and forest industries were involved in the setting of standards. The bodies that oversee the standard also consist of representatives of these groups. The standard criteria are focused on management and ecological requirements, but the social aspect of SFM is less focused. There has been criticism about the limited interest group participation. The lack of some stakeholders' access to the decision-making processes, and discussions on standard parameters that have been undertaken without a wide variety of stakeholder consultation have been causes for criticism (Cadman, 2001). For example, two NGOs participation in standard setting and operation was withdrawn. It was because that "their involvement in FSC certification schemes was the reason for the NGOs to leave the AFS development process" (JP Consulting, 2004). Limited interest group participation occurred in the certification process as well. There was no meeting with the community during the field audits of the AFS (ForestrySA, 2004b), and no community group was invited to the audit, though representatives from related companies were invited (WAPRES, 2005). In this instance, the standard seems to have had an imbalance of public participation and thus did not meet the requirements for SFM.

The main motivations for AFS certification were customer interest and justification of environmental performance. No obvious effect or impact has been reported yet, mainly because it is still a new certification. Moreover, companies accredited by the AFS have not substantially changed their environmental management policies and performances for the AFS. However, accredited companies are proud of obtaining the status as a proof their company's environmental performance.

Chapter 8 Analysis of Six Standards: Which Standards are Effective?

Introduction

In the previous chapters, six standard schemes and their requirements have been described. All these standards address sustainability. Forest standards have the same goals as SFM. They vary in their approaches, targets and achievements. Different certification systems seem to address different potential needs of the users and the schemes are almost certainly delivering different outcomes, so that any further analysis needs to establish the degree to which any particular outcome is generic or scheme-specific (Nussbaum and Simula, 2004). There have been relatively few published analyses of many of the schemes, and documentation varies between them. Some certification schemes only provide limited information on their certified areas, assessment processes, evaluation, and monitoring.

This chapter provides a comparative analysis of the six forest standards and certifications. It examines their stakeholders, initiatives, transparency, membership fees and cost, and assessment processes. Thresholds and requirements for chain of custody certification are also examined. Furthermore, mutual recognition and harmonisation in recent years are discussed. The potential effects of the standards are examined. Finally, the contribution of the various standards to SFM is discussed.

Stakeholders and Supporters

Principle 10 of the 1992 Rio Declaration affirms the importance of stakeholders participation in decision-making (Bass, 1998b). According to the principle, certification should be acceptable to all types of stakeholder and a wide variety of groups involved in decision-making. A range of stakeholder groups is represented in standard setting processes. These groups, which have varying demands are generally NGOs, forest companies, forest industries, landowners, consumers and governments (Table 8.1). Thus, the balance of stakeholders can make a difference to the nature of standards.

The six forest standards described in this thesis have involved four stakeholder groups (Table 1), and the emphasis they place on particular interests. The main proponents of a certification scheme can strongly influence its characteristics. The FSC was largely

created by NGOs. However, the WWF, Greenpeace, Friends of the Earth, Environmental Defence Fund, Sierra Club, the Nature Conservancy, and the Wilderness Society are all active FSC members (FSC, 2002e; Gillson, 2003). The FSC has had weak government support (Simula, 1996), although other stakeholders are members. On the contrary, PEFC has been assured of national government support when national standards were endorsed by this scheme. Furthermore, forest owners and wood product traders have strongly supported the scheme since its establishment. The ISO has been strongly associated with international trade interests and its members are standard bodies with strong government and business representation. CSA standard development was led by the national government and heavily involved the forest industries, only belatedly involving academics, scientists, technical experts, indigenous peoples, unions, consumer groups and environmental and social organisations. The interests of forestry and wood product industries have been dominant in SFI and the American Forest and Paper Association is the organisation that administers the certification. Moreover, all SFI members are representatives of forest-related industries. AFS was developed by the national forest industry and traders of forest products under the oversight of the accredited national standard body.

Table 8.1 shows the expectations and interests of four major stakeholders in forest certification. They vary in their emphasis on SFM and economic benefits. The forest industries support standards because they believe that they can enhance the sales of their wood product though gaining social and environmental credibility. Consequently, the ISO, SFI and AFS reflect these motivations. On the other hand, government support has sustained the PEFC and CSA. The expectations of the proponents of the two schemes were an improvement in the efficiency of forest management. Both government and industry were responding to pressures from NGOs. According to Raunetsalo, et al. (2002), the main drivers of certification were market access, market demands and NGO pressure.

