Assessing the Effectiveness of Forest Certification in the US Pacific Northwest and British Columbia, Canada

by

Anna Tikina

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF Doctor of Philosophy in The Faculty of Graduate Studies (Forestry)

UNIVERSITY OF BRITISH COLUMBIA

September 2006

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Abstract

Proponents of forest certification view the system as a tool for sustainable forest management. Opponents declare forest certification "green-washing" or as an ineffective waste of resources. This study was prompted by concerns about the ability of forest certification to induce effective change in forest practices. The study applied a classification of regime effectiveness to evaluate the impacts of forest certification. Changes in behaviours (behavioural effectiveness) constitute the core of regime effectiveness.

A secondary objective was to explore the settings that influence obtaining forest certification in the region. A mailed survey to certified and non-certified forest managing entities (public agencies, forest industry and non-industrial private forest owners) in the US Pacific Northwest inquired about the degree of behavioural changes in their forest practices related to certification. The results of this study reveal that the practices of forest managing entities in the US Pacific Northwest have undergone relatively small changes. The type and magnitude of changes differed among public, forest industry and non-industrial private forest owners. Non-certified industry holdings changed more than their certified counterparts. However, certified non-industrial private forest owners indicated more change than non-certified ones.

Case studies were conducted in British Columbia to evaluate the transferability of the results. While some behavioural changes have been found, forest certification was more effective in other aspects – in goal attainment and through process and constitutive effectiveness. The study hypothesized the importance of both biogeographical and socio-economic settings in facilitating the embracement of the process, but the socio-economic phenomena were found to prevail.

The research results are specific to the area (Washington and Oregon States and British Columbia, Canada), where the strong regulatory requirements might have eliminated the necessity to change behaviours with the introduction of forest certification.
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<th>Description</th>
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<tr>
<td>AF&amp;PA</td>
<td>American Forest &amp; Paper Association</td>
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<tr>
<td>AIC</td>
<td>Akaike’s Information Criterion</td>
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<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
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<td>ATFS</td>
<td>American Tree Farm System</td>
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<tr>
<td>BC</td>
<td>British Columbia</td>
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<td>BCTS</td>
<td>British Columbia Timber Sales</td>
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<tr>
<td>CSA</td>
<td>Canadian Standards Association</td>
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<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<tr>
<td>DIA</td>
<td>Department of Indian Affairs</td>
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<tr>
<td>DNR</td>
<td>Washington Department of Natural Resources</td>
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<td>EMS</td>
<td>Environmental Management System</td>
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<td>ENGO</td>
<td>Environmental Non-governmental Organization</td>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<td>FL</td>
<td>Forest License</td>
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<td>FPAC</td>
<td>Forest Products Association of Canada</td>
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<td>FSC</td>
<td>Forest Stewardship Council</td>
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<td>FSJ</td>
<td>Fort St. John</td>
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<td>HCVF</td>
<td>High Conservation Value Forest</td>
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<td>ISO</td>
<td>International Organization for Standardization</td>
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<td>MLE</td>
<td>Maximum Likelihood Estimation</td>
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<td>NIPF</td>
<td>Non-industrial Private Forest Owner</td>
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<td>ODF</td>
<td>Oregon Department of Forestry</td>
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<td>OR</td>
<td>Oregon</td>
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<td>OSWA</td>
<td>Oregon Small Woodlands Association</td>
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<td>PEFC</td>
<td>Programme for the Endorsement of (or Pan-European) Forest Certification</td>
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<td>PNW</td>
<td>Pacific Northwest</td>
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<td>RCFC</td>
<td>Revelstoke Community Forest Corporation</td>
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<td>SE</td>
<td>Standard Error</td>
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<td>SFI</td>
<td>Sustainable Forestry Initiative</td>
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<td>SFM</td>
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<td>Tree Farm License</td>
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<td>TSA</td>
<td>Timber Supply Area</td>
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<td>UN-ECE</td>
<td>United Nations Economic Commission for Europe</td>
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<td>US</td>
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<td>WWF</td>
<td>World Wide Fund for Nature</td>
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Acknowledgements

Through this thesis I have got an answer for my burning question on the degree of change that forest certification brings to forest practices. I came to appreciate that the answer does not need to be universally applicable. I am very grateful to the following people who helped me on the way:

My supervisor, Dr. Bruce Larson, has always been a source of inspiration. His support (both intellectual and financial for world travel), thoughtfulness and ever-lasting enthusiasm throughout the study are invaluable.

I want to thank my advisory committee, Dr. Rob Kozak, Dr. John Innes and Dr. Gary Bull, for their feedback, intellectual challenges and understanding. Without them the study would never have been what it is now.

Many other people helped this study to happen. I would like to acknowledge the cooperation of the Washington Farm Forestry Association, the Oregon Small Woodlands Association, the Intertribal Timber Council of Washington and Oregon as well as forest industry representatives for sharing their contact databases and facilitating the survey. Alex Finkral (Northern Arizona University) and Yale School of Forestry and Environmental Studies provided invaluable assistance in survey organization.

I highly appreciate the effort and interest of the case-study participants. Their welcome and hospitality as well as comments on the manuscript cannot be overestimated. The case studies were not only useful for their research value; the travel around British Columbia helped me to explore and enjoy the Province. In this, the hospitality of Laureen Waters and Doreen McGillis of Revelstoke and Patrick Soles of Golden is greatly valued.

I am very grateful to Dr. Gordon Weetman, Dr. Hamish Kimmins and Dr. Susan Watts for their comments and discussions on sustainable forest management. Such discussions, as well as philosophical debates at stress-relief gatherings on life, truth and my thesis, were highly augmented by my colleagues, Tyler Abbey, Mariano Amoroso, Rasmus Astrup, Deb Delong, Gordon Hickey, Jane Lister and Natalia Vidal, whom I want to sincerely thank.
This research would have never been completed without the financial support of Forest Renewal British Columbia (FRBC), the University of British Columbia and the multiple donors to the Faculty of Forestry.

I am especially grateful to my family, who believed in me even when I myself did not.
Co-Authorship Statement

Several of the thesis chapters are co-authored. The tables below indicate percentages of co-authors’ contributions at each stage of research for each chapter.

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Chapter 1: General introduction and background

This thesis investigates how effective forest certification has been in the Pacific Northwest of the USA and in British Columbia, Canada. It examines different aspects of effectiveness and compares the behavioural changes that occurred in forest practices of certified and non-certified forest managing entities in the last decade.

1.0. Forest certification as a tool of sustainable forest management

Concerns over the state of the natural environment in the mid-1980s led to discussions of environmental safety and stability and to inception of the idea of sustainable development\(^1\) (World Commission on Environment and Development (WCED) 1987). Consensus for defining the term “sustainability” has not been yet found, though a combination of ecological, social and economic well-being lies at the heart of the concept (Upton and Bass 1996; Varma \textit{et al.} 2000; Vogt \textit{et al.} 2000; Welford 1997). Certain tools for advancing towards sustainability do exist, and forest certification is considered to be one of them. Certification evolved as a market-based instrument to address the problem of asymmetric information (Salzman 1997). The public exerted pressure on producers to provide additional information about certain characteristics of a product or a production process, and refused to buy the product that did not have the required characteristics. In the case of forest certification, the expected information embraced the producer’s adherence to the requirements (e.g. criteria, principles or elements) set by a specific forest certification standard.

In contrast to the problems of trade in endangered species or desertification, which were addressed by internationally signed conventions (Convention on International Trade in Endangered Species and the United Nations Convention to Combat Desertification, respectively), the global community has so far failed to produce a legally-binding agreement in forestry (Upton and Bass 1996; Vogt \textit{et al.} 2000). Besides non-legally binding international Forest Principles (United Nations Organization 1992), a number of institutions have provided sets of criteria and indicators that incorporate environmental, social and economic values of

\(^1\) Sustainable development was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development (WCED), 1987).
forestry and promote sustainable forest management (SFM) (Brand 1997; Canadian Council of Forest Ministers 2004; McDonald and Lane 2004; Rametsteiner and Simula 2001). Determining conformance to a set of certification standard requirements and communicating these environmental characteristics of forest products is the main purpose of forest certification (Cason and Gangadharan 2002; Cerin and Karlson 2002; Rametsteiner 2002a; Upton and Bass 1996). Forest certification was also intended to improve forest management by providing marketing advantages (Ozinga 2001; Rametsteiner and Simula 2003; Vogt et al. 2000), and to ameliorate related forestry problems such as illegal logging and tropical deforestation (Klingberg 2003; Leslie 2004; Rametsteiner and Simula 2001).

1.1. Legal requirements vs. voluntary mechanisms
Debates over the effectiveness of voluntary mechanisms compare their effects to the impacts of “hard law” (existing laws and regulations) (Abbott and Snidal 2003; Hickey 2004; Snyder 1993) or to situations where the mechanism have not been applied (Sprinz 2000; Underdal 1992). Proponents of soft law mechanisms (Aurora and Cason 1996; Bernstein and Cashore Forthcoming; Ice et al. 2004; Kilgore and Blinn 2004; Marshall et al. 2005; Nash and Ehrenfeld 1997; Potoski and Prakash 2004a; Prakash 1999; Smart 1992) and those who exercise caution over their use (Harrison 2001; Hoberg and Harrison 1994) argue about flexibility, cost-efficiency and outcomes of soft-law programs. These arguments are also relevant for forest certification. Forest certification as a voluntary mechanism (or soft law) can supplement governmental requirements and offer greater environmental protection (Bernstein and Cashore Forthcoming; Cashore 2002). On the other hand, forest certification can impose an additional financial burden and highlight the discrepancies of economies of scale without generating any significant impact on environmental conditions (Haener and Luckert 1998; Klingberg 2003; Leslie 2004).

1.2. Research Design
This study was prompted by questions that have been raised over the effectiveness of forest certification (Miles et al. 2001; Ozinga 2001). Prior research has focused almost exclusively on the impacts of the Forest Stewardship Council (FSC) standard (Espach Forthcoming; Hartsfield and Ostermeier 2003; Newsom et al. Forthcoming; Overdevest and Rickenbach Forthcoming; Savcor Indufor Oy 2005). The impacts of forest certification (changes in human behaviour and in

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2 Soft law was defined by F. Snyder (1993) as “rules of conduct which, in principle, have no legally binding force but which nevertheless may have practical effects” (p. 32).
environmental conditions) have been studied on both private land (Savcor Indufor Oy 2005) and public land (Cubbage et al. 2003). Most past studies have evaluated the regional effectiveness of forest certification (Gulbrandsen 2005; Newsom et al. 2003; Vlosky and Granskog 2003). The role of forest certification has also been studied at an international scale through its influence on trade (Leslie 2004) and on the distribution of effort and resources (Klingberg 2003; Rametsteiner and Simula 2003). Although forest certification has gained momentum in the US Pacific Northwest and British Columbia, Canada, since the start of the process in the mid-1990s (Corrao 2005; Fletcher et al. 2001; Forest Products Association of Canada 2005), little has been done to assess the effectiveness of forest certification in the region, in particular in relation to its influence on forest practices. This study attempts to close this gap.

1.3. Study Objectives and Scope
The overall goal of this study was to assess the effectiveness of forest certification in the US Pacific Northwest and British Columbia, Canada. The study objectives include:

- Reviewing the current state of science in effectiveness evaluation;
- Reviewing trends in forest certification and its effects, and in forest practices in the region;
- Proposing a framework to assess forest certification effectiveness;
- Investigating the degree of behavioural change in forest practices prompted by forest certification;
- Comparing the degree of behavioural change that occurred in certified and non-certified forest managing entities;
- Assessing effects of forest certification (aspects of effectiveness) other than the degree of behavioural change; and
- Developing a model to reveal the factors that are relevant to decisions to proceed with obtaining forest certification, including biological and geographical factors as well as the socio-economic setting.

The main hypothesis that was examined here was whether forest certification prompts changes in the behaviours of forest managing entities (behavioural effectiveness). To test this, the study also included the hypothesis that certification does not lead to any difference in the behaviours of certified and non-certified forest managing entities. In addition, I hypothesized that the responses
to social pressures (in this case forest certification) that lead to behavioural changes depend on both socio-economic and biogeographical settings.

The geographical scope of the study included British Columbia (BC), Washington (WA) and Oregon (OR). In this study, the term “US Pacific Northwest” denotes only the states of Washington and Oregon, while other US states traditionally included into the region were not analyzed. The forest certification schemes considered in the study were the standards of the International Organization for Standardization (ISO 14001), the Sustainable Forestry Initiative (SFI), the Canadian Standards Association (CSA), the FSC, and American Tree Farm System (ATFS). Green Tag certification was initially included in the study. However, the small number of certified entities did not enable the inclusion of the standard into the analysis. While the CSA standard is a purely Canadian certification scheme, the SFI is commonly found in both the USA and Canada. The number of forest operations certified by each scheme differ. For example, ISO 14001 is the most widely utilized standard adopted by the forest industry, while the FSC scheme is used by the least number of forest companies in the PNW and BC (BC Ministry of Forests. 2003; Fletcher et al. 2001). Detailed descriptions of the history, trends and significance of the forest certification standards in the region are available (Cashore et al. 2003b; Cashore et al. 2005; Fletcher et al. 2002; Hansen 1997; McDermott and Hoberg 2003).

Forestry practices and their environmental consequences were the only aspects of sustainability that this project addressed; changes in social and economic aspects of forest management were beyond the scope of the study. The reasons for considering both Canada and the USA included the commonality of the markets, and similarities in the role of forestry in the respective regional economies (Cashore et al. 2001a; PricewaterhouseCoopers 2000; R.E. Taylor & Associates 1999; Warren 2003), in the forest products generated in the regions and in the ecosystem types (Franklin and Dyrness 1988; Meidinger and Pojar 1991). The division of both BC and the PNW into Coastal and Interior parts also illustrates the similarities. The major manufactured goods of the region are “low value–high volume” products, i.e. logs, dimension lumber and pulp (BC Ministry of Forests 2003; Sampson and Decoster 1997). The major export markets for the region are Japan, Canada (for WA), USA (for BC) China, South Korea and Europe (Cashore et al. 2001a; Center for International Trade in Forest Products 2006; Espy and Babbitt 1994; Warren 2003).
The legal framework has determined the timeframe for the study – the study investigated changes associated with certification (which was developed no longer than a decade ago) and without certification since 1994. This date was selected as a milestone because some major events in regional environmental protection happened at that time. These included the introduction of the President’s Forest Plan for the PNW in WA and OR (Cashore 1999; Forest Ecosystem Management Assessment Team (U.S.) 1993), and the introduction of the Forest Practices Code in BC in 1995 (Cashore et al. 2001a).

Despite the similarities between regions, the transferability of the proposed model is enhanced by the inclusion of certified forestry in both the USA and BC under consideration, as the regulatory and business environments show many contrasts. A major difference between BC and the PNW is the pattern of ownership of forest lands. Forest land in BC is predominantly public (95%), while in WA and OR privately owned land constitutes 51% and 60% respectively. The share of the harvest from private lands in the OR and WA states for the period of 1991 – 2001 increased from 70% to 76% in Washington, and from 54% to 84% in Oregon, while harvested timber in BC comes predominantly from public land (BC Ministry of Forests 2003; Council of Forest Industries 2000; Hoberg 2003; Mabee 2002; Oregon Forest Resources Institute 2001; Warren 2003).

1.4. Thesis structure
The first chapter of this thesis proposes a system for assessing the effectiveness of forest certification as a component of an environmental regime. This assessment is based on the definition of a regime, given by Young and Osherenko (1993): “Regimes are social institutions composed of agreed-upon principles, norms, rules and decision-making procedures that govern the interactions of actors in specific issue areas”. The proposed system divides the overall effectiveness into several aspects and addresses issues relative to forest certification. In Chapter 2, I report on a survey conducted in the PNW that investigated the behavioural effectiveness of certification, based on changes in forest practices. The actual survey is provided in Appendix 2. Chapter 3 introduces the case studies in BC that explored the behavioural changes of certified forest managing entities and also provided some insight into other aspects of effectiveness. Appendix 3 presents the interview questions used during the case studies. Chapter 4 examines the factors that facilitate obtaining forest certification, and applies the model to the PNW, while the application of the model to BC is found in Appendix 4. Each chapter describes the
corresponding methodology used in the specific study. The concluding section links the propositions and results presented in the individual chapters, and discusses the implications of the findings. The University of British Columbia Behavioural Research Ethics Board certificates for the survey and the case studies are provided in Appendix 1.
1.5. References


Espach, R. Forthcoming. When is sustainable forestry sustainable? The Forest Stewardship Council in Argentina and Brazil. *Global Environmental Politics, 6* (2).


Chapter 2: A framework for assessing the effectiveness of forest certification

2.1. Introduction

Forest certification arose in the 1990s in response to environmental concerns about forest practices. The idea of a market-based mechanism (Upton and Bass 1996) that would push forest companies into better land management quickly took hold, with a number of standards and criteria evolving in different regions. In North America, the standards, termed here Sustainable Forest Management (SFM) schemes, include the Canadian Standards Association CSA Z809 (CSA) standard, the Sustainable Forestry Initiative (SFI) standard, and the various regional Forest Stewardship Council (FSC) standards. Another certification standard widely used by the forest industry is the ISO 14001 standard, which applies an environmental management system to any sector.

A number of environmental non-governmental organizations (ENGOs) have challenged some certification processes, claiming that they are only "stamps of approval" (Ozinga 2001; Ozinga 2004a; Rainforest Action Network 2005). Alternatively, some view forest certification as a diversion from more urgent problems, such as tropical deforestation (Klingberg 2003; Leslie 2004; Vogel 2005). These concerns have prompted a revisiting of the purpose of forest certification and pose questions about the effectiveness of certification in ensuring sound forest management. A number of questions have emerged, including: a) how is the effectiveness of certification measured?, and b) is forest certification effective in meeting its goals? This paper reviews approaches to determining the effectiveness of certification and provides a perspective on whether or not certification is meeting its goals.

