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# Forestry Certification: Why it is not leading to sustainable forest management

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LUMES, Lund University, Sweden

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## **Abstract**

In the beginning of the 1980s, environmental non-governmental organizations (ENGOS) responded to the rampant deforestation in the tropics with boycotts of tropical timber. The boycott approach was, however, not successful. As a result, forestry certification emerged as a new concept within the NGO community in the late 1980s. It was thought that with the use of certified timber, consumers would make a difference in the wood product market with their purchasing power. This would eventually force the forest companies with poor management to become certified and thus manage their forests sustainably, and at the same time eliminate deforestation. To date forest certification has seen some regional success, mainly in Europe and North America. Conversely, it has not been successful in other parts of the world where issues of deforestation and unsustainable management are more prominent.

This thesis intends to explore why there has been only regional success and not global success, as is the aim of forestry certification. With this knowledge the main objective is to find out if forestry certification can lead to sustainable forest management with all that it entails. In order to gain an understanding of the concept this research has been embedded in systems dynamics. Systems dynamics allows for a holistic perspective, which is preferred when trying to analyze a complex system. Important factors, linkages and driving forces were detected in the system, using causal loop diagramming. Data was collected through literature review and a qualitative analysis was performed.

It is concluded and argued in this thesis that for a number of reasons forestry certification is currently not a viable instrument to lead the path to sustainable forest management on a global scale, but could be so regionally. The success of forest certification is limited due to a number of factors such as the ambiguity of the term sustainable forest management; the issues surrounding the structure and set up of certification schemes; the functionality of markets; and the correlation between other domestic problems such as institutional, political, and social instability. Finally, looking to the future there is a need for certification to continue being an instrument on the international field, because it is a promising concept that can catalyze more actions in the pursuit of sustainable forest management and in the long term sustainable development. While this happens, certification schemes and their proponents have to be more integrated with other actors, such as governments, purchasing organizations, and intergovernmental institutions.

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## List of Acronyms

ATFS	American Tree Farm System
CLD	Causal loop diagram
CSA	Canadian Standards Association's Sustainable Forest Management Standard
FERN	Forests and the European Union Resource Network
FSC	Forest Stewardship Council
IFF	Intergovernmental Forum on Forests
IPF	Intergovernmental Panel on Forests
ISO	International Organization for Standardization
LEI	Indonesian Ecolabelling Institute
NGO	Non-governmental organization
PEFC	Pan European Forest Certification Scheme
SFI	Sustainable Forestry Initiative
SFM	Sustainable forest management
TBT	Technical Barriers to Trade
UNCED	United Nations Conference on Environment and Development
WTO	World Trade Organization
WWF	World Wide Fund for Nature

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## 1.0 Introduction

*“Like Easter Island the earth has only limited resources to support human society and all its demands. Like the islanders, the human population of the earth has no practical means of escape. /... / For the last two million years humans have succeeded in obtaining more food and extracting more resources on complex and technologically advanced societies. But have they been any more successful than the islanders in finding a way of life that does not fatally deplete the resources that are available to them and irreversibly damage their life support system?” (Ponting, 1991, p. 7)*

The fate of the inhabitants of Easter Island is often used as a worst-case scenario of what could happen to the people and societies on Earth. The society of Easter Island flourished and was very prosperous for some hundred years. The island was providing the inhabitants with great amounts of resources, especially large and dense forests (Miller, 2000). But as time went by and people increased in numbers, the pressures on the environment increased and finally it all ended in a great collapse. It is generally thought that deforestation of the island is the fundamental cause for its breakdown (Ponting, 1991). When comparing this history of Easter Island to the earth’s history, many similarities appear; especially the increasing population and over-exploitation of resources.

The world has lost nearly half of its virgin forests that once covered the earth. According to Bryant *et al.* (1997), in an analysis for the World Resource Institute, most of this reduction in forest cover has taken place over the last 30 years. It was estimated by the Food and Agriculture Organization of the United Nations (FAO) that between 1990 and 2000 every year approximately another 10 million hectares of total forests were lost (FAO, 2001). This pace of deforestation is alarming for the future, because of the human dependence on the forest ecosystem.

Forests provide ecological, social, and economic services that humans cannot live without. This makes governments, organizations, and people concerned about their disappearance and deterioration. When forests, a major ecosystem, are threatened then action is taken, but so far most of the actions concerning forests happened for economic reasons: How can we sustain the annual yield from forests (Vogt *et al.*, 2000)? That is why there has been unsustainable forest management; governments, companies, and people have been concerned primarily with making money off of this resource.

During the last 2 decades concerns for forest loss and poor management practices have been on the international agenda. Governments have come together in various conventions and processes, such as the United Nations Conference on Environment and Development (UNCED) in Rio 1992 and its follow up processes – the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF) – in trying to formulate principles and criteria for sustainable forest management (SFM) that should prevent deforestation and poor management practices (Berg, 1998). Non-governmental organizations (NGO) also continuously fight to save forests. In the beginning of the 1980s NGOs boycotted tropical timber, however, that did not turn out as desired (Vogt *et al.*, 2000). If anything already underestimated tropical timber decreased in value and it only increased deforestation rates, thus NGOs began looking into possibilities of certifying forests and in that way separate good forest management from bad forest management (Vogt *et al.*, 2000).

Forest certification aims at using the markets to create incentives for people, companies, and countries to trade with certified wood products to favor a sustainable management of forests (Kiker and Putz, 1997). NGOs have chosen this path because they think that the approaches by

governments through various conferences have not shown results (Upton and Bass, 1995). They think that certification can change the use of forest resources dramatically.

Forest certification could potentially play a role in sustainable development. Sustainable development is based on three pillars – environmental, social, and economic (Berg, 1998). None of these aspects should be more important than the other ones in order for development to be sustainable. Forestry certification has adopted the same ideas. Companies and forestry managers agreeing to certify their forests assure to manage their forests with environmental, social, and economic aspects in mind. Thus, in the big picture forest certification is one tool in achieving sustainable development.

## **2.0 Objectives and Scope**

This thesis has the intention to analyze the forestry certification system from a holistic point of view, looking at all the main drivers and underlying forces that run the certification system. Forestry certification has a large complex structure, with many factors having to function together in order for it to meet its aim, SFM. These factors have to be evaluated in their isolation but also as parts of the larger system if a conclusion can be made regarding whether or not the forestry certification system as such is moving towards total SFM.

The main objectives of this research is to find whether or not forestry certification as a system is as promising for the future of forests, and everybody dependent on them, as many people hope and argue. The main research question that directed this thesis is:

### **Will forestry certification lead to sustainable forest management?**

In order to reach the objective of the thesis its scope is to identify and discuss the main factors and forces of forestry certification, especially those factors driving (1) the choice of becoming certified in the first place, (2) the structure of certification schemes, and (3) the markets. Underlying these factors is an understanding of the definition of SFM. To facilitate this research towards an understanding of the main research question a number of sub-questions are posed:

- ❖ What is the definition of sustainable forest management?
- ❖ What is the quality of the certification schemes on the market?
- ❖ Does the market work in favor of sustainable forest management globally and/or regionally?
- ❖ What is the relation of certification to other institutional and policy actions towards mitigating deforestation and achieving sustainable forest management?

The objective of this master's thesis may seem grand in that it attempts to look at the entire system of forestry certification, however, only the major factors and driving forces will be assessed. This assessment will not go into great depth in any of the contributing factors for it is not needed in order to understand the behavior of the system. Therefore, the theoretical limitation will be set to analyzing enough about the driving forces of certification, the quality of the overall certification schemes, and other factors important to SFM, in order to gain an understanding of the behavior of the system. The empirical limitation is not relevant to this thesis, because this is a qualitative literature study, without any empirical data collected.

## **3.0 Methods and Analytical Framework**

### ***3.1 Methods***

The foundation of this thesis is systems dynamics. After an introductory interview with Olof Johansson at Sveaskog AB and a literature review, a working causal loop diagram (CLD) was constructed of the system of forestry certification to serve as the analytical framework. The CLD was developed parallel to the development of the research questions, and was used as a tool to learn how the system behaves and also where the critical points of analysis were situated. The introductory interview with Olof Johansson was carried out with the purpose of gaining an understanding of core issues in forestry certification at the company level, such as why or why not companies choose certification and what their incentives are. This interview was ideal because Olof Johansson was a member of the group that developed the Swedish Forest Stewardship Council (FSC) standards, and thus has great insight into the driving forces of certification.

The data collected was mainly secondary data, such as books, scientific articles, and information from different organizations' web sites. The information from the interview and the literature analysis was used together with the CLD to perform a qualitative analysis of the issues concerning forestry certification.

Systems dynamics and causal loop diagramming were chosen as the methods in this research project because of the complexity of forestry certification. Recalling that the objectives of this research is to learn how the variables of the forestry certification concept affect each other, the behavior of the system, and the future outcome of this concept, it is evident that systems thinking is preferable because, "It emphasizes looking at wholes rather than parts, and stresses the role of interconnections" (Anderson and Johnson, 1997, p. 20). According to Anderson and Johnson (1997) systems thinking is also a tool to use when facing complex problems, because when humans face difficult and interconnected problems we tend to oversimplify and focus on the problems nearest at hand. In this way we might miss or underestimate the importance of certain effects that our reactive actions could possibly have in the overall system.

### ***3.2 Validity of systems dynamics and limitations of the thesis***

Forestry certification has set out to solve a major problem; the deterioration of the health of our global forests. The problem of deforestation and poor management is in itself a very complex system, as is the system of the certification, which is made up of many interlinked subsystems: system of acceptance among forest companies and owners, system of acceptance of sustainably produced forest products (environmentally sensitive markets), system of the certification schemes, and many more. One could argue that looking at this many problematic areas and drawing a conclusion on the future success of the forest certification concept is trying to cover too much in a short thesis as this. There is never any chance to go in depth with any of the areas of concern.

However, systems thinking is a way to tackle large, complex and difficult problems, and gain insight of the function of these kinds of systems (O'Connor and McDermott, 1997). O'Connor and McDermott (1997) also say that systems thinking will help us see some reoccurring patterns in different systems, which seem to have no connection but have the same structure and behavior. By looking at the forestry certification concept from a systems perspective the problems can be determined where action should be taken in order to improve the situation for forestry certification. I do not believe the limitations of this thesis are found in the application of systems thinking but

rather in the collection of data. Interviews with stakeholders in the certification business, such as certification schemes, NGOs, forest owners and companies, could have given valuable insight into the driving forces of certification and the feeling of the outlook of certification from within the systems stakeholders. This I believe cannot be retrieved from literature studies. These interviews were not done because of time constraints. However, I do believe that literature studies were sufficient enough to explore the behavior of the certification system.

### 3.3 Analytical Framework

The conceptual model and analytical framework of the forest certification system is presented in the CLD in Figure 3. This model is the basis for the analysis of the certification concept, because from it the relevant points to be analyzed have been derived. The structure of this CLD is based on the assumption that other variables that have an impact on this system, concerning the *willingness to become certified*, are not important enough to be incorporated. Therefore, the CLD does not lay claim to include all factors to the success of achieving SFM. These factors could be, for example, the influence of how long time the certification procedure takes and the pressure from NGOs on forest owner and companies.

However, there are factors concerning for example, the political and social environment in countries that are important for the accomplishment of SFM today and in the future. Where these factors fit in into the CLD in Figure 3 will not be disclosed now but, for the sake of simplicity, in chapter 5.5 *Other Factors than Forestry Certification in the Pursuit for SFM*, where they will be analyzed.

For simplifying the understanding of the CLD in this chapter and the ones throughout the paper I will give a short overview of how a CLD reads, as described by Anderson and Johnson (1997). There are a few basic features to a CLD called variables and causal links. Variables are the factors that have influence on each other. The causal links – the arrows – show the way the variables influence each other. The causal links could be either positive or negative, represented as a plus (+) and a minus (-), respectively. A positive link means that a change in one variable induces a change in the same direction of the other variable, e.g. the more births the larger population (see Figure 1). A negative link then means that a change in one variable induces a change in the reverse direction

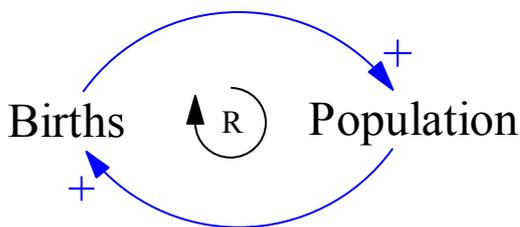


Figure 1: Example of a reinforcing loop

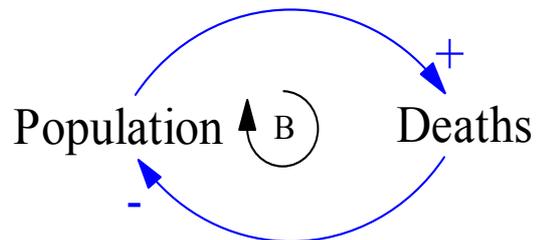


Figure 2: Example of a balancing loop

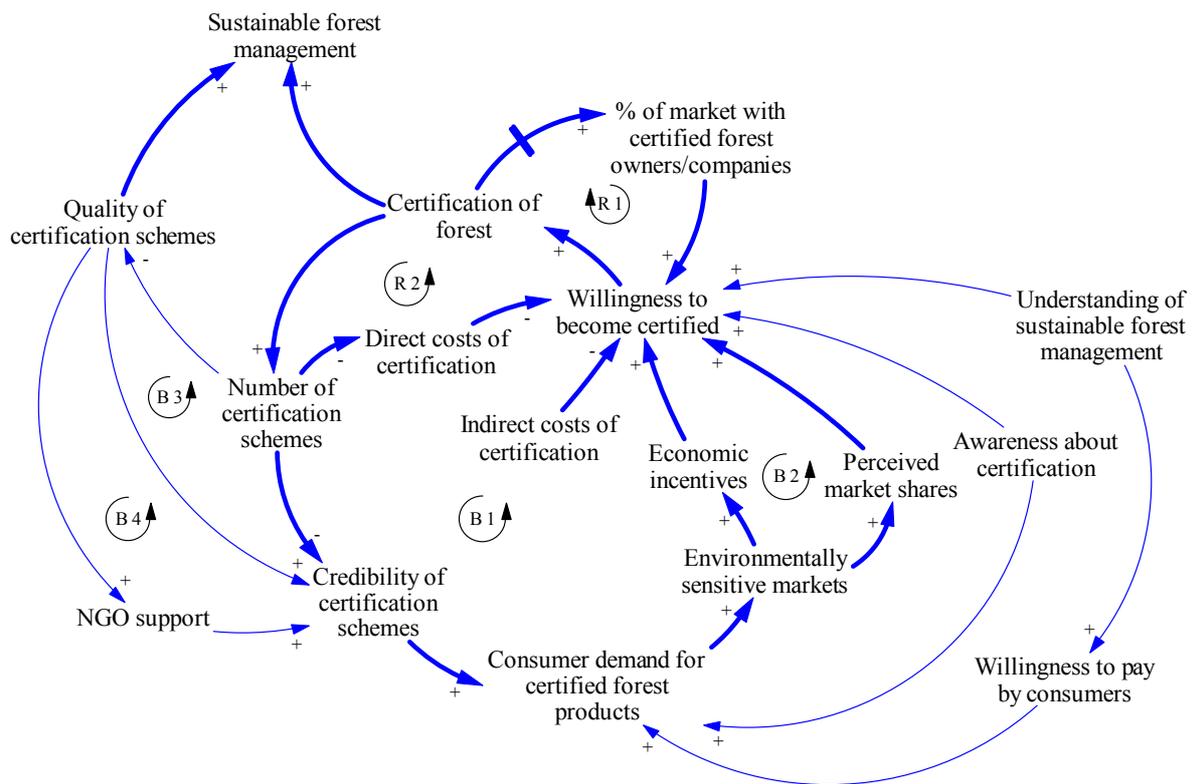
of the other variable, e.g. the more deaths the smaller the population (see Figure 2). When a circle is formed between different variables, a feedback loop has been created. This feedback loop can be either reinforcing or balancing. A reinforcing loop (R) reinforces the behavior of a system, e.g. births increase the population, which increases births (see Figure 1). A balancing loop (B) balances the behavior of a system, e.g. population increases deaths, which decreases population (see Figure 2).

Refer to the CLD in Figure 3 when reading about the forest certification system in the following paragraphs. The main variables in the CLD of the forestry certification system are *sustainable forest management* and *certification of forest*. It is the relationship between these two variables that is the main point of research. If this system would work the way that NGOs and other proponents of certification want it to then this relationship should be positive, i.e. the more certification of forests then the more SFM should be practiced. In theory the certification system should work in this way based on the assumption that the certification schemes have standards that promote SFM:

- There is a consumer demand for certified forest products, which
- Creates environmentally sensitive markets, which
- Positively influences willingness to become certified via economic incentives (price premiums) and perceived market shares (maintain or join markets with certified products).
- These benefits of certification will be larger than the direct costs and indirect costs and forestry owners and companies will become certified, and
- This certification of forests will then lead to sustainable forest management.
- The idea is that once a large enough part of the forest owners and companies have become certified that will in itself generate a drive for certification, and this is the R1 in the CLD.