Government expectations can vary from those shown in Table 8.1. Expectations can relate to the benefits of certification for national policies, the economy and trade relations. For example, Indonesia established a government led certification system, Lembaga Ekolabel Indonesia (LEI), in 1998. Indonesia cooperated with the FSC with support of the World Bank to establish a national certification scheme (DAFA, 2000). The FSC played a role in developing the LEI standard's bottom line to gain international market recognition. The joint national certification system was able to provide political and institutional changes that were not limited to the forest industry.

Table 8.1. Expectations of four major stakeholders on Forest Certification (Bass, 2003).

Stakeholder	Interest	Aspects of Certification Used to Pursue Interest
Forest Companies	1. Market access 2. Price premium 3. Price and market stability 4. Social 'licence to operate' 5. Secure tenure/concession 6. Shareholder/staff confidence 7. Policy recognition/influence 8. Efficiency, capacity strengthening	1. Label, buyers group 2. Label, competition among buyers 3. Buyers group 4. Certificate, consultation in audit 5. Certificate 6. Certificate, working group 7. Certificate, audit process 8. Audit process
NGOs	1. Improved forest management 2. Rewarding good producers and shutting out bad producers 3. Influencing consumers 4. Influencing policy and institutional development	1. Standards, audit, and accreditation processes 2. Label; buyers groups; raising level of standards to restrict numbers 3. Label; buyers groups 4. Standard development process; working groups; FSC global status
Government	1. Stakeholder agreement on SFM 2. Improved forest management and capacities 3. Reduced enforcement and monitoring costs	1. Standard/working group process 2. Standards, audit, and accreditation processes 3. Audit process; forest and chain of custody certificates
Consumers	1. Choose wood products based on origin/production processes	1. Label and all processes that produce it; buyer competition

Standard Criteria

All six standards have system requirements, which basically demand continuous improvement in their management. The basis of the system requirements is found in the ISO framework for cyclical management processes. PEFC and ISO do not have precise criteria but rather they leave decisions on requirements to national bodies. The FSC, CSA, SFI, and AFS include performance indicators in the standard. But, only the FSC identifies thresholds that mitigate environmental impacts. This makes the standard 'the most rigorous of all certification systems with respect to biodiversity conservation' (Gullison, 2003). The CSA standard has requirements for public participation, performance, and continual improvement. The national C&Is are used for performance requirements. The SFI and AFS standards do not indicate fixed thresholds, and they follow national or state level requirements.

Identified performance requirements in standards can seem to contradict their other requirements. For example, the FSC states "management should make every effort to move away from chemical pesticides and fertilizers, including their use in nurseries"

(FSC, 2004a), but it also accepts the use of some chemicals for seedlings, young trees growth and controlling grass in some plantations. The SFI requires management of wildlife habitats and biodiversity conservation but, at the same time, it allows chemical and toxic pesticide use at a level determined by state or local governments.

All six standards except the ISO 14001 are applicable to all types and sizes of forests. There are small and large forest lands certified by PEFC in European countries. The PEFC uses different measures, rules and standards, adapted for each country. The AFS provides three types of guidelines and requirements for various sizes of forests in Australia and also addresses both native and plantation forests. However, the FSC, CSA and SFI focused on large individual forestry companies. These certification schemes certified a greater number of production forests than non-production forests. Although the FSC states that P&Cs are applicable to natural and plantation forests, they are mainly designed for the production of wood products from managed forest (FSC, 2004a).

Transparency

Transparency is not the same in the six standards. The FSC widely discloses audit summary reports. Such reports cover basic information on audits, such as assessment objectives, identification of the organisation, period of the audit and the date, the audit team members, a summary of the audit process, findings and recommendations, and the audit conclusions. However, the style of reports varies between the lead auditors. Availability of the report is very limited in some certification schemes. For example, the PEFC does not publicly release their reports, although some nations belonging to the PEFC do. Also, the ISO does not disclose any audit report. On the contrary, CSA audit reports are publicly available. They document the applicant organisation, communication with the community and the sites where the assessments were conducted. Audit findings, recommendations and evaluation results are also outlined. Third-party audit is not compulsory in the SFI standard, but the audit reports are partially released. The SFI audit report focuses on the auditor's evaluation rather than providing background information about the organisation and its relationship with the community. The AFS does not release any information or make any official announcement of certification numbers, names of certified companies, and certified land size was not found on their official web site (http://www.forestrystandard.org.au/). Also, no audit reports were available from the AFS.