2.1.1. Purposes of forest certification

There are many definitions of forest certification. Most relate to the purposes of certification. For example, forest certification can be defined as a mechanism that has as its primary objective the

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A version of this chapter will be submitted for publication.
Tikina, A. and Innes, J. A framework for assessing the effectiveness of forest certification.
improvement of forest management through marketing incentives (Upton and Bass 1996), an incentive for improved forest management (European ENGOs N.d.), “a means to improve management of [forest] resources” (Vogt et al. 2000), a “market based conservation initiative aimed at reducing the impacts of poor or illegal logging” (Leslie 2004), “an instrument to promote sustainable forest management” (Rametsteiner and Simula 2003), a “non-state market-driven” mechanism providing incentives to conform to procedures and standards in forest management (Cashore 2002; Cashore et al. 2003a; Lawson and Cashore 2003), “a process of labeling wood that has been harvested from a well-managed forest” (Natural Resources Defense Council N.d.), and “a voluntary governance structure for addressing environmental spillovers” (Cashore et al. 2005), amongst others.

Two purposes appear characteristic from the range of definitions that have been adopted: a) providing an incentive to improve forest practices, and b) providing a mechanism to inform consumers of certain product characteristics. The origins of certification, which lie in eco-labeling (Vogt et al. 2000), seem to follow the latter theme, i.e. the communication of environmental characteristics of the operations from which particular products come, rather than in the transformation of practices. This is, however, dependent on the standard. For example, the FSC standards are frequently intended to identify those with excellent practices, whereas the SFI standard was intended to establish a minimum baseline of forest management practices that forest managers should aspire to (and which has subsequently been rising as part of a process of continuous improvement) (World Business Council for Sustainable Development 2002). The first theme led to the idea that undergoing forest certification in itself would change practices. Certified forest entities were expected to manage forests in a more responsible manner than their non-certified counterparts. However, obtaining certification may or may not involve a change in the practices of a particular organization.

2.2. Research objective

This research discusses forest certification as a component of an international environmental regime\(^4\), taking the regime definition beyond legally-binding international conventions and

\(^4\)"Regimes are social institutions composed of agreed-upon principles, norms, rules and decision-making procedures that govern the interactions of actors in specific issue areas" (Young and Osherenko, 1993)
protocols and including soft law\textsuperscript{5} instruments, as did Humphreys (2003). Based on the purposes of certification described above, we suggest a framework for assessing the effectiveness of forest certification. Previous research on the assessment of the effectiveness of forest certification has generally been restricted to specific issues. The impacts of the FSC certification (Hartsfield and Ostermeier 2003; Newsom \textit{et al.} Forthcoming) have been studied in detail. Regional influences of forest certification have also been assessed in the Nordic countries (Gulbrandsen 2005; Savcor Indufor Oy 2005) and on public lands in the USA (Cubbage \textit{et al.} 2003). International studies of forest certification have included discussions of its influence on trade (Leslie 2004), on the differences in affected geographical areas (Rametsteiner and Simula 2003) and on the distribution of effort and resources (Klingberg 2003). However, little (Gulbrandsen 2004) has been done to link forest certification as an environmental regime to effectiveness theory. This paper aims to add to this discourse.

\textbf{2.3. Approaches to the assessment of effectiveness}

Evaluating the effectiveness of a regime is often generalized to determining whether the modification of behaviour is such that the problem which motivated the adoption of the system is either eliminated or mitigated (Sprinz 2000; Underdal 2001; Young 1994b; Young and Levy 1999; Young and Osherenko 1993). Helm and Sprinz (2000) defined regime effects as “improvements in the object of evaluation … that can be attributed to the regime” (p. 636). They emphasized the necessity of no-regime counterfactuals (“the hypothetical state of affairs that would have come about had the regime not existed” (Underdal 1992)) in effectiveness evaluation and also described a model of the regime effects against a potential “collective optimum” (results of regime application without any obstacles). Some concern has been raised about the objectivity of counterfactuals (Tetlock and Belkin 1996), but their absence makes causal inferences about regime effects impossible (Helm and Sprinz 2000). The research by Ice and colleagues (2004) also included case-control studies and modeling as measures to evaluate effectiveness of “best management practices” as a soft-law mechanism.

Discussions of soft vs. hard law methods and their effects (Abbott and Snidal 2003; Hickey 2004; Snyder 1993) occur in the “beyond compliance” literature. The advocates of voluntary

\textsuperscript{5} Soft law was defined by F. Snyder (1993) as “rules of conduct which, in principle, have no legally binding force but which nevertheless may have practical effects” (p. 32).
mechanisms claim that regulatory approaches lack flexibility, tend to target outcomes rather than inputs, and are cost-inefficient (Nash and Ehrenfeld 1997; Prakash 1999; Smart 1992). The effectiveness and overall positive results of voluntary programs are hypothesized and discussed by a number of sources (Aurora and Cason 1996; Bernstein and Cashore Forthcoming; Ice et al. 2004; Marshall et al. 2005; Potoski and Prakash 2004a). The group of researchers led by Ice (2004) also noted that, based on positive changes in the environment, a voluntary regime can be effective in certain regions and not in others, and that the effectiveness of certain indicators differs. However, compulsory governmental requirements are believed by some to be more effective in improving environmental performance than their voluntary counterparts (Harrison 2001; Hoberg and Harrison 1994).

Certain aspects of a regime may become more effective than others. Patton (1997) divided program evaluation into three aspects: summative evaluation, which assesses the impacts of a program; formative evaluation, aimed at improving the program while it is in progress, and evaluation to generate knowledge and identify trends. Patton (1997) differentiated program evaluation from process evaluation. The former indicates external outcomes and the latter assesses processes internal to the program. This distinction appeared in earlier work in political theory (Easton 1965), which separated the outcomes of a political system from the outputs. Underdal (1992) separated outputs as results of regime creation and impacts as effects of regime implementation and maintenance. Later, however, the author (Underdal 2001) further divided regime effects into outputs (sets of rules, standards, principles), outcomes (changes in human behaviour) and impacts (changes in environmental conditions), and assessed the effectiveness of a regime in relation to its problem-solving capacity. As regimes are developed for solving different types of problems, Underdal (2001) included the nature of the problem (malign or benign) into the determination of regime effectiveness.

Young’s classification (1994b) for assessing the effectiveness of environmental regimes divides effectiveness into the areas of problem-solving, goal attainment, behavioural effectiveness, process effectiveness and constitutive effectiveness, while evaluative effectiveness stands somewhat aside from the other areas (Young 1994a). The first two areas are entangled, as the effectiveness of goal attainment includes non-stated goals. Behavioural effectiveness measures differences in behaviour brought about by a governance system (in this case, forest certification). Process effectiveness focuses on adoption of a particular system in an institution or
region/country. Constitutive effectiveness evaluates the acceptance of a system by social groups and their expenditures related to the operation of the system. Evaluative effectiveness determines if the system provides efficient, robust, equitable and sustainable results. Vedung and Roman (2002) applied intervention theory to this classification. They not only divided the evaluative effectiveness of Young’s model into equitability effectiveness, sustainability effectiveness and economic effectiveness, but they also employed “output-outcome-impact” measures of effectiveness in their classification.

2.4. A framework to assess the effectiveness of forest certification

Recent research on evaluating the effectiveness of forest certification (Gulbrandsen 2004; Gulbrandsen 2005) differentiates five components of effectiveness: a) the degree to which on-the-ground practices are modified, b) broadened forest-owner participation, c) increased supply-chain support, d) interplay with public policy instruments, and e) the amount of conflict in the forestry sector. Other indicators listed by Wettestad (1999) include access and participation of heterogeneous stakeholders, comprehensiveness and flexibility of the regime agendas, consensus-based decision-making rules, active position of the regime secretariat, balancing science and policy within a regime, and well-functioning verification and compliance mechanisms. Another approach deals only with behavioural change (Newsom et al. Forthcoming) or process effectiveness (Meridian Institute 2001). Savcor Indufor Oy (2005) followed the “beyond compliance” routine in assessing effectiveness, but also tried to evaluate the monetary input-output efficiency.

Young (1994a) has provided a classification tool that is suitable for assessing the effectiveness of the certification component of a regime (Table 2.1). The examples presented here concentrate on the environmental side of forest certification, and social impacts are not covered. The measures of effectiveness in Table 2.1 are compiled from the literature (Archer et al. 2005; Bass et al. 2001; Cashore 2002; Cashore et al. 2004; Higman et al. 2005; Klingberg 2003; Leslie 2004; Newsom et al. Forthcoming; Ozinga 2004a; Rametsteiner and Simula 2001; Rametsteiner and Simula 2003; Upton and Bass 1996; Vogel 2005).
Table 2.1. Aspects of regime effectiveness as applied to forest certification

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Young’s definition</th>
<th>Measures of effectiveness in forest certification</th>
</tr>
</thead>
</table>
| Problem solving | Problem that prompted the establishment of a governance system is solved | Negative impact from forestry is eliminated or minimized  
Biodiversity is preserved  
Deforestation is stopped |
| Goal attainment | Achievement of certain specific goals | Sustainable forest management (responsible forestry with a long-term perspective) is achieved  
Non-stated/less often stated stakeholder goals (e.g., market share gained or retained, public pressure avoided, responsibility of compliance audits shifted to non-governmental institutions, research funded, influence over decision-making gained) are achieved |
| Behavioural effectiveness | Differences in behaviour brought by a governance system | Positive changes in consumer (end-user) behaviour  
Positive changes in customer (retailer, industrial user) behaviour  
Positive changes at the landscape level  
Positive changes at the cutblock level |
| Process effectiveness | Adoption of a particular system in an institution or region/country | Commitment to certification by government, industry associations, specific companies/entities  
Compliance with the certification requirements |
| Constitutive effectiveness | Acceptance of a regime by social groups and their expenditures related to the operation of the system | Public perception of certification and forest practices  
License- or landholder awareness  
Development of similar instruments |
| Evaluative effectiveness | Assessment of efficiency, equitability, sustainability and robustness of a regime | Is forest certification the best system to minimize the potential negative impacts of forestry on ecosystems and communities? |

The following section provides more examples of the effects of forest certification. Most are related to forest certification in North America. Problem-solving and evaluative effectiveness are not addressed in the present study as the immediate problem-solving effects of a regime are hard to define because of the long-term nature of the problem and the delay in effects. Most previous studies of the effectiveness of environmental regimes have tended to discuss the effects on marine or air pollution or fisheries (Helm and Sprinz 2000; Miles et al. 2001; Young 1999). The same difficulty applies to problems in forestry. Positive or negative impacts of forestry may remain latent for a long time. Jaenicke and Weidner (1995) defined success in environmental protection as the best achievement when “the result is still insufficient but no better is known” (p. 14). Although the term “best practices” has little support in the program evaluation literature (Patton 2001) because of its potential subjectivity, Jaenicke and Weidner’s definition suits the discussion of forest certification results versus sustainable forest management. Although environmental activists often present the FSC process as a better alternative for forest management than other certification schemes (Ozinga 2001; Ozinga 2004a; Rainforest Action Network 2005), no definitive assurance exists that any certification scheme will direct management towards sustainable forestry in the long run.
2.4.1. Goal attainment

A few results provide evidence that certification can be effective for some goals. These goals could be steps towards solving the problem(s) for which the regime was developed, or to providing some additional benefits not immediately related to the resolution of the issue. As seen in Table 2.1, the goals depend on the stakeholder (Naka et al. 2000), and are very stakeholder-specific (Hartsfield and Ostermeier 2003; Ozinga 2004b). They differ for government, environmental groups, industry and other interested parties. It is impossible to demonstrate the achievement of some “non-stated” goals, as it is unclear whether they were ever consciously set by a stakeholder. However, some examples of goal attainment are quite explicit. For example, forest companies strive to gain or retain market share through becoming certified. In this context, forest certification is already viewed as a cost of doing business (Fletcher et al. 2002; Higman et al. 2005). In the event that all forest operations become certified, certification will have become a generally-accepted operational standard, as happened with ISO 14001 in Europe (Prakash 2000). Environmentally-sensitive markets, such as exist in Europe, can offer price premiums for certified wood, and access of uncertified wood products to such markets is restricted.

For managers faced with the mounting costs associated with monitoring performance, combining efforts between voluntary certification audits and governmental compliance and enforcement audits could lower costs and retain trust in the audit outcomes; such an approach has been tested in British Columbia, Canada; and views remain divided about this approach (Brownie and Edquist 2004; Cafferata et al. 2002).

2.4.2. Behavioural effectiveness

2.4.2.1. Changes in forest practices

Forest certification is a relatively new phenomenon, and very few studies have been conducted to determine its impacts on forest practices. Some impacts of SFI and FSC certification on forest management have been described in a case study dealing with public forestland management (Cubbage et al. 2003). Changes connected with FSC certification included a greater reliance on natural regeneration. A study of land management practices changes associated with the implementation of the FSC standard by different entities throughout North America revealed changes in riparian management and habitat structure management (Hartsfield and Ostermeier
A recent study on the effects of the FSC in the USA (Newsom et al. Forthcoming) concluded that there are quantifiable influences on-the-ground (e.g., enforced through High Conservation Value Forests or woody debris requirements), but emphasized the need for further research. The same conclusion appeared in studies on FSC impacts in Norway and Sweden (Gulbrandsen 2005) and Germany (Pattberg 2005). One field study compared FSC- and PEFC-related (Programme for Endorsement of Forest Certification) changes in Nordic countries (Savcor Indufor Oy 2005). Although most attention was given to the social and economic impacts of certification, the authors (Savcor Indufor Oy 2005) found a prescriptive percentage of set-aside areas required by the FSC for biodiversity protection unsatisfactory to meet sustainability objectives.

2.4.2.2. Changes in consumer behaviour

It is widely believed that the reasons for improving forest practices lie in consumer behaviour (Salzman 1997; Teisl et al. 2002). The nature of market-based mechanisms implies conscious choice by buyers in favour of environmentally-friendly products, even if this involves a price premium. However, research has shown that the consumer does not seek certified forest products except in limited, well-developed, environmentally-concerned markets or for niche products (Elliott 1996; Kozak et al. 2004; Leslie 2004; Ozanne and Vlosky 2003; Rametsteiner and Simula 2003; Upton and Bass 1996; Vogel 2005). Some studies (Haener and Luckert 1998) report increased willingness to pay for certified wood, but market evidence of an actual premium is limited (Gulbrandsen 2005), especially in North America. Even within European markets, with their sensitivity to environmental issues, eco-labeling is mostly connected to incremental changes in consumer behaviour (Jordan et al. 2003).

Previous studies (Anderson and Hansen 2004a; Anderson and Hansen 2004b; Kozak et al. 2004) have also indicated that only value-added or high-visibility (e.g., furniture) certified products may expect a price premium, while commodity goods lack this opportunity. The majority of final users of wood products show little interest in the environmental characteristics of the goods they buy. Ozanne and Vlosky (2003) found that willingness to pay a premium for certain certified goods (at the low end of the price range) decreased in the USA from 1995 to 2000. Certification costs may even lead to loss of profitability when there is little or no price premium (Murray and Abt 2001; Setjø and Swallow 2002). Researchers associate this consumer apathy to the confusion originating from the number of different certification schemes and labels (Bass et al.
2001; Jordan et al. 2003; Rametsteiner and Simula 2003), label credibility issues (Teisl et al. 2002) or lack of consumer awareness and information sharing (Anderson and Hansen 2004b; Archer et al. 2005; Kozak et al. 2004; Ozanne and Vlosky 2003). Regardless of the reason, forest certification has so far failed to change consumer behaviour on a large scale.

2.4.2.3. Changes in customer behaviour
A few retailers of wood products require or give preference to certified timber (The Home Depot Inc., Lowes, IKEA) or paper products (Random House of Canada, Time Warner, Springer-Verlag). However, consumers and retailers do not limit their choice through adherence to only one certification scheme (Vogel 2005). As a rule, preference to certified products is given only when price and quality is similar to that of non-certified goods (Forsyth et al. 1999) and a willingness to pay extra for certified goods is not always evident (Anderson and Hansen 2004a; Vlosky and Ozanne 1997b). While there is little evidence of changes in the behaviour of the final consumers, the customers of the forest products sector are showing substantial changes. These include the demands for certified forest products mentioned above, and an increasing awareness of the need to look at the complete life cycle of wood products – from tree to final product disposal. Many of these initiatives appear to be more directly related to pressures within the companies and from company shareholders for greater corporate social responsibility than to any concerns over the effectiveness of certification.

2.4.3. Process effectiveness

2.4.3.1. Commitment to certification
Some national governments have endorsed forest certification (Sample et al. 2003), particularly in Europe. In North America, a number of provinces (Canada) and states (US) have also endorsed certification, including of forest management operations on publicly-owned land. The commitment to certification may include one standard, as in the case of SFI with the lands of the Washington State Department of Natural Resources (Corrao 2005), or multiple schemes, as observed in Maine (Maine Forest Service 2005). The commitment can also be stretched to all forest operators, as happened in Ontario (Ontario Ministry of Natural Resources 2004). Cashore (2002) emphasized the idea that when government requires adherence to a certification scheme, the system loses its voluntary nature and market-driven support, but the author does not deny the legitimacy that forest certification gains through such governmental commitments. In some
regions, however, governments have adopted a “wait and see” approach (Rametsteiner 2002b), or have even indicated that government has no role to play in forest certification (as in British Columbia).

Statistics on the area of certified forests appear regularly in FAO and UN-ECE reports (Pepke 2005; Poku-Marboah et al. 2003; Raunetsalo et al. 2002). These reports by international organizations have helped to institutionalize forest certification by presenting its trends and quoting certification as a well-established phenomenon. Forest certification is widely accepted by industry associations and has established itself in the corporate social responsibility (CSR) reporting of individual companies. North American examples of industry associations that have mandated their members to become certified include the Forest Products Association of Canada (FPAC) (Forest Products Association of Canada 2005) and the American Forest & Paper Association (American Forest & Paper Association (AF&PA) 2002). Although not attaining legitimacy on a global scale, certification definitely appeals to some governments and international and national organizations. This suggests that forest certification is gaining legitimacy, and therefore, achieving process effectiveness as a governance mechanism.

