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PERCEPTIONS LOCALES DE L'AMÉNAGEMENT FORESTIER DURABLE DANS TROIS RÉGIONS DE LA FORÊT BORÉALE

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LOCAL PERCEPTIONS ON SUSTAINABLE FOREST MANAGEMENT IN THREE BOREAL REGIONS

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RÉSUMÉ

Depuis les années 1990, l'étude de la perception du public sur les forêts et l'aménagement forestier fait l'objet d'un intérêt croissant qui se reflète par une attention accrue sur l'aménagement durable des forêts (ADF). Puisque que l'ADF vise à intégrer les diverses valeurs écologiques, économiques et sociales, l'acceptabilité sociale devient un préalable essentiel à sa réalisation. Afin d'évaluer l'acceptabilité sociale, il est important d'avoir des informations sur les perceptions locales et leur distribution entre les groupes.

Jusqu'à présent, il n'existe pas de théorie ou de modèle conceptuel qui explique les interactions entre la forêt, l'individu, incluant son milieu social et culturel, ainsi que la politique et l'aménagement forestier. Pour illustrer ces interactions, le concept de modèle culturel est introduit et utilisé pour créer un modèle conceptuel fournissant un cadre théorique permettant les comparaisons entre les régions. Ce modèle conceptuel facilite aussi le lien entre l'utilisation actuelle et historique des forêts et les perceptions. Le cadre théorique explique aussi la qualité non-statique des modèles culturels sur les forêts et décrit la façon dont ils sont changés ou renforcés par de nouvelles expériences forestières ou par le discours public. L'introduction d'informations additionnelles sur les forêts et leur aménagement devrait ainsi influencer les modèles culturels des gens et leurs perceptions des forêts.

Basée sur le cadre théorique décrit au-dessus, cette dissertation a comme but de mieux comprendre l'effet des conditions locales et de l'introduction de nouvelles informations sur les perceptions reliées à l'ADF. La question des conditions locales est approchée en étudiant les valeurs forestières, les attitudes par rapport à l'aménagement forestier et les préférences des groupes d'intérêt provenant de trois régions boréales concernant l'ADF. Les régions étudiées diffèrent dans leur utilisation actuelle et historique des forêts. L'effet de l'introduction de nouvelles informations est étudié en mesurant les valeurs forestières, les attitudes face à l'aménagement forestier et les préférences touchant l'ADF avant et après la présentation des résultats de simulations illustrant les effets probables des scénarios alternatifs à long terme et à grande échelle.

Les régions étudiées, le sud-est de la Finlande, le centre du Québec et le centre du Labrador, accordent, respectivement, une grande, moyenne et basse importance à la foresterie industrielle. L'importance de la foresterie industrielle est utilisée comme indice permettant de décrire le gradient de l'utilisation actuelle et historique dans les trois régions. Les participants à cette étude, 252 personnes au total, représentent des groupes environnementaux, des utilisateurs des produits forestiers non ligneux, des groupes autochtones, des propriétaires de forêts privées et des professionnels forestiers des trois régions étudiées.

Les résultats démontrent des variations dans la priorité accordée aux composantes environnementales et économiques menant à la durabilité ainsi qu'à quelques attributs de l'ADF en fonction de l'importance de la foresterie industrielle. Le résultat le plus intéressant montre que les différences entre les groupes s'accentuent pour plusieurs aspects lorsque l'importance de la foresterie industrielle augmente. Les tendances observées reflètent, entre autres, l'influence de l'utilisation actuelle et historique des forêts sur les perceptions face à l'aménagement durable des forêts.

Des différences ainsi que des similarités ont été détectées entre les groupes d'intérêt entre les régions et au sein même des régions. Les différences les plus grandes entre les régions se trouveraient dans les perceptions des professionnels forestiers. Par contre, les environnementalistes ont des perceptions relativement similaires dans les trois régions. Les perceptions des groupes d'intérêt devraient être influencées par les conditions locales, incluant l'utilisation caractéristique de la forêt, ainsi que par des questions partagées par les groupes similaires des différentes régions, comme l'agenda global des environnementalistes, l'éducation technique des professionnels forestiers ou l'expérience des chasseurs dans la forêt.

Après avoir montré aux participants les résultats des simulations forestières à long terme et à grande échelle, nous observons aussi quelques changements significatifs au niveau des valeurs et des attitudes, mais aucun changement des préférences. Le changement le plus commun est la formation des opinions. Les participants ont aussi signalé qu'ils ont appris durant la présentation. Autant les professionnels forestiers que les autres utilisateurs des forêts ont fait des apprentissages, mais à des niveaux différents. Cette observation reflète des différences qualitatives entre les connaissances techniques et les connaissances locales. Le fait qu'il n'y a pas de changements significatifs des préférences peut être expliqué par le contexte de balancement des divers attributs sous-jacent aux expériences de choix. Il est aussi possible que les préférences soient plus stables que les valeurs et les attitudes.

Quelques groupes d'intérêt étudiés ont signalé qu'ils préfèrent le changement de régime forestier. Des perceptions conflictuelles entre groupes ont aussi été détectées spécialement dans la région de grande importance de la foresterie industrielle, le sud-est de la Finlande. Des opinions conflictuelles peuvent possiblement être réconciliées par l'utilisation d'approches innovatrices comme le commerce des valeurs de conservation ou l'approche de zonage TRIADE.

La présentation des résultats de simulations illustrant les effets des scénarios alternatifs à long terme et à grande échelle est une manière efficace pour améliorer la compréhension entre les professionnels forestiers et les autres utilisateurs des forêts. La communication répétée des résultats de simulations et l'opportunité de les commenter et de discuter durant le processus de modélisation améliore la qualité des modèles développés ainsi que la profondeur de la compréhension des participants.

ABSTRACT

Public perceptions on forests and forestry form the subject of an increasing amount of research since the 1990's due to the emerging focus on Sustainable Forest Management (SFM). SFM aims at integrating various ecological, economic and social values and thus its essential prerequisite is social acceptability. In order to evaluate social acceptability, information on local perceptions and their distribution across groups is needed.

So far, there has not been a theory or conceptual model that would explain the relationship between the forest, the individual with his/her social and cultural setting, and forest policy and management. In order to describe this relationship, the concept of cultural models is introduced and used to create a conceptual model that provides a theoretical framework for regional comparisons and connects the current and historical forest use with perceptions. This theoretical framework also explains how cultural models about forests are not static, but are either changed or reinforced by new forest experiences or public discourse. Thus the provision of new information on forests or their management is expected to affect people's cultural models and their perceptions about forests.

Based on this theoretical framework, this dissertation aims at better understanding the effect of local conditions and additional information on perceptions related to SFM. The question of local conditions is approached by studying forest values, attitudes towards forest management and sustainable forest management preferences of interest groups in three boreal regions varying in their current and historical forest use. The effect of additional information is studied by measuring forest values, attitudes towards forest management and SFM preferences before and after showing forest simulation results that demonstrate long-term effects of various forest management alternatives in a large area.

The study areas are Southeastern Finland, Central Quebec and Central Labrador which are used as examples of high, intermediate and low importance of commercial forestry in the region. The importance of commercial forestry is used as an index to describe the gradient in the historical and current forest use in the three study areas. The participants in this study, all together 252 persons, were local and regional forest users representing environmental groups, multiple users of the forest, indigenous groups, forest owners and forestry professionals from the three regions.

The results show some gradients in weighting of environmental and economic components of sustainability and some attributes of SFM along a gradient of importance of commercial forestry. The clearest result was found in relation to inter-group differences which grew in many aspects with increasing importance of commercial forestry. These detected trends are interpreted to reflect, among other

factors, the influence of current and historical forest use in shaping perceptions related to sustainable forest management.

Both differences and similarities among interest groups across and within regions were detected. Biggest differences across regions were detected in the perceptions of forestry professionals while the environmentalists were rather similar in their perceptions in all three regions. It is interpreted that the perceptions of interest groups are influenced by both the local setting with its forest conditions and characteristic forest use and issues shared by similar groups across regions like the global agenda of environmental groups, similar technical education of forestry professionals or partially similar forest experience of hunters.

The results also show some statistically significant change in held values and attitudes, but not in preferences, upon showing long-term forest simulation results on a large area. Opinion forming was the most common change and participants themselves also reported having learned from the presentation. Both forestry professionals and other forest users learned, but their learning was at different levels. While forest users gained more confidence in the current forest management plan and were motivated to further participate, professionals learned more specific things. This reflects qualitative differences between technical knowledge and local knowledge. The lack of detected preference change may be explained by the trade-off setting inherent in choice experiments or greater stability of preferences in comparison to values and attitudes.

Some of the interest groups studied showed their preference for change over the current management regime. Conflicting views were also detected within regions especially in the region that was used as an example of high importance of commercial forestry, Southeastern Finland. Conflicting views could probably be accommodated by introducing new innovative solutions like trading in natural values or the TRIAD zoning approach. Trading in natural values has been piloted in Finland. It means that private forest owners offer to maintain certain qualities of a forest area important for conservation for 10 to 20 years and receive compensation for it.

Showing simulation results that demonstrate the long-term effects of various forest management alternatives in a large area was proven an effective way to enhance understanding both among forestry professionals and other forest users. Repeated communication of simulation results and an opportunity to discuss and comment on them during the modeling process would improve both the quality of models developed and the depth of understanding of participants during public participation processes.

GENERAL INTRODUCTION

0.1 STUDY OF LOCAL PERCEPTIONS ON FORESTS AND FORESTRY

Perceptions[1] of the general public on forests and forestry have been studied in various nation-wide or provincial surveys both in North America and Northern Europe (Kangas and Niemeläinen 1995; Hänninen and Karppinen, 1996; Robinson and Hawley 1997; Nadeau et al. 2007). While these studies provide valuable information for the development of general forest policies, many issues related to forests and forestry are tied to a certain forest area and are dealt with at a more local level. As stated by Côté and Bouthillier (1999), regional, national or even international actors may become involved in these issues, but those with the strongest ties to the forest are local forest users. As I am interested in the dynamic relationships between the forest, the people and their forest use, I focus on local or regional actors that are using the forests or actively working for their protection.

Local perceptions have been broadly studied in case studies revealing critical issues for improving local forest management or improving understanding of the mechanisms related to forest related values, attitudes or preferences (Pykäläinen and Rantala, 1997; Mäntymaa, 1998; Bonnell, 2000; Brown and Reed, 2000; Nadeau, 2002; Watson and McFarlane, 2004). For example, the general public both in Western Newfoundland and the Haut-St.-Mauricie region in Quebec has been very critical towards current forest management and whether it is sustainable (Bonnell, 2000; Nadeau, 2002). There is a great gap in knowledge since most previous work on perceptions of forests and forestry, like those cited above, concentrated on studying one region or country and did not study regional differences. In addition, differences in theoretical background and methodology do not facilitate comparison across

[1] The concept perceptions here includes values, attitudes and preferences

regions. An exception is a set of European studies that use spatial variations in forest cover across Europe or across regions in one country to explain differences in local forest attitudes (Elands et al., 2004; Selby et al., 2007).

In addition to studies on the perceptions of the general public, information is needed on the distribution of perceptions across different interest groups or forest user groups (Horne, 2008). Private forest owners, forestry professionals and forestry sector employees tend to have greater support for economic values in forestry than the general public (Tindall, 2003; Horne et al., 2004b; Kant and Lee, 2004). In contrast, users of non-timber forest products, like hunters and campers, have been found to support protection-oriented management strategies (McFarlane and Boxall, 2000a). As expected, members of environmental organizations have been shown to be more environmentally oriented and biocentric than the general public or other stakeholder groups (McFarlane and Boxall, 2000b; Leskinen et al., 2004). Aboriginal groups represent an indigenous view that clearly differs from the Euro-American view (Pobihuschchy, 1986; Adamowicz et al., 1998b; Adam and Kneeshaw, 2008). Comparison of aboriginal groups with others is difficult, since in general distinct methods and research approaches are used for studying these groups. In their study in Ontario, Kumar and Kant (2007), however, found that the aboriginal group had a greater preference for spiritual and environmental values of the forest than most other groups. These are all case studies, however, and no research has so far been conducted on the differences and similarities of interest groups across regions.

0.2 SUSTAINABLE FOREST MANAGEMENT AND ITS ACCEPTABILITY

The notion of Sustainable Forest Management (SFM) has evolved historically from sustainable timber production to managing the forests for various ecological, economic and social values (Messier and Kneeshaw, 1999; McDonald and Lane, 2002; Wang, 2004). There is no single broadly accepted definition of SFM (Klenk et al. 2008), rather the concept and its application in forest management is continuously being debated. One way of conceptualizing SFM is to divide it into ecological, social and economic components; the three pillars of sustainability (Goodland, 1995; Adamowicz and Burton, 2003; Robinson, 2004). I use this conceptualization to elicit local perceptions of SFM.

While the economic component of sustainability has been strong in the tradition of managing the forest for maximum sustainable timber production, forest management has been criticized for not being based on sufficient ecological information. It has been suggested that especially information on ecological processes that occur at large spatial scales (over 100 000 ha) should be better understood and integrated into planning systems (Hunter, 1990; Levin, 2000; Turner et al., 2001). Having this in mind, forest managers and scientists are searching for new, sustainable management strategies that would simultaneously use ecological information on forest dynamics and be economically feasible (Messier et al., 2003a; Groot et al., 2004).

In order to be successful, forest management strategies should also be socially acceptable (Clawson, 1975). Social acceptability is based on an individual's judgement process where they "(1) compare perceived reality with its known alternatives; and (2) decide whether the "real" condition is superior, or sufficiently similar, to the most favorable alternative condition . . ." (Brunson, 1996, p.9). In this context the concept perception means a subjective judgement of something that is

more abstract rather than referring to the physical environment and recognizing objects, space and landscape like in environmental psychology (Kaplan and Kaplan 1982; Purcell 1987). We can refer to social acceptability as a perception that is shared by a politically relevant[2] group of people (Shindler et al., 2002, p.4). Social acceptability of forest management is thus based on shared perceptions related to forests and their management. In order to evaluate social acceptability, information on these perceptions and their distribution across groups is needed (Horne 2008).

As described above, different groups may have differing perceptions on SFM and the values for which forests should be managed. SFM planning therefore needs to consider the long-term effects of different scenarios on multiple attributes in a large area and at time-scales up to or exceeding several human generations. Modeling tools can be used to demonstrate these effects that exceed our first-hand perceptions (Daniels and Walker, 1996; Messier and Kneeshaw, 1999; Messier et al., 2003a; Sturtevant et al., 2007). The use of modeling tools helps forest managers to make better informed decisions and simulation results may also be used to facilitate discussion with local forest users (Fall et al., 2001; Sheppard and Meitner, 2005). In this work I test whether the local forest users' SFM perceptions change following demonstration of the effect of different management options on long-term processes at a landscape scale.