Availability of audit reports can contribute to the credibility of the certification schemes.

It also makes it possible for interested persons to know the certification process, audit procedures, and compliance with requirements. Certification schemes, which disclose audit reports, are likely to have more public participation in the certification process than those that do not. The FSC holds frequent stakeholder meetings during field assessment, and CSA audit schedules relied on interviews. In addition, the CSA clearly states the importance of public participation in its requirements. The SFI assessment also requires interviews with company personnel or community representatives, but assessment reports are brief, and detailed procedures are not publicly documented.

Membership Fees and Cost

The FSC sets a higher membership price for developed countries and the ISO has different prices for higher income organisations. The PEFC uses a fixed annual fee and the General Assembly decides the amount. The maximum annual membership fee is currently set at Euro 100,000 (PEFC, 2005d). Information on membership fees in the CSA, SFI, and AFS was not available. Certification cost may be the assessment cost. The price for FSC certification is mainly the assessment cost while assessment price of the ISO depends on the size of company. For example, the more employees in a company, the higher the audit costs. Employee time is the major cost. Another major cost for assessment is for the auditors. The initial certification price is higher than for surveillance audits. In the FSC field visit assessment, the initial case studies were conducted by a greater number of auditors than surveillance audits. Remarkably, five auditors assessed the 1,070 ha of Hayami Forest in the initial audit. For AFS certification, two auditors assessed 133,000 ha of ForestrySA's managing forest. The company commented in the interview that the lower certification cost of AFS was one of reasons that the company preferred AFS certification to FSC.

Assessment Processes

Assessment procedures differ relatively little between the six schemes. Audit processes in all schemes generally follow the environmental audit procedures in the ISO 14011 standard (Table 8.2), though some differences in case study assessment procedures are found. These differences seem to be caused by the nature of the assessed forest areas. The auditor's professional skills are the most important in evaluation for accreditation and locally trained specialists with extensive field experience should carry out assessments (Simula, 1996). They interpret performance requirements at the local or site level, resulting in differences in procedures.

Table 8.2. ISO 14011 Environmental Auditing Procedures

(Standards Australia/Standards New Zealand, 1996b).

Initial audit	audit scope, preliminary document review
Preparing the audit	audit plan, audit-team assignments, working documents
Conducting the audit	opening meeting, collecting audit evidence, audit findings, closing meeting
Audit reports and document retention	preparation of audit report, content of audit report, distribution of audit report, document retention
Audit completion	

Because the assessment process is central to certification, the auditors' decision is critical in success or failure to certify. Nussbaum et al. (2002) describe two types of forest management assessment: performance assessment; and, process assessment. Process assessment is based on the assessment of a particular activity, the outcome being less important than the process. All six schemes have process assessment elements. Compliance with ISO 14001 was indicated in the CSA and AFS standards, and the majority of certified companies in the two schemes are also certified for ISO 14001, which requires companies to plan, implement, check, and review their management systems. The ISO 14001 standard is also used in conjunction with forest standards at the national level. This can create double credibility for environmental management for a company: an international credibility provided by ISO 14001; and national credibility for forest management provided by a forest certification.

Performance assessment evaluates a specified minimum performance of a company, which must be achieved in a certified forest. This assessment can provide a guarantee of quality on a product coming from the forest. The FSC standard consists of performance requirement but it also includes some system elements, and the CSA standard also has some performance requirements, but the system element is predominant (Nussbaum et al., 2002).

CoC Certification

Five forest standards have CoC certification systems. In the AFS it is still under development. Each system has thresholds for minimum raw material input and volume of certified wood raw material. These can determine the types of labels. All systems that are currently issuing certification have a single label for products, which are made of 100%

certified raw wood material. Use of illegally logged wood material in certified products is specifically forbidden in the FSC and SFI. In addition, non-certified components are distinguished in the FSC and SFI standards. Furthermore, the SFI requests that non-certified materials should come from plantation forests or other well-managed forest. Consequently, the FSC seems to have the most detailed and environmentally rigorous label, disallowing conjoined use of the logos from other forest certification schemes.