2.4.3.2. Compliance to the certification requirements
The increasing number of third-party certified hectares (Abusow 2005; American Forest & Paper Association (AF&PA) 2005) indicates that entities are complying with the requirements of certification standards. Certification schemes such as ISO 14001, CSA and SFI are widespread in North America, while the FSC standard has not yet achieved a similar coverage. Doubts have been raised over the use of total area or the number of entities certified as a measure of improvement in forest practices (Klingberg 2003). This is correct, with these achievements belonging to different aspects of effectiveness. The area and the number of certification proponents speak for its high score in process effectiveness but provide no indication of the behavioural significance of this regime component.

2.4.4. Constitutive effectiveness

2.4.4.1. License- or landholder awareness
Licensees’ and landholders’ awareness of forest certification have generally increased (Auld et al. 2003; Vlosky et al. 2003; Vlosky and Granskog 2003; Vlosky and Ozanne 1997a). This is
especially true for small non-industrial land owners (Vlosky and Granskog 2003); in the USA, it is this group that has had the longest experience of certification (through the American Tree Farm System). Small non-industrial land owners have also been the subject of intensive outreach attempts by the SFI certification scheme. Increased awareness of land-use issues is viewed as one of the benefits of forest certification (Cubbage et al. 2003). Enhanced knowledge of forest management as a result of certification processes has also been reported (Hartsfield and Ostermeier 2003; Sample et al. 2003).

2.4.4.2. Public awareness of the influence of forest certification over forest practices
Despite some research that has found that a company’s reputation increases with the adoption of voluntary mechanisms (Cason and Gangadharan 2002), more evidence exists that the public does not trust either the forest management undertaken by large industrial companies (Bliss 2000; Cafferata et al. 2002; Lacy 2004) or their certification intents (Ozanne and Vlosky 2003). However, there are few studies concerning public perception of forest practices as it relates to certification. Most studies focus on either the public as consumers of timber products (Archer et al. 2005), as discussed above, or investigate the perception of forest managing entities or forest companies (Auld et al. 2003; Vlosky et al. 2003; Vlosky and Granskog 2003; Vlosky and Ozanne 1997a), which fit better into the licensee and landholder awareness section discussed above. Raising awareness amongst the general public about the effects of forest certification will require intensive education (Kozak et al. 2004) and so far has not been a priority for the major certification schemes operating in North America, which have preferred to concentrate on the direct customers of the forest products sector or on land-owners.

2.4.4.3. Prompting the development of similar policy instruments
An additional difficulty in studying forest certification is its rapid development. Although the American Tree Farm System (ATFS) standard has existed for several decades, the world has witnessed a flood of certification standards following the development of the FSC standard in the mid-1990s. Different stakeholders (e.g., the forest industry, environmental activists) promote the schemes that they believe best reflect their interests (Gulbrandsen 2005; Klingberg 2003). Cashore et al. (2004) argue that certification schemes influence each other’s development and commitments. This involves either tightening or loosening of the standards. In North America, examples of these interactions include the development of stronger social criteria (particularly local consultation over the management of public lands) by the SFI in response to the emphasis
placed on this by the FSC and CSA, the development of chain-of-custody policies by the SFI in response to the FSC requirements for this, and the development of procurement requirements by the FSC in response to those established by the SFI. Such changes should be seen positively: all three standards are seeking to improve their performance and are learning from each others’ experiences. Gulbrandsen (2005) and Klingberg (2003) further claim that forest certification has not only influenced the reciprocal development of certification standards, but has also promoted other policy instruments, although they give no specific examples of such instruments. An example of an emerging relationship is the emphasis that the SFI scheme has placed on the training of loggers. Both the CSA and the SFI schemes have recently been endorsed by the international Programme for the Endorsement of Forest Certification (PEFC), which will likely involve further improvements in the schemes as they learn from others around the world (and, correspondingly, as schemes elsewhere learn about the North American standards).

### 2.5. Concluding remarks

The effectiveness of forest certification interests many stakeholders. This article provides an overview of approaches that could be used to assess effectiveness and proposes a system for the evaluating effectiveness of this component of the international environmental regime. Dividing effectiveness into problem-solving, goal attainment, behavioural effectiveness, process effectiveness, constitutive effectiveness and evaluative effectiveness will enable a more meaningful assessment of effectiveness. One of the main fields where forest certification lacks effectiveness is communicating environmental characteristics to the consumer. Changes in customer (retailer, industrial user) behaviour are, with a few significant exceptions, marginal and restricted to a few niche products. Forest certification has been effective in raising the awareness of landholders and licensees to land-use issues. A few behavioural changes have occurred towards the improvement of forest practices, but most are either connected with the formalization of existing processes or deal with the improved communication of requirements. However, landscape-level impacts of certification often go hand-in-hand with other developments, complicating the separation of certification effects from additional drivers.

Forest certification has been quite effective in the process and constitutive aspects of effectiveness, firmly establishing itself with governments, industrial groups and (some) ENGOs. It has gained the commitment of a number of institutions and their compliance to certification
standards. This does not necessarily mean that process and constitutive effectiveness serve as a precursor of behavioural effectiveness. Underdal (1992) suggests that the assessment of behavioural changes is possible only some years or decades after adopting a regime. As the process is still young and rapidly developing, it might be too early to expect marked behavioural changes. The establishment of the certification concept with different stakeholder groups may be all that should be anticipated of forest certification at this stage of its development.
2.6. References


Chapter 3: Has Forest Certification Promoted Change in Forest Practices in the US Pacific Northwest?6

3.1. Introduction

Forest certification is viewed as a tool for achieving sustainable forest management (SFM) and is frequently considered a necessity for maintaining market share (Fletcher et al. 2001; Raunetsalo et al. 2002). Forest certification schemes commonly used in the USA are the Sustainable Forestry Initiative (SFI) and the Forest Stewardship Council (FSC). Other certification initiatives for small non-industrial private forest owners (NIPFs) in the USA are the American Tree Farm System (ATFS) and Green Tag. A standard used by the forest industry is ISO 14001; however, it is commonly excluded from SFM certification because it is exclusively systems-oriented. In contrast, the SFI and FSC standards are a mix of system and performance requirements.

The origins of each of the standards differ. The international FSC principles were developed by an international environmental non-governmental organization, whereas SFI originated as an industrial standard, introduced by the American Forest and Paper Association (AF&PA). The FSC standard has a set of international principles, but regional organizations develop appropriate standards (e.g., the Pacific Coast Regional FSC Standard).

Although forest certification is thought to be an agent of change, environmental organizations have raised concerns that not all certification schemes bring equally significant adjustments to forest practices (Ozinga 2001). Such doubts raise the questions of whether any certification schemes have actually led to significant changes in “on-the-ground” practices or whether certification has merely produced better documentation of existing practices. Studies of certification have typically focused on perceptions of the wood products and manufacturing industry (Anderson and Hansen 2004a; Ozanne and Vlosky 2003), private forestland owners in regions other than US Pacific Northwest (PNW) (Newsom et al. 2003; Vlosky and Granskog 2003), or public agencies and their forestland managers (Auld et al. 2003; Sample et al. 2003; Vlosky 2000). Previous research has compared SFI and FSC certification schemes to the legal

6 A version of this chapter has been submitted for publication.

Tikina, A., Kozak, R., Bull, G. and Larson, B. Has forest certification promoted change in forest practices in the US Pacific Northwest?
requirements in Oregon (Fletcher et al. 2001) or has explored the impacts of FSC certification with respect to either the perspectives of certified land managers (Hartsfield and Ostermeier 2003) or compliance with changes mandated by FSC audits (Newsom et al. Forthcoming). Some of the impacts of SFI and FSC certification on forest management on public forestlands have been described using a case-study approach (Cubbage et al. 2003). An analysis of the impacts of all certification schemes specifically on the forest practices in PNW has not yet been undertaken.

3.2. Research scope and objectives

This paper attempts to answer the following questions. If changes take place as a result of forest certification, what aspects of forestry operations and activities have been modified most? If there has been no significant change, why not? Specifically, the objectives of this research were:

1. To assess the degree of recent change in forest practices in the PNW; and
2. To compare the degree of change in forest practices between certified and non-certified land-holding entities.

The geographical scope of this study covered forest landowner entities in the U.S. states of Oregon and Washington. The following strata were defined for the population that was included in the study: 1) industrial companies (by division); 2) governmental agencies (by division); and 3) non-industrial private forest owners (NIPFs). Respondents represented entities that actively manage forestlands in Washington and Oregon. These included forest industry companies that own land, land-use related public agencies (US Forest Service (USFS), Washington Department of Natural Resources (DNR), Oregon Department of Forestry (ODF), the US Bureau of Land Management (BLM), the Department of Defense), tribal lands under the Department of Indian Affairs (DIA), and small non-industrial owners. Forest certification standards included into the study were the ATFS, Green Tag, SFI and FSC. In order to facilitate a comparative analysis, the survey was aimed at both certified and non-certified entities.

3.3. Methodology

Data for the study were collected using a mailed self-administered survey to a stratified sample of forest managing entities in Washington and Oregon. A three-contact method was chosen as the survey mailing method, which constituted a modification of the Total Design Method
As a result of organizational constraints, the period between the mailings was approximately six weeks, which differs from Dillman’s (2000) recommendations of two weeks. The survey was conducted in May – August 2004.

The headquarters of multi-divisional companies were contacted by email to provide advance warning of the survey and to request information for divisional contacts. A random sample of 40% of the Washington Farm Forestry Association (WFFA) and Oregon Small Woodlands Association (OSWA) membership was taken for the NIPFs. Within companies and agencies, the surveys were directed to the employees responsible for either environmental affairs (first choice) or silviculture (second choice). The survey packages, containing a cover letter, the survey, and a stamped return envelope, were sent by mail to divisions of forest companies and public agencies, as well as to the individual NIPFs.

3.3.1. Survey structure and characteristics
The survey included structured, semi-structured, and non-structured questions, as well as a comments section. The questions revolved around internal organizational structures and the local physical, social, market, and legal environments. A ten-year timeframe was developed to include the regulatory changes in the PNW in the mid-1990s and the emergence of forest certification standards. The degree of change in forest practices during the last decade was assessed using the following categories: “Logging”; “Stand Tending”; “Regeneration”; “Watershed Protection”; “Road Construction”; “Pollution Prevention”; and “Planning”. For each category, a number of aspects were evaluated. Altogether, forty aspects of operations (e.g., culvert placement and number, partial cutting percent, seral stage distribution) were assessed. The respondents were asked to rate the degree of change on the following interval scale: “0” – no change whatsoever, to “5” – radical change. Values for each category were obtained by first computing the means for each rated aspect, and then using those values to compute the means of each category. The means for each aspect and category were calculated with equal weightings applied for all three strata (public, industry and NIPFs).

Three key variables from different sections of the survey were selected to estimate for non-response bias (“Size”, “Steepness”, and “Logging”) between the two subsequent survey mailing waves. Three strata of the survey respondents were tested separately (NIPFs, industry and public agencies). Non-response bias tests were performed using two-tailed t-tests (α=0.05) and
indicated that non-response bias was not present in this study. Thus, inferences about the population of forest landowner entities in PNW are possible.

3.3.2. Statistical methods
Both descriptive and inferential statistics were used to analyse the data. The variables in the analysis were not normally distributed and a bootstrap procedure (Efron and Tibshirani 1993) was applied to address this. Where appropriate, the significance of differences between means was tested with two-tailed t-tests and one-way analysis of variance (ANOVA) (both methods at α=0.05 and α=0.10 levels). One-way ANOVA with post hoc Tukey’s studentized range was used for differentiating between the strata (i.e., between NIPFs, industry and public holdings).

Although the data have slight to moderate deviations from normality, there is evidence that ANOVA tests are robust to such departures (Kenkel 1984). Homogeneity of variance was tested against the chi-square distribution using the ρ statistic (Morrison 1976). The null hypothesis of the homogeneity of variances was not rejected (p= 0.9596) and, therefore, it was concluded that the variances could be equal. Lastly, given that responding organizations differed, it is assumed that the observations were independent.

Two-way analysis of variance methods were attempted to further investigate possible differences by looking at certified and non-certified respondents by strata (i.e., between NIPFs, industry and public holdings). However, with the missing values in the data, some cell frequencies were extremely low (e.g., there were only two valid cases for certified public holdings). Therefore, the power of such an ANOVA analysis was doubtful. That said, the differences by certification and by strata were analyzed separately. Based on the two-way ANOVA, tests for overall significance of main effects (“Strata”, “Certification”) and interaction (“Stratum*Certification”) were used for assessing the variables in the analysis. While the hypothesis of no “Stratum” effect was rejected at α=0.05 level (F=2.41, p< 0.0001), the “Certification” effect was only significant at α =0.1 level (F= 1.45, p=0.0724). This indicated that the partition into strata was more important in determining differences than an adherence to forest certification.
3.4. Results

Of the 1248 surveys mailed out, 381 were returned and 353 surveys were usable\(^7\). This provided a response rate of 28.3%, which is considered acceptable for survey research (Babbie 2001). Out of 101 surveys sent to the industry, 35 were returned, while 27 were usable (response rate of 26.7%). Usable surveys from the public agencies included six responses from ODF, two from DNR, five from the USFS, five from the BLM, and six from aboriginal (tribal) organizations. The response rates of the public entities were 32% for state agencies and 26% for federal agencies, respectively. The NIPF response rate was 28%.

Information from non-certified entities served as the control for this analysis. Inclusion of these entities was aimed at differentiating between changes in forest practices that were influenced by forest certification versus other possible influences. In absolute terms, half of the respondents were certified by one or more schemes (generally only one). For the forest industry, 63% of respondents were certified. Within the public stratum, only 13% were certified, while the other 87% came from non-certified respondents. Almost half of NIPF respondents (52%) were certified by a scheme. Only one respondent indicated Green Tag certification as the agent of change, and Green Tag was excluded from the further analysis.

The means for each category and aspect are given in Table 3.1. Respondents indicated that “Planning” had experienced the most significant changes (mean of 2.0) within the timeframe of the survey. “Riparian Management” and “Logging” changed almost as much (both with means of 1.8). However, there is no evidence of radical changes in either of the categories (“Logging”, “Stand tending”, “Regeneration”, “Riparian Management”, “Road Construction”, “Pollution Prevention” and “Planning”) as the means are relatively low relative to the maximum of 5. “Stand Tending” changed the least (mean of 1.1).

\(^7\) Unusable responses included surveys from respondents who did not directly manage forest land. Even though the aim was to reach regional offices of forest companies, only one survey per industrial company was obtained, with the single exception of an additional survey from a head office of an industrial corporation. This response was also considered unusable, along with three other responses dealing with forestlands of the entire state (rather than specific regions within a state).
Table 3.1. Degree of change in forest practices by aspect, with 95% confidence intervals: Overall and in regard to certification (on the scale of "0" – no change whatsoever to "5" – radical change).

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Overall</th>
<th>Non-certified</th>
<th>Certified</th>
<th>Overall</th>
<th>Non-certified</th>
<th>Certified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging</td>
<td>1.8</td>
<td>1.5</td>
<td>0.3</td>
<td>1.3</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Harvesting method</td>
<td>1.9</td>
<td>1.7</td>
<td>0.5</td>
<td>1.5</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Size of cut-blocks</td>
<td>1.6</td>
<td>1.4</td>
<td>0.5</td>
<td>1.2</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Location and area under skid-trails and landings</td>
<td>1.5</td>
<td>1.3</td>
<td>0.4</td>
<td>1.4</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Harvesting equipment</td>
<td>2.0</td>
<td>1.9</td>
<td>0.5</td>
<td>1.7</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Slash disposal method</td>
<td>1.8</td>
<td>1.6</td>
<td>0.4</td>
<td>1.7</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Retention per cent on the block</td>
<td>2.2</td>
<td>1.8</td>
<td>0.6</td>
<td>1.6</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Percentage of partial cutting</td>
<td>1.7</td>
<td>1.6*</td>
<td>0.5</td>
<td>1.2*</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Stand Tending</td>
<td>1.1</td>
<td>1.0</td>
<td>0.2</td>
<td>0.9</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Method of thinning</td>
<td>1.3</td>
<td>1.5</td>
<td>0.5</td>
<td>1.3</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Integrated pest management instead of chemical</td>
<td>0.8</td>
<td>0.9**</td>
<td>0.3</td>
<td>0.6**</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Introduction or restriction/refusal of pruning</td>
<td>0.9</td>
<td>1.0</td>
<td>0.4</td>
<td>1.0</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Thinning schedule</td>
<td>1.3</td>
<td>1.4</td>
<td>0.4</td>
<td>1.2</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Regeneration</td>
<td>1.2</td>
<td>1.2</td>
<td>0.2</td>
<td>1.1</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Species/ a mixture of species</td>
<td>1.9</td>
<td>1.7</td>
<td>0.5</td>
<td>1.7</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Kind of planting stock</td>
<td>1.7</td>
<td>1.6</td>
<td>0.5</td>
<td>1.6</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Site preparation</td>
<td>1.5</td>
<td>1.6</td>
<td>0.5</td>
<td>1.5</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Timing of planting</td>
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<td>1.1</td>
<td>0.4</td>
<td>1.0</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Planting density</td>
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<td>1.4</td>
<td>0.4</td>
<td>1.2</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Method of planting</td>
<td>0.9</td>
<td>1.0*</td>
<td>0.3</td>
<td>0.7*</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Additional use of natural regeneration</td>
<td>0.8</td>
<td>1.0</td>
<td>0.3</td>
<td>0.7</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Decrease in herbicide/ fertilizer use for green-up enhancement</td>
<td>0.7</td>
<td>0.9</td>
<td>0.3</td>
<td>0.7</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Riparian management</td>
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<td>1.5</td>
<td>0.3</td>
<td>1.6</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Introduction or increase of riparian zones</td>
<td>2.8</td>
<td>2.5</td>
<td>0.8</td>
<td>2.4</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Management regime in riparian zones</td>
<td>2.4</td>
<td>2.2</td>
<td>0.7</td>
<td>2.1</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Erosion control methods on cut-blocks</td>
<td>1.5</td>
<td>1.4</td>
<td>0.5</td>
<td>1.4</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Chemical application methods</td>
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<td>0.9</td>
<td>0.4</td>
<td>1.0</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Width of “filter strips” between roads and streams</td>
<td>1.5</td>
<td>1.4</td>
<td>0.5</td>
<td>1.4</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Road Construction</td>
<td>1.5</td>
<td>1.3</td>
<td>0.3</td>
<td>1.1</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Road-building equipment</td>
<td>1.0</td>
<td>1.0</td>
<td>0.3</td>
<td>0.8</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Materials used for road construction</td>
<td>1.1</td>
<td>1.2**</td>
<td>0.4</td>
<td>0.8**</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Number/ specifications of culverts, water-bars, etc.</td>
<td>2.2</td>
<td>2.1</td>
<td>0.6</td>
<td>1.7</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Road construction specifications</td>
<td>1.9</td>
<td>1.7</td>
<td>0.5</td>
<td>1.4</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Definition and requirements to steepness grade</td>
<td>1.3</td>
<td>1.2</td>
<td>0.5</td>
<td>1.2</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Pollution Prevention</td>
<td>1.2</td>
<td>1.0</td>
<td>0.3</td>
<td>1.0</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Organization of fuel and oil facilities</td>
<td>1.1</td>
<td>1.0</td>
<td>0.4</td>
<td>0.8</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Chemicals used in regeneration or pest control</td>
<td>1.0</td>
<td>1.2</td>
<td>0.4</td>
<td>1.0</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Spill management</td>
<td>1.4</td>
<td>1.1</td>
<td>0.4</td>
<td>1.1</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Waste management</td>
<td>1.2</td>
<td>1.1</td>
<td>0.5</td>
<td>1.1</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>2.0</td>
<td>1.5</td>
<td>0.3</td>
<td>1.3</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Retention of coarse woody debris</td>
<td>2.4</td>
<td>2.1</td>
<td>0.5</td>
<td>1.9</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Seral stage distribution</td>
<td>1.7</td>
<td>1.4</td>
<td>0.5</td>
<td>1.2</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Additional species to protect</td>
<td>2.2</td>
<td>1.8**</td>
<td>0.6</td>
<td>1.4**</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Increased use of NTFPs (non-timber forest products)</td>
<td>1.5</td>
<td>1.1</td>
<td>0.4</td>
<td>1.0</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Percentage in protected areas and reserves</td>
<td>2.4</td>
<td>2.1</td>
<td>0.7</td>
<td>1.8</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Rotation length</td>
<td>1.6</td>
<td>1.6</td>
<td>0.6</td>
<td>1.3</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Management for threatened or endangered species (if listed)</td>
<td>2.2</td>
<td>1.8</td>
<td>0.7</td>
<td>1.5</td>
<td>0.7</td>
<td></td>
</tr>
</tbody>
</table>