However, what happens in reality is that there are 4 balancing loops, B1, B2, B3, and B4, which are rather important because they influence the consumer behavior and the environmental sensitivity of the markets. These four balancing loops all have their starting point in that when certification of forests started it lead to an increase in the number of certification schemes. This influences the credibility of certification schemes directly, but also via the quality of certification schemes. If the markets are less environmentally sensitive, it will lower the perceived markets shares and economic incentives that can be gained by becoming certified. There are also two important reinforcing loops at work. R1 is already explained. R2 is also important in that the more certification schemes started will lead to a reduction in the direct cost of certification due to competition. This will pave the way for a higher willingness to become certified and in turn make it easier for R1 to take off.

However, this is not taking place currently. The driving forces of the willingness to become certified (*direct costs, indirect costs, economic incentives, perceived market shares, awareness about certification, and understanding of sustainable forest management*) are presently not strong enough to create this required number of certified companies to make the non-certified companies realize that they, if for no other reason than fear of losing market shares, have to become certified. The B1 and B2 and the R1 and R2 loops in the CLD are in essence describing the incentives and driving forces for companies and forest owners to become certified in the first place. These loops are also indicated by bold arrows to indicate a greater importance in the system. In addition, the *quality of certification schemes* determines if success of certification schemes results in SFM. It is not enough to have certified all forests but the actual management in the forest has to change and that is done by a high quality of the certification schemes.



**Figure 3: CLD over the forestry certification system**

Finally, in this thesis I will first give a brief background to forest certification (chapter 4.0) and why it came into being. Then I will analyze the result from the qualitative analysis of the CLD (chapter 5.0). Based on this qualitative analysis I will discuss (chapter 6) the potential of and problems with certification. Can this single-sided instrument, solve a multifaceted problem, such as deforestation and unsustainable forest management?

## 4.0 Background to Certification of Forests

Since the 1950s the world has seen impressive technological and economic developments. This has been possible at the expense of the environment in most cases (Berg, 1998; Elliott, 1998). The health of the forests is no exception, e.g. more than 200 million hectares of tropical forests have disappeared (Upton and Bass, 1995) since the 1950s. Slowly but surely reactive measures were taken in countries as well as among countries starting in Stockholm in 1972 with the UN Conference on the Human Environment.

Not until the early to mid-1980s were governmental international actions taken concerning the health of the tropical forests with initiatives such as the 1983 International Tropical Timber Agreement (ITTA) and the International Tropical Timber Organization (ITTO) in 1987 (Elliott, 1998). The purpose of these activities was to maintain and broaden the international trade of tropical forest product while at the same time protect the "...ecological balance of the timber producing regions" (Elliott, 1998, p. 85). Concurrently, NGOs had responded to deforestation by aiming at politicians and public with information and awareness campaigns (Rametsteiner and Simula, 2003). The goals of these campaigns were to reduce tropical deforestation through bans in

tropical timber trading and boycotts of tropical timber products (Bass, 1998; Vogt *et al.*, 2000). However, these campaigns had the opposite effect on the rate of deforestation if any effect (Vogt *et al.*, 2000) and NGOs came to the insight that, "...positive discrimination might be more effective" (Bass, 1998, p. 11). Forestry certification is a 'positive discrimination', because it allows consumers of wood products to choose to buy products that through the use of labels show they are sustainable (Berg, 1998) and in other words, it will, "...cause discrimination in favour of timber from sustainably-managed forests..."(Upton and Bass, 1995, p. xviii).

The concept of forestry certification came about in the late 1980s, in the light of the neo-classical paradigm in the 1980s, where it was believed that the markets can solve any problem if it was left to its own movements without government interference (Martinussen, 1997), which was perhaps also the reason for this concept to even be considered. Forestry certification is a market instrument, trying to solve a market failure, namely externalization of environmental costs and social values that forests provide (Upton and Bass, 1995; Bass, 1998). In the beginning forestry certification was a response to tropical deforestation but it has later expanded to fit temperate and boreal forests as well (Vogt *et al.*, 2000).

In the beginning of the 1990s forest issues became a focal point on the global agenda, which concurrently led to the emergence of forest certification. There were some attempts directed at developing a forestry convention, e.g. the 1992 United Nations Conference on Environment and Development (UNCED) (Vogt *et al.*, 2000) as well as reaching a consensus on SFM such as the Helsinki Process starting in 1990, and the Montreal Process in 1993 (Elliott, 1998). All the attempts at formulating a forest convention during the UNCED failed (Elliott, 1998), but what was more important were the principles and criteria for SFM that came out of the UNCED (Vogt *et al.*, 2000) as well as from the Montreal and the Helsinki processes, because they have set the basis for some of the principles and criteria developed by certification schemes e.g. Pan European Forest Certification Scheme (PEFC) (PEFC, No date (a); Ozinga, 2001).

Currently there are a number of certification schemes available on the global and the regional markets. In 1993 the Forest Stewardship Council (FSC) was founded (FSC, No date (a)), which was a scheme produced from a joint effort between global stakeholders representing industry, social groups, and environmental groups, as well as groups representing North and South (Vogt *et al.*, 2000). Another certification scheme, Pan European Forest Certification Scheme (PEFC), was set up and founded in 1999, as a response by small private forestry owners in Europe to, what they perceived as, a lack of understanding of their needs by the FSC (Ozinga, 2001; Olof Johansson, personal communication). There are also a few national schemes such as the Sustainable Forestry Initiative (SFI) initiated in 1994 by the American Forest & Paper Association (SFI, No date (a)) and the Canadian Standards Association's Sustainable Forest Management Standard (CSA) launched in 1996 (CSA, 2003a) that have made impact on the certification scene. These different certification schemes are competitors and have different principles and criteria depending on the stakeholders supporting them.

The idea of forestry certification is to allow the certified forest companies to distinguish themselves as conducting SFM, which preferably would give them competitive advantages in the market place, such as new market shares and better market access (Upton and Bass, 1995). This should be a win-win situation because the certified company can earn more money in both the short term and long term and at the same time achieve sustainable forest management. There are also, alongside the economic advantages, environmental and social gains for the forests ecosystems and the people

living from the forests. Another long-term goal is that the market, by working in favor of these certified companies, forces other uncertified companies to become certified in order for them to survive (Gullison, 2003).

The difference between *performance-based standards* such as FSC and PEFC, and *process-based standards* such as ISO 14000 needs to be recognized. The focus of this research will solely be on *performance-based standards*, because they can via a *chain-of-custody certification* provide the essential labels on the finished products (Lindhe and Stenmark, 1998; Bass, 1998). These labels are required for the consumer to make a conscious choice. If a certification cannot provide a label at the end of the production chain it cannot be used as a market instrument either. This is critical, because, “The ultimate driving force in this process is the consumer” (Terstad, 1999, p. 192). The point of forestry certification is to serve as a market instrument and also what evolved from the NGOs’ work in the beginning and middle of the 1990s were performance-based standards. The International Organization for Standardization (ISO) has been around since after the Second World War and in 1991 when the 14000 series on environmental management was developed its purpose was not specifically on forestry management but on many other areas as well (Lindstrand, 1998), and as a *process-based standard* ISO 14000 does not allow for labels on the end product.

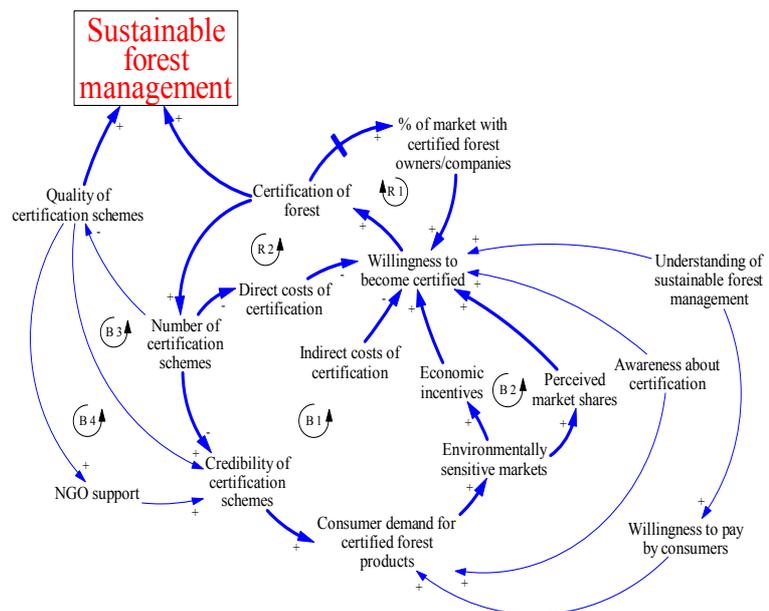
## **5.0 Results and Analysis**

In order to analyze and present results, chapter 5 is arranged in the following manner: In chapter 5.1, I will analyze what SFM is and the importance of defining it. It is crucial to first know what that goal is, which everybody is working towards. Secondly, I will analyze what a credible certification scheme should consist of (chapter 5.2). This credibility will give assurance to consumers and stakeholders that the certification scheme promotes SFM in all aspects. Thirdly, I will analyze the markets behind certification of forests and whether or not there is a possibility to arrive at a large enough number of certified forests for certification to have a substantial impact on the forest management, i.e. how well the markets work (chapter 5.3). In the next chapter (chapter 5.4) I will present a credibility analysis of the major certification schemes in the market. Are the ones currently in the market credible enough in everything they do and do they promote SFM? Finally, I will analyze what role other factors have and their importance when aiming for SFM via forest certification (chapter 5.5). In essence, these 5 aspects make up the analytical framework, and they are important to the success of certification of forests and of SFM.

### **5.1 Definition of Sustainable Forest Management**

*“Forest certification was developed as an instrument to give due recognition to and to provide an incentive for sustainable forest management”* (von Kruedener and Burger, 1998, p. 30)

As one of the ultimate aims of certification is SFM, there needs to be an analysis of definition of SFM. The question asked in this chapter is then: what are the current views on and the understanding of definitions of SFM among stakeholders and the scientific community? It is significant to have a clear understanding of what everybody is working towards, and also learn if everybody knows what they are working towards. Sustainable forest management is highlighted in the box in Figure 4 to show which part of the conceptual model is being analyzed in this chapter. The rest of the model is identical with the one in Figure 3 and that is why it is reduced in size. The same goes for Figure 5 and Figure 10.



**Figure 4: CLD over forestry certification, showing focus of analysis in chapter 5.1**

### 5.1.1 Definitions of SFM by Different Organizations

As mentioned in chapter 4, the UNCED in 1992 brought environmental issues as well as forestry issues to the forefront of international discussions. Even though there was no consensus on a decision for a convention on forests, the outcome was a non-binding statement of principles concerning all types of forests (Elliott, 1998). This is the definition of sustainable forest management according to the UNCED in this document:

*“Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations”* (UN, 2000).

This definition of sustainable forestry is drawn from the definition of sustainable development in the Brundtland report from 1987, “Our Common Future” (Berg, 1998). As a matter of fact, the definition of sustainable development by Brundtland and this above definition of sustainable forestry by UNCED are the platforms for most of the broad definitions of SFM among the inter-governmental processes, forestry certification schemes, and scientists. See Table 1 for a list of definitions by some key actors.

**Table 1: Definitions of sustainable forest management by key actors**

Actor	Definitions of Sustainable Forest Management
Helsinki Process	The stewardship and use of forests and forest lands 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 that does not cause damage to other ecosystems. (Helsinki Process, 2003)
Montreal Process	No direct definition of Sustainable Forest Management but it recognizes the importance of sustainably managing all types of forests in order to meet the needs of present and future generations. (Montreal Process, 1998)
FSC	No definition of Sustainable Forest Management. FSC refers to Forestry Stewardship and they support environmentally appropriate, socially beneficial, and economically viable management of the world's forests. (FSC, No date (a))
PEFC	The stewardship and use of forests and forest lands 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 that does not cause damage to other ecosystems. (PEFC, No date (b))
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, nurturing 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. (SFI, 2002)
CSA	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. (CSA, 2003b)

The tendencies that can be seen in Table 1 in all of these definitions of SFM are that they all mirror each other, and especially contain similarities with the UNCED definition as well as the Brundtland report. Some do not define SFM but rather define an understanding of some sort of forestry stewardship. They are all very general and open for subjective judgements of what they really mean. According to Berg (1998) there is an internationally accepted idea of what the concept of SFM encompasses, on a general level. However, concerning specific definitions of SFM and working standards, there are no universally accepted ones (Upton and Bass, 1995; Berg, 1998). The specific definitions of SFM are changing depending on the stakeholders and the different economic, social, emotional, and cultural values they associate with the forests (Stjernquist, 2001; Gullison, 2003).

### 5.1.2 Complexity of defining SFM

Specific definitions can also be thought of as the standards of different certification schemes. The standards of different actors are made up of principles, criteria, and indicators. Vogt *et al.* (2000) explain principles as ethical guidelines in terms of defining SFM, and criteria and indicators as the equipment used to assess SFM. Berg (1998) also says that these principles, criteria, and indicators are used as measures of how to evaluate the sustainability of forestry management. In other terms, this could also be understood as that principles, criteria, and indicators define SFM. However, according to Vogt *et al.* (2000) the problem of defining SFM is linked to the difficulty of properly assessing SFM, which is then done with principles, criteria, and indicators. When analyzing the definitions of SFM it is important to have an understanding of the standards and their importance, since they are closely linked to the definitions of SFM. The standards will, however, be analyzed further in depth in chapter 5.2 dealing with the actual certification schemes. It seems as if there is great difficulty in defining SFM, because the definition itself is dependent on how to assess it and

the assessment tools are dependent on the definition. Questions that can perhaps shed light on how to go about the problem of a proper definition are how specific and precise should SFM be defined, at what level (global, regional, national, or local), and who should be responsible for the definition.

There seems to be an understanding among the scientific community that writes about SFM that there should be a quite specific definition of SFM, or rather, according to Vogt *et al.* (2000), that there should be a definition of good forestry management, forestry stewardship, or similar, because those terms you can clearly define. The problem with having a too lax or broad definition of SFM is that it will be very difficult to make it functional, especially with regards to decision-making and implementation on the local forest management level (Vogt *et al.*, 2000; Eid *et al.*, 2001). This link to decision-makers confirms that the definition of SFM is linked to the quality of its tools, i.e. principles, criteria, and indicators. Therefore, terms such as good forest management or stewardship are better than the term sustainable forest management in terms of functionality and implementation. Some groups (e.g. FSC) and researchers (e.g. Upton and Bass) in the certification business have realized this definition issue and have refrained from defining it, but define ‘forestry stewardship’ or ‘quality forestry’ instead (Upton and Bass, 1995). According to Vogt *et al.* (2000) it is necessary to avoid too long discussions of the definition of what is SFM, because it takes the focus away from the significant problems concerning forestry management, i.e. how it best should be practiced.

Whether or not people choose to define SFM instead of stewardship, the next important questions are on what level this definition is made, and who defines it. Different stakeholders at different levels have different understanding of the values associated with how to use a resource (in this context the forests) (Vogt *et al.*, 2000), and because of this the definitions will vary depending on who is responsible for the definition. According to Upton and Bass (1995), “Sustainability depends upon the specific relationships of forest management with the surrounding environment and society” (p. 15), and because of this specific relationship not many of the criteria elaborated will be global in their application. Upton and Bass (1995) argue because of this fact that specific and precise definitions, or rather the criteria and indicators, need to be defined on a local basis with local stakeholders participating. One could see a potential problem of lack of local participation when SFM will be implemented, at the local forestry management unit, if they cannot participate in the negotiation of definitions. Without local participation it will be difficult to achieve SFM, because that is where the change in management techniques is expected to take place. However, stakeholders from all levels (global, regional, national, and local) should participate in the process of defining SFM as well, because the use of the forest resource is very diverse and, as a result, the definitions will be very different (Sjunnesson, 2001). Furthermore, Upton and Bass (1995) say that definitions should never be set in stone but should be formed in an iterative process where stakeholders from all levels should participate and carry the agenda forward.

In conclusion of the analysis in this chapter on definitions of SFM, an understanding has been gained that most of the general definitions made by the different actors in the forestry and the forestry certification business are based on the general definition of sustainable development in the Brundtland report “Our Common Future” from 1987, where environmental, social, and economic aspects are taken into consideration for a sustainable future. The definitions by different actors are general and not specific, and some organizations are even stepping away from defining sustainable forest management by instead defining good forest management or forestry stewardship. This will allow them to clearly define what quality management is. All definitions are based on the actors’ underlying standards – principles, criteria, and indicators – on how to reach SFM and how to assess

it. These differ a great deal between different actors as a result of different stakeholders participating in the process of defining SFM. It has also been learnt that the definitions should be negotiated at all levels (local, national, regional, and global) to allow for everybody's opinion to come forth.

## 5.2 Certification Schemes

The previous chapter has discussed the difficulties in defining SFM, which is the goal of forest certification. Now in this chapter I will analyze the certification schemes themselves, looking at what makes up the credibility of the major certification schemes on the market. To have an understanding of the structure of certification schemes is central in order to find out if forestry certification will ultimately lead to SFM. Quality of certification schemes is highlighted in the box in Figure 5 to show which part of the conceptual model is analyzed in this chapter.

Currently, the main certification schemes in the market are FSC (currently the only global scheme); PEFC (it is regional, but slowly endorsing schemes from other parts of the world); SFI (active in the US and Canada); and CSA (Canada). There are other schemes besides these, e.g. the American Tree Farm System (ATFS) and the Indonesian Ecolabelling Institute (LEI).