There are four labeling systems in the FSC that distinguish between new raw materials and recycled materials. Minimum input of certified raw material is 70% by volume or weight. The PEFC has only one type of label, but words under the logo are changed according to the percentage of certified materials. The minimum percentage of certified material is 70% by volume or weight. There is no identification of the nature of non-certified material. The CSA has three logo labels, and 70% of certified material is required by volume or weight. The CSA also classifies the labels for different wood products, one for solid wood products, and one for composite products that have a minimum percentage of certified wood. The SFI has four labels for two different uses. However, not all the labels require third-party assessment in the manufacturing processes. One-third of total material for the primary producer label can be certified by first- or second-party assessment. The threshold for the certified raw wood material input is 50% of total weight. For secondary users, two-thirds of total weight must be certified material, and either the SFI or the American Tree Farm System must certify the weight of products. There are no rules for non-certified material.

Many of the CoC certification initiatives in developed countries are related to the economic effects of the environmental concerns of consumers. CoC certification is growing rapidly, and "the focus on forest certification seems now to shift more to awarding of CoC certificates" (Rametsteiner and Kraxner, 2004). For consumers in these countries, certification can indicate sustainable management of the forests that are the source of the material. Those who supply certified wood products expect that the label can provide access to the 'green market' and gives 'green premium' price. However, there are only a few reports of the actual impact on price in timber and other wood product markets. A 'green premium' from certification is likely to be related to niche markets (Baharuddin and Simula, 1996). The U.K. Buyers group, which was one of the most aggressive associations, in phasing out non-certified timber product by the year 2000, reported that only four to five percent of their sales were certified products in 1996 (Jeanrenaud, 1996; Vajello, 1996). Other data shows that certification can add less than

10% to the price of a wood product (Buechel and Hauselmann, 1995; Vajello, 1996).

Certification Coverage

Some 177.4 million ha or 5 % of world forests had been certified by 2004 (Phillip, 2004). Five certifications for forest management, FSC, PEFC, CSA, FSI, and AFS, showed growth between 2003 and 2004, and CoC certification development was outstanding in the FSC, PEFC and CSA. However, as the ISO 14001 included non-forest sectors, it was excluded. Two worldwide certifications, PEFC and FSC, were the largest contributors to the total number of certification in 2004 (Fig. 8.1). However, the PEFC implementation numbers included certifications accredited by other national certification schemes endorsed by the PEFC.
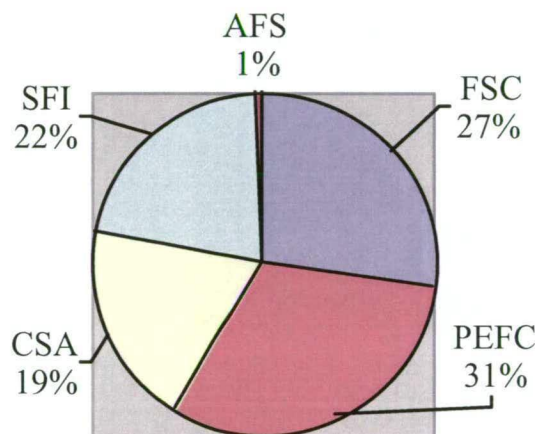

Fig. 8.1. Percentage of Total Certifications Based on Forest Areas for 5 Schemes
(FSC, 2005c; PEFC, 2005a; PEFC, 2004f; CSFCC, 2002; SFI, 2004c,).