* significant at α = 0.05 level  
** significant at α = 0.10 level
A comparison of certified and non-certified respondents showed little in the way of differences between the two. The assessment only indicated the degree of change, and it was not possible to specify trends in these changes. This made it impossible to conclude whether certified and non-certified respondents have changed in similar manners. Greater changes, however, were generally found with non-certified respondents. A two-tailed t-test indicated significant differences between the means of several variables for certified and non-certified respondents. The bootstrapped means of all aspects (with their 95% confidence intervals) are presented in Table 3.1 for both certified and non-certified respondents. It should again be noted that the degree of change in the means that are significantly different is generally greater for non-certified responses, the only exceptions being:

- Location and area under skid-trails and landings;
- Slash disposal method; and
- Chemical application methods.

The results of one-way ANOVA on the degree of changes between the strata (i.e., NIPFs, industry and public holdings) are shown in Table 3.2. Most of the differences observed were between public entities and NIPFs. In other words, NIPFs and industry differ on much fewer aspects. Public holdings experienced the highest degree of change in almost all categories, especially in “Planning”, “Riparian Management” (increase in riparian zones and changes in its regime), and “Logging” (change in the amount of partial cutting and reserves). The greatest changes in the forest industry were found in “Pollution Prevention” (road equipment and spill management). One of the clear differences observed is the degree of change; NIPF ratings are notable lower on many aspects than those of industrial and public holdings.

**Table 3.2. Degree of change in forest practices by strata (on a scale of “0” – no change whatsoever to “5” – radical change).**

<table>
<thead>
<tr>
<th>Aspect of Forest Practices</th>
<th>Means Industry</th>
<th>Means Public</th>
<th>Means NIPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging</td>
<td>1.3</td>
<td>2.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.2&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Harvesting method</td>
<td>1.8</td>
<td>2.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.5&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Size of cut-blocks</td>
<td>1.8</td>
<td>2.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Location and area under skid-trails and landings</td>
<td>1.5</td>
<td>1.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Harvesting equipment</td>
<td>2.1</td>
<td>2.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Slash disposal method</td>
<td>1.9</td>
<td>1.9</td>
<td>1.6</td>
</tr>
<tr>
<td>Retention per cent on the block</td>
<td>2.0</td>
<td>3.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.4&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Percentage of partial cutting</td>
<td>1.0</td>
<td>2.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.3&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Aspect of Forest Practices</td>
<td>Means Industry</td>
<td>Means Public</td>
<td>Means NIPF</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Stand Tending</td>
<td>0.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.9</td>
</tr>
<tr>
<td>Method of thinning</td>
<td>0.9</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Integrated pest management instead of chemical</td>
<td>0.6</td>
<td>1.0</td>
<td>0.7</td>
</tr>
<tr>
<td>Introduction or restriction/refusal of pruning</td>
<td>0.5</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Thinning schedule</td>
<td>0.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.3</td>
</tr>
<tr>
<td>Regeneration</td>
<td>0.8</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Species/ a mixture of species</td>
<td>1.6</td>
<td>2.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Kind of planting stock</td>
<td>1.8</td>
<td>1.7</td>
<td>1.6</td>
</tr>
<tr>
<td>Site preparation</td>
<td>1.6</td>
<td>1.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Timing of planting</td>
<td>1.0</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Planting density</td>
<td>1.3</td>
<td>1.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Method of planting</td>
<td>0.9</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Additional use of natural regeneration</td>
<td>0.5</td>
<td>1.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Decrease in herbicide/ fertilizer use for green-up enhancement</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Riparian management</td>
<td>1.2</td>
<td>2.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Introduction or increase of riparian zones</td>
<td>2.4</td>
<td>3.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.3&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Management regime in riparian zones</td>
<td>1.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.3&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>2.1&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Erosion control methods on cut-blocks</td>
<td>1.5</td>
<td>1.7</td>
<td>1.4</td>
</tr>
<tr>
<td>Chemical application methods</td>
<td>1.2&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.5&lt;sup&gt;*&lt;/sup&gt;</td>
<td>1.0</td>
</tr>
<tr>
<td>Width of “filter strips” between roads and streams</td>
<td>1.3</td>
<td>1.9&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.4&lt;sup&gt;**&lt;/sup&gt;</td>
</tr>
<tr>
<td>Road Construction</td>
<td>1.2</td>
<td>1.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Road-building equipment</td>
<td>1.3</td>
<td>0.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Materials used for road construction</td>
<td>1.2</td>
<td>1.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Number/ specifications of culverts, water-bars, etc.</td>
<td>2.2</td>
<td>2.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.8&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>2.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.4&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Definition and requirements to steepness grade</td>
<td>1.3</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Pollution Prevention</td>
<td>1.1</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Organization of fuel and oil facilities</td>
<td>1.3</td>
<td>1.3</td>
<td>0.8</td>
</tr>
<tr>
<td>Chemicals used in regeneration or pest control</td>
<td>1.1</td>
<td>0.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Spill management</td>
<td>1.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.3</td>
<td>1.0&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Waste management</td>
<td>1.4</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td>Planning</td>
<td>1.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.2&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Retention of coarse woody debris</td>
<td>2.3</td>
<td>3.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.8&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Serai stage distribution</td>
<td>1.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.9&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>1.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Additional species to protect</td>
<td>2.1&lt;sup&gt;*&lt;/sup&gt;</td>
<td>3.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.3&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Increased use of NTFPs (non-timber forest products)</td>
<td>1.7</td>
<td>1.8&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.9&lt;sup&gt;**&lt;/sup&gt;</td>
</tr>
<tr>
<td>Percentage in protected areas and reserves</td>
<td>2.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.7&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Rotation length</td>
<td>1.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.3&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Management for threatened or endangered species (if listed)</td>
<td>2.0&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>3.1&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>1.4&lt;sup&gt;b,c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

The table indicates significance at α =0.05 level. Significant difference at α =0.1 level indicated specifically:

- <sup>a</sup> pair of means with significant difference
- <sup>b</sup> pair of means with significant difference
- <sup>c</sup> pair of means with significant difference
- * significant at α =0.10 level
The separation into strata and certification is presented in Figure 3.1. – 3.3. All non-certified industry respondents changed more than their certified counterparts. By contrast, more changes in all categories were found in certified NIPF holdings than in the non-certified ones. “Planning” and “Regeneration” constituted the only categories for public holdings where change was greater for certified respondents.

**Figure 3.1.** Degree of change in certified and non-certified industry respondents by forest practices

**Figure 3.2.** Degree of change in certified and non-certified NIPF respondents by forest practices
3.5. Discussion

The results of this study reveal that the practices of forest managing entities in the Pacific Northwest have undergone relatively small changes, even for those that have undergone forest certification. Even the extremes (e.g., mean of 3.5 for public holdings for “Percentage in protected areas and reserves”) are far from the highest possible rating (“5 – radical change”). The low degree of change is surprising; given the intense attention devoted to forest management in the PNW and controversies over ecological and other values during the last decade, one would expect significant changes in forest practices. The low ratings may, in part, be the result of limitations in the methodology, as the survey results reflect perceptions, and some respondents may have tried to promote a message (e.g., through inflating or deflating the scores).

The degree of change differed for the public holdings, forest industry and NIPFs. Public land holdings in the PNW show the greatest degree of change with respect to forestry practices, which is conceivable due to increased public pressures on forest management. NIPFs have modified stand tending, regeneration practices, and riparian management to a greater extent than the forest industry, but they still have not altered their practices as much as have public entities. A possible explanation lies in the perceptions of the NIPF owners. Many governmental programs are aimed at regeneration practices (Oregon Department of Forestry 2006; Washington Department of Natural Resources Small Forest Landowner Office 2006), and this may affect the perception of its importance in forestry. As for the large change in pollution prevention by the industry, the SFI certification imposes strict requirements on pollution prevention, and these changes may
reflect a response to certification requirements. Some of the differences confirmed results from previous studies (e.g., the increases in the amount of partial cutting (Bliss 2000)), while others deserve further investigation (e.g., differences in non-timber forest products management between NIPFs and industrial holders).

Overall, the degree of change in non-certified holdings was found to be greater than with their certified counterparts. However, several precautions should be taken in interpreting these results. First, the study was limited to measuring the impact of forest certification on “on-the-ground” practices only. The certification process may induce change in other areas, such as stakeholder engagement or supply chain management. Second, companies tend to pursue certification when their practices are already advanced (Hayward and Vertinsky 1999; Newsom et al. Forthcoming). Such preparedness (including getting a pre-audit before the publicly-announced certification audit) limits the degree of change that an entity needs to undergo. The greater changes observed in non-certified holdings, however, may be influenced by several factors, not the least of which are adjustments to the regulatory framework within which they operate. As the forest management standards and regulatory requirements in WA and OR are very stringent (Cashore and McDermott 2004; Ice et al. 2004), it would be interesting to compare the results of this study to a similar study from a region where legal requirements are less demanding.

Certified NIPFs, in contrast to their public and industry counterparts, have changed more than non-certified ones. This may be an indication that certification does influence forest practices on NIPF land, although it is known that many NIPFs believe that their legislative burden is already high (Cashore et al. 2003b) and that forest certification is another limitation on their property rights (Zobrist 2003).

Two aspects of forest practices were found to be significantly different between certified and non-certified holdings: percentage of partial cutting and method of planting. The greatest overall change was detected in responses from the public agencies. The public holdings in the survey were mostly non-certified, and low numbers of certified public holdings (n=3) make drawing conclusions about the impact of certification difficult. The greater changes in public holdings can be related to the requirements of federal programs such as the “President’s Forest Plan” for PNW (Forest Ecosystem Management Assessment Team (U.S.) 1993; Swanson and Franklin 1992). The President’s Plan has influenced the area of forest reserves and retention on cutting sites, thus
changing the harvesting strategies (e.g., introducing a switch towards more partial cutting). Requirements of state regulations (e.g., Forest and Fish Rules of 1999 in Washington (Zobrist 2003)) have also drawn attention to riparian management issues on public forestland. Public pressure for visual values (Bliss 2000) and the use of the tree retention may also have changed the percentages of partial cutting. Leaving more trees on the site may have influenced respondents’ methods of planting (e.g., by favouring advanced regeneration).

The findings of this study indicate that forest certification influences forest practices on NIPF land. While the definitive effects of the certification process on forest practices in public or industrial holdings are less clear, the importance of certification requirements may change in the future through their rapid development (e.g., development of or amendments to a certification standard) and the highly-politicized nature (e.g., possibility of adopting a certification standard as a governmental requirement) of the certification process. It is difficult to predict further advances in the area of forest certification in the PNW, although one of its main benefits may lie in its requirement to document institutional forest practices. By benchmarking some of the “on the ground” changes in forestry practices, the results of this study may provide land-holders, public agencies, and certification organizations with a better understanding of the impacts of forest certification.

**3.6. Conclusion**

This study has not uncovered convincing evidence that forest certification has promoted significant change in forest practices in the Pacific Northwest. The purposes of certification include providing an incentive for better, more environmentally friendly forest practices and informing consumers about the environmental characteristics of forest products. The assessment of changes in forest practices over the past decade in the PNW has shown that the degree of overall change has not been large. Irrespective of certification, public land management has undergone more significant changes than private holdings. Forest practices in NIPF holdings have changed more on certified than on non-certified land, but the degree of change is small. However, industrial non-certified holdings have changed to a greater extent than the certified ones. This leads to a conclusion that, although forest certification may have changed NIPF practices, other factors, which include stringent regulatory requirement for regional forestry, are at stake in changing forest practices for large forestland holdings in Washington and Oregon.
3.7. References


Washington Department of Natural Resources Small Forest Landowner Office. 2006. *Financial Assistance Programs for Family Forests.* Washington Department of Natural Resources, Olympia, WA.

Chapter 4: Is forest certification effective? A qualitative study of British Columbia, Canada

4.1. Introduction

Forest certification was developed in the mid-1990s in an effort to improve forest practices and enhance the social responsibility of forest management, thus limiting the negative impact on the environment and human communities (Vogt et al. 2000). Certification first appeared in the tropics to address concerns with tropical deforestation (Upton and Bass 1996), however, most efforts and resources have been dedicated to forest certification in temperate and boreal regions in developed countries (Leslie 2004). Canada currently has three major forest certification standards namely, the Canadian Standards Association CSA Z809 (CSA), the Sustainable Forestry Initiative (SFI), and the multiple standards of the Forest Stewardship Council (FSC). The Canadian forest industry also uses the ISO 14001 certification standard, which requires the development of an environmental management system. The CSA, SFI and FSC standards all deliver a mix of system and performance requirements, while ISO 14001 is mainly system-based. The CSA standard is a purely Canadian scheme, while SFI-certified companies can be found in both the USA and Canada. The FSC has a set of international criteria, but the organization develops regional standards, such as the FSC standard for British Columbia (BC).

Concerns about the usefulness of forest certification have been raised (Klingberg 2003; Leslie 2004; Ozinga 2001; Ozinga 2004a; Rainforest Action Network 2005). These concerns have posed questions about the effectiveness of the process and have triggered a number of studies on the impacts of forest certification. Previous research has explored the impacts of FSC certification through surveying either the perspectives of certified land managers (Hartsfield and Ostermeier 2003) or compliance with changes mandated by FSC audits (Newsom et al. Forthcoming), with both studies relating specifically to the USA. Some impacts of SFI and FSC certification on forest management in the USA have been described in a case study of public forestland management (Cubbage et al. 2003). Other regional studies have compared the impacts of FSC and PEFC (Programme for the Endorsement of Forest Certification) in Nordic countries.

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8 A version of this chapter will be submitted for publication.

Tikina, A. Is forest certification effective? A qualitative study of British Columbia, Canada.
(Gulbrandsen 2005; Savcor Indufor Oy 2005) or have focused on FSC effects in South America (Espach 2006). More general issues, such as the influence of forest certification on trade (Leslie 2004), variance in affected geographical areas (Rametsteiner and Simula 2003) and regional distribution of effort and resources (Klingberg 2003) have also been discussed. In BC forest certification has gained momentum and has been adopted by many forest companies (Abusow 2005). However, there has been no evaluation of the impacts of forest certification on forest management practices in British Columbia. This paper reports on a qualitative study of the effectiveness of forest certification in changing forest practices in British Columbia.