The ATFS and LEI are national schemes and are endorsed or are in the process of being endorsed by larger schemes such as PEFC or FSC. Most research has been done on the four big ones, FSC, PEFC, SFI, and CSA. This analysis will focus on these four since they are among the largest schemes on the market based on hectares of certified forests (Ozinga, 2001) and most of the available material concerns them.

According to scientists, NGOs, industry, and governments there are some criteria that should be basic to each and every certification scheme if that scheme is to be trustworthy, effective, and ultimately allow for SFM (Chihambakwe *et al.*, 1997; Bass, 1998; Griffiths, 2001; Oliver, 2001; Ozinga, 2001; IPF, No date). Besides these criteria used to measure the quality of a certification scheme, which will be returned to in chapter 5.4, there is an overarching structure of a certification scheme, which is made up of three main elements. These elements are: standards setting process, certification routine, and accreditation procedure.

### 5.2.1 Standard setting process

The first element, standard setting process, is concerning the importance of the development procedure of the certification scheme standards, and what the standards are in terms of principles, criteria, and indicators. In this development of a scheme's standard it is perhaps the arrangement of

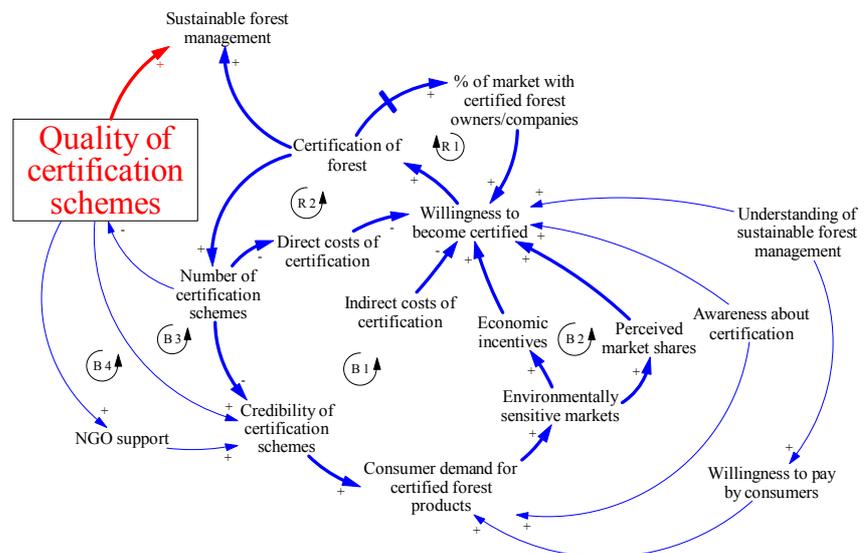


Figure 5: CLD over forestry certification, showing focus of analysis in chapter 5.2

the stakeholders that are allowed to participate in the negotiation process that is the most important. According to Ozinga (2001), a broad set of stakeholders is very important to the final outcome of the principles and criteria, because everybody with an interest in this scheme must be allowed to give their opinion on how it should be formed. No stakeholder group should be allowed to dictate the process. Lindstrand (1998) adds to this discussion and says that a scheme that has had broad stakeholder participation has an advantage in the market place simply because of the credibility that has been created. Broad stakeholder participation could potentially make the decision process long and indecisive. However, broad stakeholder participation is important for the reason that everybody's opinion has to be considered otherwise it does not reflect the true definition of SFM (see chapter 5.1).

In terms of the principles, criteria, and indicators of different schemes it is mainly the ones concerning social and environmental sustainability that show significant differences depending on the variation in stakeholder composition (Gullison, 2003). Ozinga (2001) says that what FSC has is standards that cover all areas while PEFC, SFI, and CSA have particularly low social standards. See Table 2 for principles or criteria of FSC, PEFC, SFI, and CSA. The complete standards (principles, and/or criteria, and indicators) for FSC and PEFC are found in Appendix 1 and 2. For the complete standards of SFI and CSA standards see their web pages<sup>1</sup>. Table 2 shows that FSC has put more weight on social aspects, whereas, the other schemes, especially PEFC and SFI, focus more on environmental aspects. CSA is somewhere in between.

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<sup>1</sup> The full standards of CSA and SFI can be retrieved at these web pages, <http://www.sampsongroup.com/acrobat/2002-2004%2520Standard.pdf> and [http://www.ccfm.org/2000pdf/CI\\_Booklet\\_e.pdf](http://www.ccfm.org/2000pdf/CI_Booklet_e.pdf), respectively.

**Table 2: Principles or criteria by different certification schemes (FSC, PEFC, SFI, and CSA)**

Certification Schemes			
FSC Principles	PEFC Criteria	SFI Principles	CSA Criteria
Compliance with Laws and FSC Principles	Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles	Sustainable Forestry	Biological Diversity
Tenure and Use Rights and Responsibilities	Maintenance of Forest Ecosystem Health and Vitality	Responsible Practices	Ecosystem Condition and Productivity
Indigenous Peoples' Rights	Maintenance and Encouragement of Productive Functions of Forests (wood and non-wood)	Forest Health and Productivity	Soil and Water
Community Relations and Worker's Rights	Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems	Protecting Special Sites	Role in Global Ecological Cycles
Benefits from the Forest	Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (notably soil and water)	Legal Compliance	Economic and Social Benefits
Environmental Impact	Maintenance of other Socio-Economic Functions and Conditions	Continual Improvement	Society's Responsibility
Management Plan			
Monitoring and Assessment			
Maintenance of High Conservation Value Forests			
Plantations			

It seems as if the composition of stakeholders in the standard setting process is very important because if sustainability builds on social, environmental, and economic aspects then there must be stakeholders from each group in order to have a chance to come close to achieving SFM. It is also evident that the standard setting process is closely linked to the process of defining SFM, which was concluded in the previous chapter of this thesis. Just as with the definition process, the standard setting process should be an iterative process and it should evolve over time (Upton and Bass, 1995), since it is over time that it is learnt how forests should be managed sustainably and then the principles, criteria, and indicators need to be open for change.

### 5.2.2 Certification routine

Regarding the certification routine, what is important in this part is how certification is carried out. The certification of the forest management unit is done by the accredited and independent third-party organization. The certification routine, thus, has to be a liable and an impartial process, which, "... should be acceptable to stakeholders and inspire market confidence" (Bass, 1998, p. 8). One of the very central components to the certification process is the auditing of the forest management unit according to Rametsteiner and Simula (2003), because they say that just because a certification scheme has developed great standards on paper together with all the stakeholders it does not mean that the required changes in forest management will be implemented. This entire certification

routine should, in addition, be an iterative process, because as the definitions of SFM change and as criteria and indicators change, the forest management on the ground may have to adapt and change as well.

The certifier should have a good connection to the forest company or forest owner. Kiker and Putz (1997) have developed an understanding of the certification process as a relationship between what they call the ‘agent’, which is the forest company, and the ‘principal’, which is the certifying organization. According to these authors this has to be a close relationship because of the different goals the ‘agent’ and the ‘principal’ have despite that they are following the certification standards. The ‘agent’ is mostly concerned with how to make ends meet and have an economically sustainable situation, whereas the ‘principal’ is concerned about the overall sustainability of the forest management. If this relationship is close it means that both parts can learn from each other and implementation of standards in the long term will be easier. Kiker and Putz (1997) also say that this is the most challenging part of a certification process, namely, how to meet and implement the goals of the certification standards at the management level; therefore, a close relationship is crucial. The better this relationship and the entire certification process work, the more credibility and confidence the certification scheme will have in other actors’ eyes. One potential problem with a close relationship is nepotism. The relationship has to be professional enough that certificates can be withdrawn if the forest company or the forest owner no longer fulfills the standards. This relationship discussion is not only a matter of credibility and confidence in other people’s eyes but also a matter of actually making sure that SFM is achieved, and for that reason, a liable certification process is crucial, as well as a liable certification organization and that is where the accreditation procedure comes into play.

### 5.2.3 Accreditation procedure

The last element is accreditation. Ozinga (2001) puts the accreditation procedure in very simple words, “... accreditation refers to the process of certifying a certifier” (p. 11). This process concerns how accreditation is carried out and who is accredited to carry out the actual certification on the ground. Certification programs are certified according to standards and criteria set by national organizations or international organizations, such as ISO (Upton and Bass, 1995). However, some concerns have been raised with this approach, since these organizations are not primarily set up with accreditation of forest certification programs in mind (Ozinga, 2001). It is argued that the accredited certification programs accredited via standards set by for example ISO are not competent enough with forest management issues and therefore should not be allowed to be certifiers (Ozinga, 2001). FSC has, as a response to this, become their own accreditation organization, that is, they accredit certification programs that in turn certify forest management units according to the FSC principles and criteria. According to Ozinga (2001) it is also a dilemma that FSC does both parts; develops standards and accredits certification bodies. At any rate, the main reason why accreditation is one of the very central issues to a certification program and a certification scheme is reliability to the consumers and the markets (Upton and Bass, 1995; Bass, 1998).

What it boils down to in these three elements are the keywords reliability, confidence, and credibility. According to Vallejo and Hauselmann (2001), credibility is perhaps the most important quality to achieve as a certification scheme. A certification scheme needs to be credible in the marketplace, to the consumers, to the stakeholders, to governments, to the industry, and to anybody with an interest in the future health of forests in terms of its sustainability. If some certification schemes are not credible it could potentially undermine the credibility of the entire certification concept. Therefore it is important to do comparative analyses of different certification schemes to

see at what level the standards are and to see which ones are performing well and which ones are not. That analysis will be returned to in chapter 5.4. First, however, I will analyze how the markets for forestry certification work or do not work, because I want to investigate if it is possible to gain widespread acceptance for and success of certification in the market place.

### **5.3 Certification and Markets**

*“Certification has the twin objectives of (a) working as a market incentive to improve forest management; and (b) improving market access and share for the products of such management”* (Upton and Bass, 1995, p. xviii)

This chapter will analyze the certification concept from the perspective that it was developed as, namely, a market instrument. An additional objective to the objectives above is, as previously stated, for certification to provide positive discrimination in the market place for certified products (Upton and Bass, 1995). The products from sustainably managed forests should provide a push for certification through the market place and it should in that way provide economic incentives to become certified. The performance of the markets is one of the keys regarding the connection between certification and SFM, hence the importance to learn if the markets work properly. The markets need to create wide spread certification, which will allow the certification schemes, via their standards, to make a difference in the management of forests.

The aim of this chapter is to gain an understanding of the driving forces of certification in the market place. Why do forest owners choose certification? A follow-up to this question is to learn if in the long run the markets allow for SFM to take place, i.e. if there is a possibility for a large enough percentage of the forests to be certified so that certification really can make a difference, locally and globally. It is important to put emphasis on the global aspect, since certification in the beginning through FSC was set out to tackle global forest problems. I want to know if the markets work equally well in all parts of the world, because they need to work globally and reach places where the need for improved forest management is the greatest.

#### 5.3.1 What is a market instrument and how should it work in the forest certification context?

There are different ways of dealing with environmental problems and pollution (Connelly and Smith, 1999). Some are government-driven, known as command and control i.e. regulations and laws, and some are market-driven, where economic incentives are created to not pollute or to become more environmentally friendly. Market-based instruments fall under this latter category, and so does certification of forests. Certification of forests does work in both ends of the market (Upton and Bass, 1995). It is an incentive for the companies to manage their forests in a sustainable manner, as well as it is an incentive for consumers to buy certified forest products and in that way promote SFM. Companies will gain new market shares or maintain markets, and consumers will help save the forests by their choice at time of purchase. This market instrument is trying to solve some market failures associated with forestry and forest management (Haener and Luckert, 1998). These failures are, first, related to external costs not being incorporated into the price of wood products. What are often not calculated into the cost of wood products are the services that forests supply us with that there are no markets for, such as carbon sequestration and biodiversity. The other market failure is information asymmetry. Information asymmetry in the forest context is that

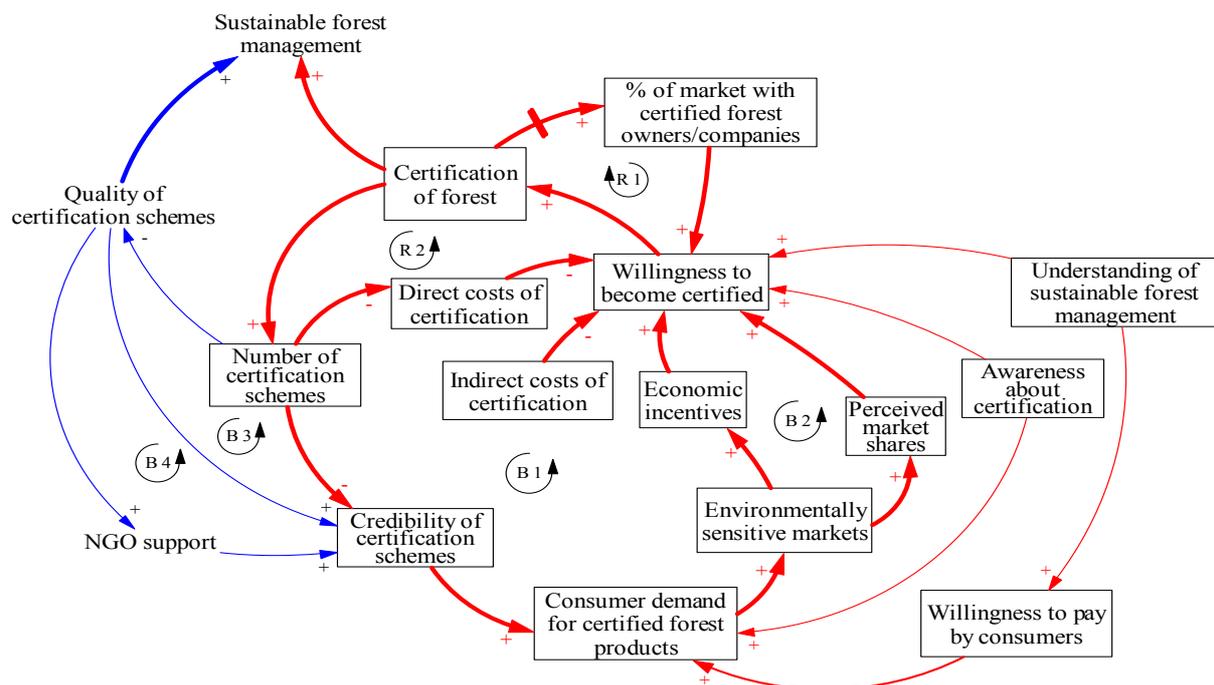
there is no information available at the time of purchase in order for the consumer to distinguish between ‘good’ and ‘bad’ forest management.

In order for this market instrument to work successfully and solve the market failures, the certification schemes also have to have a functioning chain of custody certification with available labels to put on the end product. The chain of custody and the labels are the connection between the certification schemes, the markets, and the point of sale of forest products. If there are no connections, there cannot be any economic incentives gained, only costs. According to Kiker and Putz (1997) the consumer is the most important actor in the certification concept. As information is handed to the consumer in forms of labels, which separate ‘good’ products from ‘bad’ products, the consumer has to respond to that and create a demand for the certified products and that, however, requires a label and chain of custody certification.

There are some assumptions that the entire certification concept builds upon that are relevant and important for the acceptance and success of certification in the market (Upton and Bass, 1995; Merry and Carter, 1997). The main assumption relates back to the previous paragraph and the discussion about the consumer role, because it is assumed that the consumer has a keen concern for forest issues. The follow up assumption is then that this concern is large enough to change the consumption patterns in regards to forest products. This also relates to the next assumption that via the market incentives created by the higher demand for certified products, the producers of these products change behavior. It is also assumed that this demand for certified forest products creates economic incentives that are large enough to allow the forest owner to implement new and more expensive management techniques without economic losses.

The assumptions mentioned above are by no means minor, but they are cornerstones to the success of certification of forests in the market place. In the long run they are creating the foundation to the success of the entire certification concept, because if certification, a market instrument, does not have success in the market place, the goal of SFM via forest certification will most likely not be achieved. Why, then, did FSC and their stakeholders believe in a market instrument such as certification to solve such a complex problem as deforestation and unsustainable use of forests, when forest certification was initially started? Cashore *et al.* (2003) say that environmental NGOs learned how markets could create quick and powerful results in policy changes, from how globalization and internationalization worked. The way through markets seemed quicker than, “... attempting to influence domestic and international business dominated policy networks” (Cashore *et al.*, 2003, p. 3). The World Wide Fund for Nature (WWF) (2001), a proponent of and a stakeholder of FSC, believes that this way via markets is the solution to the issues concerning forest management, “Bad forestry can be squeezed out of the system as markets and consumers demand increased environmental [sic] performance” (p. 10). They base their argument on the fact that only a small number of companies (5 companies) process 20 per cent of all the industrial wood in the world (WWF, 2001). The WWF (2001) also believes that in order to see widespread and fundamental change in forest management these big actors need to be part of the solution and that can be done via markets. The WWF has a valid point that the actors have to be part of the solution, but despite this there are many concerns regarding the markets and how they work or do not work, which will be analyzed in the next section.

In Figure 6 is the CLD showing in red arrows the important driving forces for certification in the market and in the boxes the variables, all of which are the emphasis of analysis in this chapter.