[2] In this case politically relevant people would be those using forests or interested in forestry issues.

0.3 HUMAN-FOREST INTERACTIONS

People's perceptions on forests and their management are influenced by their interaction with both the socio-cultural and natural environments (Adamowicz et al. 1998b). Tuan (1974) explains how human beings perceive the physical world, structure it and create symbolic meanings. In studying the perceptions of a given group of people, it is essential to know their cultural history and experiences in the context of their physical setting (Tuan, 1974, p.59). Thus a place and its physical qualities, which may be shaped by human activities and interwoven with given meanings, become important. Recently, much work has been done on the sense of place and attachment to a particular place (for example Stedman, 2003a, b; Brown and Raymond, 2007).

People's relationships with the forest in a broader context of the forest in general, without making reference to particular places, have been studied in relation to forest and wilderness experience and forest landscape (Hallikainen, 1998; O'Brien 2005). Also the impact of social networks on people's relationship with the forest has been examined (Harshaw and Tindall, 2005). There is no theory or conceptual model, however, that would explain the relationship between the forest, the individual with his/her social and cultural setting, and forest policy and management. I introduce the concept of cultural models derived from psychological anthropology (Shore, 1996; Strauss and Quinn, 1997) in order to describe this relationship. The conceptual model presented in Chapter 1 provides a theoretical framework for regional comparisons and connecting current and historical forest use with perceptions.

The conceptual model described in Chapter 1 is based on the idea of the interrelatedness between physical and social or cultural worlds: people's perceptions on the physical world are shaped by social construction processes, whereas the physical qualities of the environment influence social phenomena (Freudenburg et al.

1995). The concept of culture has been defined in various, distinct ways and especially in anthropology its definition is subject to continuous debate. Milton (1996) describes how culture may be redefined in order to describe human interactions with the environment. According to Milton (1996, p.66) culture includes three dimensions: "First, culture exists in people's minds and is expressed through what they say and do. Second, culture consists of perceptions and interpretations…through which people make sense of their experience. Third, culture is the mechanism through which human beings interact with their environments."

The theoretical framework based on cultural models also explains how cultural models about forests are not static, but are either changed or reinforced by new forest experiences or public discourse. This means that the provision of new information on forests or their management should have an effect on people's cultural models and their perceptions about forests. The effect of providing new or additional information has been studied by two clearly distinguishable research traditions. One is studying cognitive learning and the effects of persuasive messages (Petty and Cacioppo, 1986; Eagly and Chaiken, 1993), while the other concentrates on deliberation and learning by hearing other peoples' opinions (Arvai et al., 2001). The latter approach has its origin in political science (for example Fishkin, 1991; 1995) and has been recently applied by economists searching for methods to elicit more informed opinions in economic valuation (for example Howarth and Wilson, 2006; Shapansky et al., 2008). In relation to forest management, there are a few studies following each tradition (Bright and Manfredo, 1997; Tyrväinen et al., 2003; Seekamp, 2006), but none of them tests changes in perceptions following demonstration of the effect of different management options on long-term processes at a landscape scale.

0.4 HELD AND ASSIGNED VALUES

Perceptions are often described using the concepts of held values and attitudes or the concept of preferences. These concepts are based on distinct disciplines and theories. The cognitive hierarchy model from social psychology describes the concepts of held values, value orientations and attitudes (Rokeach, 1973, 1979; Fulton et al. 1996; Vaske and Donnelly 1999) while the concept of preferences is related to assigned values and based on economic theory (Brown and Manfredo, 1987; Grafton et al., 2004). Adamowicz et al. (1998b) theoretically describe the hypothesized relationship between held and assigned values in a resource use setting. Held values are described as influencing assigned values through preferences, which are defined as favoured options of forest management, for example (Figure 0.1). Assigned values related to forests describe the relative value of ecosystem services or different uses of the forest (Adamowicz et al., 1998b). Socially shared assigned values may also influence held values which is demonstrated by the dashed arrows in Figure 1. Further work has empirically found a moderate connection between held forest values and attitudes and preferences for forest use or management alternatives (Brown and Reed, 2000; Horne et al., 2004a,b). In spite of these few exceptions, most researchers have studied either held values or assigned values and very little has been done to link these concepts.

0.5 THE CONCEPT "IMPORTANCE OF COMMERCIAL FORESTRY"

This work focuses on local perceptions in three boreal regions – Southeastern Finland, the Mauricie region in Quebec and Central Labrador, the latter two both in Canada. In the comparison of the three study regions, I use a new concept - the importance of commercial forestry – as an index to describe the gradient in historical and current forest use in the three study areas. One of the aspects involved is the intensity of forest management which can be defined as the extent of silvicultural

interventions to increase wood production. Park and Wilson (2007) classify forest management into four categories according to intensity: 1) Extensive management with minimal silvicultural intervention and long rotation times, 2) Basic management with some silvicutural intervention, rotation times may be reduced by planting or juvenile spacing, 3) Intensive management with silvicultural treatments that shorten the rotation time and increase wood volume and quality, and 4) Super-intensive management with plantations of fast growing trees like hybrid varieties. Of the three study areas one falls clearly into the category of basic management (the Mauricie) and one into the category of intensive management (Southeastern Finland). In Central Labrador logging has been marginal (for example in 1997-2002 less than 0.1 % of the land area of District 19A was harvested), but where it's done it can be categorised as extensive or basic management. Other attributes used to describe the importance of commercial forestry as an index are the length of time that commercial forestry has been employed, the importance of the forest sector to local and regional employment and the economy as well as the forest ownership structure (see Table 1.1 in Chapter 1).

0.6 OBJECTIVES, MAIN RESEARCH QUESTIONS AND ORGANIZATION OF THE THESIS

The long-term objective of the current research is to better understand the effect of local conditions and additional information on perceptions related to Sustainable Forest Management (SFM). The short-term objectives are:

1) to compare forest related values, attitudes and preferences of different interest groups in three regions,

2) to study how different historical and current forest use affects the forest related values, attitudes and preferences, and whether the importance of commercial forestry plays a role in regional differences in perceptions,

3) to study if people's forest related values, attitudes and preferences change when they are given information that illustrates long-time and large-scale processes

The main research questions are the following:
1) Is there a gradient in forest values, attitudes related to forest management and/or SFM preferences along a gradient of importance of commercial forestry?
2) Will values, attitudes and preferences change when long-term forest simulation results are shown for a large area?

The thesis is organized around two axis (Figure 0.2): the first axis proceeds from a comparison of regions at a fixed point in time to measuring change in one region, while the other axis moves from measuring held values and attitudes based on social psychological theory to measuring preferences which reflect assigned values based on economic theory (see introduction above). Chapter 1 develops theory on the connection of the historical and current forest use and forest conditions and held forest values. The theory is based on cultural models on forests that are shared by groups of people with similar forest experiences. This theory is used as a basis for comparing value orientations and attitudes (Chapter 2) and preferences (Chapter 3) in the three research areas measured at one point in time. It also explains how cultural models change over time which links it to Chapters 4 and 5 measuring value and attitude change (Chapter 4) and preference change (Chapter 5) in one region, Central Labrador.

0.7 NOTES ON THE METHODS USED

This thesis is written in the form of a collection of articles published or submitted to scientific journals. The methods used and the research setting are described separately in each chapter. Thus there is some repetition in the description of the methods, participants and research areas. The participants in Chapters 1-3 come from all three research areas, while Chapters 4 and 5 focus on participants from Central Labrador only. There is also variation in the number of participants included in each Chapter. The data in Chapter 1 is based on a preliminary study and thus the sample was smaller (n=72) than in other Chapters studying regional differences (n=252). In Chapter 4 the sample was smaller than that of Central Labrador in Chapters 2 and 3 since not all the participants filled in the second questionnaire. In Chapter 5 the Innu group was not included in the analysis since the initial choice experiment showed a strong preference for one attribute only (wildlife), while the parameter estimates for other attributes were not significant (Chapter 3). It was thus not feasible to measure change.

In this work, I use a mixed methods approach. The main methods used are quantitative and they are complemented with qualitative data on SFM indicators and self-evaluation about things learned as well as the quality of opinion change (Creswell, 2005, pp.208-210). The qualitative data was used to develop attributes for the choice experiment, and provide a deeper understanding of the issues that were important for the participants as well as their views of the presentation of modeling results. Part of the information gathered after presentation of modeling results was used in further refining the model (Sturtevant et al. 2007).

The participants were invited to take part in seminars. This was essential in order to complete the group work in the preliminary study reported in Chapter 1 and to present the simulation results in Central Labrador (Chapters 4 and 5). In order to

ensure comparability of results across regions, this approach was used in all three regions.

An alternative approach could have been the use of semi-structured or deep interviews which would have allowed deeper qualitative understanding on the issue, describing why people perceive the forests and forestry the way they do (Creswell, 2005). This would have, however, required a long time per participant which would have affected the breath of the study. Conducting interviews in three (or four if innu-aimun is included) languages would also have required interpretation during interviews and/or translation of transcribed interviews.

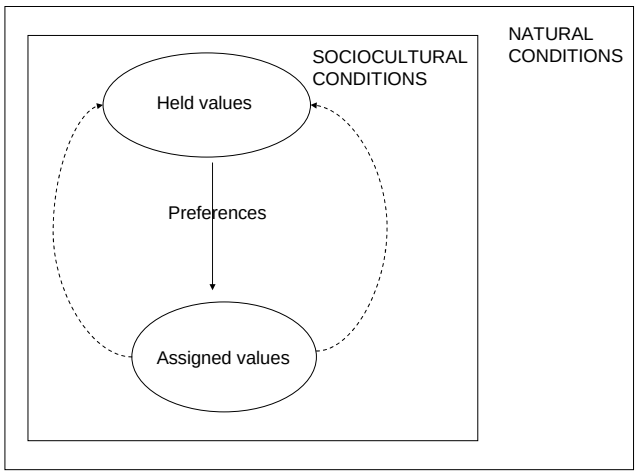

Figure 0.1 The relationship between held and assigned values, modified from Adamowicz et al. (1998b)

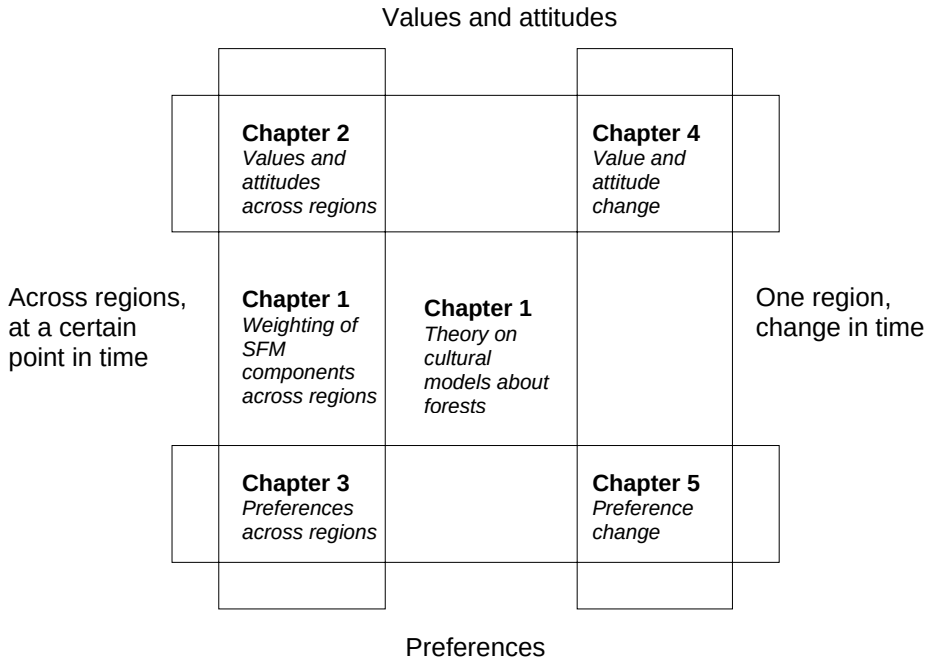

Figure 0.2 The thesis is organized along two axes: measuring change in one region vs. comparing several regions at a certain point of time and measuring held values and attitudes vs. measuring preferences. The theory on cultural models about forests links all chapters together.

CHAPTER I

THE ROLE OF CULTURAL MODELS IN LOCAL PERCEPTIONS OF SFM – DIFFERENCES AND SIMILARITIES OF INTEREST GROUPS FROM THREE BOREAL REGIONS

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1.1 RÉSUMÉ

Les différences de perception des groupes d'intérêt locaux et régionaux face à l'aménagement durable des forêts sont étudiées en fonction de régions présentant un gradient de l'historique de l'utilisation de la forêt. Le sud-est de la Finlande, le centre du Québec et le centre du Labrador accordent respectivement une grande, moyenne et faible importance à la foresterie industrielle. Nous présentons ici un modèle conceptuel qui illustre l'interaction cyclique entre la forêt, les modèles culturels sur les forêts et l'aménagement forestier. Notre hypothèse suppose que les perceptions des gens seraient influencées par leur modèle culturel et varieraient donc entre les régions ayant différentes histoires d'utilisation de la forêt ainsi qu'entre différents groupes d'intérêt. Des données sur l'ordre d'importance des composantes environnementales, sociales et économiques menant à la durabilité ainsi que des données sur les thèmes importants pour chaque groupe d'intérêt ont été collectées en demandant à chaque individu de créer une liste des indicateurs d'aménagement durable des forêts. Par la suite, un travail d'équipe a été réalisé pour obtenir un consensus sur une liste commune des indicateurs. Dans le sud-est de la Finlande, les opinions des différents groupes sont polarisées sur les axes environnement - économie alors que dans le centre du Labrador, les opinions de tous les groupes accordent une plus grande importance à l'environnement. La dimension sociale (peu représentée) est faible pour tous les groupes sauf pour les Metis et les Innus du Labrador. Seul l'ordre d'importance accordé par les groupes environnementaux est similaire pour les trois régions étudiées. Les plus grandes différences se retrouvent parmi les professionnels forestiers au niveau du poids qu'ils accordent à l'importance des facteurs économiques et environnementaux. Lorsque l'importance de la foresterie industrielle augmente, une plus grande importance des aspects économiques est exprimée, alors qu'une tendance contraire est observée pour les aspects environnementaux. De plus, les différences entre les groupes augmentent lorsque l'importance de la foresterie industrielle augmente. Nous considérons que l'aménagement forestier et l'utilisation des forêts sont des facteurs influençant fortement les modèles culturels sur les forêts.