4.2. Research design

4.2.1. Scope, objectives, methods and hypotheses

This research investigates the effects of all major certification standards that exist in BC (CSA, SFI, FSC and ISO 14001) and is aimed at assessing the overall effectiveness of forest certification in the Province with the emphasis on behavioural changes in forest practices. The study adapts a framework for assessing forest certification effectiveness (Tikina and Innes Forthcoming) and applies it to the BC setting. The framework was developed from Young’s classification of aspects of regime effectiveness (Young 1994a). A number of hypotheses were developed based on an extensive literature review (Table 4.1), and then seven case studies were selected to test the hypotheses. The case studies were limited to forest managing companies/entities. The modified effectiveness assessment framework (Tikina and Innes Forthcoming) focused on goal attainment, behavioural changes, process and constitutive aspects of effectiveness, without discussing the problem-solving and evaluative aspects of effectiveness. The studies were conducted through interviews, document analysis and pattern-matching in summer and autumn of 2005. The study concentrated on forest practices only (e.g., incorporating more soil conservation, riparian protection, or species at risk management) and did not cover any changes in the social sphere (e.g., employment, community stability, safety or equity).
Table 4.1. Aspects of effectiveness with corresponding BC case-study hypotheses

<table>
<thead>
<tr>
<th>Aspect of Effectiveness</th>
<th>Case-Study Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal Attainment</strong></td>
<td>Forest certification assists forest managing entities in achieving certain goals (Bass <em>et al.</em> 2001; Naka <em>et al.</em> 2000; Ozinga 2004b)</td>
</tr>
<tr>
<td><strong>Behavioural</strong></td>
<td></td>
</tr>
<tr>
<td>Changes in forest practices</td>
<td>Different certification schemes promote change (Gulbrandsen 2005; Newsom <em>et al.</em> Forthcoming)</td>
</tr>
<tr>
<td>Change in customer behaviour</td>
<td>Retailers require or request certified products (Archer <em>et al.</em> 2005; Kozak <em>et al.</em> 2004)</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td></td>
</tr>
<tr>
<td>Commitment</td>
<td>Forest companies/entities commit to certification</td>
</tr>
<tr>
<td>Compliance</td>
<td>Committed entities comply to standards (Klingberg 2003)</td>
</tr>
<tr>
<td><strong>Constitutive</strong></td>
<td></td>
</tr>
<tr>
<td>Landholder/license-holder awareness</td>
<td>Forest companies/entities show an increase in environmental awareness (Auld <em>et al.</em> 2003; Hartsfield and Ostermeier 2003)</td>
</tr>
</tbody>
</table>

In order to maximize representativeness (Yin 1984), the cases were selected to cover a broad range of biological and organizational conditions. The research covered entities operating on public land and certified by one or more of the common certification schemes, i.e. ISO 14001, CSA, SFI and FSC. The case studies included several forest companies (Interfor, Canfor Coastal, Canfor Fort St. John, and Tembec), a community forest (Revelstoke Community Forest Corporation (RCFC)), and a Woodlot License. Two different divisions of Canfor Corporation were selected to represent different organizational settings. Another participant was BC Timber Sales (BCTS), an organization within the BC Ministry of Forest and Range, which is mandated to administer timber sales and harvesting operations to establish a market price for timber.

Characteristics of the case studies are given in Table 4.2. British Columbian timber rights (tenures) represented here fall into two major license types. The majority of the timber in the Province comes from Forest Licenses (FLs), which govern rights to harvest a specific volume, but do not pre-determine the area for harvesting. Timber Licenses (TLs) combine area and volume allocation. Tree Farm Licenses (TFLs) are long-term tenures that define the area where the tenure-holder has rights to harvest. A Woodlot License is another area-based tenure, consisting partly of private land and partly of public land.
Table 4.2. Summary of case-study characteristics

<table>
<thead>
<tr>
<th>Entity</th>
<th>Location</th>
<th>Timber Rights (Tenure)</th>
<th>Certification</th>
<th>Terrain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interfor</td>
<td>Coast of BC: south to mid-coast</td>
<td>FLs, TFLs, some TLs</td>
<td>ISO 14001, SFI</td>
<td>Steep terrain (in part)</td>
</tr>
<tr>
<td>Canfor Coastal</td>
<td>Coast of BC: northern part of Vancouver Island</td>
<td>TFL 37</td>
<td>ISO 14001, CSA</td>
<td>Steep terrain (in part)</td>
</tr>
<tr>
<td>Canfor Fort St. John (FSJ)</td>
<td>Interior: Northeast of BC</td>
<td>FLs under Fort St. John Code Pilot Project</td>
<td>ISO 14001, CSA</td>
<td>Gently rolling or flat terrain</td>
</tr>
<tr>
<td>Tembec</td>
<td>Interior: Southeast</td>
<td>TFL 14</td>
<td>ISO 14001, FSC</td>
<td>Steep terrain</td>
</tr>
<tr>
<td>“Transitional” between</td>
<td>“Transitional” between Interior and Coastal</td>
<td>TFL 56</td>
<td>ISO 14001</td>
<td>Steep terrain</td>
</tr>
<tr>
<td>Woodlot</td>
<td>Interior: Central BC</td>
<td>Woodlot Licence W0550</td>
<td>FSC</td>
<td>Gently rolling or flat terrain</td>
</tr>
<tr>
<td>BCTS Chinook Business Area</td>
<td>Coastal: Southwest BC, Queen Charlotte Islands</td>
<td>TLs, FLs</td>
<td>ISO 14001</td>
<td>Steep terrain</td>
</tr>
</tbody>
</table>

4.2.2. Research limitations

A few limitations made the interpretation of the results difficult. The first and foremost problem, common to most case-study research, is the limited number of cases. It was not possible to avoid this concern. Only seven cases were selected, and this precluded drawing inferences beyond the scope of the study. Although it would be very interesting to match the conditions in which the cases operate, each case presents a unique set of conditions, and “counterpart” entities simply do not exist. To some extent, the selection of cases was dictated by time and funding. That said, representation of different scales and environmental conditions provided for some meaningful interpretation of the results. The divisional affiliation of Canfor Coastal and Canfor FSJ may introduce some pseudo-replication among the cases, although they were selected based on the divergence of their biological and organizational conditions at the time of the study. As the study limitations included subjectivity of perceptions or affiliation of interviewees, these weaknesses called for verification of the responses through management plan analysis.

Other study caveats included the rapid development and short history of the certification process in BC. The impacts of various drivers on the certification process (political, legal, economic and technological) are also hard to separate (Young 2001). The changing policies (e.g., the termination of Forest Renewal BC program and adoption of Forestry Innovation Investment (Forestry Innovation Investment 2006)) and market conditions, as well as the regulatory environment in BC (for example, a switch from the prescriptive Forest Practices Code of 1995 to a results-based Forest and Range Practices Act in 2003) complicated the interpretation and analysis of the drivers for behavioural change. Although the full effects of the Forest and Range
Practices Act are anticipated to take place in the future, the confusion produced by the changing regulatory framework among forest managing entities was evident (BC Ministry of Forests 2002). However, this study only covered the developments in the market conditions and certification status for the case-study participants by the fall of 2005.

Additional confusion may have been introduced by the nature of the legislation that governs the Canfor FSJ Pilot Project and its management. A special regulation allows for greater variance in the practices in the Project area than is allowed in the rest of the Province. Although Canfor led the Pilot Project, the management of the area under the CSA certificate is done in cooperation with all the participants in the Pilot Project: British Columbia Timber Sales, Cameron River Logging, Tembec Inc., Louisiana-Pacific Canada Ltd., Canadian Forest Products Ltd. (Canfor), and Slocan Forest Products Ltd. (the latter no longer exists, having merged with Canfor).

4.3. Results

4.3.1. Goal attainment

In this study, I investigated what goals the participants sought to achieve through their commitment to certification apart from improving forest practices, verifying responsible management or communicating environmental characteristics of the products. Maintaining market share for certain products was one of the goals that five participants (Interfor, Canfor Coastal, Canfor FSJ, Tembec and BCTS) pursued. While Canfor FSJ considered certification a guarantee for maintaining their market access, Tembec’s approach was to keep ahead of the competition. The company anticipated greater future demand for FSC-certified products as compared to that of the other standards. Certification was also important for Tembec and Canfor in meeting their FPAC membership obligation.

Maintaining a social license to operate\(^9\) or relieving public pressure was another goal. Third-party verification allowed Interfor and Canfor (both divisions) to provide more opportunities for public scrutiny. The nature of the public pressure differed between RCFC and BCTS. As RCFC is owned by the City of Revelstoke, the Corporation needed to address community pressures first. BCTS tackled two fronts – the public pressure of the local and Lower Mainland stakeholders and the mandate of the organization as part of BC Ministry of Forest and Range. By

\(^9\) License to operate is defined by Salzmann et al. (N.d.) “the degree of match between stakeholders’ individual expectations of corporate behavior and companies’ actual behavior”.

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adopting certification, they fulfilled their institutional commitment and to some extent relieved
the pressure received from the general public. The Woodlot Licensee’s major goal was
verification of their good practices in return for a price premium, which they have not yet
achieved. Table 4.3 summarizes the information on the goals that case-study participants
pursued when obtaining certification.

Table 4.3. Relevant goals for obtaining certification

<table>
<thead>
<tr>
<th>Goals</th>
<th>Relevant for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining social license to operate</td>
<td>Interfor, Canfor Coastal, Canfor FSJ, Tembec and BCTS</td>
</tr>
<tr>
<td>Relieving public pressure</td>
<td>Interfor, Canfor Coastal, Canfor FSJ, BCTS, RCFC</td>
</tr>
<tr>
<td>Providing information to the public</td>
<td>Interfor, Canfor Coastal, Canfor FSJ,</td>
</tr>
<tr>
<td></td>
<td>Tembec</td>
</tr>
<tr>
<td>Maintaining market share</td>
<td>Interfor, Canfor Coastal, Canfor FSJ, Tembec and BCTS</td>
</tr>
<tr>
<td>Staying ahead of competition</td>
<td>Tembec</td>
</tr>
<tr>
<td>Fulfilling FPAC membership requirement</td>
<td>Canfor Coastal, Canfor FSJ, Tembec,</td>
</tr>
<tr>
<td>Obtaining price premium</td>
<td>Woodlot</td>
</tr>
</tbody>
</table>

Far from being the only means, forest certification has certainly been an aid in the achievement
of institutional goals. The goals are often hard to separate; for example, maintaining a social
license is to some extent connected with communicating the characteristics of the product.
However, this connection is neither immediate nor direct. The attained goals are mostly
“additional bonuses”, which may, or may not, speak to behavioural effectiveness and
purposefulness of certification.

4.3.2. Behavioural effectiveness

4.3.2.1. Changes in practices at the cutblock and landscape level
Changes were observed at two separate levels in the BC case studies – landscape level and
cutblock level. The case studies results refute the view (Ozinga 2004a) that ISO 14001, as a
purely system-based certification scheme has no impact on forest management. The results are,
however, consistent with recent research by Potoski and Prakash (2005), who found ISO 14001
effective for improving environmental performance. The impacts of various certification
standards indeed differ, as claimed by Ozinga (2004a). However, separating the levels of
changes indicated that ISO 14001 has had behavioural effectiveness. The ISO 14001 standard
was found effective in changing operations at the cutblock level. For example, pre-works,
required by the environmental management system (EMS), provide more detail and lead to fewer
operational errors. The ISO 14001 either formalized what an entity was already doing or, in
some cases, the monitoring requirements of the standard resulted in less environmental impact, such as fewer clogged culverts, or the proper location of skid-trails. During the project, it was observed that ISO 14001 helped in identifying and fixing the legal non-compliances before governmental inspections, or helped to avoid such non-compliances altogether.

Adoption of the SFI, FSC and CSA standards all resulted in changes at the landscape scale of management. These alterations included protection of species, specific areas and/or landscape diversity. The CSA standard worked towards biodiversity conservation through local indicators and targets, which were set beyond legal compliance by a local Public Advisory Group (e.g., proportion of late seral forests). It could be inferred from the interviews that in the case of BC SFI voluntary measures may have accounted for variable retention harvesting, but it is difficult to conclude that certification has acted as the driver for this change. However, there was an indication that SFI certification assisted in further development of variable retention methods through the monitoring and research requirements of the standard. For Tembec’s FSC-certified operation, the most significant change comprised the identification and management of high conservation value forests (HCVFs). Although consistent with the land-use planning process established through the provincial regulation, the placement of sensitive areas and areas requiring additional protection included more values for consideration and differed the from the old-growth management areas and Provincial protected areas set by the government.

These modifications could be related to fulfilling forest certification requirements, while other possible drivers for changes in behaviours include public campaigns and other companies’ initiatives in the region. While the results are limited by the scope of the study, they reinstate the view (Bass et al. 2001; Gulbrandsen 2005; Newsom et al. Forthcoming) that certification changes the behaviour of forest managing entities, regardless of the nature of the certification scheme. The changes induced by forest certification at the landscape level may become more profound with time. At the scale of the cutblock, changes prompted by the ISO 14001 standards were largely unnoticed by the public, since they involved modifications to internal processes by the companies.

4.3.2.2. Changes in customer behaviour

The reaction of customers differs by product. Interfor, Canfor Coastal and Tembec indicated a demand for certified pulpwood or chips from the customers who produced certified pulp, which
is not surprising given the demand of large publishing companies for certified paper (e.g., Time Warner and Springer-Verlag). Canfor Coastal did not have requests for certified logs or lumber, while some European and US customers have requested certified lumber from Interfor. Tembec’s FSC certification added Home Depot as a new lumber customer, thus expanding their market. For smaller operations, such as RCFC and BCTS, the pressure for certified wood was very low – no more than 5% of customers ask for certification. This pressure has grown slightly in the last couple of years. The Woodlot Licensee’s search for FSC-certified markets had been unsuccessful, as the majority of their customers (local mills) did not show preference for certified timber. This had pushed the operator into researching markets for other products, such as flooring or log frames. None of the study participants received a premium for certified product. This result partly confirmed the prior findings (Anderson and Hansen 2004b; Archer et al. 2005; Ozanne and Vlosky 2003; The Home Depot Inc. 2005) that retailers request certified wood, this preference differs by product, and that price premiums certified wood are generally non-existent.

4.3.3. Process effectiveness

4.3.3.1. Commitment to certification

Large companies (Interfor, Canfor and Tembec) were committed to more than one certification scheme, while RCFC, BCTS and the Woodlot License were, at the time of the study, certified by one scheme only. The majority (five out of seven) cases committed to certification in 1999. The system-based ISO 14001 was the first scheme for large companies, and FSC was the only certification for the Woodlot License operation. A year or two later, large companies added either SFI or CSA into their portfolios. BCTS joined the ISO-certified group in 2001. There is evidence that small companies, which are licensees to BCTS, have not sought certification as it is too expensive. However, they have been bound by the EMS requirements of BCTS contracts since 2003. Although not committed to certification, contractors of large companies have also been trained in the EMS, and some of the EMS language enters the contracts. RCFC was the last to obtain certification. Although the RCFC seriously considered an SFM scheme, the lack of capacity and difficult market situation precluded them from pursuing another certification.

Canfor and Tembec are both members of FPAC, which requires all members to be certified by an SFM scheme by the end of 2006. The first ISO certification of both companies, as well as
Canfor Coastal CSA certification in 2000, pre-dated the FPAC commitment made in 2002. Obtaining FSC certification in 2004 served for Tembec – besides achieving other goals – as fulfillment of their FPAC membership obligations. Interfor, RCFC, BCTS, and the Woodlot License do not belong to FPAC. Thus, forest certification gained the commitment of forest managing entities to a large extent regardless of any commitments made by forest industry associations or government. It is therefore possible to conclude that certification was successful in this area of process effectiveness, regardless of the goal that an entity pursued by adopting forest certification.

4.3.3.2. Compliance to the certification requirements
Canfor, both Coastal and FSJ, and Tembec noted that the level of compliance with legal requirements increased with obtaining certification, as fewer operational errors occurred with the intensified monitoring required by certification. As for compliance to certification standards, a large percent of non-conformances found in certification audits was connected to the additional documentation for all study participants. The most commonly mentioned non-conformances were connected with fuel handling and management, and signage. The Woodlot Licensee found formalized monitoring most difficult. All of the case study participants complied with certification standards because most viewed the maintenance of certification as a necessary market condition.

4.3.4. Constitutive effectiveness

4.3.4.1. License- or landholder awareness
Research and training requirements of ISO and SFI, as well as the management plan preparation requirements of CSA, SFI and FSC, inform and educate land managers in environmental and social issues. The effort to educate stakeholders in these fields is also present, but evaluation of its effectiveness lies beyond the scope of the study. The increased awareness is especially evident and beneficial for small land-owners. After undergoing certification, the Woodlot Licensee admitted a shift in the outlook on forest management from maintaining a crop of trees to embracing ecosystem management. The Woodlot Licensee also emphasized improved communication with aboriginal people, as understanding of their issues and land claims increased. Interfor and Canfor (FSJ and Coastal) noticed more public comprehension of company activities through stakeholder group and public advisory group work.
Improved communication with contractors was an achievement of forest certification mentioned by all entities, except the Woodlot License. This exception is reasonable, given that most of the operations are carried out by the owner himself. Monitoring what was going on with the operations raised the comfort level amongst staff and reduced pressure from governmental inspections (Canfor Coastal and BCTS). Tembec and Canfor Coastal explicitly mentioned that better communication reduced the risk of legal non-compliance of operations. Training and intensive preparation (pre-works) with the contractor crews and company employees on boundaries, road placement and deactivation, and fuel storage requirements made the crews more aware of the environmental issues. The training and preparation let the crews understand the why of the requirements, which eased their acceptance of certification and compliance with the standard. Canfor FSJ and BCTS noted that improved communication also provided for self-reporting, i.e. reporting and analysis of a non-conformance instead of “quick-fixing” and hiding the drawback.

All cases showed that certification served as a tool for formalizing processes that were previously informal. Although this caused many “growing pains”, the benefits of formalized information flow, combined with other entity-specific gains, was viewed positively by the study participants.

Perfect operations are never attainable. However, the EMS required by ISO 14001 and its monitoring requirements assisted in keeping track of the operations and possible areas for improvement. This aspect of certification impact has not received much attention in previous research, but it is possible to say that certification gained some constitutive effectiveness through raising the awareness of forest managing entities on environmental issues.

4.4. Discussion

The search for effectiveness often involves investigation of the nature and direction of change. When can change be expected from a certification process? The purpose of certification is often interpreted as identifying the “leaders” in forest innovation and practices. Progressive land ethics and practices (i.e., substantial efforts in corporate social responsibility (CSR) or, in terms of small-scale landowners, progressive land stewardship) can alleviate the need to further change...
behaviours (Pattberg 2005) when obtaining certification, and this factor makes certification attractive to responsible companies (Hayward and Vertinsky 1999; Leslie 2004; Newsom et al. Forthcoming). Communicating their commitments to high standards of operation to the public is the main purpose of certification for such firms. However, the direction of “leadership” and “improvement” in forest practices is unclear, given the results in forestry have long-term effects and may have no immediate manifestation. Without discussing the “positive” or “negative” effects of a particular practice, this study strived to identify behavioural changes that promoted additional values in forest practices, besides the timber value (e.g., biodiversity or habitat management).