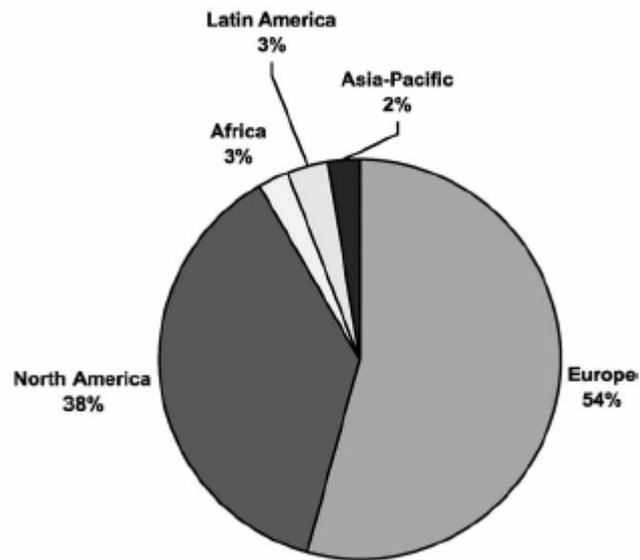
**Figure 6: CLD over forestry certification, showing focus of analysis in chapter 7**

The CLD above shows, as mentioned, the points of analysis in this chapter, but it also shows how the markets of forest certification should work in theory and in a perfect world. Gullison (2003) explains in simple words the basic idea of certification, “An environmentally sensitive consumer base should create incentives that reward certified producers, and encourage other non-certified producers to seek certification and its market benefits” (p. 154). The market benefits are in the shape of economic incentives such as a price premium and maintained or gained market shares. When the producer can sell the products at a higher price per item sold due to the certification and the label then the producer receives a price premium (Merry and Carter, 1997). The idea is also that these economic benefits created by the markets will be larger than the costs of certification (direct and indirect costs). The forest owner wants to become certified, and what hopefully will happen after some time, is that once enough forests owners have become certified it will generate a pull for the rest of the owners that are not yet certified. If this happens, the costs and the economic incentives will no longer make a difference, forest owners will become certified just because of the signals they get from the market. It will come down to that you have to be certified or you will lose your market shares and cannot take part in trade any longer (Chihambakwe *et al.*, 1997).

### 5.3.2 A closer look at the span of certification

In the above paragraph the desired outcome and behavior of certification in the market in theory was presented. In this part I will take a closer look at the market system and learn the dynamics of this system in reality. According my research, the market for certification has not worked properly and the desired outcome of a world-wide impact has not happened. Certification was hoped to work globally but most of the certified forests in terms certified area are found in the North (Europe and North America), which is shown in Figure 7. Less than 10 per cent of the certified forests in 2002 belonged to the South (Africa, Latin America, and Asia-Pacific), and more than 90 per cent to the North. According to Rametsteiner and Simula (2003), this is an indication that so far certification of forests cannot have played any greater role in changing forest management to the better in a global perspective. This is especially evident since the total amount of certified forests in the world by the

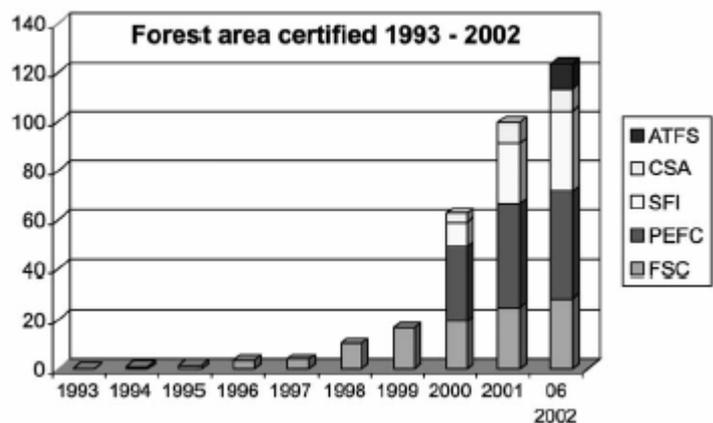
four major certification schemes (FSC, PEFC, SFI, and CSA) sums up to be merely 124 million hectares (as of June 2002), and the total area of forested land is approximately 3869 million hectares (Rametsteiner and Simula, 2003). This means that only 3.2 per cent of the forests were certified in 2002, and less than 10 per cent of that is then certified in the South. Quickly it becomes obvious that certification up until now cannot have had any greater possibility for widespread impact on the unsustainable management of forests. However, Rametsteiner and Simula (2003) say that certification of forests is likely to increase rapidly in the next few years considering the increase during the last few years. The question is if this increase will take place in the North or in the South, because according to Côté (1999) it is not in the North that the forest management is in greatest need but in the South. In the North the environmental laws and regulations are considerably good and much closer to what is considered to be SFM. Côté (1999) also says that it is in the North that most forests are being certified at the moment and it will probably continue to be that way. That can be seen from the fact that in 1996 about 70 per cent of certified forests were found in the South (Rametsteiner, 2002a) and today it is less than 10 per cent (see Figure 7). Rametsteiner (2002a) says that this dramatic change is due to recently started regional certification schemes (PEFC, SFI, and CSA) in the North. These numbers about amount of forests certified and the global distribution of forests certification raises questions about how well the markets really work.



**Figure 7: Distribution of certified forests in different parts of the world as of January 2002 (Source: Atyi and Simula, 2002 in Rametsteiner and Simula, 2003)**

5.3.3 A closer look at the market driving forces of certification

It has been presented how the certification should work in theory and what the current outcome is of the certification system in terms of actual amount of certified forests. In this part I will look at the market system and learn the dynamics of the system in reality. When doing this I start from the point of *certification of forests* in the CLD in Figure 6. When certification of forests started through the FSC it lead to an increase after a few years of new certification schemes as a response to FSC (Cashore *et al.*, 2003), and this can



**Figure 8: Graph showing the increase in number of certification schemes in the market (Source: UNECE, 2002 in Rametsterner and Simula, 2003)**

be seen in Figure 8 (the Y-axis shows total hectares of certified forests). This increase in number of certification schemes has indirect implications for *perceived market shares* which is one of the main positive driving forces for *willingness to become certified*. The other driving forces, positive and negative, are *economic incentives*, *indirect costs*, *direct costs*, *awareness about certification*, and *understanding of sustainable forest management*, and these will be discussed subsequently.

#### 5.3.3.1 *Perceived market shares*

This driving force is seen as the most important positive factor for becoming certified according to studies and research (Chihambakwe *et al.*, 1997; Raunetsalo *et al.*, 2002; Rametsteiner and Simula, 2003). It is a positive factor, because it will potentially provide the company or forest owner with additional income. This factor can work in two ways. First, companies and owners see a potential loss in market shares if they choose to stay outside certification and this concern forces them to become certified (Chihambakwe *et al.*, 1997; Rametsteiner and Simula, 2003;). Secondly, companies and owners see that they can gain new market shares and join markets that were previously closed to them (Raunetsalo *et al.*, 2002; Olof Johansson, personal communication). However, this factor of perceived market shares is not standing on its own. The potential of it as a factor, positively influencing the willingness to become certified, depends on if there are market shares to be gained or maintained, i.e. if the markets are environmentally sensitive.

Environmentally sensitive markets are a crucial prerequisite for companies and owners to see the potential in the markets for certified forest products, because if there are no markets for certified products then there is no incentive to become certified, since there are no economic benefits to be gained (Olof Johansson, personal communication). The environmentally sensitive markets are present where there is a consumer demand. Consumer demand is the result of an awareness of the importance of SFM, resulting in a willingness to pay a higher price for certified products. Another precondition for consumer demand is that the consumers are also informed about certification schemes. However, it is questioned if this is really the case, especially the willingness to pay (Kiker and Putz, 1997). There are studies done on the willingness to pay for certified products and they have similar results, 50 to 80 per cent of consumers are on average willing to pay 5-15 per cent more for certified products (Berg, 1998; Haener and Luckert, 1998). This can be understood as that consumers are presently not very willing to pay more for certified forest products according to Berg (1998) and Gullison (2003). Berg (1998) gives one possible explanation to this and it is because of consumers' attitude to wood products in the first place. They think that wood products are more environmentally friendly than other products and do not want to pay more for certified wood.

Earlier I mentioned that the number of certification schemes would have implications for the perceived market shares. They have implication because the more schemes in the markets, and the more labels, the less credibility for certification, partly because it becomes confusing for the consumers (Vallejo and Hauselmann, 2001) and partly because it seems as if the quality of the schemes goes down with the start of more and more schemes. Credibility among the consumers for certification schemes has a major impact on the consumer demands, and the consumer demand influences the size of environmentally sensitive markets.

#### 5.3.3.2 *Economic incentives*

Economic incentives are closely linked to the discussion of market shares and are also a positive driving force for certification. Economic incentives are, as mentioned before, known as price premiums, which is when a certified product receives a higher price in the market place resulting in higher returns per unit sold for certified producers. This is then based on the prerequisite that there

are environmentally sensitive markets and a consumer demand, including a willingness to pay for certified products (Haener and Luckert, 1998). It seems as if there may not be great economic incentives, in the form of price premium, to be gained (Haener and Luckert, 1998). There is also an issue regarding price premiums. Where there has been a higher price for certified products it has not necessarily been driven by higher willingness to pay but rather by low supply of certified products (Gullison, 2003). In this case the price premium will then not last longer than until the supply goes up (Gullison, 2003; Rametsteiner and Simula, 2003). Price premiums or economic incentives are in general a positive driving force for certification but so far it does not seem as if it will or has had a great impact on the willingness to become certified. Rametsteiner and Simula (2003) say that in Europe the expected price premium has not been created. Some surveys done also show that, in reality, the possibility of receiving price premiums is not one of the main reasons for becoming certified either (Merry and Carter, 1997; Raunetsalo *et al.*, 2002). Perhaps one reason is that the potential price premium is linked to the chain of custody certificates that are issued because that, as mentioned before, allows the producer to apply a label and it provides the link to the market place. However, in 2002 there were only around 2500 chain of custody certificates and almost all of them belonged to FSC (Rametsteiner, 2002a). Without this link to the consumers it seems unlikely that a producer can differentiate the product from others.

#### 5.3.3.3 *Indirect costs*

Indirect costs are one of the two costs associated with acquiring certification, the other one is direct costs and will be discussed in the next section. Indirect costs are all the costs associated with certification that do not regard the upfront costs to the certifying organization (Gullison, 2003). The indirect costs are perhaps the main barrier to certification because they regard the costs that are needed to improve the forest management to achieve and meet the standards set in order to become certified (Merry and Carter, 1997; Gullison, 2003). The reason why these costs are potentially a main barrier is that they depend on the status of the current forest management, i.e. how good the company currently is and how much do they have to improve in terms of management techniques, paying legal wages i.e. higher labor costs, and lost opportunity costs because of lower harvests (Gullison, 2003).

The ambiguity around indirect costs has created concerns about the behavior of forest companies and forest owners. Bass (1998), Haener and Luckert (1998), Gullison (2003), and Rametsteiner and Simula, (2003) explain how the indirect costs can lead to a higher relative willingness to become certified among medium to large public or private companies in the developed world, because the forest management there is already at a standard close to the one required by certification schemes. It is cheaper for them to become certified, whereas, in the developing world the indirect costs tend to be dramatically higher. As a consequence, “Forest certification will thus primarily attract those where little or no impact will occur” (Rametsteiner and Simula, 2003, p. 96) and it, “... could simply be recognizing exemplary companies with good environmental management practices already in place, rather than requiring relatively poorly managed companies to improve their management ...” (Gullison, 2003, p. 156, 158).

#### 5.3.3.4 *Direct costs*

The direct costs refer to fees that the forest company or forest owner has to pay to the certification organization (Gullison, 2003). These costs are different depending on the size and the location of the company. The size of the company or the forest makes a large difference because a larger company can spread the costs over the area of the forest (Olof Johansson, personal communication). In this way the cost per m<sup>3</sup> wood decreases with forest size. The location of the company makes a

difference as well because the direct costs include travel costs for the certification body (Gullison, 2003). However, it seems as if the size of the company is more important than its location. Haener and Luckert (1998) and Gullison (2003) give some example of costs of certification, and they are generally smaller in the North and in larger public or private companies e.g. Sweden or Poland than in the South and in small private forest owners. In the North direct costs are in the neighborhood of US\$ 0.05 per m<sup>3</sup> of produced wood and in the South it ranges from US\$ 0.26-4.00 per m<sup>3</sup> of produced wood. These numbers are in themselves not necessarily of importance, because they are just examples and not representative of all of the certification bodies. However, the importance of the numbers is the relationship and difference between them, which indicates the difference that has to be paid in direct costs, if you are not a big company and/or from the North.

Earlier it was mentioned that an increase in numbers of certification schemes would negatively affect the market situation for forest owners and companies in terms of economic incentives and potential market gains. On the contrary, it has to be said that an increase in certification schemes is expected to decrease the direct costs of certification, because of competition among the schemes (Bass, 1998). In order to attract more forest companies and forest owners the schemes and the certification bodies have to lower their direct costs of certification, this will be positive for small forest owners especially.

The direct and indirect costs of certification are the main driving forces for not becoming certified. The forest owners and forest companies usually conduct a cost-benefit analysis between the two costs and the potential economic incentives and perceived market shares when they decide on certification (Rametsteiner and Simula, 2003). It is crucial that the costs of certification are returned via the benefits for certification in order for certification to become widespread (Merry and Carter, 1997).

#### *5.3.3.5 Awareness about certification and understanding of sustainable forest management*

Costs and especially benefits of certification in monetary terms are the most important factors when making a decision on certification (Côté, 1999). Awareness about certification and understanding of SFM are, however, quite important factors as well. A survey done by Raunetsalo *et al.* (2002) showed that among the drivers of forest certification pressure from environmental NGOs was one of the main driving forces of certification, as well as keeping an environmental image. This was emphasized by Olof Johansson (personal communication) as well. Companies choose to become certified because they want to create a positive environmental image as well as credibility to the consumers. How do environmental NGO pressure and environmental image and credibility link to awareness about certification and understanding of SFM? They are fruits of the work of NGOs and certification schemes. They try to create awareness for and understanding of SFM so that in turn companies feel pressure to become certified.

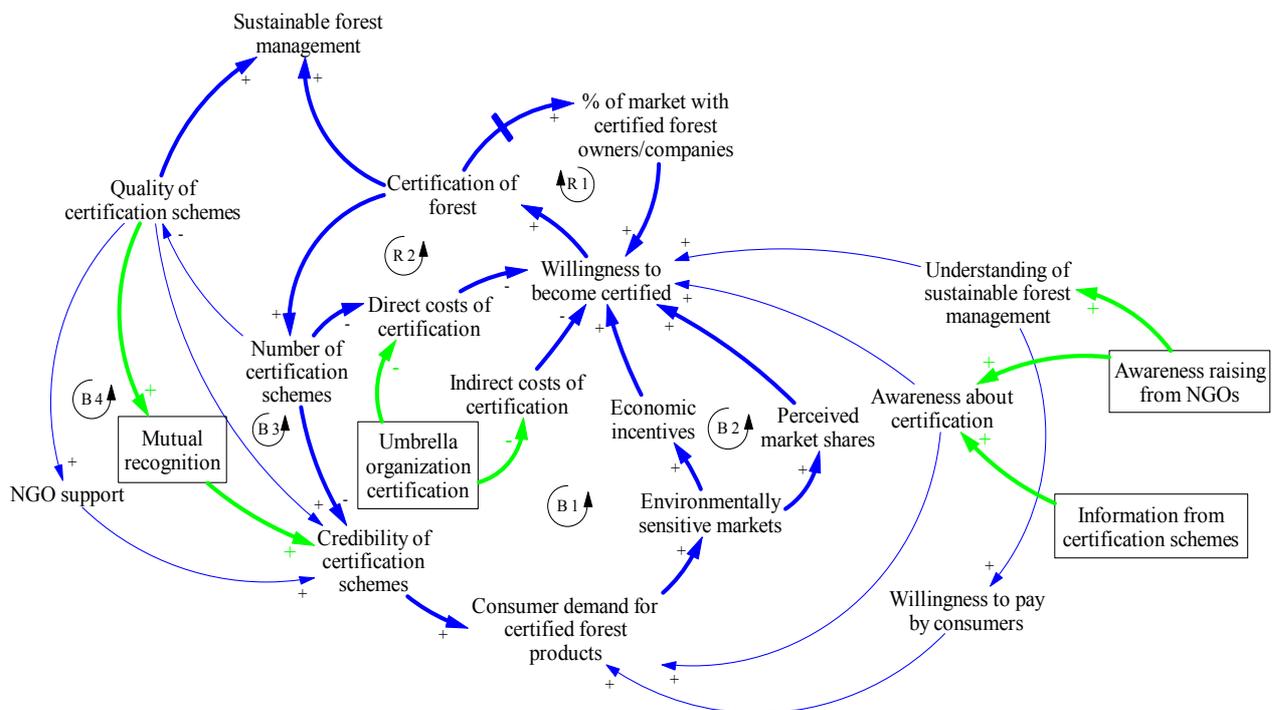
#### *5.3.3.6 Willingness to become certified*

All of these factors discussed above: perceived market shares, economic incentives, indirect costs, direct costs, awareness of about certification, and understanding of sustainable forest management, are deciding the willingness to become certified among forest owners and companies. We have seen that from examples to this date certification has not had such a great success in terms of area of forests certified as well as global acceptance and success. Most of the certified forests are found in the North. The hope is that once a high enough per cent of the forest owners and companies have become certified the factors discussed above will not matter, because certification of forests will take place purely because one has to be certified in order to survive in the market (WWF, 2001).