1.2 ABSTRACT

Differences in the way local and regional interest groups perceive Sustainable Forest Management in regions with different forest use histories were studied using Southeastern Finland, the Mauricie in Quebec and Central Labrador in Canada as examples of regions with high, medium and low importance of commercial forestry. We present a conceptual model illustrating the cyclic interaction between the forest, cultural models about forests and forest management. We hypothesized that peoples' perceptions would be influenced by their cultural models about forests and would thus vary amongst regions with different forest use histories and among different interest groups. The weightings of the environmental, economic and social components of sustainability as well as themes important for each of the interest groups were elicited using individual listing of SFM indicators and group work aimed at developing a consensus opinion on a common indicator list. In Southeastern Finland the views of the different groups were polarized along the environment-economy axis, whereas in Central Labrador all groups were environmentally oriented. The social dimension was low overall except among the Metis and the Innu in Labrador. Only environmental groups were similar in all three research regions, the largest differences between regions were found among the forestry professionals in their weightings concerning economy and nature. As the importance of commercial forestry increased, a greater importance of economic issues was expressed whereas the opposite trend was observed for issues regarding nature. Also inter-group differences grew as the importance of commercial forestry increased in the region. Forest management and forest use can be seen as factors strongly influencing peoples' cultural models on forests.

1.3 INTRODUCTION

The concept of Sustainable Forest Management (SFM) has been debated by scientists and forestry professionals during the last two decades (Messier and Kneeshaw, 1999; McDonald and Lane, 2002; Wang, 2004). Determining public and stakeholder forest values is considered an integral part of SFM and this knowledge is increasingly being used to guide forest management planning especially in publicly owned forests (Xu and Bengston, 1997; McFarlane and Boxall, 2000a,b;Watson and McFarlane, 2004). Local people have also been involved in the definition of Sustainable Forest Management criteria and indicators of SFM (CMFP, 2000). Despite this earlier work, the local definition of SFM is just beginning to take form and there is a need for innovative approaches to study how local people in different regions perceive SFM. Our study contributes to this end.

We use the three-pillar approach to sustainability (Goodland, 1995; Adamowicz and Burton, 2003; Robinson, 2004), where the concept of sustainable development is divided into ecological, social and economic components. In natural resource management, earlier studies related to the three-pillar approach used weightings by different stakeholder groups of the three components of sustainability in coastal management (Brown et al., 2001) and criteria for sustainable forestry (Sheppard and Meitner, 2005). These are all case studies focused on one region. In contrast, we compare three geographical regions with great differences in the importance of commercial forestry. In Section 2 we present a conceptual model that describes the dynamics by which local natural and socio-cultural conditions together with forest use history influence peoples' perceptions on forests and forestry.

Specific and contrasting perceptions about the forest and forestry have been associated with various interest groups (McFarlane and Boxall, 2000a,b; Tindall, 2003; Horne et al., 2004b; Kant and Lee, 2004). Forest owners and forestry sector

employees tend to have greater support for economic values in forestry than the general public (Tindall, 2003; Horne et al., 2004b; Kant and Lee, 2004). In contrast, users of non-timber forest products, like hunters and campers, have been shown to support protection-oriented management strategies (McFarlane and Boxall, 2000a). Members of environmental organizations have, logically, been found to be more environmentally oriented and biocentric than the general public or other stakeholder groups (McFarlane and Boxall, 2000b; Leskinen et al., 2004). Although differences between interest groups have been consistently identified in local studies, it is unclear whether such trends exist across regions. We predict that forest subcultures of interest groups are partially shared across regions so that in spite of regional differences the same interest groups, such as forestry professionals or environmentalists, should have similar views in all regions.

Our study will provide additional insights into the ways local communities define sustainability and weighs the three components of sustainability in forest use and management in three regions. We used a combination of different methods including individual listing of SFM indicators and group work aimed at developing a consensus opinion on a common indicator list to elicit themes and weightings of the three components of sustainability. The comparisons in this paper are structured on the differences between the three regions, each having a different history of forest management and use. Within each region we also studied the differences between the perceptions of interest groups. Thus this is a stratified study with the main focus on regional comparison.

1.4 CONCEPTUAL FRAMEWORK AND PREDICTIONS

Many previous studies state that forest management and other forest uses reflect peoples' values (Xu and Bengston, 1997; McFarlane and Boxall, 2000a,b). We believe that this relationship between values and forest use functions in two ways. Forest use history affects our forest values through the experiences we have in the forest and the cultural models that reflect life experiences shared by a group of people.

Human perception of the environment is influenced by how the experience is modeled by a particular socio-cultural environment (Shore, 1996, p. 4). The theory of cultural models describes the existence of prepackaged forms of knowledge that coordinate groups of people (Shore, 1996, p. 10). Culture is here understood as not only a private or a public property, but as a combination of the two (Shore, 1996, p. 36). The theory of cultural models is related to the psychologists' theory of schemas which can be described as mental structures by which we interpret the world or organize information (Strauss and Quinn, 1997, p. 16, 49). Cultural models are schemas that are socially shared and learned through explicit teaching or observation (Strauss and Quinn, 1997, p. 7, 16). Cultural models are not uniform, but may vary between individuals and groups (Shore, 1996, p. 312). Some persistent cultural models are transmitted from one generation to the next either unintentionally or deliberately (Strauss and Quinn, 1997, pp.111-112). This creates the historical durability of cultural models. Different sub-cultural groups may have different typical experiences, their cognitive networks may develop in a different way and thus their interpretation of a certain object or event may differ (Strauss and Quinn, 1997, p. 89).

Using the theoretical basis on the creation and transmission of cultural models explained above, we created a conceptual model to illustrate the cycle of interaction between the forest, cultural models about forests and forest management (Figure 1.1).

A certain group of people has a shared understanding (cultural models) about how forests can and should be managed or used. The models are based on both local natural and sociocultural conditions as well as the relationship each individual has with the forest, and thus they are a result of an interaction of public and individual factors. For example, public attitudes toward forest management are related to both the individuals' economic dependence on forestry and the local socio-cultural conditions (Brunson et al., 1997). These cultural models modify and are modified by forest values and public discourse. The cultural models about forests together with other cultural models have an effect on forest policy. The extent of this effect depends on how widely shared the particular cultural models are in the society. Forest policy determines how forests are managed whereas cultural models have a direct effect on forest use in guiding the activities we do in the forest. Forest policy has an indirect effect on cultural models by modifying the forest itself and by influencing the public discourse on forests. The forest, modified by historical and current use, has an effect on our understanding of what the forest should be like. The forest that we have become accustomed to see and the activities we normally do in the forest become familiar and natural. These perceptions of what is familiar and natural are then transmitted from one generation to another (Strauss and Quinn, 1997, p. 112). Certain attributes of the forest are associated with characteristic forest experiences (Stedman, 2003). New forest experiences or public discourse will either change or reinforce existing models (Strauss and Quinn, 1997, p. 89, 115). Cultural models about forests are thus created by an interaction between forest experiences, forest values and social interaction.

Based on this conceptual model, we formulated three research hypotheses:

1. Based on different social environments and forest experiences, cultural models about forests in our three study regions will be different. This will lead to differences between weightings of sustainability components and topics included in SFM across regions.

2. The same interest groups in different regions will have partially shared cultural models about forests in spite of regional differences in forest culture. This will lead to similarities in weightings of sustainability components and topics included in SFM by the same interest groups across regions.

3. Different interest groups in the same region will have partially contrasting cultural models about forests as a result of subcultures created by partially different forest experiences, forest values and forest discourse. Thus the weightings of sustainability components and topics included in SFM will differ between groups in the same region. Even if the regions are different, the environmental groups are predicted to be more environmentally oriented and forestry professionals more economically oriented than other groups in each region.

1.5 METHODS

We used a combination of quantitative and qualitative methods to collect data from the same individuals. Individuals' listings and rankings were collected using forms before participants discussed the given task. After the individual work, a consensus opinion was developed during group discussions. Work done in groups include inter-group interaction which makes it possible to gather information that would be difficult to reach in individual situations (Morgan, 1997, p.2). Groups have previously been used to study environmental values and attitudes (Myers and McNaghten, 1998; Linnros and Hallin, 2001), public participation in forestry (Smith and McDonough, 2001; Schusler et al., 2003) and weighting of criteria of sustainable forestry (Sheppard and Meitner, 2005).

1.5.1 Interest groups

The target public included those residents of the study areas that belonged to the selected interest groups. The purpose of this study was thus not to reach the silent majority, but rather to contact individuals actively involved in the use or protection of forests. Interest groups included those who have direct links to the management or the use of forests in each study area: (1) local or regional environmental groups; (2) multiple users of the forest including local hunting, berry and mushroom picking or recreation groups; and (3) forestry professionals in each of the three study locations. The forestry professionals group included representatives of both government forest resource management and the forest industry. They were grouped together because earlier studies have shown that their views on forestry are similar (Leskinen et al., 2004).

We also included area-specific interest groups to reflect important stakeholders. In Finland, a non-industrial private forest owners group (later called only forest owners) was added because they are a key group in Finnish forestry (see Table 1.1 about the forest ownership structure). In the Labrador study area, the Innu Nation (about 13% of the population in Central Labrador) and the Labrador Metis Nation were included in the study because they strongly influence forestry decisions. In contrast with some earlier studies and other regions, these groups have been empowered and are equal partners in the decision making process regarding the development of forest management in the region. Although their views differ somewhat, they represent an indigenous view that clearly differs from the Euro-American view (Pobihuschchy, 1986; Adamowicz et al., 1998). In the quantitative results the Innu and the Metis are together called First Nations, whereas in the qualitative results their views are presented separately.

1.5.2 The meetings and the participants

The study consisted of separate meetings with a sample of each interest group in order to obtain information about their views and rankings for each of the three components of Sustainable Forest Management. The use of separate meetings for each group has proven to be effective at least in conflict prone areas (Sheppard and Meitner, 2005). The meetings were organized during the summer and fall of 2005: in Shawinigan, Mauricie May 25th and October 17th; in Goose Bay and Sheshatshiu, Central Labrador from June 2nd to June 8th; and in Lappeenranta, Southeastern Finland from August 23rd to August 25th.

The participants were mainly invited using letters sent by email or by regular mail. Contact information was obtained from the networks of the forestry planning processes mentioned above. Additional contact information was sought from environmental and recreation organizations active in each area. In Central Labrador, there was no active hunters' organization, so the multiple users' meeting was also announced in the local newspaper and on the radio.

A total of 72 participants (Table 1.2) generated a list of indicators of sustainable forestry, or of factors important for them in the forest. These participants were then asked to select the five most important indicators in order of priority. This information was collected on simple forms. The participants were not given a definition of sustainable forestry, but instead they were presented a figure with three circles illustrating that sustainability may be divided into three components that may overlap. The participants were also told that they may concentrate on a single component they felt was the most important or they may wish to include all three components. The participants were given a definition of a sustainable forestry indicator as an aspect used for evaluating the state of the forest, but they were not given a list of indicators to choose from, so as not to lead their thinking. Measurable

indicators were not required and thus a list of topics or important factors in the forest was acceptable.

After the individual reflection, the participants formed one or several groups to discuss their indicator lists and form a common opinion on the most important indicators based on consensus within the group. In meetings where several small groups were formed, each presented their results to the other participants and a consensus opinion was formed for the whole group. The discussions were recorded on tape for later analysis. In the Mauricie area, the group work was carried out only with forestry professionals because individuals in the other groups were spread out over too large a geographic area to get them together for group discussions.

Demographic characteristics of the participants were compared to the findings of other studies. In the present study, the majority of the participants were men; in some groups there were no women at all (Table 1.2). The multiple users from Southeastern Finland consisted of only male hunters from age groups 41-50 and 51-64. This reflects the typical profile of Finnish hunters (Petäjistö et al., 2004). The Central Labrador forestry professionals were all men. The age distribution of forestry professionals in Southeastern Finland and Central Labrador is consistent with the study of McFarlane and Boxall (2000b) where the mean age of forestry professionals was 42.5 years. The professionals from the Mauricie were younger, half of them under 30 years of age. The age profile of the environmentalists in Southeastern Finland is close to that reported by McFarlane and Boxall (2000b), where the mean age of environmentalists was 50.6 years. The age distribution of forest owners is consistent with the study of Horne et al. (2004b) where the mean age of forest owners was 58 years. The age distribution in the meetings was quite similar in Southeastern Finland and in Central Labrador, whereas in the Mauricie area the participants were generally younger than in the other research areas (Table 1.2).

The participants were asked to indicate if they identified themselves with another interest group included in the study. In Southeastern Finland, more than half the respondents were multiple users of the forest, which is very common in Finland. Nine people belonging to other interest groups were also forest owners, a phenomenon typical in the region. In the Mauricie area, three professionals and one environmentalist considered themselves multiple users, and in Central Labrador all groups included multiple users, although the Innu did not explicitly indicate they were multiple users. In Central Labrador various professionals and Metis associated themselves with environmental groups. The Metis were also represented in the environmental, professional and multiple user groups.

1.5.3 Analysis

The individual data consisted of indicators identified by each participant and their order of preference. The data were first classified into broad categories according to themes and the themes were divided into sub-themes if relevant. Ranks assigned to each topic were then counted for each study area. The topics with the highest number of first ranks were considered to be the most important. Table 1.3 presents the themes and sub-themes used and examples of indicators assigned to each theme. Also the main themes identified in the different locations during the group work were compared (Table 1.4).

The individual data were also analyzed to study the weightings of each of the three components of sustainability: environmental, economic and social. The five most important indicators listed by each individual were included. The order of priority marked by the individuals was converted into points so that the most important indicator was given 5 points and the fifth most important received 1 point. The answers were grouped into three categories: environmental, economic and social

(Table 1.3). Each individual had a score in each category that varied from 0 to 15. For example, if all five of the most important aspects were classified into only one category, this category was given 15 points and the other two categories got 0 points. Some indicators did not fit into any category, for example, the continuing improvement of activity that refers to the environmental management systems of forest companies. These indicators were left out of the quantitative analysis. Some participants listed less than five aspects. If there were less than five indicators or the same person gave the same rank to several indicators, they were weighted so that the sum of the points equalled 15.

As there is an overlap in the components of sustainability, it was sometimes difficult to decide in which component an aspect belonged. The following examples illustrate how decisions were made. For example, jobs were included in the social component because they are important for human well being, whereas silvicultural work aimed at enhancing the productivity of the forest was considered an economic component (Table 1.3). The regeneration of the forest was also considered to be part of the economic component since it represents the traditional market economy-based perception of sustainability (Table 1.3).