Besides progressive efforts in CSR, several preconditions, such as policy and socioeconomic preconditions (Elliott 1996), may predispose certification to be effective in changing practices. Governmental land-use policies and legislation comprise a major one. Absence or weakness of legal or regulatory requirements may create a challenge for the companies to comply with certification requirements. The notion of strength of requirements here follows the definition by Zacher (1987): “the stringency with which rules regulate the behavior [of countries]”. Weakness of legal requirements implies a lack of attention to environmental damage through forestry or the impossibility of enforcement. The possibility of change is assessed on a two-dimensional grid with the strength of the certification standard requirements (soft law) and the strength of legal requirements (hard law) (Figure 4.1). A weak certification standard should not be expected to motivate change with either weak or strong legal requirements. Change is expected with a strong certification scheme and weak legal requirements, while strong legal requirements may or may not eliminate the necessity of change for certification compliance.

![Figure 4.1. Expectations of change related to the stringency of certification and legal requirements.](image-url)
Corporate social responsibility efforts are not included in Figure 4.1, as CSR constitutes a separate dimension of regulation - self-regulation (Nasi et al. 1997; Salzmann et al. N.d.; Vogel 2005). A company may have progressive internal policies and practices regardless of whether the legal requirements are strong or weak. Such policies might have changed the company performance prior to the emergence of forest certification. In this case no change would be expected in any of the cells of the two-dimensional grid on Figure 4.1. Advanced performance prior to certification may remove the necessity for change, even if the certification standard is strong. The impossibility to fit these features into Figure 4.1 led to the exclusion of company-specific CSR measures from the grid.

With the case of “strong legal-strong standard” requirements, the possibility of change arises from the nature of the certification standard. Stringent standards are more likely to avert negative environmental impacts (Gulbrandsen 2005) but they are less likely to be widely accepted (Cashore et al. 2004). The application of a certification standard that has been effective in areas with weak legal requirements may not lead to change in practices. This study, along with the other recent studies (Newsom et al. Forthcoming; Pattberg 2005), questions the role of certification under strong vs. weak legal requirements. The application of certification in highly regulated regions does not necessarily lead to major changes in behaviour.

If a standard was developed for an entity with strong environmental regulation, its requirements could go beyond the legal realm and force change on the to-be-certified entities (Vogel 2005). The FSC-BC standard serves as an example of this, but may also indicate the marginality of forest certification effects for entities certifying to the FSC. Although a recent study (Newsom et al. Forthcoming) found changes in “on-the-ground” practices in the USA, it has to be seen whether this finding can be extended to other parts of the world. Moreover, given the small average size of the operations considered in the study, the direct overall impact of FSC certification on US forest management is quite insignificant (Vogel 2005). The question still remains if preference should be given to a significant effect on small areas (FSC model) or to a less noticeable effect on large areas (ISO 14001 or CSA model). On the other hand, more stringent standards may indirectly increase the strength of weaker standards through competition between certification schemes or accelerate the adoption of comparable governmental policies (Cashore et al. 2004). The openness to public scrutiny and input required by some standards may
also increasingly stimulate the use of science-based information by forest managers. However, the strength of certification standards and existing regulatory requirements is undoubtedly a factor in evaluating behavioural changes and therefore the overall effectiveness of the system.

4.5. Conclusion

This study of forest certification effectiveness in the British Columbian setting has shown that behavioural effectiveness is, to a certain extent, achieved at two different scales, namely the stand scale and landscape scale. The analysis of the case studies has shown that most of the behavioural changes at the stand level deal with training and communication of environmental requirements through the formalization of the existing operational procedures. A few examples of changes at the landscape level were also discovered, e.g., specializing management in high conservation value forests (HCVFs).

The certification process has gained a high degree of effectiveness in the process and constitutive aspects. Entities have committed to certification and complied with its requirements. Forest certification has also increased awareness of license-holders on land-use issues. While a few behavioural changes indicate behavioural effectiveness of the process, forest certification in British Columbia has been so far more effective in goal attainment, and process and constitutive aspects. The results of the study are only applicable to behavioural changes prompted by forest certification in environmental forest practices, and did not touch upon modifications in social or economic spheres.
4.6. References


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Chapter 5: What Settings Influence Obtaining Forest Certification in the US Pacific Northwest?10

5.1. Introduction

Forest certification emerged in the mid-1990s as a market-based incentive to improve forest management (Cashore et al. 2005; Upton and Bass 1996; Vogt et al. 2000). As a voluntary mechanism, forest certification is considered an addition to the command and control method of governance (Abbott and Snidal 2003; Cashore and Vertinsky 2000), the latter normally being used by governments through laws, regulations and best available technology prescriptions (Teeter et al. 2003). However, social pressures often pose more requirements than do governments (Aurora and Cason 1996; Cerin and Karlson 2002; Elliott 1996; Kilgore and Blinn 2002). Some forest managing entities have embraced the public pressure and adopted forest certification, others have exercised caution in accepting the process (Lawson and Cashore 2003; Leslie 2004; Rametsteiner 2002b; Vogel 2005). A generally accepted view is that companies used to dismiss or manipulate public pressures. Later, however, compromise strategies to address public pressure prevailed and companies became more proactive (Cashore et al. 2001b; Nasi et al. 1997; Oliver 1991). Elliott (1996) emphasizes the role of policy and socioeconomic preconditions in the acceptance and development of forest certification. It has been argued that the high costs of forest certification create a limitation that is not easily overcome by the assumed benefits of obtaining the certificate (Fletcher et al. 2002; Forest Stewardship Council 2002; Hansen 1997; Murray and Abt 2001; Rametsteiner and Simula 2001). In the case of certification, direct and indirect monetary costs accrued may be significantly greater than monetary benefits gained. In addition, uncertainty surrounding price premiums for certified forest products have made many entities cautious about certification. A few reasons are commonly applied:

1) Price premiums can be negligible or nonexistent (Sedjo and Swallow 1999; Wilson et al. 2001).

2) Higher-priced certified products can generally only compete with the non-certified products in the value-added products sector (Kozak et al. 2004; Vlosky et al. 2003)

10 A version of this chapter will be submitted for publication.

Tikina, A., Kozak, R. and Larson, B. What attributes facilitate obtaining forest certification in the US Pacific Northwest?
3) The demand for certified products is very limited and often producers have difficulties finding consumers (Anderson and Hansen 2004a).

On the other hand, past research has warned that confining the reasons of organizational response to material incentives is insufficient for obtaining a holistic picture on “corporate greening” (Cashore et al. 2005). Factors affecting responses include organizational structures, organizational behaviours (corporate culture and changes within), the environments in which companies operate and external pressures (Cashore and Vertinsky 2000; Oliver 1991; Vertinsky and Zietsma 1998).

5.2. Background

Factors affecting “corporate greening” (in this case, decisions to obtain forest certification) include the environmental settings, both external and internal to an institution. Earlier research on environmental dependency focused solely on the social environment (Clark and Jennings 1997; Pfeffer and Salancik 1978). The existing literature on certification pays substantial attention to social and economic settings that facilitate organizational responses to pressures, describing them in great detail. Biological and geographical settings have received less attention although these should be also included in any discussion of the context of certification.

5.2.1. Socio-economic issues

Different stakeholder groups have been identified as pressuring institutions, including environmental activists (Elliott and Schlaepfer 2001; Sasser 2003; Stafford and Hartman 1996), company shareholders (including institutional investors) (Nasi et al. 1997; Vertinsky and Zietsma 1998), associations of peers/companies of a similar scale (Vertinsky and Zietsma 1998), supply chain customers (direct retailers or dealers) (Anderson and Hansen 2004a; Auld et al. 2003) and product consumers (Marshall et al. 2005; Ozanne and Vlosky 2003; Vlosky and Ozanne 1997b). Large institutions and their practices attract greater attention from the public and, therefore, are more prone to experience public pressure (Cashore et al. 2005; Cashore et al. 2001b; Vertinsky and Zietsma 1998; Vidal et al. 2005). However, if an institution has been proactive from the onset of such pressure, the proactive position eases the response (Aurora and Cason 1996; Cashore et al. 2001b; Potoski and Prakash 2004b; Prakash 2001; Vertinsky and Zietsma 1998).
Besides social pressure drivers, certain institutional factors determine the response strategies to pressures. The land ownership patterns have also been found to be a relevant driver (Cashore et al. 2005; Cashore et al. 2001b; Vlosky 2000; Vlosky and Granskog 2003). Companies with an export orientation tend to experience higher degrees of pressure based on their customers’ preferences for product specifications (Potoski and Prakash 2004b; Prakash 2001; Prakash 2002) or their exposure to environmental concerns (Cashore et al. 2003a; Cashore and Vertinsky 2000). Other factors related to business, such as existing infrastructure (Aurora and Cason 1996; Greening and Gray 1994; Sasser 2003) and product diversity (Kozak et al. 2004; Wilson et al. 2001), can also lessen the necessity to react to external pressures.

These findings can be applied to the reactions of forest managing entities to forest certification requirements. The factors influencing responses to certification include export markets, company sizes and structures, social pressures and ownership of forestlands. Market pressures and degrees of business establishment through infrastructure are also considered relevant.

5.2.2. Biogeographical issues

This study considers those biological and geographical settings that can affect decisions to obtain forest certification. These settings were selected through a review of regulatory requirements and the relevant literature. While some settings were chosen because of their relevance to the requirements of certification standards (e.g., attention of all standards to water and soil protection), the others require additional attention when selecting forest management regimes (e.g., disturbance types, ecosystem diversity, or protected species or ecosystems). Throughout this chapter, Section WAC 222 of the Forest Practices Rules (Washington Department of Natural Resources Forest Practices Division 2001) and the Forest Practices Administrative Rules and Forest Practices Act (Oregon Department of Forestry 2002) are cited as the regulatory requirements in Washington (WA) and Oregon (OR), respectively.

5.2.2.1. Ecosystem diversity

The presence of several different ecosystems within a management unit is hypothesized to create difficulties in the determination of a response to pressures for certification. The basis for this hypothesis lies in the fact that different ecosystems require different management strategies. Therefore, an entity has to adapt its forest practices to provide for flexibility in selecting a management regime. Lyons and Merilees (1995) distinguished eight zones in WA: Gulf and San
Juan Islands, Coast Forest, Subalpine, Alpine Tundra, Mountain Forest, Ponderosa Pine, Interior Cedar-Hemlock, and Bunchgrass and Sagebrush zones. This division is similar to the classification put forward by Franklin and Dyrness (1988). Both classifications are based on the most common tree species found in both WA and OR, illustrating the dominance of conifers in the region. (Franklin and Dyrness 1988; Meidinger and Pojar 1991).

5.2.2.2. Large-scale disturbance
The Biodiversity Guidebook produced for British Columbia by the Ministry of Forests (BC Ministry of Forests 1995; Parminter 1998) divides natural disturbances into four broad types: 1) ecosystems with rare stand-initiating events; 2) ecosystems with infrequent stand-initiating events; 3) ecosystems with frequent stand-initiating events; and 4) ecosystems with frequent stand-maintaining fires. The same classification is applicable in WA and OR (Franklin and Dyrness 1988). The guidebook recommends different management regimes for each natural disturbance type. Uncertainties surrounding resource availability in areas subject to large-scale disturbances was hypothesized to be a constraint when reacting to the pressures of certification requirements.

5.2.2.3. Threatened and endangered species
Threatened and endangered species and requirements for the management of their habitats are addressed in Washington WAC 222-10-040 through 222-10-042, as well as WAC 222-16-080 through 222-16-105. While the first group of regulations focuses on the northern spotted owl (*Strix occidentalis*) and marbled murrelet (*Brachyramphus marmoratus*), the latter regulations describe the habitats of a greater number of species and give more specific requirements for forest practices. The Oregon Forest Practices Act devotes Division 665 (Specified Resource Site Protection Rules), Sections 629-665-000 through 629-665-240, to explaining the goals of species and habitat protection requirements and exceptions. While Washington regulations contain rules for animal species, the Oregon Forest Practices Act focuses solely on birds (osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*), bald eagle (*Haliaeetus leucocephalus*) and northern spotted owl *Strix occidentalis*). The necessity to adapt forest management to species-at-risk requirements was hypothesized to decrease the ability of a forest managing entity to react to external pressures.
5.2.2.4. Coastal ecosystems and remoteness

In the US Pacific Northwest (PNW), forestry practices in coastal ecosystems are subject to particular scrutiny by the public, as they contain forests highly valued by the environmentally-concerned public. Operators on the Coast have greater exposure to threats of action from the environmental community (WWF N.d.). In contrast, the remoteness of an area from large settlements tends to result in reduced public criticism of forestry issues, as the objectives for forest use differ between urban and rural areas (Bass et al. 2001). The remoteness of forest operations was assessed in terms of the distance from a settlement of 20,000 people. This threshold was based on OR and WA definitions of rural areas: a) Oregon - "Rural" is a geographic area ten or more miles from a population center of 30,000 or more; b) Washington - “Rural” is an area that is at least 50 miles from a metropolitan area of at least 5,000 people (Chimoskey and Norris 1999; Oregon Rural Health Association N.d.). The remoteness of forest operations decreases public pressure and was therefore hypothesized to increase the ability of an entity to react to certification pressures. Managing a coastal operation (as an operation with higher public constraints) was hypothesized to decrease this ability.

5.2.2.5. Water-body abundance

Specific protection established for water bodies and their adjacent riparian areas imposes constraints on forest management for timber. The more abundant water bodies are in a certain forest management area, the greater are the complexities of planning and operations. The Oregon Forest Practices Code addresses water protection under Divisions 635–655, and 660. It divides water bodies into three types: F (streams with fish and also used for domestic water supply); D (streams without fish used for domestic water supply), and N (all other streams). These types each have three categories (large, medium and small). Lakes and wetlands are divided into classes by size (larger or smaller than 8 acres (approximately 3.3 ha)). Riparian zones and their management are set separately for each type and category of water body.

In Washington, water bodies are classified in WAC 222-16-030 and WAC 222-22, 222-23. Three types of water bodies are defined into the following classes: S (all waters, classified under “shorelines of the state”; this excludes wetlands), F (fish-bearing waters), and N (Np – perennial non-fish bearing streams and Ns – seasonal non-fish bearing streams). Riparian zones and their management are set separately for Western and Eastern Washington, and for each of five zone
classes within a water class. Compliance with these requirements is hypothesized to limit the ability of forest managing entities to react to pressures of certification requirements.

5.2.2.6. Terrain steepness
Steep/unstable slopes are designated as risk areas in both WA and OR. WAC 222-16-050 considers “Class – IV – special” a terrain class that requires specific forest practices. It is defined as “inner gorges, convergent headwalls, or bedrock hollows with slopes steeper than 35 degrees (70%); toes of deep-seated landslides, with slopes steeper than 33 degrees (65%)”. A forty percent slope is threshold for the separation of Class I management requirements from the classes with stricter forest practices. In OR, 629-600-100 (28) defines slopes steeper than 65% as high-risk sites. High-risk areas and high-risk sites are determined by the State Forester and require special approval of any proposed management actions. As steep terrain introduces additional difficulties to forest planning and management, it was hypothesized to limit the ability of a forest managing entity to react to certification pressures.

5.3. Methodology

5.3.1. Scope and objectives
This study aimed to reveal the attributes of forest managing entities that influence decisions for the adoption of forest certification. This project hypothesizes that institutional responses to pressure depend on both socio-economic and biogeographical settings. A factor that was not considered in the development of the model was leadership. This factor has become much more significant since the time the study was performed, as many of institutions have become more proactive (Potoski and Prakash 2005), for example, through corporate social responsibility. The environmental aspects discussed above (types of ecosystem where entities operate, terrain steepness, disturbance types, abundance of surface water, threatened and endangered species, and remoteness) were assumed to add difficulty to operations and, therefore, influence the behaviour of forest managing entities.