Mutual Recognition

There has been a gradual increase in national certification schemes. The FSC, PEFC and ISO can accredit national standard schemes and individual applicants. Two international certification schemes, the PEFC and the FSC, have their own frameworks for mutual recognition but have different criteria for accrediting national standards and individual forest owners. The FSC's national accreditation uses an 'interim standard' where there is no national standard (Hardford and Nussbaum, 2001). The interim standard uses expert advice and consultation with stakeholders to determine national and regional forest values. The FSC has also established the National Initiatives, and developed international networks, in order to develop national or sub-national standards. This allows the FSC to decentralise its activities and be more accessible to local interests (FSC, 2004a) (Fig. 8.2). In 2005, there were 34 National Initiatives (FSC, 2005c).
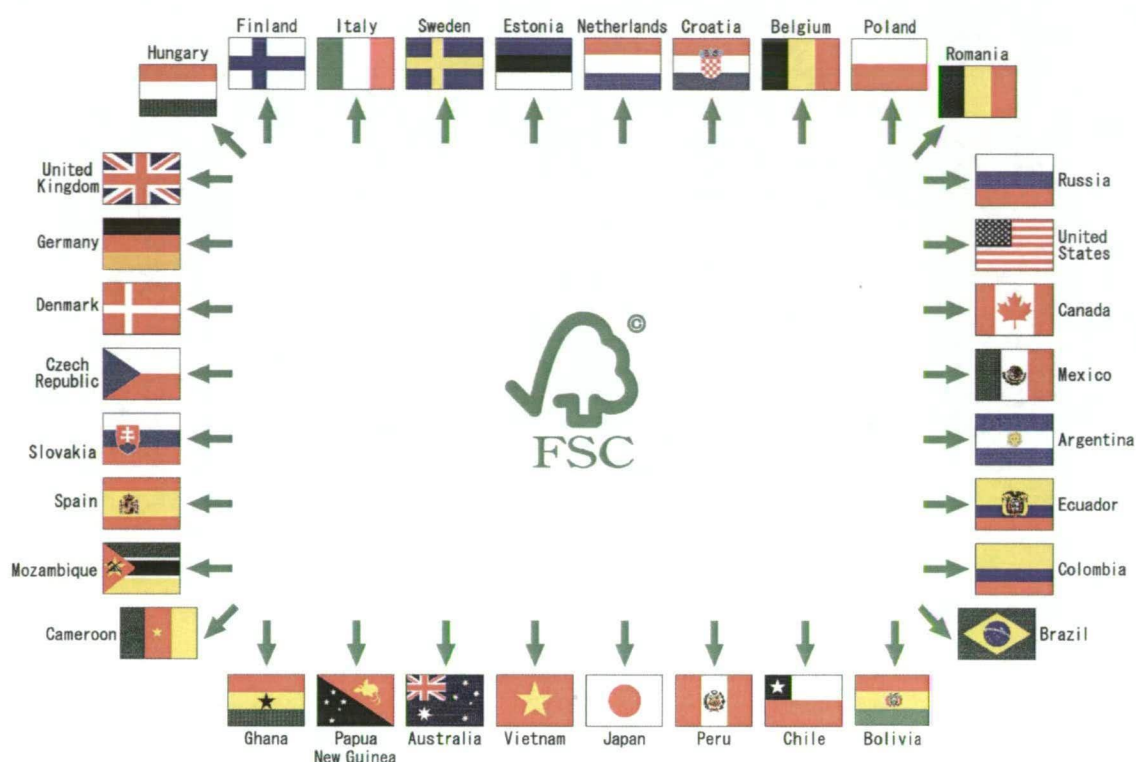
Fig. 8.2. Decentralising FSC Frameworks.