Differences in the answers of different interest groups within regions and the same interest groups across regions were tested using the non-parametric Kruskall-Wallis test because of the ordinal scale of the data and the heterogeneity of the variances between the regions. The test was complemented by the comparison of all pairs using the Tukey-Kramer test. Statistical tests were carried out using JMP (SAS institute).

1.6 RESULTS

1.6.1 Comparisons between regions

When the points for the three components of sustainability, environment, economy and society, for each individual are plotted in three-dimensional space, a clearly different pattern can be seen in each of the study areas (Figure 1.3). In Southeastern Finland and in the Mauricie, the social dimension was low, while in Central Labrador it was relatively high for some individuals, mostly from First Nations. In Southeastern Finland, individuals are widely distributed along the economy-environment dimension. Forest owners and forestry professionals assigned the greatest weight to the economy, while the greatest weight assigned to the environment was by environmentalists and multiple users. In the Mauricie area, most of the individuals are in the middle range of the economy-environment axis, although there are some professionals who weigh the economy highly. In Central Labrador, almost all individuals from all groups weigh the environment higher than the economy.

In Central Labrador, one broad topic, the importance of nature, dominated most individual answers in all the interest groups, with a total of 23 first rankings (82%) and 19 second rankings. Other indicators ranked first included: creating jobs, keeping logs and wood processing in Labrador, avoiding large clear cuts, maintaining traditional use and the availability of qualified forestry professionals. Another important topic, which was given a high ranking, was multiple use of the forest, including recreation and tourism. When the topic of nature was investigated in detail we observed that the most important issue was the maintenance of wildlife habitat, followed by protection of biodiversity and the maintenance of large undisturbed areas of forest. Table 1.3 gives examples of individual answers.

In the Mauricie area, the most important broad topic was also nature, receiving 9 first rankings (60%) and 7 second rankings. The second most important issue was the permanence of forests receiving 2 first rankings and 5 second rankings. Other first rankings were given to multiple uses of the forest, productivity of the forest, employment and wood supply. Within the nature topic, the most important issues were protection of biodiversity and the protection of special places like rare forest types, wetlands and habitats of endangered species. The permanence of forests was more frequently present in the answers of forestry professionals, whereas maintaining nature was more frequent among multiple users and environmentalists. For examples of indicators, see Table 1.3.

In Southeastern Finland, three topics were equal, each receiving 9 first rankings: silviculture, economy and nature. These three topics together correspond to 93% of the first rankings. Other first rankings were given to soft logging practices and maintenance of the forest cover. The most important issues within the topics of silviculture, economy and nature were forest regeneration activities, private forest owners' economy and the protection of biodiversity, respectively. Examples of indicators within these categories are provided in Table 1.3. The interest groups were clearly divided into two groups: forestry professionals and forest owners who ranked the economy and silviculture the highest, whereas environmentalists and multiple users ranked nature the highest.

The analysis of the most important topics in the individual answers illustrates qualitative differences between the three research areas. Nature was important in all three areas, but most important in Central Labrador. In Southeastern Finland and the Mauricie, the most important issue within the nature topic was biodiversity, while in Labrador it was wildlife habitat. This reflects the importance of hunting in Labrador. People from the Mauricie area were the most concerned about the permanence of forests. Southeastern Finland was the only

place where economy and silviculture were ranked high.

During the group work, different topics were discussed in each region. In Central Labrador, a strong topic in the discussions during the group work was local processing of wood. People were unhappy about logs being transported outside the region for transformation preferring to see timber processed locally to create more jobs and local economic benefits. In the Mauricie area, where the group discussion was only done among the forestry professionals, the concern was about the sustainability of wood supply, and in Southeastern Finland the primary concern was the need to import logs from Russia to feed the various pulp mills in the region.

1.6.2 Interest groups within and across regions

When different interest groups within a region are compared, in Southeastern Finland differences can be observed between forest owners and forestry professionals on one side supporting economic values and environmentalists and multiple users on the other side supporting the importance of nature (Figure 1.3). Environmentalists differed from both forestry professionals and forest owners both in economic (Kruskall-Wallis test $p = 0.0060$, Tukey-Kramer $p = 0.05$) and environmental scores (Kruskall-Wallis test $p = 0.0057$, Tukey-Kramer $p = 0.05$). In Central Labrador, all groups shared similar weightings except the First Nations who weighted social aspects more than the economy. The economic scores given by the First Nations participants differed significantly from those of multiple users and professionals (Kruskall-Wallis test $p = 0.0043$, Tukey-Kramer $p = 0.05$). In the Mauricie area the economic scores of the professionals differed significantly from those of environmentalists and multiple users (Kruskall-Wallis test $p = 0.023$, Tukey-Kramer $p = 0.05$).

When patterns between the three interest groups common to all three study areas are studied, the biggest differences between the three areas are among the forestry professionals (Figure 1.4). The economic scores of the professionals from Southeastern Finland differed significantly from those of Central Labrador (Kruskall-Wallis test $p = 0.0057$, Tukey-Kramer $p = 0.05$). Multiple users are rather similar along the economy-environment axis, but the social component is stronger in Central Labrador than in the other two areas. Environmentalists have similar weightings with respect to all three components across all three regions. No significant differences were detected across regions for multiple users or environmentalists.

The group opinions that were formed as a result of group discussions show qualitative differences and similarities among the different interest groups in the three research areas (Table 1.4). These results support the individual results described above. As in the individual results, the biggest difference between the three areas is among the forestry professionals. The professional foresters in Southeastern Finland are the most concerned about the profitability of forestry activities, and the Quebec professionals about continuous wood supply, whereas the professionals from Labrador talk about ecosystem integrity.

The environmental groups from Southeastern Finland and Labrador had very similar views at a regional level, although the Labrador group also took up the global issue of carbon sequestration. Multiple users from Southeastern Finland had a nature-oriented view, but it was restricted to their own individual benefits and they were against the development of new conservation areas. In contrast, the Central Labrador multiple users group also included industry and jobs in their list of important issues. These differences can at least partly be explained by the composition of the groups: the group from Southeastern Finland consisted only of hunters while the Central Labrador group also included local politicians.

In terms of groups with specific affiliation to one of the study regions, both the Metis and the Innu in Central Labrador were most concerned about wildlife habitat, traditional use of the forests and conservation of natural forest. In Southeastern Finland, the forest owners talked at length about the profitability of forest ownership, maintaining the vitality of rural areas and the lack of interest from the youth to continue forestry activities.

1.7 DISCUSSION

Some general trends can be noted that reflect the differences and similarities between the regions and various interest groups even though the sample size is small. Moving from a region where industrial forestry is of great importance to a region where it is less important, our study suggests that forest values tend to be more environmentally and less economically oriented, and more uniform among groups. The results support the first prediction that there are differences in weightings of sustainability components and topics included in SFM across regions. Most previous studies have not sought regional differences, but have concentrated on one country or a region within a country. However, there are European studies that use spatial variations in forest cover across Europe or across regions in one country to explain differences in local forest attitudes (Elands et al., 2004; Selby et al., 2007). Our results also suggest that people are mainly concerned about changes from the existing condition, whatever it is. As the existing situation is well known, it is considered to be the safest alternative in contrast to the unknown outcomes of a changing situation. Our results also reflect the fact that peoples' views strongly depend on the forestry foundation of the local society. The forest sector is of great economic importance in Southeastern Finland (see Table 1.1). Whereas in Labrador, where there has been little historical industrial forestry activity, the most important uses of the forest are based on non-timber forest products and services.

The results partially support the second hypothesis that weightings of sustainability components and topics included in SFM in the same interest groups across regions are similar and the third hypothesis that the weightings of sustainability components and topics included in SFM differ between groups in the same region. In Southeastern Finland the views of the different interest groups seem to be more polarized than in the two study areas in Canada. This polarization of views was also noted in the discussion on national forest policy in Finland (Rantala and Primmer, 2003). There is evidence that conflicts between the various interest groups in Finland are intense in comparison with other countries (Hellström, 2001). New voluntary nature protection measures like trading in natural values have been suggested as a way to bring the conflicting views closer to each other (Berninger, 2006).

The social component of sustainability was weak in the weightings in Southeastern Finland and the Mauricie, but came up in discussions, for example, the forest owners' concern about the lack of interest from the youth to continue forestry activities. The weakness of the weightings of the social component may partially be explained by the polarization between economic and ecological components in Southeastern Finland and the Mauricie that may have pushed social issues to the background. In this case less structured methods like group discussions are better suited to elicit these topics. On the other hand, the weakness of the social component detected in the results can partly be explained by the difficulty in defining social sustainability at both a national and an international level compared to the greater conceptual understanding of ecological and economic sustainabilities. People either do not necessarily understand what social sustainability means or they may consider themselves and their viewpoints to be the social component. This result is consistent with surveys conducted in Canada indicating that people value ecological conditions of the forests over direct social aspects such as jobs and recreation possibilities (Meitner et al., 2001; Tindall, 2001). Sheppard (2003) states that the satisfaction of local people with

forestry is an important part of social sustainability, and that satisfaction can be reached, at least partially, by showing that forestry is ecologically sustainable. It is also possible that the concept of indicators that we used in the questions is not as effective in capturing social values as in capturing ecological and economic values or alternatively that the social values are indirectly represented by the forest conditions people wish to maintain.

In this study we compared peoples' weightings of sustainability components and themes included in SFM in three different regions. Our results show a clear pattern across our study regions. Despite other differences between the regions, our conceptual model (Figure 1.1) suggests that an important part of the variation across regions comes from the gradient of historical and current differences in the importance of commercial forestry. In contrast, it could be argued that the results are a stronger reflection of the cultural differences between the regions than the differences in the importance of industrial forestry. However, we observe forest management and forest use factors to strongly influence the cultural models about forests and forest values (see Figure 1.1). For example, the Finnish view of their forests is based on a long history of intensive forestry. The Finns prefer a relatively open forest where it is easy to move. Although this kind of forest is normally a result of rather intensive management, old natural pine forests are also open and hence highly valued (Karjalainen, 2001). The forest we see around us and the activities we are used to do in the forest both shape our cultural models about what forests should be like and how they should be managed.

1.8 CONCLUSIONS

By focusing on three regions with different forest uses we were able to evaluate trends in perceptions about SFM that escape traditional case study evaluations. Our study shows that the definition of Sustainable Forest Management is rather elastic and varies not only between interest groups, as shown elsewhere, but among the same interest groups in different regions. Although foresters always valued the economic benefit of forests more than the other interest groups, differences between the groups were smaller in regions where commercial forestry is less important. This illustrates that local natural and socio-cultural conditions, public discourse and individual forest experiences interact in such a way that creates localized subcultures with distinct cultural models about forests. It should be remembered that the present study is only a beginning and more research will be needed with larger sample sizes in multiple regions to confirm the results obtained here.

Our results illustrate that the dichotomy of economy versus nature that has often been used in discussions on SFM is too simplistic to give a full picture of different local conditions. In regions where forestry is economically relatively important, like Southeastern Finland, this dichotomy may work, but in regions like Central Labrador, where the current economic role of forestry is marginal and where First Nations play an important role in the use of the forests, the social dimension of sustainability is of higher importance. The three-pillar approach gives a more complete picture of the different aspects of SFM.

Table 1.1 Basic information characterizing the three areas[3]

	Southeastern Finland	**Mauricie**	**Central Labrador**
Land area	12 824 km^2	35 452 km^2	About 70 000 km^2
Population	321 900 in 2003	260 078 in 2005	9 640 in 2001
Population density	24 inhabitants/km^2	7 inhabitants/km^2	0.14 inhabitants/km^2
Unemployment rate	From 12.9 % to 14.3 % in 2004	10.0 % in 2005	Happy Valley-Goose Bay 12.8 % Northwest River 19.1 % in 2001
History of forestry	Industrial forestry since the 1870's[4]	Forestry since the early 20th century, virgin forests still being cut	Marginal logging in 1970's and again since 1990's
Forest sectors' share of the labor force	12 % in 2002	4 % in 2003	0.8 %[5]
Forest sectors' share of the total production	32.7 % in 2002	31.6 % in 2004	Minimal
Forest area	815 900 ha	3 388 100 ha	About 7 100 000 ha Around Goose Bay[6] 1 200 000 ha
Annual logging	4 053 000 m^3 in 2002	3 874 000 m^3 in 2002	45 000 m^3 in 2003
Forest ownership			
Non-industrial private	80 %	9 %	1 %
Companies	12 %	8 %	0 %
State or province	2 %	83 %	99 %
Others	5 %	-	0 %

[3] Data is from the following institutions: Central Labrador Economic Development Board, Finnish Forest Research Institute, Forest Centre of Southeastern Finland, Institute de la Statistique Québec, Newfoundland and Labrador Department of Forest Resources and Agrifoods, Statistics Canada

[4] Tasanen (2004, p. 421)

[5] An estimate using 2001 census data on population, labor force participation and an estimate of forest sector jobs.

[6] This area includes most of the closed canopy forest.

Table 1.2 Number of participants and their age group distribution for each interest group and region (the number of female participants is in parenthesis).