Given the lack of understanding of the influence of biogeographical factors in the adoption of certification, the relevance of several settings of the biogeographical environment was studied along with the relevant socio-economic factors identified from past research (Table 5.1).
### Table 5.1. Settings influencing obtaining of forest certification, corresponding variables and their use in the model

<table>
<thead>
<tr>
<th>Settings</th>
<th>Variable</th>
<th>Variable characteristics</th>
<th>Used in the Model?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socio-Economic Settings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shareholder-owned companies are more susceptible to pressures than private companies (Stafford and Hartman 1996)</td>
<td>Ownership structure</td>
<td>Dummy (public vs. shareholder vs. private)</td>
<td>Very few cases in “shareholder” ownership category - excluded</td>
</tr>
<tr>
<td>Entities operating on public forestland are more susceptible to pressures to obtain certification than private forestland owners (Vlosky and Granskog 2003)</td>
<td>Private land</td>
<td>Dummy (yes, no)</td>
<td>Yes</td>
</tr>
<tr>
<td>Larger entities are more susceptible to pressures to obtain certification than smaller entities (Sasser 2003)</td>
<td>Size</td>
<td>Continuous (ha)</td>
<td>Yes</td>
</tr>
<tr>
<td>Entities with orientation to export markets are more susceptible to pressures to obtain certification than entities working for domestic market solely (Cashore and Vertinsky 2000).</td>
<td>Export proportion</td>
<td>Continuous (percent of volume)</td>
<td>Yes</td>
</tr>
<tr>
<td>The greater the product diversity produced by an entity, the easier it is for it to react to certification pressures by maintaining market share (Wilson <em>et al.</em> 2001).</td>
<td>Product diversity</td>
<td>Continuous (number of products)</td>
<td>Did not hold the linearity of the logit assumption – excluded</td>
</tr>
<tr>
<td>The better the existing infrastructure of an entity, the easier it is for the entity to react to pressures (Aurora and Cason 1996)</td>
<td>Accessibility (road network)</td>
<td>Continuous (km of roads built)</td>
<td>Yes</td>
</tr>
<tr>
<td>Entities that have previously had experience with social pressure are more susceptible to pressures to obtain certification (Cashore <em>et al.</em> 2005)</td>
<td>Boycotting</td>
<td>Dummy (yes, no)</td>
<td>Very few cases – excluded</td>
</tr>
<tr>
<td>The higher the environmental requirements of associations the entity is a member of, the easier it is for that entity to react to pressures (Vertinsky and Zietsma 1998)</td>
<td>Association pressure</td>
<td>Continuous (interval scale)</td>
<td>Did not hold the linearity of the logit assumption – excluded</td>
</tr>
<tr>
<td>The greater market pressure that wholesalers, retailers and dealers exercise, the more responsive the entity is to requests to pursue forest certification (Auld <em>et al.</em> 2003)</td>
<td>Market pressure (wholesalers, retailers, etc.)</td>
<td>Continuous (percent of customers)</td>
<td>Yes</td>
</tr>
<tr>
<td>Settings</td>
<td>Variable</td>
<td>Variable characteristics</td>
<td>Used in the Model?</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>--------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Biogeographical Settings</td>
<td>Ecosystem variety</td>
<td>Continuous (number of ecosystem types)</td>
<td>Impossible to assess from survey responses</td>
</tr>
<tr>
<td>Coastal ecosystems are considered more environmentally valuable, and entities operating in such areas are under a greater amount of pressures</td>
<td>Coastal</td>
<td>Dummy (yes, no)</td>
<td>Yes</td>
</tr>
<tr>
<td>The greater the slope steepness of the terrain where the forest operations take place, the more difficult it is for an entity to react to pressures</td>
<td>Steepness</td>
<td>Continuous (typical grade)</td>
<td>Yes</td>
</tr>
<tr>
<td>The greater the scale of disturbance common in the area of forest operations, the more difficult it is for an entity to react to pressures</td>
<td>Prone to large-scale disturbance</td>
<td>Continuous (interval scale)</td>
<td>Did not hold the linearity of the logit assumption - excluded</td>
</tr>
<tr>
<td>The presence of endangered or threatened species in the area of forest operations makes it more difficult for an entity to react to pressures</td>
<td>Red-listed species</td>
<td>Continuous (interval scale)</td>
<td>Did not hold the linearity of the logit assumption - excluded</td>
</tr>
<tr>
<td>The greater area of forest operations that is covered by surface water, the more difficult it is for an entity to react to pressures</td>
<td>Water body abundance</td>
<td>Continuous (percent area cover)</td>
<td>Yes</td>
</tr>
<tr>
<td>The more remote forest operations are from large settlements (with population greater than 20,000 people), the less need an entity has to react to pressures</td>
<td>Remoteness (far from settlements larger than 20,000)</td>
<td>Continuous (km)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Likert scale was used for variables with the interval scale

The geographic scope of this study covered forest landowner entities in the US PNW, specifically the states of Oregon and Washington. The study assessed the responses of the forest industry, governmental organizations managing forestland and non-industrial private forest owners. These included the US Forest Service (USFS), the Washington Department of Natural Resources (DNR), the Oregon Department of Forestry (ODF), the US Bureau of Land Management (BLM), tribal lands under the Department of Indian Affairs (DIA), and small non-industrial owners in the PNW. Both certified and non-certified entities were included.

5.3.2. Data collection

Data were collected through a mailed self-administered survey to a stratified sample of forest managing entities in WA and OR. A three-contact method was chosen as the survey mailing method, which constituted a modification of the Total Design Method (Dillman 2000). The survey was conducted in May – August 2004. Within companies and agencies, the surveys were directed to the employees responsible for either environmental affairs (first choice) or silviculture (second choice). For non-industrial woodlot owners, a random sample of 40% of the
Washington Farm Forestry Association (WFFA) and Oregon Small Woodlands Association (OSWA) was taken. The survey package contained a cover letter, the survey and a stamped return envelope and included structured, semi-structured and non-structured questions, as well as the opportunity to provide comments. The survey questions requested information on internal organizational settings and the settings of the local physical, social, market and legal environments (Tikina et al. Forthcoming). Forty-nine percent of responses came from certified entities.

5.3.3. Statistical analysis
Identifying relationships between the certification and the respondents’ settings was performed using logistic regression procedures (Bergerud 1996; Hutchinson and Sofroniou 1999; Tabachnik and Fidell 2001). The probability of being certified by a scheme was used as a response variable. A probability greater than the cutoff point of 0.5 indicated that an entity was certified.

Standard logistic regression was conducted using SAS PROC Logistic to assess the probability of being certified $P(X)$ in relation to the bio-geographical and socio-economic institutional settings described above. The variables used for the model development are listed in Table 5.1. A few continuous variables (Hutchinson and Sofroniou 1999) were measured using interval (Likert) scales. Three binary variables and one categorical variable were introduced as dummy variables. The details of variables, their characteristics and their use in the further model development are presented in Table 5.1. Table 5.1 also describes the assumptions on the expected relations of the variables (settings) made prior to model development, based on the hypotheses and findings discussed above.

The dataset was first screened for outliers through plots of estimated probability vs. one step differences in the Pearson chi-square statistics. The three cases with the greatest difference (8-10 steps) were considered outliers and excluded from the analysis. Multicollinearity was assessed through Pearson correlations between the variables. Multicollinearity did not present a problem in the analysis as the correlations ranged from low to medium.

The linearity of the logit assumption was then tested with the Box-Tidwell approach (Tabachnik and Fidell 2001), and the log transformations of each variable were added to the full hierarchical
model. The following variables violated the linearity of the logit assumption: product diversity; natural disturbance, influence of endangered species, and association pressure. As such, they did not enter the model. Ecosystem diversity could not be properly assessed from the survey responses, and was also excluded from the model development. There were too few cases of companies which ownership structure is based on shares, and the introduction of “Boycotting” variable did not allow for the MLE (Maximum Likelihood Estimation) solution. Both of these variables (boycotting, and company ownership structure) were dropped from the model development. These decisions are also described in Table 5.1.

All variables included were left in their original forms (none were transformed) in order to help the interpretation of the results. Although the variables had slight to moderate departures from normality, normality is not a necessary requirement for logistic regression analysis (Tabachnik and Fidell 2001). In the analysis, 153 missing values in explanatory and response variables were detected, leaving 229 valid cases for the model development.

5.4. Results and discussion

Several models were attempted, including the full hierarchical model with potential interaction variables, the latter being the products of two independent variables. However, inclusion of the interaction variables led to the absence of an MLE solution and the interaction terms were not included into the final model. The MLE solution was derived in five iterations (Table 5.2).

All of the tests employed provided evidence of relatively good model fit. The null hypothesis of all $\beta=0$ was rejected with a significant Likelihood Ratio $= 86.67$ and Wald Criterion $= 35.64$. The Hosmer-Lemeshow test was used to assess the goodness-of-fit. The fitted model ($N= 229, \chi^2 = 4.8503$), produced $p = 0.7734$, and the non-significant chi-square showed a reasonable fit (Tabachnik and Fidell 2001). Other diagnostics employed were pseudo $R^2$ tests (Cox and Snell $R^2=0.3151$, and max-rescaled $R^2 = 0.4211$). The pseudo $R^2$ values were quite high for logistic regression, where, unlike linear models, $R^2$ can never approach the maximum of 1. The Nagelkerke $R^2$, which corrects the Cox and Snell measure so that the value of 1 can be achieved, reached 0.5599 for this model. Other goodness-of-fit measures, such as Akaike’s Information Criterion (AIC) (249.218), and the -2 log likelihood chi-square statistic (229.218) for the

11 The results of case studies from BC were used to test the model. Although the information from the BC case studies did not precisely coincide with the survey questions, similar data were collected.
intercept and covariates, also indicated a reasonable model fit. The model classified in 65.5% cases correctly, which is 15.5% greater than by chance alone.

Of the 10 variables used for the analysis, three variables contributed significantly to the model. They were land ownership, water body abundance and market pressure. The intercept was also significant and was included into the model (Table 5.2.).

Table 5.2. Variables facilitating obtaining of forest certification

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate (β)</th>
<th>S.E.</th>
<th>Wald</th>
<th>Significance</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio-geographic aspects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.8393</td>
<td>0.4117</td>
<td>4.1557</td>
<td>0.0415</td>
<td></td>
</tr>
<tr>
<td>Coastal</td>
<td>0.4296</td>
<td>0.3445</td>
<td>1.5554</td>
<td>0.2123</td>
<td>1.357</td>
</tr>
<tr>
<td>Steepness</td>
<td>-0.00717</td>
<td>0.0128</td>
<td>0.3118</td>
<td>0.5766</td>
<td>0.993</td>
</tr>
<tr>
<td>Water body abundance (X3)</td>
<td>0.0729*</td>
<td>0.0394</td>
<td>3.4195</td>
<td>0.0644</td>
<td>1.076</td>
</tr>
<tr>
<td>Remoteness</td>
<td>0.0561</td>
<td>0.00499</td>
<td>1.2676</td>
<td>0.2602</td>
<td>1.006</td>
</tr>
<tr>
<td>Socio-economic aspects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private land (X1)</td>
<td>-3.3318**</td>
<td>1.0255</td>
<td>10.5565</td>
<td>0.0012</td>
<td>0.036</td>
</tr>
<tr>
<td>Size</td>
<td>-1.77E-6</td>
<td>1.951E-6</td>
<td>0.8250</td>
<td>0.3637</td>
<td>1.000</td>
</tr>
<tr>
<td>Export proportion</td>
<td>0.3898</td>
<td>0.4228</td>
<td>0.8498</td>
<td>0.3566</td>
<td>1.477</td>
</tr>
<tr>
<td>Accessibility (road network)</td>
<td>0.00871</td>
<td>0.00819</td>
<td>1.1306</td>
<td>0.2877</td>
<td>1.009</td>
</tr>
<tr>
<td>Market pressure (X2)</td>
<td>0.0489**</td>
<td>0.00936</td>
<td>27.3271</td>
<td>&lt;.0001</td>
<td>1.050</td>
</tr>
</tbody>
</table>

** - statistically significant at α=0.05 level or better
* - statistically significant at α=0.10 level

The dependent variable shows the probability of a forest managing entity in the US PNW being certified. Based on the available data at the time of the study, three variables (water-body abundance, market pressure, and private vs. public land) were the only ones significant in determining whether or not an entity is certified. However, the data characteristics do not enable extrapolation of the results beyond WA and OR. The interpretation of the odds ratios provided some interesting insights and unexpected results.

It was found that entities operating on public land have 96.4% lower odds of being certified than those managing private land. In terms of land ownership (private vs. public land, i.e. federal,
state and tribal land in WA and OR), the expected relation was positive (entities on public lands are more prone to get certification). However, a very significant negative relation was discovered. This latter finding may no longer be applicable as the data were obtained from public entities before the commitment of the WA state to obtain certification for its lands (Corrao 2005).

For every additional percent in water-body abundance, the odds of being certified increased by 7.6%. This result should be treated with caution, as the water-body abundance relationship may appear significant through a “transfer” effect from the regulatory requirements. The water protection requirements of both WA and OR, as well as federal laws and regulations in these states, are very detailed and demanding. Vertinsky and Ziestma (1998) found that the likelihood of spending additional effort on obtaining certification is inversely proportional to the difficulty of coping with regulatory requirements for environmentally-sensitive areas. Prior to the model-fitting, the relation between water-body abundance and being certified was expected to be negative (i.e. the more surface water-bodies a holding has on the land, the more difficult it is for the entity to become certified). The model showed, however, that the relation is positive – with a one-unit percent increase in water-body abundance, the probability of being certified increased by 7.6 %. An explanation may be that holdings having a greater impact from riparian requirements on their operations try through certification to achieve recognition of their efforts.

Each additional percent of customers (of the total number of customers) requesting certified goods increased the odds of being certified by 5.0%. This finding confirmed the results of the prior research (Auld et al. 2003; Vidal et al. 2005) about the influence of this socio-economic setting. On the other hand, the survey did not distinguish between categories of customers (e.g., brokers, retailers), and it was not possible to conclude that the finding applies to all categories to the same degree.

Although a positive relation was anticipated (based on prior research (Cashore and Vertinsky 2000)) between the percentage of exports in the timber sales of a holding and the probability of being certified, the relation did not prove significant. This finding corresponds with the recent results of Cashore et al. (2005), who indicated that international markets influence certification decisions to a lesser extent than has been previously hypothesized. On the other hand, the effects of the holding size (Mathur and Mathur 2000; Sasser 2003; Vertinsky and Zietsma 1998) and the
development of infrastructure (Aurora and Cason 1996) with respect to response to pressures were included into the model, but their effects were not insignificant.

Among the biogeographical variables, it appears that only water-body abundance had a significant influence on the probability of being certified. The difficulty of operations on steep terrain may preclude allocation of resources toward certification, but the variable appears non-significant, even though the relation is negative as hypothesized. The remoteness of operations from larger settlements was hypothesized to decrease public pressure, and minimize the incentives to obtain certification, but the empirical findings did not support the hypothesis. The opposite was expected of the coastal holdings (the coastal ecosystems are considered to be more unique, and entities operating in these areas may be subject to greater amounts of pressure), but there was no evidence to support this hypothesis either.

5.5. Conclusion

Three (out of sixteen) biogeographical and socio-economic settings were confirmed to influence the decisions to obtain forest certification in the PNW: market pressure, land ownership pattern and water-body abundance. The effect of the water-body abundance should be treated with caution, given the possible correlation with socio-economic phenomena (e.g., regulatory requirements). Given that other biogeographical settings (terrain steepness, remoteness, Coastal location of operations) either did not have or may have lost (as in the case of land ownership pattern) their significance in the presence of overriding socio-economic factors, which include policy decisions, there is a doubt of the usefulness of biogeographical settings in assessing pressures for forest certification.
5.6. References


Chapter 6: General discussion and conclusions

The goal of this research project was to assess the effectiveness of forest certification in the US Pacific Northwest (PNW) and British Columbia, Canada, thus providing decision-makers and forestry professionals with further knowledge on this highly-debated forestry issue. A survey mailed out to forestland owners in Washington (WA) and Oregon (OR) and case studies in British Columbia (BC) supplied timely and relevant data, which have added significantly to our understanding of certification issues in the region. A few other studies have aimed at evaluating forest certification effectiveness, but none has covered the PNW and BC. A combination of survey and case-study methods was utilized to obtain a balance between the breadth of survey data and the in-depth analysis provided by case studies.

After the brief general description of the study scope and objectives in Chapter 1, the second chapter used regime evaluation theory and a review of the current state of science in effectiveness evaluation to develop a system for assessing the effectiveness of forest certification as a component of an international environmental regime on forests. Based on an existing classification, this system divided effectiveness into problem-solving, goal attainment, behavioural effectiveness, process effectiveness, constitutive effectiveness, and evaluative effectiveness, and provided measures of effectiveness related to forest certification. An exploratory study explained in Chapter 2 reviewed recent findings and discussions on regime effectiveness and linked them with the debate surrounding forest certification trends and impacts. The review indicated that one of the main fields where forest certification lacks effectiveness lies in the communication of environmental characteristics to the consumer. Forest certification has established itself with governments, industrial groups and most ENGOs, which shows that it has been quite successful in the process and constitutive aspects of effectiveness. Forest certification has gained the commitment of a number of institutions and their compliance to certification standards. Changes in customer (i.e., retailer, manufacturer) behaviour are, with a few significant exceptions, marginal and restricted to a few products. A few behavioural changes have occurred toward the improvement of forest practices in the region, but most are either connected with the formalization of existing processes or with the improved communication of requirements. Moreover, some effects of certification often go hand-in-hand with other developments, complicating the separation of certification effects from additional drivers.
Chapter 3 looked at the behavioural effectiveness of certification based on changes in forest practices in the PNW. The survey data were discussed in detail in this chapter. The collected data enabled the conclusion to be drawn that forest certification does prompt change in the behaviours of forest managing entities in the PNW, but the degree of this change is small and related to the land ownership pattern. The management of public lands has undergone more change than forest practices on privately held land, and these changes were not connected with forest certification. Industrial non-certified forest companies have changed forest practices to a greater extent than the certified ones, while forest practices in non-industrial private forest holdings have changed more on certified than on non-certified land.

Chapter 4 examined behavioural effectiveness through case studies of certified forest managing entities in BC, but also confirmed trends in other aspects of effectiveness (goal attainment, process and constitutive effectiveness), which were discussed in Chapter 2. In the BC setting, the case studies revealed that behavioural effectiveness is, to a certain extent, achieved on two different scales, the stand and the landscape. The analysis of the case studies indicated that most of the behavioural changes are either connected with the formalization of existing operational conditions or reflect the improved communication of environmental requirements. While a few behavioural changes indicate the behavioural effectiveness of the process, forest certification in BC has been more effective in other aspects. The effectiveness of goal attainment, together with process effectiveness and constitutive effectiveness, were the most noticeable. Entities have committed to certification and complied with its requirements. Forest certification has been effective in raising the awareness of landholders and licensees to land-use issues. The review of forest practices in the region suggested that other factors (such as regulatory reform or public policy change) may have prompted the change in forest practices for large forestland holdings in the PNW and forest managing entities in BC.

As one of the objectives of the study was to explore the settings influencing adoption of forest certification by forest managing entities, Chapter 5 investigated the importance of these settings in the PNW. The same model was applied to BC, but the results, presented in the Appendix 4, showed its limited applicability to BC settings. The following socio-economic and biogeographical characteristics of forest managing entities were assessed: ecosystem diversity, remoteness, Coastal location, water-body abundance, terrain steepness, size of the holding,
threatened and endangered species, land ownership pattern, company/entity ownership pattern, market pressure, associational pressure, export proportion, product diversity, accessibility of operations and boycotting. The logistic regression model that was developed based on the survey data supported the hypothesis of importance of both socio-economic and biogeographical settings in facilitating forest certification. Market pressure was confirmed to be a setting influencing the decision to proceed with forest certification in the PNW. Water-body abundance (as a percent of surface area) and land ownership pattern also influenced decisions for certification, but these findings should be treated with caution and their significance may change over time.

This study has filled several knowledge gaps identified during the literature review, but several caveats remain. The limited number of case studies is a well-known constraint for case-study research, and precludes making inferences beyond the scope of the study. It was not possible to find a counterpart for each case study to compare, for example, certified and non-certified entities with similar settings. Although many measures were taken to maintain the validity of the survey sampling, too few certified entities were surveyed among public land holdings. The reliability of the data may also have impacted the research results through the subjectivity of survey respondents and the affiliation of the case-study interviewees, but precautions were taken to avoid this.