In contrast, the PEFC has been providing a framework for mutual recognition of national forest certification programmes. The PEFC member countries have extended outside Europe in recent years, and all the forest areas certified by those national schemes receive PEFC endorsement. CSA, FSI, and AFS are also included under the PEFC umbrella. Consequently, CSA and SFI became members of the PEFC in 2001 (Certification Watch, 2004), and AFS was endorsed by the PEFC in 2004 (PEFC, 2004f). However, the PEFC does not have mediative measures for national initiatives. The PEFC accredits national initiatives when they meet the PEFC criteria, though it recognises regional differences and takes them into account during assessment. There are 30 national certification schemes approved by PEFC and 17 are being assessed for endorsement (Fig. 8.3). The PEFC assessment is top-down accreditation, whereas FSC assessment is more interactive.
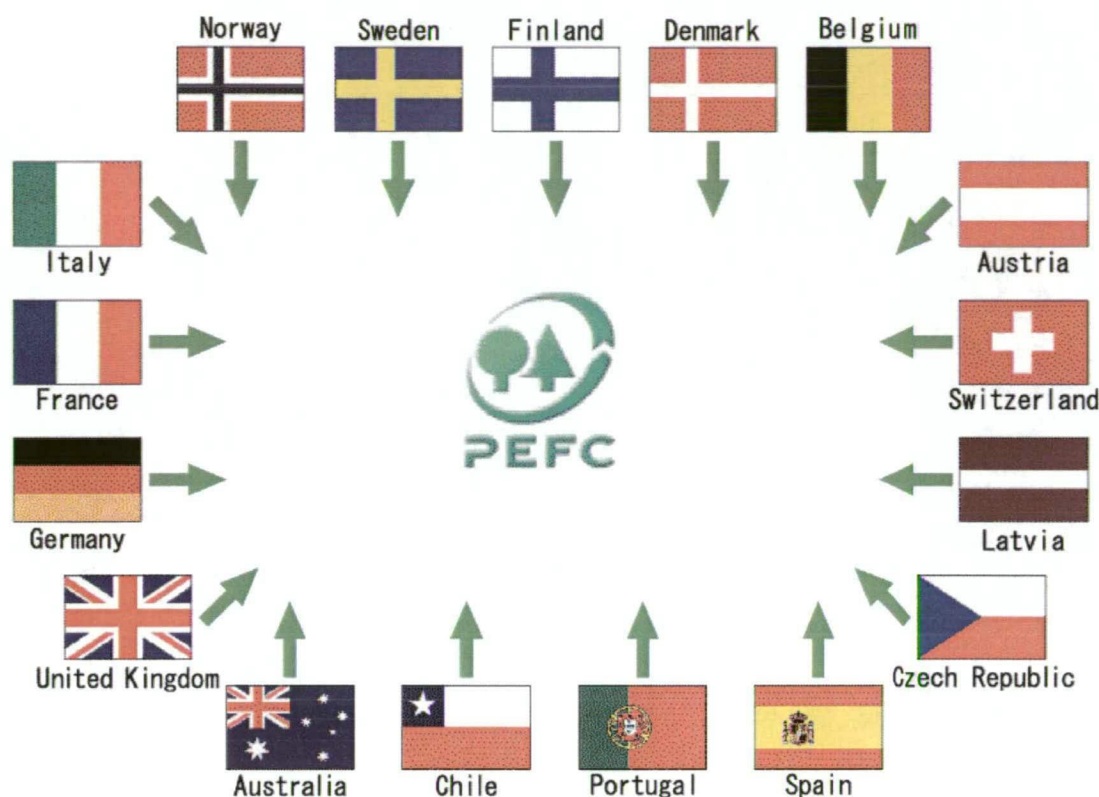
Fig. 8.3. The 17 National Initiatives Endorsed by PEFC (Source: Gunneberg, 2000 (modified)).

One significant difference between the FSC and the PEFC groups is in their use of labels (Meridian Institute, 2001). The FSC does not allow countries to use their own national standard logo if they have been certified under the FSC standard. The international accreditation provides equivalence of national schemes to the FSC. In contrast, the PEFC allows national scheme bodies to use their own logo if they wish.

The Forest Product Association of Canada (FPAC) has a positive attitude to other standard schemes, expecting that at least 75% of Canada's working forest will be certified by one of three forest standards in Canada, ISO, SFI or FSC. This avoids a single certification scheme monopoly in the wood product marketplace (FPAC, 2002). At the same time, various kinds of certification may cause some confusion because the differences between certified products from different schemes are unclear. The standard schemes lack focus on the consumers of wood products. Many international debates have centred on credibility, and how cooperation between individual certification schemes should be arranged (Atyi and Simula, 2002). Thus, the increasing number of national standards has raised the issue of eventual mutual recognition between individual schemes (Atyi and Simula, 2002).

Harmonisation

International discussions of national certification proliferation have confirmed that understanding of other schemes is necessary to develop a common framework. Harmonisation could inspire mutual improvement or, alternatively, reduce standards to the lowest common denominator. Ideally, a scheme would take advantage of the strengths of the different standards, avoid the weaknesses in other schemes, and work to upgrade their various standards. This would lead to a convergence in the systems. Such harmonisation is already reflected in some standard revisions. For example, a group assessment system has been developing in the FSC and PEFC, and the CoC certification system was improved in the FSC, PEFC and SFI.

Group certification can widen participation and reduce certification cost. This system came from the PEFC certification processes, and allowed the participation of many small European forests. The PEFC group certification is applicable to; 1) a grouping of individual owners; and 2) a regional grouping drawing on local organisations of forest owners (Atyi and Simula, 2002). The FSC has introduced group assessment in response to the complaint that FSC certification is only pertinent to large forest owners. However, the CSA allowed cooperative certification with other organisations while the SFI commenced a group certification system in 2004 (SFI, 2004c). National certification schemes also involve participation from various sizes of forests. For example, Sweden introduced both standards and certification for large and small forest owners with 50% of small-scale family forestry operations (average land size 50-60 ha) and 50% of large-scale of forest industries preferring the FSC (PEFC, 2000).