The certification schemes, their stakeholders, and other interested parties have tried to solve the problem with the markets in order to increase the willingness to become certified. These problems are in particular, low credibility in the market for certification schemes due to the many certification schemes, high costs associated with certification, and lack of environmentally sensitive markets.

### 5.3.4 Measures taken to improve the willingness to become certified

There are two major measures that have been taken in trying to improve the market situation for forest certification. These are mutual recognition between different certification schemes and umbrella organization certification. It is thought that these actions should solve the problems with low credibility for certification schemes, which in turn will lead to more environmentally sensitive markets, and lower the direct and indirect costs of certification. Regarding the lack of environmentally sensitive markets the stakeholders of certification schemes have to create a higher consumer demand via awareness raising and information. These measures taken are displayed with green arrows and in boxes in the CLD in Figure 9 in order to see where they fit into the system and the dynamics of the system.



**Figure 9: CLD with highlighted measures that indirectly should increase the willingness to become certified**

#### 5.3.4.1 Mutual recognition

Mutual recognition is defined by the International Forest Industry Roundtable (IFIR) as, “Reciprocal and non-discriminatory arrangements under which one certification system owner recognises and accepts other certification systems as being substantively equivalent in intent, outcomes and process in identified critical elements” (Griffiths, 2001, p. 7). There are many reasons as to why different stakeholders in the certification business propose mutual recognition, but the main ones are to gain credibility in the market place for certification as a concept as well as to gain

credibility for the forest industry as a whole (Griffiths, 2001). If there is a mutual recognition between schemes it also decreases the confusion among consumers of what is a credible label and not. This means that, in the CLD in Figure 9, the *mutual recognition* should override the balancing effects that *number of certification schemes* has on the certification system.

The discussion of mutual recognition is mainly between the FSC and the PEFC, while SFI and CSA are in the process of being accepted by PEFC. First of all, PEFC is in itself a certification scheme that mutually recognizes national certification schemes or standards (Raunetsalo *et al.*, 2002). Secondly, FSC also mutually recognizes national schemes such as LEI in Indonesia. However, the reason why stakeholders of FSC do not recognize all other schemes, and especially not PEFC, is because they do not fulfill all the criteria of what constitutes a credible certification scheme (Ozinga, 2001). The discussions regarding mutual recognition are divided as well; some think that many different schemes will create a necessary competition in the market place, whereas other believe that mutual recognition is necessary for the future development of forest certification (Raunetsalo *et al.*, 2002). However, it seems as if mutual recognition should be positive for the certification concept, because according to Rametsteiner (2002b) the fewer the labels in the market the better it is because it makes it easier for the consumer to learn about that label. In a greater perspective, that of the aim of SFM, mutual recognition has to be looked at critically, for it may lower the standards to the lowest common denominator. The discussion about credibility and how credible the different certification schemes are will be returned to in chapter 5.4.

#### 5.3.4.2 Umbrella organization certification

Umbrella organization certification is a measure and instrument developed in order to lower the costs of the certification process for small forest owners and companies (Olof Johansson, personal communication). It works in the way that there are umbrella organizations that small forest owners and companies can join. These umbrella organizations in turn vouch for the members of their organization and they all become certified as one single unit (Olof Johansson, personal communication). These umbrella organizations can consist of many hundreds of forest owners. The objective is to open up certification to all sizes of forest owners, especially the small ones, by decreasing direct costs of certification. A negative aspect of umbrella organization certification can be that not every forestry owner is assessed when becoming certified. They are inspected randomly on different occasions instead and it is for the reason of keeping costs down (Olof Johansson, personal communication).

#### 5.3.4.3 Awareness and information campaigns

Information about the certification concept and about SFM has been a key point of focus by environmental NGOs. These information and awareness campaigns increase the environmental sensitive markets that are very crucial to the willingness to become certified, because there has to be a demand for certified forest products. Gullison (2003) says that there has been a large effort by NGOs in order to change the purchasing patterns among consumers and these efforts have largely been towards FSC certified products. However, he also says that the main efforts have been directed towards larger retailers instead of the private consumer. This could be the outcome of low pressure to certify the chain of custody (Rametsteiner, 2002a). It seems that it currently is easier to get a pull for demand of certified forest products between companies than between the company and the consumer.

### 5.3.5 Certification and trade issues

One additional issue that is relevant to the certification concept and the markets is concerning the actual trade with certified wood products between countries. Certification has to be voluntary and certification cannot be made mandatory by any governments or other organizations, because then it will violate the Technical Barriers to Trade (TBT) agreed on by World Trade Organization (WTO) (Bass, 1998; Berg, 1998; Haener and Luckert, 1998; Rametsteiner, 2002b). Certification also has to be non-discriminatory to regions and types of forests (Bass, 1998; Rametsteiner, 2002b). There are some concerns that certification of forests might already violate the TBT because of the high social standards, as well as the high environmental levels found in the standards of the schemes (Bass, 1998). The main point of this is that certification has to be voluntary to all the forest owners and companies interested, and it cannot be a barrier to trade to not be certified.

In conclusion to this chapter on certification and markets the outlook for a widespread success for certification seems meager. The driving forces of certification do not allow for a major part of the market to become certified, because of low economic incentives as well as large costs. Under these circumstances it does not seem as if the desired effect of certification will take place, which is that companies and forest owners will become certified on the basis that they will otherwise not be able to sell their products. It is also clear from the analysis in this chapter that forest certification has mainly worked in the North and not much has been done in the South. This is a concern because initially FSC started with the intention to make a difference on a global scale, and so far most success has been in the North. It is also in the North that the need is not the greatest, because the management of forests is considered relatively good compared to the South (Gullison, 2003; Olof Johansson, personal communication).

Why have the problems with forest certification and markets occurred and what can happen if these problems are not solved globally, meaning where the need for SFM is greatest? Some see the danger in that companies in the developing world might think certification is too expensive and will deforest instead, take the benefits and move to other regions and continue with the same style, a process called asset-stripping (Bass, 1998; Côté, 1999). In other words a situation similar to the one during the boycotts in the 1980s can occur again, with increasing rates of deforestation instead of a conversion to SFM. Can a market incentive solve the issue of minimal certification in the South? Is the problem only related to too high costs and too low benefits? These issues will be analyzed in chapter 5.5, but first I will turn to the credibility analysis of certification schemes.

### 5.4 Credibility analysis of certification schemes

In this chapter there will be an analysis of the credibility of certification schemes. The reason why this is crucial is because I want to know if forest management will be sustainable if for example 100 per cent of all the forests in the world are certified. That is, I want to know if the certification schemes in their set up, structures, implementation policies, etc. allow for SFM to take place. The focus of analysis is the relationship between the boxes of *quality of certification schemes* and *sustainable forest management*, which is seen in the red arrow in the CLD in Figure 10.

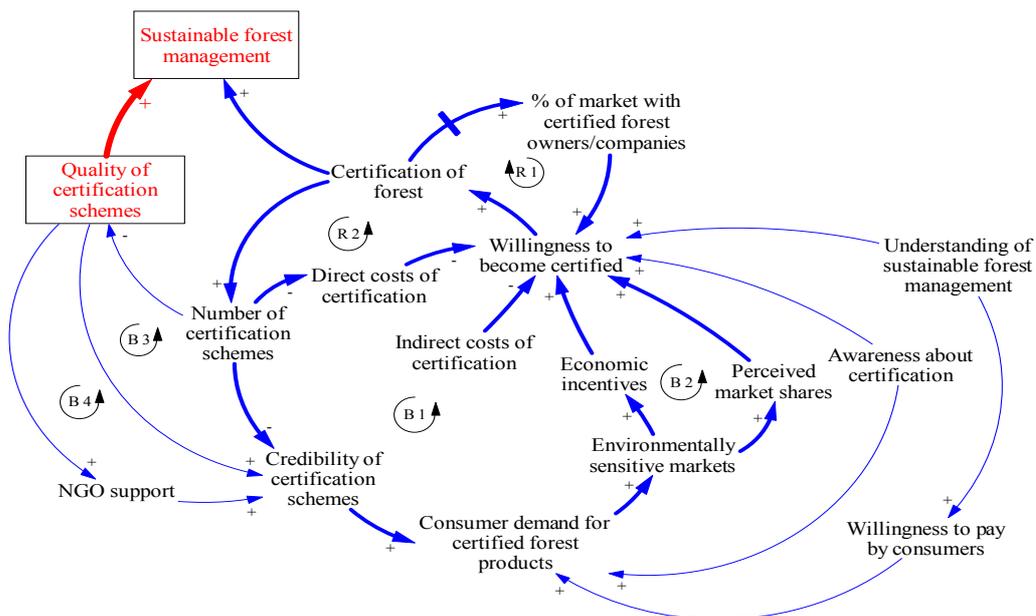


Figure 10: CLD over forestry certification, showing focus of analysis in chapter 5.4

#### 5.4.1 Presentation of results

For this analysis there are some criteria, which have been developed by a wide range of stakeholders that every credible certification scheme should meet. This analysis will help me to understand if the schemes meet the three overarching elements (standards setting process, certification routine, and accreditation procedure) discussed in chapter 5.2. Data used in this analysis will be drawn from other reports and analyses of certification schemes that have been done by Ozinga (2001) on behalf of the Forests and the European Union Resource Network (FERN); Vallejo and Hauselmann (2001) on behalf of WWF and European Forest Team; and from Meridian Institute (2001) on behalf of FSC, Home Depot, and SFI. All of these reports have in one way or another based their analysis on these criteria. It should be noted that only Ozinga (2001) has done a comparative analysis of all these four certification schemes while Vallejo and Hauselmann (2001) did a qualitative analysis of the PEFC. The Meridian Institute (2001) did a comparative analysis between FSC and SFI.

The purpose of this analysis is to learn the overall status of certification schemes currently in the market. But the purpose is also to see which scheme or schemes are credible and as a result will lead to SFM. The conclusion can then be made as to how well the certification as a concept is doing

now and also which of the certification schemes are currently the most preferable one. The summary of different analyses of certification schemes done is found the a matrix in Table 3.

**Table 3: Matrix of analysis on certification schemes and how they perform against criteria representing a credible certification scheme, adapted from Meridian Institute (2001), Ozinga (2001), and Vallejo and Hauselmann (2001)**

Criteria for a credible certification scheme	Certification schemes			
	FSC	PEFC	SFI	CSA
1) Does the scheme have performance-based standards with environmental and social thresholds based on scientifically accepted information?	Yes	No	No	No
2) Does the certification scheme allow for all interested stakeholders to participate in the decision-making process without any domination by a single interest?	Yes	No	No	Yes
3) Is there a credible chain of custody, resulting in labelling of products?	Yes	Partially	No	No
4) Are there independent, impartial, and competent third-party certification bodies auditing the forest management units?	Yes	No	Partially	Yes
5) Is there full transparency for all interests in terms of procedures and documentation?	Yes	No	No	No
6) Is there certification at the local level, i.e. the forest management unit, instead of the national or regional levels?	Yes	No	Yes	Yes
7) Is the certification cost-effective and voluntary?	Yes/Yes	Yes/Partially	Yes/Yes	Not available/Yes
8) Is the certification standards and procedures an iterative process that evolves, adapts, and improves with new knowledge?	Yes	No	No	No
9) Is the certification non-discriminatory and applicable to all forest types, sizes, forest owners, and managers?	Yes	Yes	Yes	Yes
10) Does the certification body have a transparent and functional complaints procedure?	Yes	Partially	Yes	Yes
11) Does the certification procedure show consistency and repeatability?	Yes	Partially	Partially	Partially
12) Is the accreditation process independent and based on internationally accepted methods?	Yes	Partially	Partially	Partially
13) Are the certification standards compatible with national forestry regulations and laws?	Yes	Partially	Yes	Not available

Before analyzing this matrix it should be mentioned that an analysis set up in a summarized form does not give justice to the complexities of the complete answers to the criteria. This shortcoming of the use of tables and matrices is observed by Vallejo and Hauselmann (2001) in their analysis of PEFC as well. However, the purpose of this analysis is not to do an in-depth qualitative analysis of the performance of certification scheme but rather a general overview where tendencies can be seen and for that purpose this matrix is useful.

#### 5.4.2 Analysis of certification schemes

The first impression from this matrix is that only FSC delivers positive answers to all the criteria. The other schemes score positively on occasion yet are not consistent. This conclusion was made by Ozinga (2001) that while, "... the PEFC, the CSA and the SFI incorporate a few of the essential elements of a credible forest certification scheme, the FSC delivers on every component" (p. 51). Besides this overall difference in quality and credibility between FSC, PEFC, SFI, and CSA, there are a few points that should be made about specific issues regarding the certification schemes that are necessary for a general understanding of the current standing of the certification schemes. The points and conclusions below are drawn from the conclusions of Ozinga (2001), Vallejo and Hauselmann (2001), and Gullison (2003).

- Only FSC has clear and binding performance based standards with environmental and social thresholds to be met. The other schemes do not. They are more angled to system or process based standards. This means that FSC focuses more on the actual outcome of the forest management. With FSC there will be a change in management on the ground where it is most needed.
- PEFC and SFI are driven by industry interests and do not have broad stakeholder participation. FSC, and to some extent CSA, have broad stakeholder participation and transparency.
- The certification process is clear and straight-forward in FSC, allowing for very little divergence in outcome of certification, which means that the outcome of FSC certified forests will be more or less the same no matter which certification body that performs the audit. The FSC certification can be repeated and the same outcome is expected. PEFC, especially, has an uneven quality in the result of certification by different certification bodies, because the rules and standards for certification are vague. Neither CSA nor SFI have great certification procedures. Their main concern is that the forest owner or manager, to be certified, can to a large extent make an impact on the standards he or she will be audited against.
- The accreditation procedures in FSC are well-developed, which also ensures that the certification bodies are competent in environmental and social issues related to forestry management. PEFC, SFI, and CSA all use ISO guidelines in their accreditation procedures, which means that their certifying bodies might not be competent within environmental and social issues.
- The final point to be mentioned is the chain of custody certification and the use of labels. This is very important, because all of these schemes are supposedly performance-based systems that can allow for a label to be put on the end-product. Recalling also that the forest certification concept is a market based instrument, there needs to be a connection to the market if there can be positive discrimination of forest products from sustainably managed forests. According to von Kruedener and Burger (1998), "Chain of custody verification is a precondition for credible product labelling, as claims of 'coming from sound sources' can only be substantiated if the product can be traced back to those sources" (p. 31). The problem with SFI and CSA is that, at the point of these analyses in 2001, they did not have any chain of custody certification let alone a label, and this means that they cannot make credible claims of SFM in the market. PEFC has a chain of custody certification but 3 different labels, depending on how much certified wood is in the end product, which means that the consumer can be mislead and confused if there are many labels that say different things. The rules for the chain of custody

certification are vague as are the rules for certification and accreditation. FSC is the only scheme that is purely performance based and it has a credible chain of custody certification.

In terms of the three overarching elements that a credible certification scheme should contain – standards setting process, certification routine, and accreditation procedure – it is only FSC that meets all three of them. PEFC, SFI, and CSA meet some or none of them and could then be said to not be credible certification schemes. This is also the conclusion made by Ozinga (2001).

It should be said that the analyses above are a few years old and that there have been changes done that may have improved these certification schemes since then. A couple can be mentioned here. SFI and CSA have asked the PEFC to endorse them, and this endorsement is currently taking place (CSA, 2003c). With this endorsement, SFI and CSA can use the PEFC logotype on the forest products that they produce, but according to Ozinga (2001) this should not be done because of the fundamental credibility problems concerning PEFC. SFI and CSA have also developed their own logotypes to be used on products (SFI, No date (b); CSA, 2003d). The implication for SFI and CSA to be endorsed by PEFC can be seen as a polarization of the certification schemes in the global market, PEFC versus FSC. If the certification concept boils down to these two standards only it should be a concern when finding out if certification can in itself allow for SFM, because from the analysis above in 2001 there were then great fundamental differences between PEFC and FSC. According to the analyses above, PEFC certified forests are not sustainably managed, whereas FSC certified forests are. These differences between PEFC and FSC, but perhaps more importantly the problems with PEFC, are fundamental, in that they are concerning the lack of broad range stakeholder participation, non-credible certification procedures, as well as unreliable accreditation practices. PEFC did have a consultant company look at the entire PEFC structure in 2002 and give comments where PEFC can improve in credibility, and suggested improvements concerned all these three elements about stakeholder participation, certification, and accreditation. The question is if PEFC will implement these changes (Indufor, 2002).

In addition to these viewpoints presented above there are institutions that argue that the differences between these certification schemes are not necessarily negative. Abusow (2003) discussed FSC, CSA, and SFI in a document written for the Forest Products Association of Canada. In this document the author thinks that the focus of research should not be on what the detailed differences between the schemes are but on the major similarities. All of these certification schemes will lead to SFM in their own way, because, “All 3 standards [FSC, CSA, and SFI] share key, overarching commonalities that together are fundamental building blocks of SFM” (Abusow, 2003, p. 2). However, this analysis made by Abusow (2003) is only a comparison of the similarities of the three schemes, and no conclusions are drawn besides what is already mentioned about that the focus should be on similarities and not on differences. Especially important is that in this study it is just noted that the deep discussions around the differences between the schemes will only lead to us losing sight of the aspects that tie these schemes together (Abusow, 2003). It is important to see that there are opposing views to the idea that FSC is the only credible scheme in the market. However, the differences that according to Abusow (2003) are not important to dwell on too much will determine the credibility of a scheme and if schemes do not meet these important criteria they will not be credible. Furthermore, the differences between schemes regard factors that will determine the actual outcome of how sustainable or non-sustainable the forest management will be on the ground and that is what is important.