The rapid developments of the forest certification process also limit the applicability of the study. While it might be too early to expect marked behavioural changes prompted by forest certification, a public policy change may negate the importance of biogeographical settings. The commitment to certify all state public land in WA serves as an example of this drawback. The latest updates on the status of the case-study participants (e.g., in market conditions or certification commitments) suggests that the validity of the results is likely to change over time.

This exploratory research provides a solid background for evaluating forest certification effectiveness for policy-makers and forest managers, as well as providing new perspectives on the regional effectiveness of forest certification in the PNW and BC. It is emphasized that the thesis studied only the environmental side of forest certification (forest practices), and did not touch upon social or economic sides. This is an important point, as the most fundamental effect of, for example, the SFI scheme in highly regulated jurisdictions is considered by some to be its
impact on outreach and procurement. The results will be useful for decision-makers as they consider certification-related resource allocation within the region and on a broader scale. Specifically, this research project contributed the following premises and recommendations:

- Assessment of forest certification effectiveness needs to be divided into a number of different aspects. The regime component may be more effective in some aspects and less so in others, and the relative importance can change over time. While it may be too early to evaluate behavioural effectiveness, certification has been successful in meeting the process and constitutive aspects of effectiveness.

- Behavioural effectiveness of forest certification should be evaluated at two scales, the landscape and the stand. Different forest certification standards are more effective at one level than the other. Effects at the scale of the landscape can go hand-in-hand with other drivers, besides forest certification, and this complicated the analysis of the landscape-scale effectiveness.

- Forest certification is very effective in raising the awareness of land- and license-holders. This is particularly relevant for small land-holders, for whom a change in outlook often brings a change in forest practices.

- Biogeographical settings are less important than socio-economic ones for making decisions on obtaining forest certification. Of the biogeographical settings, only water abundance was relevant, but the relationship may have been influenced by the effects of existing regulation. The effects of regulation were also obvious for non-certified holdings in the PNW that needed to change more than certified ones to comply with the changing regulations. Doubling control (hard law plus certification as soft law) may lack benefits in a region with strong forest regulations.

- Market pressure was found significant in decisions for obtaining forest certification, but the changes in customer behaviour were small. This suggests that the behavioural effectiveness of forest certification may be limited.

- The purpose of forest certification should be more clearly communicated to the general public. Instead of dual purpose of: a) informing the consumer of certain characteristics, and b) improving forest practices (or social or economic conditions), “certify” in forest certification should mean no more than “c: to attest
as being true or as represented or as meeting a standard” (Webster’s Collegiate Dictionary). The idea of changing practices should be limited in the notion.

Future research to build on the study results could cover several areas. Conducting similar research on the effects of forest certification with other forestry stakeholders (for example, governments or customers), but excluding forest managers, would fill in the gaps in the framework that could not be addressed by the case-studies. This could be a survey of the customer (retailer or distributor) behaviours in the region on their intent to purchase certified wood products. The influence of a combination of drivers (e.g., certification by institutional strata by state) on forest practices would be an interesting topic for further investigation. The framework for evaluating forest certification effectiveness would benefit by a study of evaluative effectiveness, for example by a comparison of forest certification with voluntary best management practices. An investigation of the effects of forest certification on social and economic aspects would help to link forest certification effectiveness with discussions about corporate social responsibility.
Appendix 2. Survey Instrument

Change in Forest Practices with Forest Certification in the Pacific Northwest

ATTENTION! If your company or institution has several divisions, please refer to your division only

Section I. Organizational Structure

1. Which organizational structure best reflects your company/institution?
   - [ ] Privately held
   - [ ] Shareholders
   - [ ] Public

2. Area of the forest holding ___________________________ acres

3. Number of employees (in your division, if applicable) ___________________________

4. What species do you cut? (Please check all that apply)
   - [ ] Douglas-fir (coastal)
   - [ ] Douglas-fir (interior)
   - [ ] Lodgepole pine
   - [ ] Western hemlock
   - [ ] True firs
   - [ ] Spruce
   - [ ] Western redcedar
   - [ ] Ponderosa pine
   - [ ] Other (please specify) ___________________________

5. How many product lines does your company/institution have? (A product line refers to an individual product that your company/institution sells like dimension lumber and it includes standing timber) ___________________________

6. What proportion of your timber comes from the following sources?
   - Public land that you manage ___________________________ %
   - Private land that you manage ___________________________ %
   - Public land that you do not manage ___________________________ %
   - Private land that you do not manage ___________________________ %

6. What proportion of your timber comes from the following sources?

   100 %

7. What markets does your company/institution sell products into? (Please show the percentage, if applicable)
   - [ ] Canada ___________________________ %
   - [ ] USA ___________________________ %
   - [ ] Japan ___________________________ %
   - [ ] Other Asia ___________________________ %
   - [ ] Europe ___________________________ %
   - [ ] Other (please specify) ___________________________ %

   100 %

8. What percentage of your product buyers asks you to pursue forest certification? ___________________________ % percent

9. What is the average distance from your operations to a settlement larger than 20,000 people? ____________ miles

10. What is the length of forest roads that your operations built in the last five years? ____________ miles

Section II. Forest Practices

11. Which documents best reflect the on-the-ground changes in your forest practices undergone in the last 10 years? (Please check all that apply)
   - [ ] Forest Management Plan
   - [ ] Certification Audit Report
   - [ ] Memo’s and reports from field personnel
   - [ ] Other (please specify) ___________________________
12. Have your forest operations ever been boycotted/threatened to be boycotted by an environmental NGO or local community?

☐ Yes

☐ No (go to Question 14)

13. Please describe boycott(s)/threat(s) to boycott that your operations experienced (Please list all):

<table>
<thead>
<tr>
<th>Public Group</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

14. What slope gradient best describes the terrain where you have forest operations? %

15. How often do you use chemicals for regeneration enhancement?

Never 1 2 3 4 5 Always

16. What percentage of your forest operations area is covered by surface water? %

17. Please rank your level of agreement with each of the following statements (1 - Strongly agree, 2 - Agree, 3 - Neither agree nor disagree, 4 - Disagree, 5 - Strongly disagree):

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your forest practices on the ground have undergone significant changes in the last 10 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The increase of partial cutting harvesting has been a major change in your forest operations in the last 10 years</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Considerations for visual values have significantly increased in your forest operations in the last 10 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The length of temporary and permanent roads on steep grades you build decreased greatly in the last 10 years</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>You use fewer chemicals for regeneration and pest control than it did 10 years ago</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>You have left riparian zones along a greater number of streams and rivers in the last 10 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>You have improved methods of pollution prevention in the field by better fuel facility management in the last 10 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your institution includes its environmental performance results into marketing strategy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>You have documentation reflecting your aim to responsible forest management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your strategy for responsible forest management precedes forest certification initiatives</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

18. Does your company/institution exceed minimum regulatory requirements in forest practices?

☐ Yes

☐ No (go to Question 20)

19. Please rate the reasons for exceeding the minimum regulatory requirements (1 - very important, 5 - not at all important)

<table>
<thead>
<tr>
<th>Reason</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Part of company/institutional philosophy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Forest/certification requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Public pressure (ENGO's or local community)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>d) Association pressure (operations of similar scale)</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>e) Market pressure (product buyers)</td>
<td></td>
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</tr>
</tbody>
</table>

20. Please check all schemes that you are certified or anticipate to be certified by and list the dates when you received (plan to receive) certification

<table>
<thead>
<tr>
<th>Certification Scheme</th>
<th>Date</th>
</tr>
</thead>
</table>
21. Please rate the impact of natural disturbances common in your area (1 – Minimal impact, 5 – Significant impact).

- Fire
- Insects
- Wind-throw
- Avalanche
- Snow breakage

22. How significant are the impacts on your forest practices caused by the following?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Not at all significant</th>
<th>Not very significant</th>
<th>Somewhat significant</th>
<th>Very significant</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Proximity to highways and travel routes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Habitat(s) of threatened/endangered species</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Requirements of associations you are a member in</td>
<td></td>
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<td></td>
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<tr>
<td>d) Organizational change in the last 10 years</td>
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</tr>
</tbody>
</table>

Section III. Extent of Change in Forest Practices

**ATTENTION!** If your company/institution is certified, please consider changes undergone with regard to or in anticipation of forest certification. If your company/institution has several certification schemes, please refer to the scheme that in your opinion has brought the greatest change. Please specify the certification scheme ________.

If you are not certified, please consider changes undergone in the last 10 years.

23. Please rank the change in the following aspects of forest operations (with 0 – No change whatsoever up to 5 – Radical change). For each category (e.g. Logging), please check the specific aspect that in your opinion has the "Most" positive impacts on the environment and the "Least" positive impacts on the environment. Please leave blank if you are unfamiliar with the issue.
<table>
<thead>
<tr>
<th>Planting density</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Method of planting</td>
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<td></td>
<td></td>
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<tr>
<td>Additional use of natural regeneration</td>
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<tr>
<td>Decrease in herbicide/fertilizer use for green-up enhancement</td>
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**Riparian Management**

<table>
<thead>
<tr>
<th>Introduction or increase of riparian zones</th>
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<tbody>
<tr>
<td>Management regime in riparian zones</td>
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<tr>
<td>Erosion control methods on cut-blocks</td>
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<tr>
<td>Chemical application methods</td>
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<tr>
<td>Width of “filter strips” between roads and streams</td>
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**Road Construction**

<table>
<thead>
<tr>
<th>Road-building equipment</th>
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<tbody>
<tr>
<td>Materials used for road construction</td>
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<tr>
<td>Number/specifications of culverts, water-bars, etc.</td>
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<tr>
<td>Road construction specifications</td>
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<tr>
<td>Definition and requirements to steepness grade</td>
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**Pollution Prevention**

<table>
<thead>
<tr>
<th>Organization of fuel and oil facilities</th>
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<td>Chemicals used in regeneration or pest control</td>
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**Planning**

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<th>Retention of coarse woody debris</th>
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<td>Seral stage distribution</td>
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<td>Additional species to protect</td>
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<td>Increased use of NTFPs (non-timber forest products)</td>
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<td>Percentage in protected areas and reserves</td>
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<td>Management for threatened or endangered species (if listed)</td>
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24. Please rate the importance of the change within the categories to overall change in the on-the-ground forest practices (1 – Very important, 5 – Not at all important).

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<td>Logging</td>
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<td>Stand Tending</td>
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<td>Regeneration</td>
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<td>Watershed Management</td>
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<td>Road construction</td>
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<td>Pollution prevention</td>
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25. Describe up to three key changes in greater detail:

1. ____________________________________________
   
2. ____________________________________________
   
3. ____________________________________________
Section IV. Profile.

26. Company /Institution
   ☐ Please check here if Non-Industrial Private holding

27. Your division (if applicable)

28. What professional/ business associations, if any, does your institution hold membership in? (Please list most important)

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<tr>
<th>Association</th>
<th>Date of Joining</th>
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29. Your occupational title/ position

30. Would you like to receive the summary of this research project?
   ☐ No
   ☐ Yes → Contact ____________________________
   Address (if different from survey mailing address)

31. We would like to extend this research by documentation analysis, interviews and field visits. Would your company/ institution be willing to participate in such further study?
   ☐ Yes
   ☐ No

If you have additional comments on change in on-the-ground practices with regard to forest certification, please provide them in the space below.

_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
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Thank you very much for your time and cooperation in filling out this survey!
Appendix 3. Interview Questions

General

1. What position do you hold in the institution?
2. What forest products does your institution produce?
3. Does your institution export forest products? To what countries and what percentage of the total production of the institution?
4. What percentage of your customers requests certified forest products?

Influence: Biological and Institutional

5. What are the main ecosystem types where your institution has operations?
6. What natural disturbance types (NDTs) are present on the land where you have your forest operations?
7. How does your institution take into consideration uncertainty brought by natural disturbance regimes?
8. What environmental (biological, geographical) factors of your timber harvesting land-base make forest operations (and change in the operations) the most challenging?
9. What organizational (institutional, social) factors of your timber harvesting land-base make forest operations (and change in the operations) the most challenging?
10. What is the percent of the area-based and volume-based forest tenures in your institution? Do you think the tenures that you have influence your choice of forest practices? If yes, to what extent and how?
11. How much do you invest in infrastructure (e.g. road construction)?
12. How have your forest practices been influenced by a) markets; b) public pressure; c) organizational change; d) associational pressure (peers); e) technological change? Please describe to what extent they are influenced.
13. How would you describe the extent of public pressure on your forest management (high, medium, low)? When was the public pressure most extreme?

Change

14. What changes happened in the forest practices of the institution in the last 10 years? Could you estimate when exactly they happened? How many years ago?
15. What category of forest management underwent the most change, given the following choices: logging, stand tending, regeneration, watershed management, road construction, pollution prevention, planning?
16. What is the direction of each change in each aspect of forest practices?
17. What is the most important for changes in your forest practices out of three choices (regulation, forest certification as a voluntary mechanism and corporate social responsibility)? How does your institutional philosophy influence the changes?

18. Could you describe the most influential factor (a catalyst) for changes in forest practices?

19. What documents best reflect change (gradual or abrupt) in your forest practices?

20. Are you exceeding minimum regulatory requirements? In what mode does your institution exceed them? If yes, please describe aspects of forest practices where these requirements are exceeded

Certification

21. Is your institution certified by any certification scheme? If yes, when did you receive certification?

22. Why did you decide to choose a particular forest certification scheme?

23. If you have more than one certification scheme in place, how has the first scheme that you obtained influenced the changes?

24. How have your forest practices been influenced by forest certification?

25. What are the non-compliances (if any) found in certification or surveillance audits? How have they been addressed?

26. How are the objectives and guidelines from certification process (or other initiatives) communicated to field personnel?

Organizational

27. Area, documents, timing
Appendix 4. Attempted Logistic Model in the BC Settings

While BC differs from the PNW in relation to many socio-economic factors (e.g., land ownership patterns), the two regions share a number of ecological features. This encouraged a test to see whether the certification facilitation model developed for the PNW could be used in the BC setting. The similar biogeographical background factors are discussed below. British Columbian rules and regulations, such as the Forest Planning and Practices Regulation (FPPR) are cited.

Ecosystem diversity
I hypothesized that the presence of several different ecosystems on the forest land creates difficulties when responding to certification pressures. The basis for this hypothesis lies in the differing management strategies required by different ecosystems. As a result, the managing entity has to adapt its forest practices to provide flexibility in the selection of a suitable management regime and in maintaining wider infrastructure. In addition to the information presented in Section 5.2.2.1., the government-endorsed BC ecosystem classification (Meidinger and Pojar 1991) defines fourteen biogeoclimatic zones in BC. These are based on the climax species characteristic to each unit (for example, the Coastal Western Hemlock zone).

Large-scale disturbance
The influence of large-scale disturbance was based on the Biodiversity Guidebook (BC Ministry of Forests 1995; Parminter 1998). Uncertainty associated with resource availability in areas with large-scale disturbances was hypothesized to be a constraint in reacting to certification pressures.

Threatened and endangered species
British Columbia has a list of identified wildlife (including red-listed and blue-listed species) that require special management considerations, and also provides guidelines for the habitat protection of these species in the Managing Identified Wildlife Guidebook (British Columbia Ministry of Environment Lands and Parks and British Columbia Ministry of Forests 1999). Threatened and endangered species management is regulated federally through the Species at
Risk Act. The necessity to adapt forest management to species-at-risk requirements was hypothesized to decrease the ability of a forest managing entity to react to certification pressure.

**Coastal ecosystems and remoteness**

In BC, coastal ecosystems are highly valued for their environmental and recreational features, in addition to their timber value. The public, especially in large cities, possesses a similar attitude (Cashore et al. 2001; Duinker et al. 2003) as in the PNW, towards protecting and limiting harvesting in such ecosystems. The same hypotheses on coastal ecosystems and remoteness of forest operations were tested as in Section 5.2.2.4.

**Water-body abundance**

Specific protection established for water bodies and their adjacent riparian areas imposes constraints on forest management for timber. The more abundant water bodies are in a specific forest management area, the greater are the complexities of planning and operations. In BC, FPPR Division 3 of Part 4 divides streams into six riparian classes: community and/or fish streams (S1 to S4) and non-fish streams located outside of community watersheds (S5 and S6). Riparian management areas (including riparian reserve zones and riparian management zones) are established for each type of water. A division of wetlands (W1-W5) and lakes (L1-L4) also prescribes the width of management areas around these water bodies. Compliance with these requirements is hypothesized to limit the ability of forest managing institutions to react to certification requirements.

**Terrain steepness**

The BC FPPR Division 5 of Part 4 (Roads) states only that roads have to be structurally sound and safe for use by industrial users. The BC FPPR Division 1 of Part 4 (Soils) indicates hazard classes for “sensitive soils”. The classes are characterized by slope gradient and landslide-prone terrain. The Forest Road Regulation under the Forest Practices Code calls for terrain stability surveys on potentially unstable soils (e.g., on slopes greater than 60%). Steep terrain introduces additional difficulties to forest planning and management, and therefore was hypothesized to limit the ability of a forest managing institution to react to pressure.
Lack of the model transferability

The information gained from the BC case studies was used to test the model in the BC setting. The case studies are described in detail in Chapter 4. Although the information from the case studies did not coincide precisely with the survey questions used in the model development, similar data were collected.

The analysis revealed that the model did not fit the information derived for the BC case studies. Running the statistical analysis with the combined data-set (survey and case-study data together) gave contradictory results during the goodness-of-fit testing. Some diagnostic tests indicated a slightly improved fit of the model. The general classification improved to 67.2% correct, AIC (265.243), and -2 Log likelihood (245.243) increased, and the null hypothesis of all $\beta=0$ was rejected. Other tests ($R^2=0.2821$, and max-rescaled $R^2 =0.3775$) showed a worse model fit. However, no cases were correctly classified by the model when taken separately. The reason for this could be the different land ownership pattern in the two regions, since this was one of the significant variables in the model. While most of the forest land holdings in the PNW were privately owned, the majority of the BC forestland is public, which is, moreover, managed differently from the public land in WA and OR. Thus, the model discussed in Chapter 5 would best be applied in regions with forestland ownership patterns similar to the PNW.
Appendix 4. References