	Southeastern Finland	The Mauricie	Central Labrador
Environmentalists	7 (4)	4 (0)	4 (2)
Professionals	10 (2)	6 (2)	9 (0)
Multiple users	4 (0)	5 (1)	6 (1)
Forest owners	8 (2)	-	-
First Nations	-	-	9 (3)
Total	29	15	28
Age group			
30 and under	0	8	1
31-40	3	4	7
41-50	13	1	4
51-64	10	0	12
Over 64	3	1	4
Not known	0	1	0

Table 1.3 The main themes and sub-themes identified and examples of indicators belonging to each theme. Indicators were identified by the participants. They were subsequently classified into sub-themes and main themes and into environmental, economic and social components of sustainability by the authors. The examples of the indicators were chosen to cover and illustrate every sub-theme and to give examples from different regions. FIN=Southeastern Finland, MAUR=Mauricie, LAB=Central Labrador

Main theme	Sub-theme	Examples of indicators
Environmental	*sustainability*	
Nature	Protection of biodiversity	Maintaining the species richness of trees (MAUR) Ecosystem diversity, integrity (LAB)
	Maintenance of wildlife habitat	Beaver habitat, wetlands (LAB) Wildlife habitat, most of the forest to be preserved for animals (LAB)
	Old growth or undisturbed areas of forest	Proportion of old growth forest of the total forest area (FIN) There is enough intact (undisturbed) forest left to support healthy ecosystems (enough territory for animals requiring large range for example, LAB)
	Protection of special places	Known areas of valuable nature protected (FIN) Conservation of rare forest types (MAUR)
	Endangered species	Site protection of the endangered or vulnerable species (MAUR)
	Others	Safeguarding biodiversity by combining economic and ecological interests (compensation from the state to the forest owners, FIN) Protection and productivity of soils (MAUR) Carbon sink (weather influence, LAB)
"Green forestry"	No clear cuts	Clear cuts only in connection with monoculture plantations on old fields (FIN) Partial cutting (MAUR)
	Soft silvicultural methods	Treatment or use of forests doesn't spoil the environment or water (FIN) Careful, cautious commercial harvest practices going toward minimum harvest rather than maximizing 'economic' benefit (LAB)
Economic	*sustainability*	
Permanence of forest		Logging should not exceed the growth (FIN) Secure the permanence of the resource (MAUR)
Silviculture	Securing regeneration of the forest	Planting and seeding right after the area has been cut (FIN)
	Different silvicultural treatments	Silvicultural treatment of young forest (clearings and liberation work, FIN)
Economy	Forest owners' economy	Income from forestry (FIN)
	Broader economic aspects	Profitability of forest industry from the national economy point of view (FIN) Maintaining the economic benefits related to forestry activities (employment, regional development etc., MAUR) No exporting logs out of here (LAB)
Wood supply		Continuous wood supply for the industry (FIN)
Infrastructure		Building and maintenance of the road network (FIN)
Social	*sustainability*	
Jobs and vitality of rural areas		Safeguarding jobs and vitality in the countryside (FIN) Maintenance and creation of employment in the forest sector (MAUR) Maximum local job creation (LAB)
Multiple use		All the uses of the forest can exist side by side (FIN) Minimize the impacts of forestry on other users of the forest (MAUR) Hunting, gathering, trapping, berry picking (LAB)
Social acceptability		Developing forest management that is socially more acceptable (MAUR) Agreement among the stakeholders (MAUR)
No disturbance and esthetics		Maintenance of esthetic values (FIN) No disturbance caused by humans (i.e. noise, pollution of air or water, FIN)
Knowledge		Increasing information on forests and forestry in primary education (FIN) Education i.e. teach the children the importance of forests so they value what we have and hold the forests in trust for their children (LAB)
Others		Forests' positive effect on health (FIN)

Table 1.4 Group opinions on the most important issues in sustainable forestry in each interest group in Southeastern Finland (Fin.), the Mauricie (Maur.) and Central Labrador (Labr.). They are the result of consensus based group work summarizing and putting together indicators identified by each participant.
Env= environmentalists, Prof. = forestry professionals, Mult. = multiple users

Group	Highest ranking	2. highest ranking	3. highest ranking	4.highest ranking	5.highest ranking
Fin.					
Env.	Biodiversity	Multiple use: mushrooms, berries, recreation, hunting, nature tourism, wood production, aesthetics	Securing availability and quality of wood using ecological forestry		
Prof.	Profitable forestry: forest industry and private forest owners	Ecological sustainability: multiple use, biodiversity, conservation, the ratio of growth and logging	Social sustainability: work and livelihood, every man's rights, inclusion of different user groups in decision making	Knowledge, skills and research	Acceptable forestry: national and international acceptability
Forest owners	Economical profitability of forest ownership	Employment and vitality of rural areas	Good silviculture	Increasing the "forestry spirit" and appreciation of forestry in youth	Multiple use, for example energy and recreation
Mult.	Untouched bogs, wetlands, border areas, "wastelands" (biodiversity)	Diversity of trees and other vegetation	The rates of protected and commercial forest areas	Population density of different game species	Rehabilitated bogs, wetlands, meadows
Maur.					
Prof.	Continuous wood supply	Biodiversity and integrity of forest ecosystems, old growth forests	Quality and quantity of water (sedimentation)	Protection of soils and their productivity	Diversity of fauna (protection)
Labr.					
Env.	Biodiversity	Carbon sink	Local people can still hunt, fish, pick berries, trap, enjoy scenery (social/cultural)	Small scale forestry, secondary processing, ecotourism, local markets (economic)	Non-timber economic values: berries, birch bark, birch syrup, medicinal plants, dried flowers etc.
Prof.	Sustained ecosystem integrity: integrated inventory (for measuring), includes protected areas, habitat, BD	Socioeconomic opportunities: includes local processing, commitment of local input, tourism, non-wood forest products	Maintenance of cultural/spiritual values: includes scenery, recreation, hunting and trapping, relics/special places	Commitment: funds, staff, legislation, methodology	
Mult.	Environmental protection	Protection of wildlife habitat and species	Aesthetics	Sustainable forest for industry	Maximum local job creation
Metis	Habitat	Traditional use	Recreation	Tourism	Preservation
Innu	Animal habitat	Medicinal plants and trees, berries	Natural forest	Big dry trees for firewood	Big birch for canoes and snowshoes

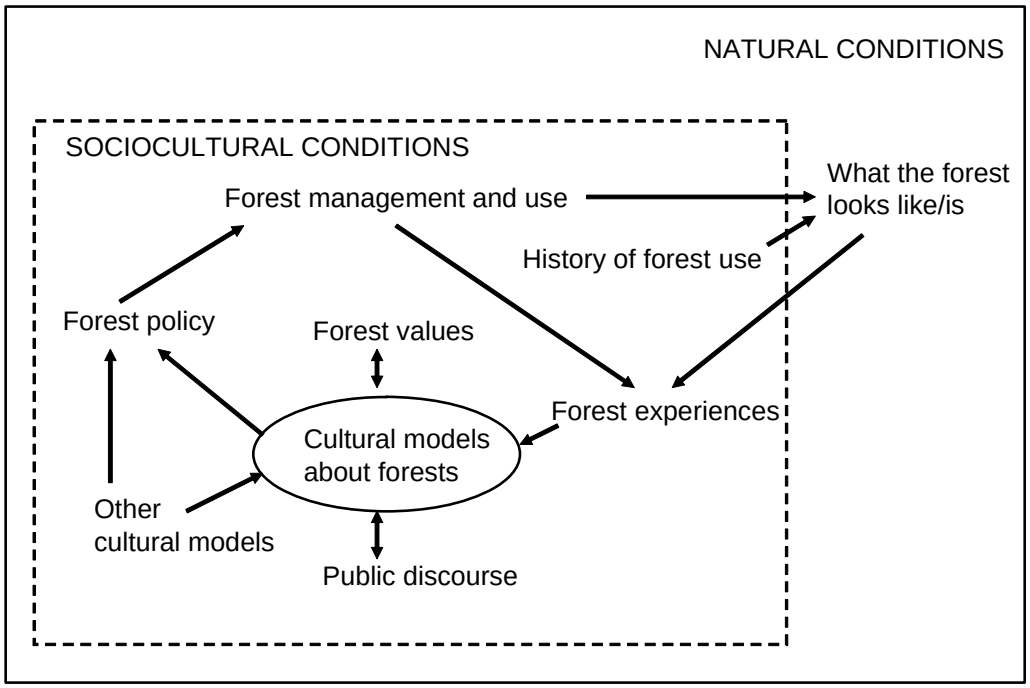

Figure 1.1 A conceptual model illustrating the cycle of interaction between the forest, cultural models on forests and forest management. Values transmitted from the previous generation will affect the forest experiences of the next generation.

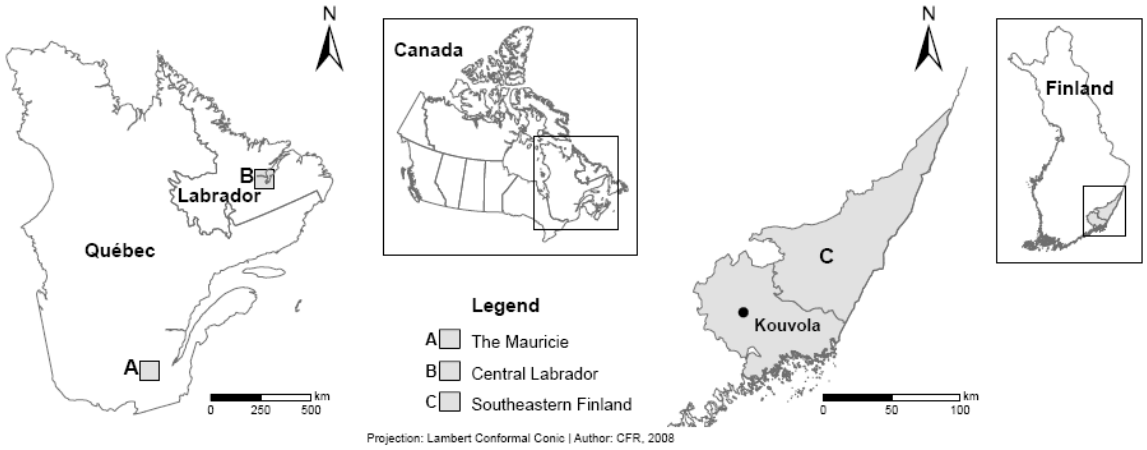

Figure 1.2 The study locations: The Mauricie region in Quebec, Central Labrador and Southeastern Finland.

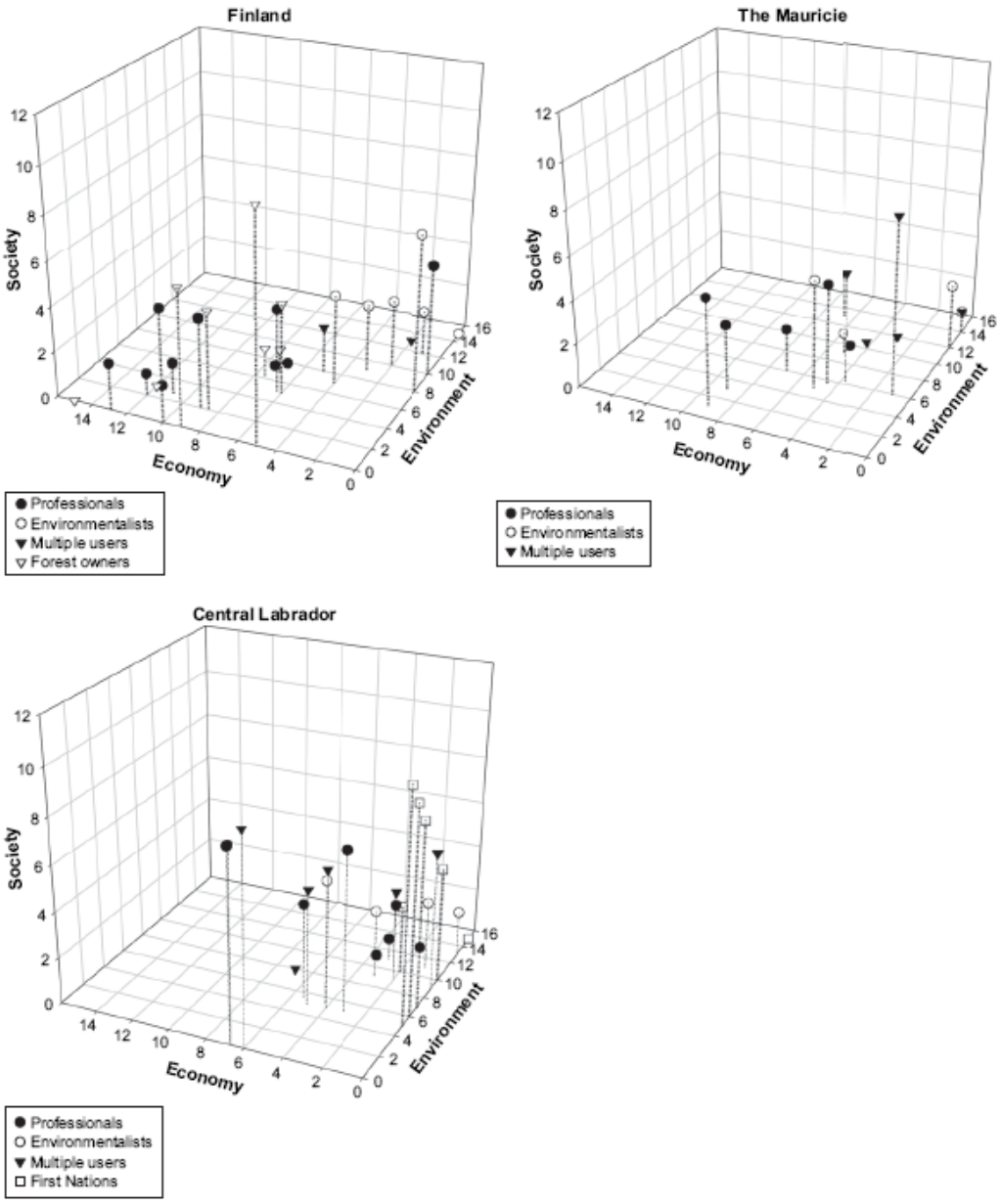

Figure 1.3 Individual answers from the three study areas placed in three-dimensional space, where the dimensions represent the environmental, economic and social components of sustainability. Each point represents the answers of one individual. The scale is the relative importance given to each component based on the respondents' ranking. The total score of the three components is always 15. The most important aspects receive the most points.