Labeling systems show a similar improvement in some certification schemes. A greater number of labeling identifications have been introduced and as a result, requirements are more precise. A minimum percentage of certified wood input has become common. On-product labeling revision has progressed in the FSC, PEFC and CSA as well. Furthermore, the FSC will strengthen its labeling system and more variations of on-product claims will be used. The PEFC is also now working towards a new marking system, which identifies the percentage of certified raw material, natural raw material and other raw materials.

The SFI and FSC have converged their C&Is related to chemical use. The SFI standard mostly allows chemical use at legal levels and includes the use of pesticides in management. The FSC standard has been easing chemical or pesticide use restrictions,

although there are variations in frequency, level of practice and purpose permitted in national schemes. Criticisms of the SFI standard have made improvements and it is now closer to the FSC, thus, if it keeps progressing the standards will be very similar (BuildingGreen.Com, 2005).

Conclusion

The six forest certification schemes reviewed in this thesis all purport to promote sustainable forest management using economic, social, and ecological criteria. The criteria addressed in each standard define its interpretation of SFM. FSC, CSA, and SFI all have performance thresholds. However, the FSC is only the certification scheme that has clear and precise forest management performance requirements that reflect the interests of non-government stakeholders. The FSC requires ecologically and socially acceptable practice in such areas as GMO use, plantation establishment, illegal logging, high conservation value forests, chemical use and indigenous people. It also requires a long-term commitment. The CSA and SFI set broader performance requirements, which are more adaptable to state and local conditions. Furthermore, the CSA applies ecological element performance requirements that apply at the ecosystem, species, and genetic variation levels.

The interests of the predominant stakeholders are reflected in the relative degrees to which the three aspects of sustainability are emphasized in the standards. The ISO standard reflects the international trade interest of companies while the FSC focuses on social and ecological reflecting its NGO origin. The SFI promotes the development of the American forestry and paper industry and the PEFC reflects the decisions of national governments and the forest industry. In the case of the CSA, government and forest industrial interests worked together and allowed public participation in assessment processes. The AFS stressed the timber industry interests without NGO input in the standard development processes.

The Chain of Custody labeling system also reflects stakeholder interest. However, label classification differs between the certification schemes. The FSC labeling has four labels, and distinguishes between new and recycled material but the PEFC does not have precise categories in its labeling system and does not have rules for proportions of non-certified material. The PEFC label is adaptable to various product types from many countries. The CSA uses three different labels for wood products.

International forest certification schemes influence national schemes. The FSC has acted as a model for third party assessment certification, performance standards, and public participation in the assessment and standard setting processes. The PEFC promotes the

idea of making certification frameworks adaptable to the decisions of national bodies. In contrast, the ISO 14001 affects all other forest standards, providing principles for cyclical adaptive management.

The ISO 14001 is a high level standard that promotes third party assessment and environmental management policies. Many certification schemes follow this standard by not disclosing assessment reports to the public. Only the FSC and CSA publicly provide audit summaries. The transparency of the FSC scheme increases public credibility, although the audit rules are not clearly defined in the standard. These include the decision-making processes in the assessment, auditor numbers and length of audits. The PEFC assessment does not have set procedures, these depending on national certification schemes. The SFI assessment is well coordinated and clearly described in the standard, which can be used as guidance for the first and second-party audit.

All six forest certification systems address social, economic, and ecological sustainability. However, the FSC and CSA are likely to be more effective in ensuring social sustainability than the other standards. Although all the six standards cover social sustainability, these two schemes require that conformance to their principles of social sustainability is assessed. They also require stakeholder participation in the assessment process. On the other hand, the AFS seems to be less socially sustainable, as it does not include all stakeholder group participation in standard development and assessment. Moreover, the audit process is not clear and lacks publicly available assessment information. The focus of SFI is economically sustainable industrial development. This certification system was originally developed only for the purpose of helping the forest industry to grow, and the standard was designed not to be inconvenient for the industry. The performance thresholds allow some ecologically unsustainable practices that are beneficial for production forestry. On the other hand, FSC thresholds are set to maintain ecological sustainability. The FSC has the most rigid thresholds for environmental performance in forest management and it also requires ecological concerns to be covered in wood production lines for CoC certification. Although all certification systems improve SFM and reduce environmental problems to at least some degree, the ecological aspects of sustainability are generally underemphasized. A better balance of the three elements of sustainability seems to be desirable for most schemes.

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