To conclude to this chapter, there are some criteria agreed on by governments, industry, scientists, and NGOs about what constitutes a credible certification scheme. Concerning these criteria there are three overarching elements that are fundamental and need to be clear, transparent and reliable: standards setting process, certification routine, and accreditation procedure. There is currently only one certification scheme in the market that meets all these fundamental elements as well as all of the criteria and that is FSC, according to the qualitative analyses performed. PEFC, SFI, and CSA all lack these fundamental elements and criteria to different extents, but enough for them not to be considered credible by NGOs and scientists. Despite the shallow presentation of the analysis in this chapter, it is still good enough to see the general trends in the quality of certification schemes. As of now, the quality of certification schemes is not good enough to promote and allow for SFM, unless FSC is the scheme used. According to Ozinga (2001), "... products labelled by the PEFC, the CSA, or the SFI schemes claiming to come from sustainably managed forests are misleading" (p. 50). One concern about SFM and all the certification schemes including the FSC is that FSC is the only global one. However, PEFC is becoming global by endorsing national certification schemes outside of Europe, but it was started as a regional scheme. Even though FSC is global most of the certification activity has taken place in North America and Europe, because of the national and the regional schemes (PEFC, SFI, and CSA). If certification wants to achieve SFM globally, as is the goal of FSC, then the markets have to work globally as well, which they currently do not. If this is due to the problems with the markets discussed in chapter 5.3 or if other factors are responsible, will be the topic of analysis in the following chapter.

### ***5.5 Factors Other than Forestry Certification in the Pursuit for SFM***

Forestry certification is in theory a very noble attempt to combat deforestation and poor forest management around the world. However, according to literature it does not seem to be as simple as it is in theory. From looking at the market structure and its driving forces it is demonstrated that certification does not work the way theory works. Certification seems to work somewhat or at least has potential to work on a large scale in the North but so far not much has happened in the South. These problems have been pointed out by some authors and they have had concerns that certification will be something for the rich people only, a potential trade barrier, and it will only attract the companies with good management in place already, which means that certification will not make a difference in the forest management on a global scale (Bass, 1998; Berg, 1998; Côté, 1999; Ramesteiner and Simula, 2002). Because of these concerns I have to look at other factors that certification might rest on. Perhaps the importance of other factors being in place is too great for certification to work properly in the market and on the ground. It also seems as if policy instruments other than certification should be used in order to achieve SFM.

*"The overarching prerequisite for forest certification is that there exists adequate policies, legislation and capacities to implement SFM"* (ETC East Africa, 2002, p. 7)

#### ***5.5.1 Prerequisites for certification***

According to Bass (1998) there are four major prerequisites for forest certification to be successful. The first one is that there has to be environmentally sensitive markets. This factor decides the market success and it was discussed in chapter 5.3. The second prerequisite is the forest management already in place has to be considerably good otherwise the indirect costs of certification will be too large. The third factor regards the policies that have to be in place to assist quality forest management. The final prerequisite is that there has to be a place for stakeholder participation. The conclusion Bass (1998) makes to these prerequisites is that there must be

sufficient compensation in money from the first factor so that the costs from the other factors are not a barrier, in other words, for certification to be successful there has to be a solid foundation in terms of national policies and forest management where forest certification can be built on.

The existence of these factors as prerequisites can perhaps explain why there has not been much certification in the South. ETC East Africa (2002) says that in order for certification to be accepted and pursued in Africa and other countries in similar situations, the countries there have to first change their policies and legislation in the direction towards SFM. This will by no means be an easy task, because these countries may not have the potential and the competence to set this up in the first place (Upton and Bass, 1995). Upton and Bass (1995) also say that, "... regulatory and institutional provisions are likely to be needed as a supplement to market-based initiatives such as certification ..." (p. 49). The idea that certification needs to have a base to work from in terms of policies and management, signals that there are not only market failures in regards to the problems of forests. In order to achieve SFM there are also national policy failures that need to be solved, and then not only forest policies. Certification does not only have to have a satisfactory base or policy environment to start from, but some authors argue that certification should not and could not on its own achieve SFM (Rametsteiner, 2002b; Gullison, 2003; Rametsteiner and Simula, 2003).

#### 5.5.2 Issues regarding certification as an instrument for SFM

According to Bass (1998) the destruction of the forest habitat is due to some underlying causes originating in failures of markets, policy, and institutions. An understanding, or rather a picture, of these failures and what they really are is relevant to the understanding of the possibility of certification to solve these failures. However, it is outside the scope of this thesis to go into depth about the direct and indirect causes of deforestation, because it is a very broad issue with many spatially, temporally, nationally, and internationally interrelated problems (Kolk, 1996). At any rate, for the purposes of this thesis some of the issues that are causing forest problems can be presented without putting emphasis on the relative importance between them. The reason for this is that I want to show that there is a great diversity of causes of deforestation and poor management.

Kolk (1996), Elliott (1998), and Côté (1999) discuss the underlying causes of forest degradation and deforestation, and they give a good overview of the complexities regarding these causes. The overall picture they give is that deforestation and poor management of forests is found in land management, because there are many other activities that compete for land use than forestry. These could be activities such as agriculture, animal grazing, mining, dams, and infrastructure. But of course there are many activities around forestry that degrade land as well such as logging roads. Logging roads often have a triggering effect, because they open up the forests to people and other uses such as agriculture. All of these causes of forest degradation and deforestation are also dependent on population growth, industrialization, and consumption, as well as debt, and poor aid policies. Corruption of weak governments plays a considerable role in forest problems as well, because it often allows industry to change the playing field completely and to disregard regulations and enforcement (Côté, 1999; Sieböck, 2002).

From this short presentation above of causes of forest degradation and deforestation it shows that forest problems do not only arise out of unsustainable forest management, but have their roots in other areas. According to Upton and Bass (1995) these problems will not be solved by actions taken from the forestry perspective only. This is what forest certification is trying to do according to Rametsteiner and Simula (2003), "The initiatives on forest certification have set out to tackle an immensely diverse field by using one single instrument across the globe and across all conceivable

situations” (p. 2). However, other instruments or perspectives have to be considered because all the root causes have to be taken into consideration otherwise it will not be possible to achieve SFM (Côté, 1999). It seems as if certification may not be fit to solve issues regarding global forests, because it is a market incentive intent on solving some market failures, and evidently, there are other failures as well outside the market and the forestry sector.

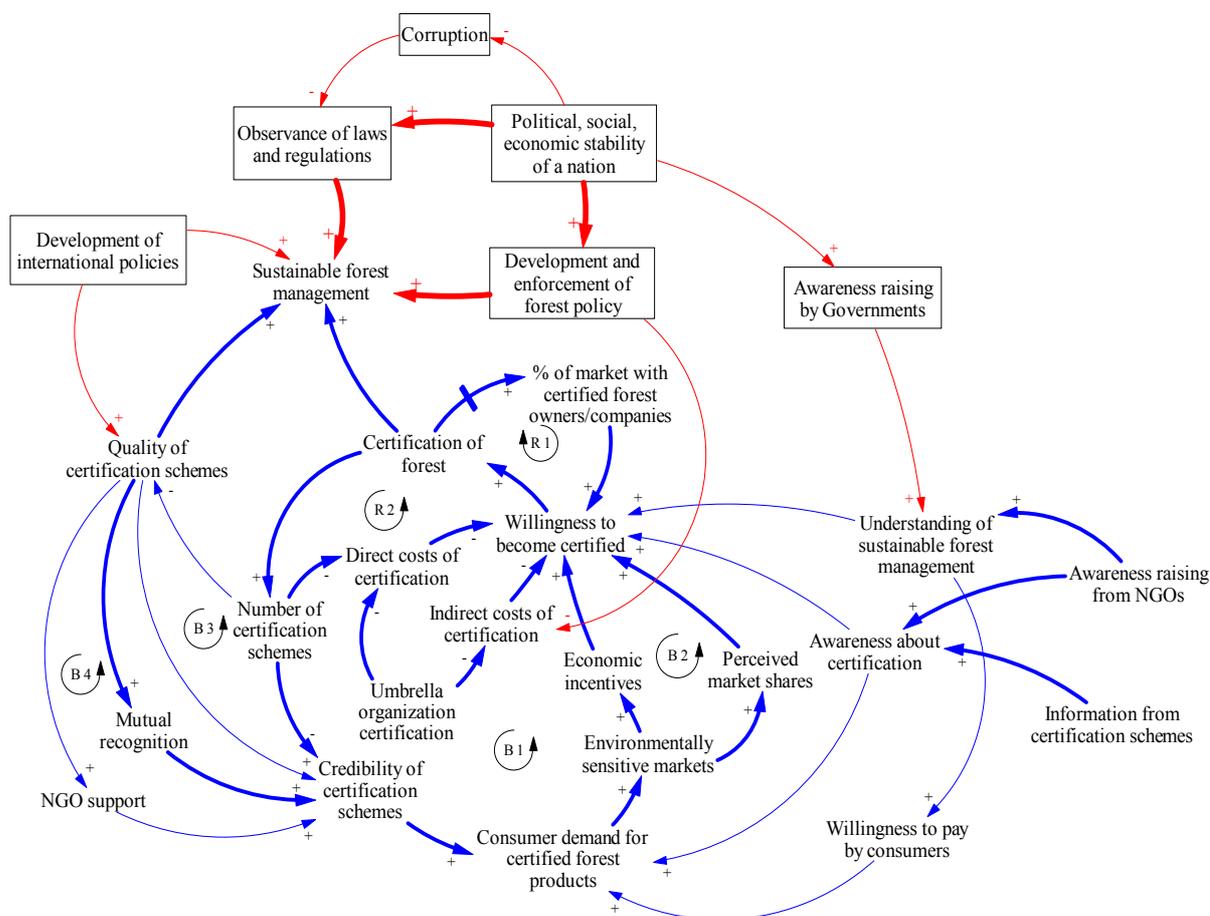
The main problems with the certification instrument are that it cannot solve failures with policy and institutions, and it cannot solve problems regarding management of forest land that does not regard forest management, e.g. agriculture (Upton and Bass, 1995; Bass, 1998). Connelly and Smith (1999) elaborate on different means and instruments on how to solve environmental problems that have arisen in society. These means can be voluntary (such as certification), regulations and enforcement, and economic instruments (such as forest certification). The conclusions they draw as to when to use what means and why, are that each one of these means and instruments have advantages and disadvantages and should therefore not be applied in isolation, “...sensible policy in respect of the environment will therefore rely not on one or other mechanism to the exclusion of all others, but on a mixture depending on the conditions facing it” (Connelly and Smith, 1999, p. 172). It seems then as if forest certification could still be useful in the pursuit for SFM, but only as a complementary tool in a bigger strategy (Rametsteiner and Simula, 2003). Rametsteiner (2002b) agrees with this point because of poor results that forest certification has had so far in improving the forest health globally.

### 5.5.3 Governments, forest certification, and SFM

Governments and their role in forest certification in connection to SFM is the last thing to analyze in this chapter. According to Rametsteiner (2002b) governmental action in regards to certification has ranged from not participating at all to funding of certification schemes. Out of this variety of actions there seems to be two ways that governments can and should complement certification. However, governments cannot go in and demand all imports of wood to be certified, without it being mandatory for all companies in the country to be certified, because that would be a violation of the TBT agreement (Haener and Luckert, 1998). In any case, the first action that governments can take is to indirectly assist certification by setting up policies of and enforce SFM, because that will decrease the costs of certification for the companies and forest owners (Rametsteiner, 2002b). General education of SFM is also an action that would improve the situation for certification. The second action is more direct; they can work towards strengthening the forest certification as a market incentive (Rametsteiner, 2002b). They can do this by public procurement.

Governments could also and should also work towards SFM and preventing deforestation in other areas than the two presented above, because poor forest management and deforestation has multiple causes that have roots in other policy areas than forest policy. However, this deeper discussion and analysis of governments and their role in deforestation, and what they can and should do about it is outside the scope of this thesis.

Finally, I have conceptualized the other factors that forestry certification and SFM are dependent on in boxes and with red arrows in the CLD in Figure 11.



**Figure 11: CLD with other factors influencing forest certification and sustainable forest management**

One aspect in this CLD that has not been mentioned yet is the impact development of international policies has on SFM and certification schemes. There are many intergovernmental processes that have and are working for development of criteria and indicators of SFM, e.g. the Helsinki and the Montreal process (Ozinga, 2001). These criteria and indicators should be used by countries to work towards SFM on a national level. Therefore, development of international policies should lead to SFM. Since these processes are government driven the criteria and indicators they produce are highly legitimate and that is why some certification schemes have based their criteria and principles on these processes, e.g. PEFC which has adopted the criteria and indicators from the Helsinki process to be more legitimate in the market place (Rametsteiner, 2002b). That is why development of international policies increases the quality of certification schemes, because the better these international processes are the better the certification schemes adopting them should become.

In conclusion to this chapter there seems to be some fundamental problems concerning the potential outcome of forest certification as a remedy to deforestation and poor forest management. The main problems are that the acceptance and success of certification in a country or part of the world depend not only on the costs versus benefits but also on the status of the country in terms of availability of and enforcement of forest policies and forest management. Another main issue is that forest certification as a market instrument cannot solve major underlying causes to deforestation and poor forest management that arise from policy failures as well as institutional failures. This

means that forest certification should be seen as one of many options to deal with forest issues. This is shown in that forest certification has to date had most success from a market perspective in areas of the world where there are prerequisites in place, such as already acceptable forest management, and social and economic policies in place that do not give rise to failures. It seems in the end from the analysis in this chapter as if certification should only be used as one component of a holistic approach to combat deforestation and poor forest management on a global scale.

## **6.0 Discussion**

### ***6.1 Fundamental issues of the certification concept***

In the introduction I presented the example of Easter Island and the fate this society saw. I think it is a good example of what could potentially happen to the Earth. Maybe humans will not completely deforest the entire globe. However, the loss and state of forests might become severe enough to cause major problems within and between societies, because of the enormous value that the forest ecosystem has to humans.

Forestry certification is a nice effort to protect and save forests, however, there are fundamental problems to this concept. I believe that the process of defining SFM is the most fundamental issue that certification faces. Recalling that the ultimate aim of certification is SFM, then the definition of SFM is crucial, because it must be known what the goal really is. I believe that the standards (Principles, criteria, and indicators), which are linked to the formulation of the definition, are the key to SFM. The standards represent how all the stakeholders of a certification scheme view SFM and they are also a blue print of how to achieve SFM. If there is not complete stakeholder participation at all levels, there cannot be SFM, because SFM is a holistic concept, encompassing everything and everybody. The problem of narrow stakeholder participation as in some certification schemes (e.g. PEFC and SFI) is also the link to credibility of schemes, because there must be broad stakeholder participation in all parts; in definition process, standard setting process etc. to allow for SFM to take place. The problems with the acceptance of the markets are less fundamental issues as compared to definition and participation. If the certification schemes cannot deliver true SFM on the ground via their standards, then it does not matter if everybody is certified. Certification per se is no guarantee for SFM.

One can still wonder why the certification concept has not given results on a global scale. The major efforts are in the North. I agree that the ideas of certification that e.g. WWF and researchers support are interesting and definitely have potential, or at least they should have. They basically argue that certification is the answer to the problems of our forest, because poorly managed forests will be forced out of the market, and this should not be overly difficult. WWF (2001) says that, "...50 companies process 43% of the world annual harvest of industrial wood" (p. 17), and this shows that if these companies become certified, and then with the FSC certification, which WWF is a stakeholder of, a pull or a need can be created for the rest of the companies to become certified. This sounds very simple, and it is logical as well, because it is argued that there will be no widespread certification or SFM on the ground if the main actors, i.e. industry and business, are not involved in the process (Terstad, 1999; Vogt *et al.*, 2000; WWF, 2001). Putting the industry and the consumers together in this quest for SFM seems to be a good way to solve forest problems, because then two critical market failures – externalities and information asymmetry – will be solved since certification aims at solving these two. However, I believe this idea of certification would work if

the world and the markets worked perfectly (but if they did there would not be any forest problems in the first place), but there are two main reasons as I see it to why certification does not work out.

These reasons are fundamental and not necessarily the visible reasons that have been explored throughout this paper. The first one regards the feature of complex systems. According to Anderson and Johnson (1997) there are known virtues and weaknesses of large and complex systems, regardless of what the systems are. One of these is the self-stabilizing effect these systems are likely to have. This means large systems like forest certification, or rather the problems with forest management and deforestation, have many balancing forces to make the current system stay the way it does. For example low incentives of certification and large environmentally insensitive markets such as Japan – where only 0.2 per cent of the traded wood products are certified (Gullison, 2003) – will balance efforts of certification. Another weakness is that large systems have many subsystems that have to work in order for the system to work properly. This is definitely the case with forestry certification and deforestation. A problem linked to this is that with all these subsystems many of them have conflicting goals, e.g. the reasons why different stakeholders chose to become certified or what is the ultimate goal of certification between stakeholder groups. This is problematic because the ultimate goal of certification is SFM but that is not necessarily the goal of all systems involved in certification.