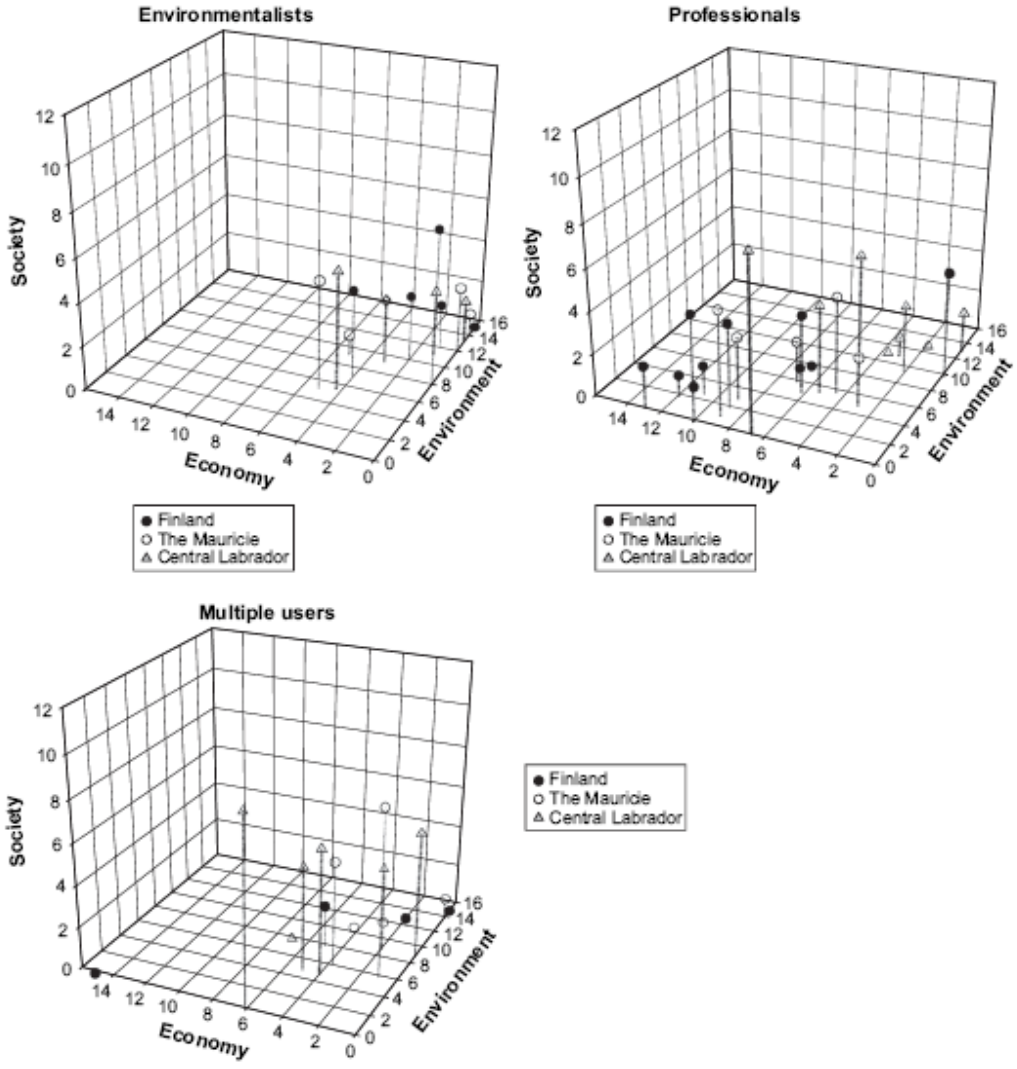

Figure 1.4 Individual answers of different interest groups placed in three-dimensional space, where the dimensions represent the environmental, economic and social components of sustainability. Each point represents the answers of one individual. The scale is the relative importance given to each component based on the respondents' ranking. The total score of the three components is always 15. The most important aspects receive the most points.

CHAPTER II

FOREST VALUE ORIENTATIONS AND ATTITUDES TOWARDS FORESTRY OF INTEREST GROUPS IN THREE REGIONS VARYING IN IMPORTANCE OF FORESTRY

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2.1 RÉSUMÉ

Les différences dans l'orientation des valeurs forestières et des attitudes envers la foresterie de groupes d'intérêt ont été étudiées dans le sud-est de la Finlande, le centre du Québec et le centre du Labrador, trois régions accordant une importance variable à la foresterie industrielle. Les groupes étudiés étaient des groupes environnementaux, des professionnels forestiers et des utilisateurs des produits non ligneux dans toutes les régions étudiées aussi que des propriétaires de forêts privées du sud-est de la Finlande et deux groupes autochtones dans le centre du Labrador. Notre comparaison est basée sur l'idée que la condition actuelle de la forêt, qui reflète l'histoire de son utilisation dans la région, interagit avec les orientations des valeurs et attitudes des gens. Nous avions donc comme hypothèse qu'une plus grande orientation des valeurs forestières anthropocentriques serait exprimée lorsque l'importance de la foresterie industrielle augmente. Ceci se produirait en parallèle avec une tendance opposée pour l'orientation des valeurs forestières biocentriques. Nous supposions aussi que les différences entre les groupes d'intérêt augmentent lorsque l'importance de la foresterie augmente reflétant ainsi la rareté des forêts âgées et la diminution de la biodiversité. Un continuum des orientations des valeurs forestières anthropocentriques à biocentriques était aussi supposé. À partir de notre base de données de 252 personnes, nous n'avons pas trouvé de tendance claire quant à l'importance des orientations des valeurs anthropocentriques ou biocentriques. Cependant, les différences entre les groupes augmentent lorsque l'importance de la foresterie industrielle augmente. Les résultats indiquent l'indépendance de l'orientation des valeurs anthropocentriques et biocentriques. Un score élevé sur les deux échelles peut être atteint simultanément et, dans le cas de cette étude, peut être interprété comme un reflet de l'importance des produits forestiers non ligneux ainsi que des rapports très proches avec la nature chez certains groupes.

2.2 ABSTRACT

Differences in forest value orientations and attitudes towards forest management of interest groups were studied in Southeastern Finland, the Mauricie in Central Quebec, Canada and Central Labrador in Canada; regions that vary in the importance of commercial forestry. The groups studied were environmentalists, multiple users of the forest, and forestry professionals in each region as well as forest owners in Southeastern Finland and two indigenous groups in Central Labrador. The comparison is based on the idea that the current state of the forest, which reflects the history of forest use of the area, interacts with people's forest value orientations and attitudes. It was hypothesized that greater anthropocentric forest value orientation would be expressed as the importance of commercial forestry increases, whereas the opposite trend was expected for the biocentric value orientation. Inter-group differences were expected to increase as the importance of commercial forestry increases reflecting the scarcity of old-growth forest and biodiversity. A continuum of forest value orientations from anthropocentric to biocentric was also expected. From a data set of 252 persons, no clear trends regarding the importance of anthropocentric or biocentric forest value orientations were detected across regions. However, our data gave an indication of growing inter-group differences as the importance of commercial forestry increased. Results indicate that a high score in both anthropocentric and biocentric value orientation scales can be attained simultaneously and in this case it may be interpreted as reflecting the high importance of the non-wood forest products together with a close connection to nature for certain groups.

2.3 INTRODUCTION

Sustainable forest management (SFM) aims at integrating ecological, economic and social values (Messier and Kneeshaw, 1999; McDonald and Lane, 2002; Wang, 2004). Public forest values and attitudes, however, evolve in time and vary across regions (Xu and Bengston, 1997; Elands et al., 2004; Selby et al., 2007). A better understanding of the factors influencing the formation of forest values and attitudes would thus allow for a better prediction of the acceptability of forest management options (Manning et al., 1999; Fischer and van der Wal, 2007).

The measurement of value orientations is based on the cognitive hierarchy model of human behaviour consisting of values, value orientations, attitudes, behavioural intentions and behaviours (Rokeach, 1973, 1979; Fulton et al., 1996; Vaske and Donnelly, 1999) which according to this theory build upon each other like an inverted pyramid (Fulton et al., 1996; Vaske and Donnelly, 1999). Fundamental values form the foundation of the cognitive hierarchy (Fulton et al., 1996). They are enduring beliefs that are used as standards for evaluating attitudes and behaviour; they transcend specific situations and are relatively few in number (Rokeach, 1973, 1979). Value orientations are patterns of basic beliefs that strengthen and give meaning to fundamental values (Vaske and Donnelly, 1999). They can be used to predict attitudes or behaviour (Schultz and Zelezny, 1999). Research on value orientations thus better helps understanding of the debate on environmental and natural resources issues that have been centred around conflicting views of conservation versus use (Stern and Dietz, 1994).

In natural resource management, value orientations have been measured in relation to wildlife (Fulton et al., 1996; Zinn et al., 1998; Teel et al., 2005) and forests (Vaske and Donnelly, 1999; McFarlane and Boxall, 2000a, b; Vaske et al., 2001). A rich

literature exists suggesting that environmental and forest value orientations are distributed along a single continuum from anthropocentric to biocentric (Gagnon-Thompson and Barton, 1994; Vaske and Donnelly, 1999; McFarlane and Boxall, 2000a; Vaske et al., 2001). There is, however, also some research suggesting a possible overlap between these two dimensions in environmental and wildlife value orientations (Bechtel et al., 1999; 2006; Teel et al., 2005; Corral-Verdugo et al., 2008). Other alternative and more diverse dimensions have also been used to describe environmental (e.g. Stern et al., 1993; Stern and Dietz 1994) and wildlife value orientations (e.g. Bright et al., 2000). For example Webb et al., (2008) identify three distinct forest value orientations in Australia: commodity, ecological and moral/spiritual/aesthetic value orientations. This research examines the existence of a single continuum of anthropocentric and biocentric value orientations in a forest management context.

Another main objective of this study is to examine how anthropocentric and biocentric forest value orientations vary across regions that are found along a gradient of importance of industrial forestry. We use the importance of industrial forestry as an underlying variable. This encapsulates several aspects of current and historical forest uses in a region and the cultural values related to the condition of the forest, to describe differences across regions (for more information, see section on study areas). Earlier research suggests that more economically and less environmentally oriented sustainable forestry indicators were more highly valued in a region where industrial forestry is of great importance than in regions where it is less important (Berninger et al., 2009). These results lead us to predict that a similar trend along a gradient of importance of industrial forestry would also be true for value orientations.

Our reasoning is based on the combined role of cultural and physical environments in the formation of values (Tuan, 1974, p. 59). Environmental experience is an interactive process between a person and an environment during which the person

lives through, feels or becomes aware of the environment (Hallikainen, 1998, p. 20). Forest values are shaped by individual and collective forest experiences that reflect forest use history through the physical quality of the forest and cultural models about forests (Berninger et al. 2009). On the other hand, forest values guide forest management and uses which modify the forest environment (Xu and Bengston, 1997; McFarlane and Boxall, 2000a, b; Berninger et al., 2009). The forest and the forest experiences to which we are accustomed have an effect on our understanding of what the forest should be like; it becomes familiar and normal (Strauss and Quinn, 1997, p. 112; Berninger et al., 2009). If they are strong enough, the perceptions of what the forest should be like are transmitted from one generation to another (Strauss and Quinn, 1997, p. 112). However, partially shared forest experiences and discourse create local subcultures, and cultural models vary between different local groups and among the same interest groups in different regions (Berninger et al., 2009).

It can be further noted that international comparisons of forestry conflicts have shown (1) that value structure and the type of relationship between different groups are important factors affecting the intensity of conflicts and (2) that the national importance of forestry may enhance conflicts between groups (Hellström and Reunala, 1995; Hellström, 2001). This together with the results of Berninger et al. (2009) described above give us reason to predict that inter-group differences, especially the differences between environmentalists and forestry professionals, grow as the importance of commercial forestry increases in a region.

Our study is thus based on the following three predictions:

1) People's forest value orientations are distributed along a single continuum from anthropocentric to biocentric.

2) If forest value orientations are at least partially shaped by forest use history then greater anthropocentric forest value orientation will be expressed as the importance of

commercial forestry increases, whereas the opposite trend is expected for the biocentric value orientation.
3) Inter-group differences in value orientations will increase as the importance of commercial forestry increases.

2.4 METHODS

2.4.1 Study areas and interest groups

Our study areas were Southeastern Finland, the Mauricie in Central Quebec and Central Labrador (Figure 2.1). They all have an extensive cover of boreal forest and forest use is important for the local people. They form a gradient of importance of commercial forestry which is used as an index measured by the forest sector's share of the labour force, the total economic production, the amount of logging per forest area, and the length of history of commercially managed forests in the area (Berninger et al., 2009). Among our study areas Southeastern Finland represents the highest, the Mauricie intermediate and Central Labrador the lowest importance of industrial forestry (Berninger et al., 2009). The forest ownership structure is also different in the three areas: in Southeastern Finland the majority of the forest is owned by non-industrial private forest owners, whereas in Mauricie about 83 % and in Central Labrador 99 % of the forest is publicly owned (Berninger et al., 2009).

Also the length of time forests have been commercially managed varies across regions. Finland has a long history of intensive forestry; industrial forestry's breakthrough occurred in the 1870's (Tasanen, 2004, p. 421). In contrast, in Central Labrador very little commercial forestry has been practiced. In the 1970's there was limited logging activity and after a long pause logging started again in the 1990's, but

the extent of logging has been marginal so that most of the forests in the area are mature and large areas can be considered as old-growth (Forsyth et al., 2003). The Mauricie in Central Quebec is between these two extremes in the length of forest management history. Forest management in this area became important a century ago, although virgin forests are still being cut (Government of Quebec, 2004). Traditional forest use in the form of berry and mushroom picking as well as hunting is very important for local people in Labrador and also in Finland. In the Mauricie the use of non-timber forest products is more restricted to hunting in recent generations.

Tindall (2003) stated that more research revealing inter-group differences is needed. We tried to answer his call by investigating the views of the most important forest user groups in each region. Our goal was thus not to reach the silent majority, but rather to study persons that have the potential to act as agents of change in search of new solutions for SFM (Törnquist 2006; Davies 2008). The study included such persons from the following groups in each area: 1) local or regional environmental groups; 2) multiple users of the forest like hunters, berry and mushroom pickers and hikers; 3) forestry professionals including representatives of both government forest management agencies and forest industry. In Southeastern Finland forest owners and in Central Labrador two indigenous groups, the Metis and the Innu, were also included since they are important actors in determining forest policy in these regions.

2.4.2 Meetings and participants

The study consisted of separate meetings with a sample of each interest group's members in order to obtain information about their forest value orientations and attitudes towards forestry. We decided to invite the participants to a central facility, to give them an opportunity to reflect thoroughly on the issues and questions at hand. The use of separate meetings for each group has proven to be effective, especially in conflict-prone areas (Sheppard and Meitner, 2005). The meetings, one for each

interest group in each locality, with the different interest groups were organized during 2006: in Kouvola and Lappeenranta, Southeastern Finland from January 17th to January 26th, in La Tuque and Trois Rivières, Mauricie from July 4th to July 9th, in Goose Bay and Sheshatshiu, Central Labrador from September 19th to September 22nd and on November 30th. Each meeting lasted about two hours.

The recruitment techniques used were adapted to the local conditions of each region and special characteristics of each group. The participants were invited using email, whenever possible, but also traditional letters, telephone calls, a newspaper advertisement and posters distributed in the Innu community of Sheshatsiu in Central Labrador. The contact information was obtained through the local networks of forest planning in each region. Since the number of potential participants in each group was in many cases very low, we did not aim for a random sample, but instead tried to reach as many potential participants for each interest group as possible. For example, the base population of the environmentalists or forestry professionals in Central Labrador was about 20 persons (Berninger 2007c). Random sampling was only used to invite 200 forest owners from the over 20 000 person forest owner register in Southeastern Finland (Berninger 2007a) since this group was abundant. More details on the recruitment in each region are available in Berninger (2007a, b and c).