The second reason is the thinking behind which the whole idea that certification is founded on. O'Connor and McDermott (1997) say that, “We are taught to think logically, to understand by analyzing – breaking events into pieces and then reassembling them” (p. xvi) and this might be good on occasion but in general this thinking does not work with systems, because of their unpredictability. What this logical thinking in pieces and parts also does is that, “...it tends to see simple sequences of cause and effect that are limited in time and space, rather than as a combination of factors that mutually influence each other” (O'Connor and McDermott, 1997, p. xvii). This thinking can be seen in the foundation of certification, because what people saw was the cause of forests problems in the fundamental market failures, external costs and information asymmetry, and the effect was forest problems. Then they saw that fixing these market failures with a market based instrument would help to solve the problem; a simple cause and effect. This has not happened yet, but it should be noticed that certification only has been around for about 10 years and perhaps more time is needed to see the true effects of it, but what has happened so far is that there are more problems created that are important for the outcome of certification, such as high costs of certification and confusion for the consumers.

In complement to these two reasons above is a problem of the major assumptions that certification is based upon. The assumption is that consumers care about the forests to the extent that they will pay extra for certified products and this in turn will create economic incentives for producers to become certified. The higher rates of certification in the North as compared to the South might be an indication that the behavior necessary for these assumptions about consumer demand is present there. However, more or less the only markets for certified wood products in the North are found in the UK, the Netherlands, and Germany (Gullison, 2003) and the overall share of certified wood products in the market in Europe is only around 5 per cent as of 2002 (Rametsteiner, 2002a). This, on the other hand, indicates that there is very low consumer care and demand for certified wood products. Then forest certification falls on one of its basic driving forces for certification.

## **6.2 Final considerations**

I also question the idea that FSC certification will be successful with the industry, which is the hope of WWF. WWF believes that with broad industry participation then radical changes to the amount of certified forests can be made. FSC should be the one to incorporate the forest industry. According to the analysis it is the only credible certification scheme and it has high probability to achieve SFM or good quality forest management. The reason why I disagree with this idea of the WWF is that so far it seems as if industry has been quite reluctant to join FSC. FSC strives for global SFM and is credible, and if this was the true goal of industry they should have joined, but instead they have come up with their own certification schemes in response to FSC (Cashore *et al.*, 2003), such as PEFC and SFI. These schemes are regional and not focused on the areas of greatest concern, the forests in the South. It is also interesting that the industry calls for mutual recognition between PEFC and FSC. Now they want to be seen as equal to FSC, despite the flaws that they carry. Why did they not stick to FSC in the beginning if they now want to be mutually recognized? FSC has all the good virtues and goals. All of these problems that come up, problems of conflicting goals and other problems of complex systems make me wonder about the possibility for certification to really make a change where it ultimately has to: on the local forest management level, i.e. in the forest itself.

I believe that forest certification as a concept with all its stakeholders has to rethink some of the fundamental assumptions and then look at the system from a systems thinking perspective and realize where the problems are, and that they might not be in certification. It could be that the ways to deal with deforestation and poor management is to focus on land use management instead, as suggested by Côté (1999), and in particular agriculture. Kolk (1996) presents figures from different sources that agriculture is held accountable for 60 to 80 per cent of forest loss in the tropics during the last 20 years. According to the FAO (2001), out of a net loss of natural forests, which was 16.1 million hectares per year between 1990 and 2000, 14.6 million hectares were lost to other uses of land due to deforestation and only 1.5 million hectares were converted to forest plantation. These numbers should help the stakeholders of certification realize that perhaps certification really should be only one tool among many that should be applied in the quest for saving the forests of the world. The reason for this is that certification can only be useful if forest management is practiced, but this is not the case with most of the destruction of the forests in the world. In most places in the world land management is practiced and not forest management (Côté, 1999), which is backed up by the 14.6 million hectares of forests lost to other land uses. Therefore, a wide array of tools should be applied if the vast deforestation of forests should come to an end.

## **7.0 Conclusions and Suggestions for the Future**

The intention and objective of this thesis was to find out the present and future possibility for forestry certification to reach sustainable forest management in the world. An understanding of the main research question – Will forestry certification lead to sustainable forest management? – was gained via analysis of the areas of most concern of forestry certification: the concept of sustainable forest management, the quality of current certification schemes, market functionality, and other factors important for sustainable forest management. From this analysis it is evident that forestry certification will not lead to global sustainable forest management. However, it could potentially lead to regional sustainable forest management.

There are many flaws with certification schemes and the way the markets work or do not work. The market works in the North where there is already relatively good forestry management. There are also environmentally sensitive markets in the North. The environmentally sensitive consumers are the key, because the consumer is the most important actor in the success of certification in the market.

Despite the problems with the acceptance of certification in the markets, there is another fundamental problem and that is the problem of credibility of certification schemes. This is important because the credibility of a scheme confirms if it will promote SFM via their standards in the location where it counts, namely in the forest management. From analysis made in this thesis, there is currently only one credible certification scheme and that is the Forest Stewardship Council.

The problem with the slow acceptance of certification in the South is, it seems, due to a lack of fundamental structures in policies in the forestry sectors of countries. But it is also due to the fact that most of the problems with forests in the South originate outside poor forest management, but they rather originate in poor overall land management such as conversion to agriculture. However, logging and poor forest management can sometimes be a catalyst of deforestation. What this means is that certification is trying to solve poor forest management, but in reality it is not forest management that is carried out in the South but land management. Therefore, forestry certification should be applied as one of many tools to improve the forest situation and efforts need also to be made in land management sectors.

Based on the analysis of this thesis I suggest future research to do qualitative studies based on interviews of people, NGOs, forest companies, and other stakeholders living in areas where deforestation occurs. The point of this kind of research would be to learn what specific factors are seen as problems of deforestation on a local level. Alongside to this, it can be better understood how forestry certification can be integrated as one tool of many.

## 8.0 References:

- Abusow, K. 2003. Focusing on Certification Similarities to Promote SFM. Forest Products Association of Canada (FPAC), Ottawa, Canada.
- Anderson, V. and L. Johnson. 1997. *Systems Thinking Basics: From Concepts to Causal Loops*. Pegasus Communications Inc., Waltham, USA.
- Bass, S. 1998. Forest Certification: The Debate about Standards. Rural Development Forestry Network, London, UK.
- Berg, S. 1998. Drivkrafterna: Miljöproblem Blir en Global Fråga. (The Driving Forces: Environmental Problems Becoming a Global Issue). (In Swedish). *Skog & Forskning*. 2:6-11.
- Bryant, D., D. Nielsen and L. Tangely. 1997. *The Last Frontier Forests: Ecosystems and Economies on the Edge*. World Resource Institute, Washington D.C., USA.
- Canadian Standards Association (CSA). 2003a. *About the CSA*. <http://www.sfms.com/csa.htm>. Accessed on October 14<sup>th</sup>, 2003.
- Canadian Standards Association (CSA). 2003b. *Sustainable Forest Management: Requirements and Guidance*. <http://www.csa.ca/%5Crepository%5Cgroup%5CZ809-02july.pdf>. Accessed on October 20<sup>th</sup>, 2003.
- Canadian Standards Association (CSA). 2003c. *Mutual Recognition*. <http://www.sfms.com/recognition.htm>. Accessed on October 27<sup>th</sup>, 2003.
- Canadian Standards Association (CSA). 2003d. *The CSA Chain-of-Custody and Label Option*. <http://www.certificationcanada.org/csa.htm>. Accessed on October 14<sup>th</sup>, 2003.
- Cashore, B., G. Auld and D. Newsom. 2003. Forest Certification (Eco-labeling) Programs and Their Policy-making Authority: Explaining Divergence among North American and European Case Studies. *Forest Policy and Economics*. 5:225-247.
- Chihambakwe, M., R. Mupudzi and P.T. Mushove. 1997. Forestry Certification: A Developing World Viewpoint. *Commonwealth Forestry Review*. 76:191-193.
- Connelly, J. and G. Smith. 1999. *Politics and the Environment: From Theory to Practice*. Routledge, London, UK.
- Côté, M-A. 1999. Possible Impact of Forest Product Certification on the Worldwide Forest Environment. *The Forestry Chronicle*. 75:208-212.
- Eid, T., H.F. Hoen and P. Økseter. 2001. Economic Consequences of Sustainable Forest Management Regimes at Non-industrial Forest Owner Level in Norway. *Forest Policy and Economics*. 2:213-228.
- Elliott, L. 1998. *The Global Politics of the Environment*. MacMillan Press Ltd., London, UK.
- ETC East Africa. 2002. Development of Capacity Building Strategies for Forest Certification in East Africa. ETC East Africa, Nairobi, Kenya.
- Food and Agriculture Organization of the United Nations (FAO). 2001. *Global Forest Resources Assessment 2000 Main Report*. FAO Forestry Paper 140, Rome, Italy.
- Forest Stewardship Council (FSC). No date (a). *Who are We?* <http://www.fscoax.org/principal.htm>. Accessed on October 14<sup>th</sup>, 2003.
- Forest Stewardship Council (FSC). No date (b). *Documents list*. <http://www.fscoax.org/principal.htm>. Accessed on November 10<sup>th</sup>, 2003.
- Griffiths, J. 2001. Proposing an International Mutual Recognition Framework. Working Group on Mutual Recognition between Credible Sustainable Forest Management Certification Systems and Standards. <http://www.sfms.com/pdfs/ifirframework.pdf>. Accessed on September 10<sup>th</sup>, 2003.
- Gullison, R.E. 2003. Does Forest Certification Conserve Biodiversity? *Oryx*. 37:153-165.

- Haener, M.K. and M.K. Luckert. 1998. Forest Certification: Economic Issues and Welfare Implications. *Canadian Public Policy*. 24:83-94.
- Helsinki Process. 2003. *RESOLUTION H1: General Guidelines for the Sustainable Management of Forests in Europe*. <http://www.minconf-forests.net/secure/k-tools/phplib/MedienDatenbankView.inc.php?id=269>. Accessed on October 20<sup>th</sup>, 2003.
- Indufor. 2002. Strengthening the PEFC Certification Framework. Indufor, Helsinki, Finland.
- Intergovernmental Panel on Forests (IPF). No date. *IPF Proposals for Action*. <http://www.un.org/esa/forests/pdf/ipf-iff-proposalsforaction.pdf>. Accessed on November 2<sup>nd</sup>, 2003.
- Kiker, C.F. and F.E. Putz. 1997. Ecological Certification of Forest Products: Economic Challenges. *Ecological Economics*. 20:37-51.
- Kolk, A. 1996. *Forests in International Environmental Politics*. International Books, Utrecht, Netherlands.
- von Kruedener, B. and D. Burger. 1998. Forest Certification: A Consumer-driven Market Instrument with Potential to Promote Sustainable Development. *Gate*. 2:30-35.
- Lindhe, A. and P. Stenmark. 1998. *Certifiering av Skogsbruk. (Certification of Forestry)*. (In Swedish). Sveriges Skogsvårdsförbund, Danderyd, Sweden.
- Lindstrand, N. 1998. Blanda inte Äpplen och Päron – Certifiering och Bra Skogsbruk Behöver inte Vara Samma Sak. (Do not Mix Apples and Pears – Certification and Good Forestry Are not Necessarily the Same Thing). (In Swedish). *Skog & Forskning*. 2:13-16.
- Merry, F.D. and D.R. Carter. 1997. Certified Wood Markets in the US: Implications for Tropical Deforestation. *Forest Ecology and Management*. 92:221-228.
- Montreal Process. 1998. *Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests*. [http://www.mpci.org/rep-pub/1995/santiago\\_e.html#appendix](http://www.mpci.org/rep-pub/1995/santiago_e.html#appendix). Accessed on October 20<sup>th</sup>, 2003.
- Pan European Forest Certification (PEFC). No date (a). *What is PEFC?* <http://www.pefc.org/about4.htm>. Accessed on October 14<sup>th</sup>, 2003.
- Pan European Forest Certification (PEFC). No date (b). *PEFC Terms and Definitions*. [http://www.pefc.org/TechDocs/Annex1\\_Definitions\\_2002-11-22.pdf](http://www.pefc.org/TechDocs/Annex1_Definitions_2002-11-22.pdf). Accessed on October 20<sup>th</sup>, 2003.
- Pan European Forest Certification (PEFC). No date (c). *Pan-European Criteria and Indicators for Sustainable Forest Management*. <http://www.mcpfe.org/secure/ktools/phplib/MedienDatenbankView.inc.php?id=128>. Accessed on November 10<sup>th</sup>, 2003.
- Ponting, C. 1991. *A Green History of the World: The Environment and the Collapse of Great Civilizations*. Penguin Books USA Inc., New York, USA.
- Martinussen, J. 1997. *Society, State & Market: A Guide to Competing Theories of Development*. Zed Books Ltd, London, UK.
- Meridian Institute. 2001. *Comparative Analysis of the Forest Stewardship Council and Sustainable Forestry Initiative Certification Programs*. Meridian Institute, Washington, DC., USA.
- Miller, G.T. 2000. *Living in the Environment: Principles, Connections, and Solutions*, 11<sup>th</sup> edition. Brooks/Cole Publishing Company, Pacific Grove, USA.
- O'Connor, J. and I. McDermott. 1997. *The Art of Systems Thinking*. Thorsons, London, UK.
- Oliver, R. 2001. *Comparative Matrix of Forest Certification Schemes*. Confederation of European Paper Industries (CEPI), Brussels, Belgium.
- Ozinga, S. 2001. *Behind the Logo: An Environmental and Social Assessment of Forest*

Certification Schemes. Forests and the European Union Resource Network (FERN), Moreton-in-Marsh, UK.

- Rametsteiner, E. 2002a. Markets for Certified Forest Products. In UNECE/FAO, *Forest Products Annual Market Review, 2001-2002*. United Nations Publications, Geneva, Switzerland.
- Rametsteiner, E. 2002b. The Role of Governments in Forest Certification – A Normative Analysis Based on New Institutional Economics Theories. *Forest Policy and Economics*. 4:163-173.
- Rametsteiner, E. and M. Simula. 2003. Forest Certification – An Instrument to Promote Sustainable Forest Management? *Journal of Environmental Management*. 67:87-98.
- Raunetsalo, J., H. Juslin, E. Hansen and K. Forsyth. 2002. Forest Certification Update for the UNECE Region, Summer 2002. United Nations Publications, Geneva, Switzerland.
- Sieböck, G. 2002. A Political, Legal and Economic Framework for Sustainable Forest Management in Cameroon. Concerted Initiatives to Save the Rainforests. Masters thesis. Lund University, Lund, Sweden.
- Sjunnesson, S. 2001. Reflexioner Kring Begreppet Uthålligt Skogsbruk. (Reflections Concerning the Concept of Sustainable Forestry). In Uthållighet – Var, När, Hur och Varför... (Sustainability – Where, When, How and Why...). Sustainable Forestry in Southern Sweden (SUFOR). <http://www.sufor.nu/Webbsidor/Arsskrift2001.pdf>. Accessed on August 15<sup>th</sup>, 2003.
- Stjernquist, I. 2001. Uthållighetsbegreppet på Olika Beslutsnivåer – Kan De Mötas? (The Concept of Sustainability at Different Levels of Decision-making – Can They Agree with Each Other?). In Uthållighet – Var, När, Hur och Varför... (Sustainability – Where, When, How and Why...). Sustainable Forestry in Southern Sweden (SUFOR). <http://www.sufor.nu/Webbsidor/Arsskrift2001.pdf>. Accessed on August 15<sup>th</sup>, 2003.
- Sustainable Forestry Initiative (SFI). No date (a). *About SFI*. <http://www.aboutsfi.org/about.asp>. Accessed on October 14<sup>th</sup>, 2003.
- Sustainable Forestry Initiative (SFI). No date (b). *SFI History*. <http://www.aboutsfb.org/>. Accessed on October 14<sup>th</sup>, 2003.
- Sustainable Forestry Initiative (SFI). 2002. *2002-2004 Edition Sustainable Forestry Initiative® (SFI) Program*. <http://www.sampsongroup.com/acrobat/2002-2004%2520Standard.pdf>. Accessed on October 20<sup>th</sup>, 2003.
- Terstad, J. 1999. Swedish Experiences of Incentives for the Protection of Nature. *The Science of the Total Environment*. 240:189-196.
- United Nations (UN). 2000. *Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all Types of Forests*. <http://www.un.org/documents/ga/conf151/aconf15126-3annex3.htm>. Accessed on October 20<sup>th</sup>, 2003.
- Upton, C. and S. Bass. 1995. *The Forest Certification Handbook*. Earthscan Publications Ltd., London, UK.
- Vallejo, N. and P. Hauselmann. 2001. PEFC – An Analysis. Pi Environmental Consulting, Pully, Switzerland.
- Vogt, K.A., B.C. Larson, J.C. Gordon, D.J. Vogt and A. Fanzeres. 2000. *Forest Certification: Roots, Issues, Challenges, and Benefits*. CRC Press LLC, Boca Raton, USA.
- World Wide Fund for Nature (WWF). 2001. *The Forest Industry in the 21<sup>st</sup> Century*. World Wide Fund for Nature (WWF), Godalming, UK.