We used self-administered questionnaires with questions adapted from McFarlane and Boxall (2000a) measuring forest value orientations and attitudes towards forest management. Questions on multiple uses of the forests and the effects of forestry on the visual quality of the landscape were added. A five-level Likert scale was used in the questions. The questionnaires were first written in English and then translated into Finnish and French. Thus each region had a different language version of the questionnaire. In the Finnish version, earlier Finnish translations of Horne et al. (2004a) of McFarlane and Boxall's (2000a) questions were used when applicable.

The questionnaires were tested by a small group of people in each region and adjusted if problems in understanding the questions were encountered.

In the meetings, the objectives of the study and the contents of the questionnaire were explained to the participants. They were then given time to fill in the questionnaire. In the end each group had an opportunity for discussion after turning in their questionnaires. In the meeting for the Innu in Sheshatsiu, questions that were presented in English were interpreted to Innu-aimun when needed and assistance was also provided in filling in the questionnaires.

A total of 252 persons participated in the study (Table 2.1). The region with the most participants was Southeastern Finland, which also has the largest population. Mean age and the percentage of women participants in the forestry professionals group were similar in all three regions and also consistent with the study of McFarlane and Boxall (2000a). About half of the environmentalists were women both in Southeastern Finland and Central Labrador, but only one third of the environmentalists were women in the Mauricie (Table 2.1). The mean age of environmentalists in Central Labrador was higher than in the other regions due to a limited number of persons under 40 years old. The multiple users group in Central Labrador had more female than male participants, while only one fifth of the multiple users group in the other regions were women (Table 2.1). There was a considerable difference in the mean age of the multiple users groups in the different regions with the oldest participants being in Southeastern Finland and the youngest in the Mauricie.

2.4.3 Data analysis

A factor analysis using principal component analysis with varimax rotations was conducted to confirm that the forest value questions used measured the dimensions they were intended to measure, that is biocentric and anthropocentric value orientations (Brynn and Cramer, 1990, p. 68). The number of factors included in the varimax rotation was defined by a graphical scree test (Brynn and Cramer, 1990, p. 259). The factor analysis confirmed that the forest value questions used corresponded to biocentric and anthropocentric value orientations (Table 2.2). The two identified factors explain about 45 % of the total variation.

A K-means cluster analysis was used to classify the participants according to their answers to the questions measuring biocentric and anthropocentric value orientations. A biocentric score and anthropocentric score for each cluster and each interest group were calculated as a mean of the scores for statements measuring each dimension described in Table 2.2. A non-parametric Kruskall-Wallis test together with the Tukey-Kramer test was used to compare the mean biocentric and anthropocentric value scores across groups within each region (Howell 2004, p. 413). Nonparametric methods were used since the variances of the compared interest groups were different (Howell 2004, p. 467). Spearman's nonparametric correlations between forest value orientation and attitudes towards forest management were calculated (for attitude questions, see Table 2.3). Statistical analyses were carried out using the JMP statistical package (SAS institute).

2.5 RESULTS

Three clusters were found in this work: a biocentric cluster with a high biocentric score and a low anthropocentric score, an anthropocentric cluster with a medium biocentric score and a high anthropocentric score and an intermediate cluster between these extremes (Figure 2.2). The greatest proportion of participants (39 %) was classified to the intermediate cluster. The biocentric score is high for all clusters, which means that most participants agreed with many of the biocentric statements (Berninger, 2007b, c). The biggest differences across clusters are found in the anthropocentric value scores.

More than half of the environmentalists in all three regions and almost half of the multiple users in Central Labrador were classified into the biocentric cluster. The highest proportion of respondents in the anthropocentric cluster occurred among the Innu in Labrador, the professionals in the Mauricie and Southeastern Finland as well as the Finnish multiple users and forest owners (Figure 2.3). The largest proportion of respondents in the intermediate cluster was found among professionals from Central Labrador and Southeastern Finland, the multiple users in the Mauricie and the Metis (Figure 2.3). The proportion of respondents in the anthropocentric cluster among the environmentalists and in the biocentric cluster among the multiple users increases from Southeastern Finland through Mauricie to Central Labrador (Figure 2.3).

When the biocentric and anthropocentric scores of the interest groups common to all three regions were compared (Figure 2.4), the biocentric scores of environmentalists were equally high in all regions, but the anthropocentric score of environmentalists in Southeastern Finland was significantly lower (Tukey-Kramer test, $p=0.05$) than that in Central Labrador. The multiple users in Southeastern Finland had a significantly lower biocentric score than the multiple users in other regions. The anthropocentric score of multiple users in Southeastern Finland was significantly higher than among

the multiple users in Mauricie. The forestry professionals in Central Labrador had a significantly higher biocentric score than the professionals in Southeastern Finland. The anthropocentric score of the professionals in Central Labrador is lower than in other regions, but the difference is not significant. There is no clear statistically significant trend along the gradient of regions with higher to lower importance of commercial forestry, but each group shows a different pattern across regions.

Differences between extreme groups both in biocentric and anthropocentric scores show a descending trend from Southeastern Finland to Central Labrador (Figure 2.5). The anthropocentric value score was positively correlated ($p<0.0001$, $R=0.36$-0.52) with satisfaction with current forestry and with the statement that the managed forest is beautiful (Table 2.3). A negative correlation ($p<0.0001$, $R=-0.36$) was found between the anthropocentric value score and answers to questions on the effects of logging on multiple uses of the forest. The biocentric value score correlated negatively ($p<0.0001$, $R=-0.36$-0.52) with satisfaction with current forest management and the statement on the beauty of managed forest and positively ($p<0.0001$, $R=0.40$-0.46) with questions on the effects of logging on multiple uses (Table 2.3).

2.6 DISCUSSION

Our data does not support the first prediction, that there would be a single continuum from anthropocentric to biocentric value orientations. Instead, some groups have high scores on both scales simultaneously. Teel et al. (2005) classify individuals into four segments according to their wildlife value orientations. One of the segments consists of persons who hold both biocentric (mutualist) and anthropocentric (utilitarian) value orientations simultaneously. In our study of forest value orientations about 19 % of the participants had high scores in both biocentric (4 and over) and

anthropocentric (over 3) value orientations. They could be called pluralists using the terminology of Teel et al. (2005), but our interpretation of this group is different. Teel et al. (2005) state that this group is an indication of social transition: these individuals hold both traditional utilitarian values that the society is moving away from and a mutualist value orientation that the society may be moving towards. This may be true for wildlife value orientations, since there is a dichotomy amongst people willing to protect animals and those wanting to hunt. Our data, however, indicate that the pluralists in forest value orientations are people who traditionally use non-wood forest products and maybe wood for domestic purposes, but at the same time have a strong relationship with nature. These people are rarely members of environmental groups, but represent a traditional or an aboriginal view of the forest. This could thus indicate the existence of a third value orientation related to cultural, spiritual and aesthetic values as suggested by Webb and others (2008).

A very high percentage of participants from the Innu were classified to the anthropocentric cluster (Figure 2.3). In order to compare the Innu with other groups within and across regions we used conventional survey techniques which may be a source of error due to cultural differences (Adamowicz et al., 1998b). The use of the forest and non-wood products is important for the Innu and they see humans and nature as inseparable (Mailhot, 1997, p. 166). The anthropocentric value orientation observed here does thus not mean a desire for more timber production, but rather should be interpreted as an aboriginal world view in which humans are a part of nature (Warren, 2007; Adam and Kneeshaw, 2008).

Our results partially support the second prediction, as some trends in the distribution of clusters across regions were detected, however no clear statistically significant trends regarding anthropocentric or biocentric value orientations were found across regions. In contrast, each group had a different pattern (Figure 2.4). Among the environmentalists, there was no difference in biocentric scores across regions, but

there was a visible rising trend in anthropocentric scores from Southeastern Finland to Central Labrador. The multiple users group in Southeastern Finland held a more anthropocentric value orientation than the multiple users in the other regions. This difference may be explained by the high proportion of non-industrial private forest owners in Southeastern Finland that led to a situation in which 55 % of multiple users were also forest owners. Forest owners have been previously found to have an anthropocentric value orientation (Horne et al. 2004b). In contrast, hunters and campers in Alberta have been reported to hold a biocentric value orientation (McFarlane and Boxall 2000b). This corrobates our results for the multiple users in Mauricie and Central Labrador, since they are mainly hunters and recreational users of the forest.

The forestry professionals in Southeastern Finland and the Mauricie are similar in their value orientations, while the professionals in Central Labrador are different from those in the other regions. This should not be surprising, since the extent of forest management in the Mauricie is closer to Southeastern Finland than Central Labrador. The amount of annual commercial logging is around 4 million m^3 in both Southeastern Finland and the Mauricie while the Annual Allowable Cut (AAC) is twenty times less at around 200 000 m^3 in Central Labrador (Forsyth et al., 2003; Kaakkois-Suomen metsäkeskus, 2006; MRNF, 2007). The forest management plan of District 19A, where most of the commercial logging takes place in Labrador, is based on the philosophy of first ensuring ecological and cultural values in a large network of conservation areas and only then assigning logging to the remaining areas (Forsyth et al., 2003). The high support for biocentric value orientation among the professionals in Central Labrador may be a reflection of this management philosophy. Similarly, it may also reflect the cultural and historical context of the region in which the forest has been an integral part of peoples lives for generations but in which commercial forestry has a short history.

As expected according to the value hierarchy model (Vaske and Donnelly, 1999), the biocentric and anthropocentric value orientations correlated with the attitudes towards forestry (Table 2.3). The biocentric value orientation correlated with a negative attitude towards current forest management suggesting that the prevalent forest management paradigm is based primarily on an anthropocentric value orientation. This is also seen in the high proportion of forestry professionals being classified into the anthropocentric cluster (Figure 2.3). This is less true in Central Labrador than in other regions which may be explained by the relatively low importance of commercial forestry in the region and the short history of forest harvesting.

Differences between extreme groups in anthropocentric and biocentric scores grew when the index of the importance of commercial forestry increased. This finding provides support for the third prediction. Earlier international comparisons indicate that Finland has relatively intense conflicts over forestry issues in comparison with other countries and that national importance of forestry is one of the factors that enhance conflicts (Hellström and Reunala, 1995; Hellström, 2001). We hypothesize that one possible reason for increased polarity in regions with a high importance of commercial forestry is the simultaneous occurrence of dependence on forestry for livelihood and the scarcity of old-growth forests as well as a perceived or real reduction in biodiversity. Increasing changes in the physical environment and increasing resource scarcity can enhance potential for increasing conflicts (Maxwell and Reuveny, 2000; Reuveny and Maxwell, 2001; Raitio, 2008, p.15). On the other hand, it should be recognised that this is only one factor as regions with similar levels of commercial forestry may have differing polarity and conflict patterns, as factors such as culture influence how conflicts are dealt with (Hellström, 2001).

Despite the trends that we have observed, we caution that our data set is small and that prudence should thus be used in interpreting the results. It was also difficult to reach the multiple users of the forest which lead to different compositions of this

group in different regions. Further work will thus be needed in different regions and cultural settings to confirm the findings reported here.

2.7 CONCLUSIONS

Our comparison of three regions indicates that the greater the index of the importance of commercial forestry in a region, the more polarized are held forest values and attitudes across different forest user groups. This also increases the probability of intense conflict over resource use. We have, however, only studied three regions and confirmation of the results obtained here is needed from other regions with similar cultural backgrounds. The importance of commercial forestry interacts with local forest use and local forest conditions, which among other factors shape cultural models about forests as well as the held forest values and attitudes (Berninger et al., 2009). We have also observed that a single continuum of biocentric and anthropocentric forest value orientations may not be appropriate in all cases. Instead, an interesting future line of research would be to further investigate the existence of pluralist and other more nuanced value orientations and their relationship with forest management.

Table 2.1 The number of participants, percentage of women and mean age in each region and each group. Env. = Environmentalists

	Env.	Forestry professionals	Multiple users	Forest owners	Metis	Innu	Total
Southeastern Finland							
No of participants	41	24	22	28	-	-	115
% of women	49	13	18	18			28
Mean age	45	43	58	50			49
Mauricie							
No of participants	13	20	18	-	-	-	51
% of women	31	11	20				20
Mean age	47	43	46				45
Central Labrador							
No of participants	15	15	15	-	18	23	86
% of women	53	13	53		39	32	38
Mean age	52	45	50		52	40	47

Table 2.2 The varimax –rotated principal component loadings of the questions used to measure biocentric and anthropocentric value orientations. Only loadings greater than 0.2 are presented.

	Biocentric values	Anthropocentric values
Forests let me feel close to nature	0.726	
Humans should have more respect and admiration for the forests	0.690	
It is important to maintain the forests for future generations	0.590	
Wildlife, plants, and humans should have equal rights to live and develop	0.581	
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans	0.572	
Forests give me a sense of peace and well-being	0.518	
Forests should have the right to exist for their own sake, regardless of human concerns and uses	0.450	
Forests should exist mainly to serve human needs		0.794
The primary function of forests should be for the products and services that are useful to humans		0.833
It is a waste of our natural resources if forests are not used for human benefit		0.767
Cronbach's Alpha	0.662	0.736
% of variation explained by the component	25.23	20.13

Table 2.3 Spearman's nonparametric correlations between the biocentric and anthropocentric value scores and responses to questions on the effects of forestry and satisfaction with forest management. Only correlation coefficients above 0.35 with a significance level < 0.0001 are marked.

	Biocentric value orientation, Rho	Anthropocentric value orientation, Rho
Logging spoils the landscape	0.46	-0.39
A managed forest is beautiful	-0.39	0.52
Forest management diminishes populations of game species	0.42	
Forest management diminishes the harvest of berries and mushrooms	0.40	
Forests are currently being managed for a wide range of uses and values, not just timber		0.36
Current forest management does a good job in including environmental concerns	-0.46	0.40
There are enough protected areas in the area	-0.52	0.53
The present rate of logging is too great to sustain our forests in the future	0.46	
Forests are being managed successfully for the benefit of future generations	-0.39	0.42
The forests in the area are currently managed in such a way that they are well suited for recreation use	-0.36	0.45

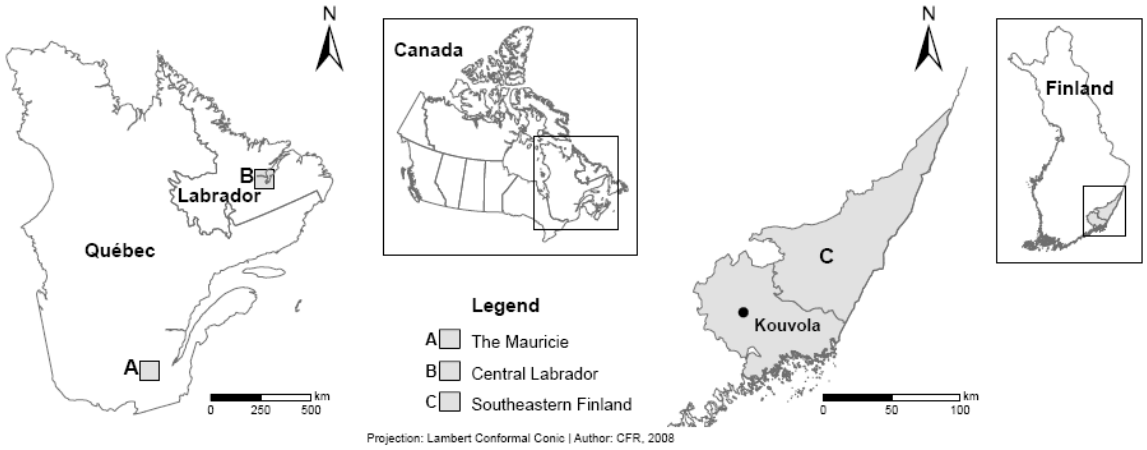

Figure 2.1 The study locations: The Mauricie region in Quebec, Central Labrador and Southeastern Finland.