#### **Interview:**

- Olof Johansson. Ecologist at Sveaskog AB, Växjö, Sweden. Interview on August 15<sup>th</sup>, 2003.

## **Appendix 1: FSC Principles and Criteria (FSC, No date (b))**

### **PRINCIPLE #1: COMPLIANCE WITH LAWS AND FSC PRINCIPLES**

Forest management shall respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory, and comply with all FSC Principles and Criteria.

- 1.1 Forest management shall respect all national and local laws and administrative requirements.
- 1.2 All applicable and legally prescribed fees, royalties, taxes and other charges shall be paid.
- 1.3 In signatory countries, the provisions of all binding international agreements such as CITES, ILO Conventions, ITTA, and Convention on Biological Diversity, shall be respected.
- 1.4 Conflicts between laws, regulations and the FSC Principles and Criteria shall be evaluated for the purposes of certification, on a case by case basis, by the certifiers and the involved or affected parties.
- 1.5 Forest management areas should be protected from illegal harvesting, settlement and other unauthorized activities.
- 1.6 Forest managers shall demonstrate a long-term commitment to adhere to the FSC Principles and Criteria.

### **PRINCIPLE #2: TENURE AND USE RIGHTS AND RESPONSIBILITIES**

Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.

- 2.1 Clear evidence of long-term forest use rights to the land (e.g. land title, customary rights, or lease agreements) shall be demonstrated.
- 2.2 Local communities with legal or customary tenure or use rights shall maintain control, to the extent necessary to protect their rights or resources, over forest operations unless they delegate control with free and informed consent to other agencies.
- 2.3 Appropriate mechanisms shall be employed to resolve disputes over tenure claims and use rights. The circumstances and status of any outstanding disputes will be explicitly considered in the certification evaluation. Disputes of substantial magnitude involving a significant number of interests will normally disqualify an operation from being certified.

### **PRINCIPLE #3: INDIGENOUS PEOPLES' RIGHTS**

The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.

- 3.1 Indigenous peoples shall control forest management on their lands and territories unless they delegate control with free and informed consent to other agencies.
- 3.2 Forest management shall not threaten or diminish, either directly or indirectly, the resources or tenure rights of indigenous peoples.
- 3.3 Sites of special cultural, ecological, economic or religious significance to indigenous peoples shall be clearly identified in cooperation with such peoples, and recognized and protected by forest managers.
- 3.4 Indigenous peoples shall be compensated for the application of their traditional knowledge regarding the use of forest species or management systems in forest operations. This compensation shall be formally agreed upon with their free and informed consent before forest operations commence.

### **PRINCIPLE #4: COMMUNITY RELATIONS AND WORKER'S RIGHTS**

Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.

- 4.1 The communities within, or adjacent to, the forest management area should be given opportunities for employment, training, and other services.
- 4.2 Forest management should meet or exceed all applicable laws and/or regulations covering health and safety of employees and their families.
- 4.3 The rights of workers to organize and voluntarily negotiate with their employers shall be guaranteed as outlined in Conventions 87 and 98 of the International Labour Organisation (ILO).
- 4.4 Management planning and operations shall incorporate the results of evaluations of social impact. Consultations shall be maintained with people and groups directly affected by management operations.
- 4.5 Appropriate mechanisms shall be employed for resolving grievances and for providing fair compensation in the case of loss or damage affecting the legal or customary rights, property, resources, or livelihoods of local peoples. Measures shall be taken to avoid such loss or damage.

### **PRINCIPLE # 5: BENEFITS FROM THE FOREST**

Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.

- 5.1 Forest management should strive toward economic viability, while taking into account the full environmental, social, and operational costs of production, and ensuring the investments necessary to maintain the ecological productivity of the forest.
- 5.2 Forest management and marketing operations should encourage the optimal use and local processing of the forest's diversity of products.
- 5.3 Forest management should minimize waste associated with harvesting and on-site processing operations and avoid damage to other forest resources.
- 5.4 Forest management should strive to strengthen and diversify the local economy, avoiding dependence on a single forest product.

5.5 Forest management operations shall recognize, maintain, and, where appropriate, enhance the value of forest services and resources such as watersheds and fisheries.

5.6 The rate of harvest of forest products shall not exceed levels which can be permanently sustained.

#### **PRINCIPLE #6: ENVIRONMENTAL IMPACT**

Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.

6.1 Assessment of environmental impacts shall be completed -- appropriate to the scale, intensity of forest management and the uniqueness of the affected resources -- and adequately integrated into management systems. Assessments shall include landscape level considerations as well as the impacts of on-site processing facilities. Environmental impacts shall be assessed prior to commencement of site-disturbing operations.

6.2 Safeguards shall exist which protect rare, threatened and endangered species and their habitats (e.g., nesting and feeding areas). Conservation zones and protection areas shall be established, appropriate to the scale and intensity of forest management and the uniqueness of the affected resources. Inappropriate hunting, fishing, trapping and collecting shall be controlled.

6.3 Ecological functions and values shall be maintained intact, enhanced, or restored, including:

- a) Forest regeneration and succession.
- b) Genetic, species, and ecosystem diversity.
- c) Natural cycles that affect the productivity of the forest ecosystem.

6.4 Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources.

6.5 Written guidelines shall be prepared and implemented to: control erosion; minimize forest damage during harvesting, road construction, and all other mechanical disturbances; and protect water resources.

6.6 Management systems shall promote the development and adoption of environmentally friendly non-chemical methods of pest management and strive to avoid the use of chemical pesticides. World Health Organization Type 1A and 1B and chlorinated hydrocarbon pesticides; pesticides that are persistent, toxic or whose derivatives remain biologically active and accumulate in the food chain beyond their intended use; as well as any pesticides banned by international agreement, shall be prohibited. If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks.

6.7 Chemicals, containers, liquid and solid non-organic wastes including fuel and oil shall be disposed of in an environmentally appropriate manner at off-site locations.

6.8 Use of biological control agents shall be documented, minimized, monitored and strictly controlled in accordance with national laws and internationally accepted scientific protocols. Use of genetically modified organisms shall be prohibited.

6.9 The use of exotic species shall be carefully controlled and actively monitored to avoid adverse ecological impacts.

6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion:

- a) entails a very limited portion of the forest management unit; and
- b) does not occur on high conservation value forest areas; and
- c) will enable clear, substantial, additional, secure, long term conservation benefits across the forest management unit.

#### **PRINCIPLE #7: MANAGEMENT PLAN**

A management plan -- appropriate to the scale and intensity of the operations -- shall be written, implemented, and kept up to date. The long term objectives of management, and the means of achieving them, shall be clearly stated.

7.1 The management plan and supporting documents shall provide:

- a) Management objectives.
- b) Description of the forest resources to be managed, environmental limitations, land use and ownership status, socio-economic conditions, and a profile of adjacent lands.
- c) Description of silvicultural and/or other management system, based on the ecology of the forest in question and information gathered through resource inventories.
- d) Rationale for rate of annual harvest and species selection.
- e) Provisions for monitoring of forest growth and dynamics.
- f) Environmental safeguards based on environmental assessments.
- g) Plans for the identification and protection of rare, threatened and endangered species.
- h) Maps describing the forest resource base including protected areas, planned management activities and land ownership.
- i) Description and justification of harvesting techniques and equipment to be used.

7.2 The management plan shall be periodically revised to incorporate the results of monitoring or new scientific and technical information, as well as to respond to changing environmental, social and economic circumstances.

7.3 Forest workers shall receive adequate training and supervision to ensure proper implementation of the management plan.

7.4 While respecting the confidentiality of information, forest managers shall make publicly available a summary of the primary elements of the management plan, including those listed in Criterion 7.1.

#### **PRINCIPLE #8: MONITORING AND ASSESSMENT**

Monitoring shall be conducted -- appropriate to the scale and intensity of forest management -- to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.

8.1 The frequency and intensity of monitoring should be determined by the scale and intensity of forest management operations as well as the relative complexity and fragility of the affected environment. Monitoring procedures should be consistent and replicable over time to allow comparison of results and assessment of change.

8.2 Forest management should include the research and data collection needed to monitor, at a minimum, the following indicators:

- a) Yield of all forest products harvested.
- b) Growth rates, regeneration and condition of the forest.
- c) Composition and observed changes in the flora and fauna.
- d) Environmental and social impacts of harvesting and other operations.
- e) Costs, productivity, and efficiency of forest management.

8.3 Documentation shall be provided by the forest manager to enable monitoring and certifying organizations to trace each forest product from its origin, a process known as the "chain of custody."

8.4 The results of monitoring shall be incorporated into the implementation and revision of the management plan.

8.5 While respecting the confidentiality of information, forest managers shall make publicly available a summary of the results of monitoring indicators, including those listed in Criterion 8.2.

#### **PRINCIPLE 9: MAINTENANCE OF HIGH CONSERVATION VALUE FORESTS**

Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

9.1 Assessment to determine the presence of the attributes consistent with High Conservation Value Forests will be completed, appropriate to scale and intensity of forest management.

9.2 The consultative portion of the certification process must place emphasis on the identified conservation attributes, and options for the maintenance thereof.

9.3 The management plan shall include and implement specific measures that ensure the maintenance and/or enhancement of the applicable conservation attributes consistent with the precautionary approach. These measures shall be specifically included in the publicly available management plan summary.

9.4 Annual monitoring shall be conducted to assess the effectiveness of the measures employed to maintain or enhance the applicable conservation attributes.

#### **PRINCIPLE # 10: PLANTATIONS**

Plantations shall be planned and managed in accordance with Principles and Criteria 1 - 9, and Principle 10 and its Criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's needs for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.

10.1 The management objectives of the plantation, including natural forest conservation and restoration objectives, shall be explicitly stated in the management plan, and clearly demonstrated in the implementation of the plan.

10.2 The design and layout of plantations should promote the protection, restoration and conservation of natural forests, and not increase pressures on natural forests. Wildlife corridors, streamside zones and a mosaic of stands of different ages and rotation periods, shall be used in the layout of the plantation, consistent with the scale of the operation. The scale and layout of plantation blocks shall be consistent with the patterns of forest stands found within the natural landscape.

10.3 Diversity in the composition of plantations is preferred, so as to enhance economic, ecological and social stability. Such diversity may include the size and spatial distribution of management units within the landscape, number and genetic composition of species, age classes and structures.

10.4 The selection of species for planting shall be based on their overall suitability for the site and their appropriateness to the management objectives. In order to enhance the conservation of biological diversity, native species are preferred over exotic species in the establishment of plantations and the restoration of degraded ecosystems. Exotic species, which shall be used only when their performance is greater than that of native species, shall be carefully monitored to detect unusual mortality, disease, or insect outbreaks and adverse ecological impacts.

10.5 A proportion of the overall forest management area, appropriate to the scale of the plantation and to be determined in regional standards, shall be managed so as to restore the site to a natural forest cover.

10.6 Measures shall be taken to maintain or improve soil structure, fertility, and biological activity. The techniques and rate of harvesting, road and trail construction and maintenance, and the choice of species shall not result in long term soil degradation or adverse impacts on water quality, quantity or substantial deviation from stream course drainage patterns.

10.7 Measures shall be taken to prevent and minimize outbreaks of pests, diseases, fire and invasive plant introductions. Integrated pest management shall form an essential part of the management plan, with primary reliance on prevention and biological control methods rather than chemical pesticides and fertilizers. Plantation management should make every effort to move away from chemical pesticides and fertilizers, including their use in nurseries. The use of chemicals is also covered in Criteria 6.6 and 6.7.

10.8 Appropriate to the scale and diversity of the operation, monitoring of plantations shall include regular assessment of potential on-site and off-site ecological and social impacts, (e.g. natural regeneration, effects on water resources and soil fertility, and impacts on local welfare and social well-being), in addition to those elements addressed in principles 8, 6 and 4. No species should be planted on a large scale until local trials and/or experience have shown that they are ecologically well-adapted to the site, are not invasive, and do not have significant negative ecological impacts on other ecosystems. Special attention will be paid to social issues of land acquisition for plantations, especially the protection of local rights of ownership, use or access.

10.9 Plantations established in areas converted from natural forests after November 1994 normally shall not qualify for certification. Certification may be allowed in circumstances where sufficient evidence is submitted to the certification body that the manager/owner is not responsible directly or indirectly of such conversion.

## Appendix 2: PEFC Criteria and Indicators (PEFC, no date (c))

### CRITERION 1: Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles

CONCEPT AREA: GENERAL CAPACITY

**Descriptive** indicators (examples):

1. Existence of a legal / regulatory framework, and the extent to which it:
  - provides an overall policy framework for conservation and sustainable management of forests
2. Existence and capacity of an institutional framework to:
  - provide guidelines for national plans or programmes
3. Existence of economic policy framework and financial instruments, and the extent to which it:
  - permits the flow of capital in and out of the forest sector in response to market signals and public policy decisions
4. Existence of informational means to implement the policy framework, and the capacity to:
  - recognise the full range of forest values and potentials with periodic forest-related planning and assessment of national forest resources

CONCEPT AREA: LAND USE AND FOREST AREA

**Quantitative** indicator:

- 1.1. Area of forest and other wooded land and changes in area (classified, if appropriate, according to forest and vegetation type, ownership structure, age structure, origin of forest)

CONCEPT AREA: GROWING STOCK

**Quantitative** indicator:

- 1.2. Changes in:
  - a. total volume of the growing stock
  - b. mean volume of the growing stock on forest land (classified, if appropriate, according to different vegetation zones or site classes)
  - c. age structure or appropriate diameter distribution classes

CONCEPT AREA: CARBON BALANCE

**Quantitative** indicator:

- 1.3. Total carbon storage and, changes in the storage in forest stands

### CRITERION 2: Maintenance of Forest Ecosystem Health and Vitality

**Quantitative** indicators:

- 2.1. Total amount of and, changes over the past 5 years in depositions of air pollutants (assessed in permanent plots)
- 2.2. Changes in serious defoliation of forests using the UN/ECE and EU defoliation classification (classes 2, 3, and 4) over the past 5 years
- 2.3. Serious damage caused by biotic or abiotic agents:
  - a. severe damage caused by insects and diseases with a measurement of seriousness of the damage as a function of (mortality or) loss of growth
  - b. annual area of burnt forest and other wooded land
  - c. annual area affected by storm damage and volume harvested from these areas
  - d. proportion of regeneration area seriously damaged by game and other animals or by grazing
- 2.4. Changes in nutrient balance and acidity over the past 10 years (pH and CEC); level of saturation of CEC on the plots of the European network or of an equivalent national network

### CRITERION 3: Maintenance and Encouragement of Productive Functions of Forests (wood and non-wood)

CONCEPT AREA: WOOD PRODUCTION

**Quantitative** indicators:

- 3.1. Balance between growth and removals of wood over the past 10 years
- 3.2. Percentage of forest area managed according to a management plan or management guidelines

CONCEPT AREA: NON-WOOD PRODUCTS

**Quantitative** indicator:

- 3.3. Total amount of and changes in the value and/or quantity of non-wood forest products (e.g., hunting and game, cork, berries, mushrooms, etc.)

### CRITERION 4: Maintenance, Conservation and Appropriate Enhancement of Biological

#### Diversity in Forest Ecosystems

CONCEPT AREA: GENERAL CONDITIONS

CONCEPT AREA: REPRESENTATIVE, RARE AND VULNERABLE FOREST ECOSYSTEMS

**Quantitative** indicator:

- 4.1. Changes in the area of:
  - a. natural and ancient seminatural forest types
  - b. strictly protected forest reserves
  - c. forests protected by special management regime

CONCEPT AREA: THREATENED SPECIES

**Quantitative** indicator:

4.2. Changes in the number and percentage of threatened species in relation to total number of forest species (using reference lists e.g., IUCN, Council of Europe or the EU Habitat Directive)

CONCEPT AREA: BIOLOGICAL DIVERSITY IN PRODUCTION FORESTS

**Quantitative** indicators:

4.3. Changes in the proportions of stands managed for the conservation and utilisation of forest genetic resources (gene reserve forests, seed collection stands, etc.); differentiation between indigenous and introduced species

4.4. Changes in the proportions of mixed stands of 2-3 tree species

4.5. In relation to total area regenerated, proportions of annual area of natural regeneration

**CRITERION 5: Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (notably soil and water)**

CONCEPT AREA: GENERAL PROTECTION

CONCEPT AREA: SOIL EROSION

**Quantitative** indicator:

5.1. Proportion of forest area managed primarily for soil protection

CONCEPT AREA: WATER CONSERVATION IN FORESTS

**Quantitative** indicator:

5.2. Proportion of forest area managed primarily for water protection

**CRITERION 6: Maintenance of other Socio-Economic Functions and Conditions**

CONCEPT AREA: SIGNIFICANCE OF THE FOREST SECTOR

**Quantitative** indicator:

6.1. Share of the forest sector from the gross national product

CONCEPT AREA: RECREATIONAL SERVICES

**Quantitative** indicator:

6.2. Provision of recreation: area of forest with access per inhabitant, % of total forest area

CONCEPT AREA: PROVISION OF EMPLOYMENT

**Quantitative** indicator:

6.3. Changes in the rate of employment in forestry, notably in rural areas (persons employed in forestry, logging, forest industry)

CONCEPT AREA: RESEARCH AND PROFESSIONAL EDUCATION

CONCEPT AREA: PUBLIC AWARENESS

CONCEPT AREA: PUBLIC PARTICIPATION

CONCEPT AREA: CULTURAL VALUES