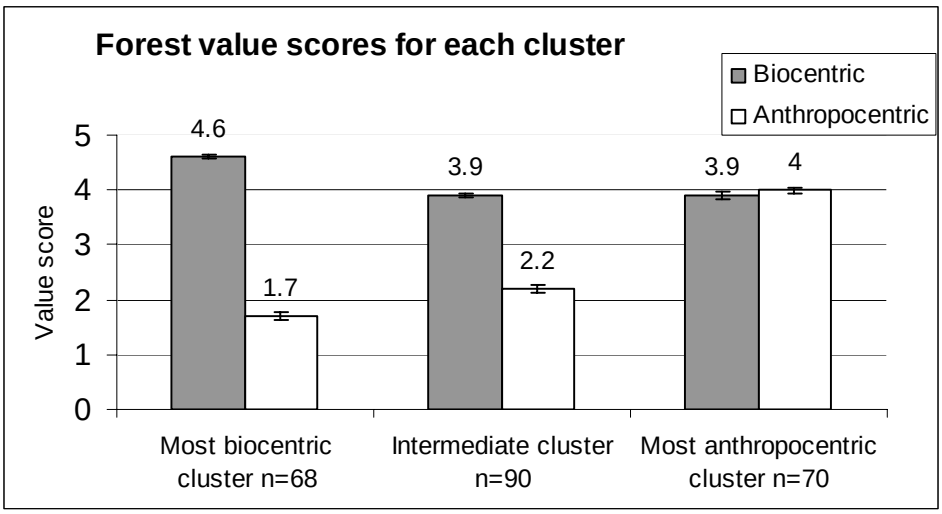

Figure 2.2 Biocentric and anthropocentric forest value scores for each cluster. The higher the score the more the value orientation is supported.

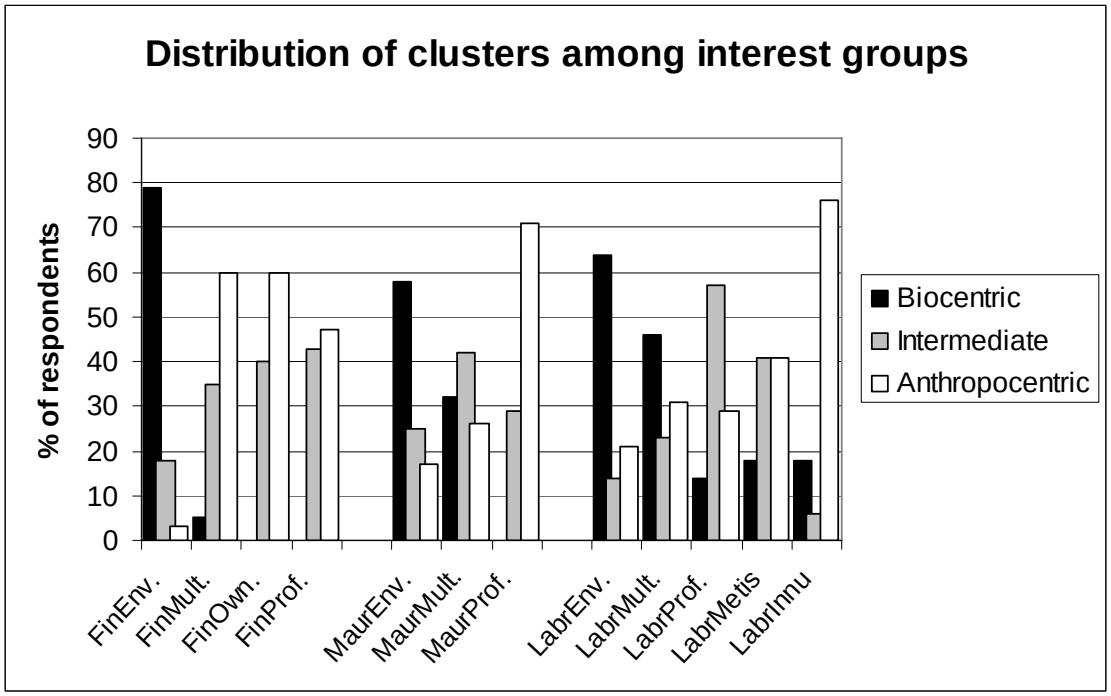

Figure 2.3 Percentage of participants belonging to an interest group that were associated with biocentric, intermediate, and anthropocentric clusters in the three regions. Fin=Southeastern Finland, Maur=Mauricie, Labr=Central Labrador, Env.=Environmentalists, Mult.=Multiple users, Prof.=Forestry professionals

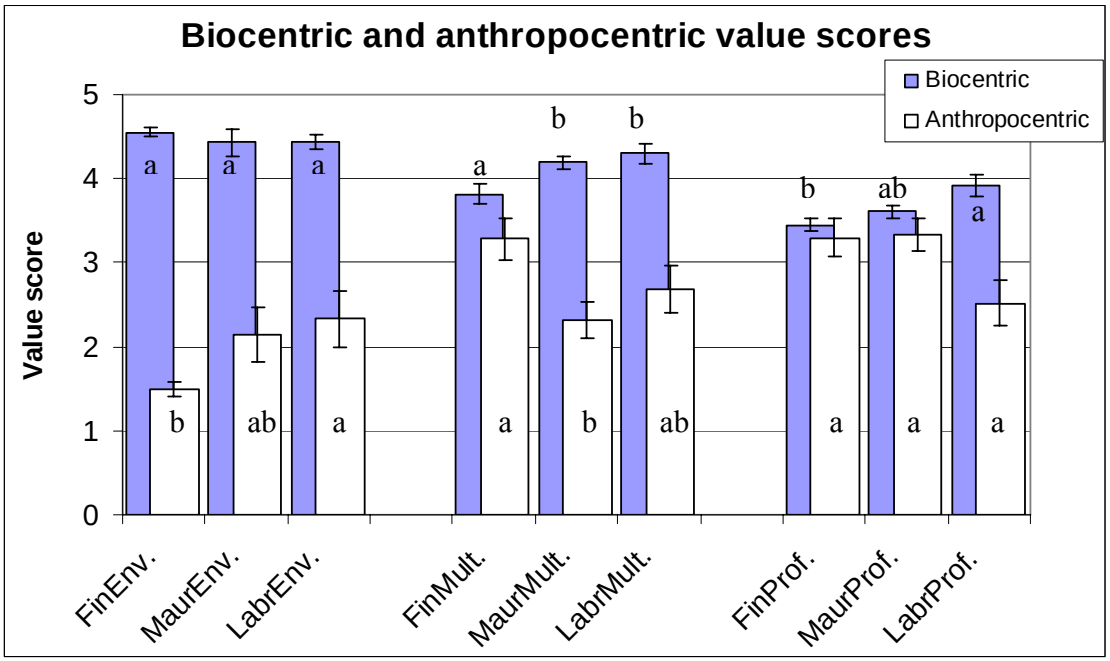

Figure 2.4 Biocentric and anthropocentric value scores for environmentalists, multiple users and forestry professionals in the three regions. The higher the score the more the value orientation is supported. Groups that do not share a letter are significantly different (Tukey-Kramer test, $p \leq 0.05$). Fin=Southeastern Finland, Maur=Mauricie, Labr=Central Labrador, Env.=Environmentalists, Mult.=Multiple users, Prof.=Forestry professionals

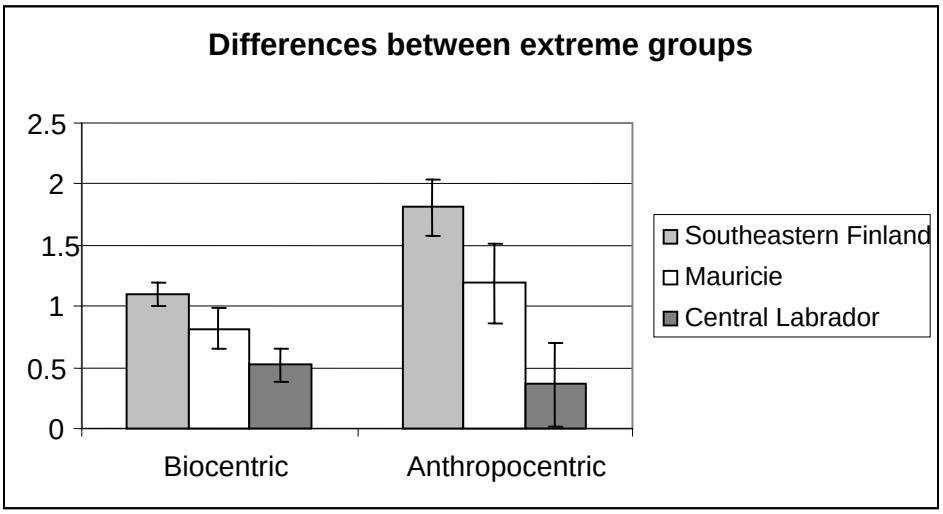

Figure 2.5 Differences in biocentric and anthropocentric value scores between extreme groups. Only those groups common to all regions were included. The standard errors are the highest values for each region.

CHAPTER III

SFM PREFERENCES OF INTEREST GROUPS IN THREE REGIONS VARYING IN IMPORTANCE OF INDUSTRIAL FORESTRY: AN ATTRIBUTE-BASED CHOICE EXPERIMENT

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3.1 RÉSUMÉ

Le défi de l'aménagement durable des forêts est l'intégration de divers objectifs conflictuels d'aménagement. Pour réussir cette intégration, il est important de mieux connaître les aspects qui influencent les préférences des différents groupes d'intérêt ainsi que la façon dont ces groupes balancent les attributs différents de l'aménagement de la forêt. Les différences au niveau des préférences reliées à l'aménagement durable des forêts des groupes d'intérêt ont été étudiées entre des régions ayant un historique de l'utilisation de la forêt différent. Le sud-est de la Finlande, le centre du Québec et le centre du Labrador représentent des régions accordant une grande, moyenne et basse importance à la foresterie industrielle. Les groupes étudiés incluent les environnementalistes, les professionnels forestiers et les utilisateurs des produits non ligneux. En Finlande, un groupe de propriétaires de forêts privées a aussi été inclus, tout comme des groupes Métis et Innus au Labrador. Notre comparaison se base sur le postulat que la condition de la forêt reflète l'histoire de son utilisation dans la région. La condition de la forêt a aussi un effet sur les valeurs et attitudes forestières des individus. Ces valeurs et attitudes influenceraient les préférences reliées à l'aménagement durable des forêts. Nous avons testé si les préférences reliées à l'aménagement durable des forêts sont différentes entre les divers groupes d'intérêt à l'intérieur des régions et entre les régions. Les données provenant de 252 personnes ont été récoltées en utilisant un questionnaire rempli par les participants dans un lieu central. Nous avons utilisé l'approche de l'expérience de choix où les participants doivent choisir plusieurs fois parmi des options différentes décrites par les combinaisons des attributs qui ont été assignées aux différents niveaux. La nouveauté de l'approche est dans l'utilisation des expériences de choix pour l'évaluation des différences de préférences entre les régions. Nos résultats montrent que l'agrégation des préférences parmi tous les individus dans une région donnée ne révèle pas toute l'information nécessaire pour la planification de l'aménagement forestier parce que des opinions opposées peuvent s'annuler et résulter en une interprétation qui ne reflète pas les opinions polarisées. L'analyse statistique montre que les préférences des groupes d'intérêt dans une région sont généralement différentes d'un groupe à l'autre. Cependant, les préférences des groupes d'intérêt entre les régions sont aussi significativement différentes. Cela illustre bien l'importance d'étudier l'hétérogénéité par région et par groupe.

3.2 ABSTRACT

The challenge of sustainable forest management (SFM) is to integrate diverse and sometimes conflicting management objectives. In order to successfully implement this task, we need a better understanding of the aspects influencing preferences of diverse groups and how they make trade-offs between different attributes of SFM. Differences in the SFM preferences of interest groups in regions with different forest use histories were studied using Southeastern Finland, Central Quebec and Central Labrador in Canada as examples of regions with high, medium and low importance of commercial forestry and different histories of forestry. The groups surveyed included environmentalists, forestry professionals and multiple users of the forest. Private forest owners were included in Finland while the Innu and Metis were included in Labrador. Our comparison is based on the reasoning that the condition of the forest reflects the forest use history of the area. The condition of the forest also shapes an individual's forest values and attitudes. These held values and attitudes are thought to influence SFM preferences. We tested whether the SFM preferences differ in the different interest groups within and across regions. Data from 252 persons were collected using self-administered questionnaires in a central facility. We used a choice experiment approach, where participants chose multiple times among different options described by a combination of attributes that are given different levels. The novelty of our approach was the use of choice experiments in the assessment of regional preference differences. Our results show that the aggregation of preferences of all individuals within a region does not reveal all of the information necessary for forest management planning since opposing viewpoints can cancel each other out and lead to an interpretation that does not reflect possibly polarised views. Statistical analysis shows that the preferences of interest groups within a region are generally significantly different from each other; however preferences of interest groups across regions are also significantly different. This illustrates the importance of assessing heterogeneity by region and by group.

3.3 INTRODUCTION

In trying to implement sustainable forest management (SFM), forest managers face the challenge of integrating diverse management objectives into their management plans (Margerum, 1995; Ananda and Herath, 2003). The task is not simple, since a balance is needed between different objectives like conservation, recreational use and timber production which are valued differently by different groups of people. Sophisticated planning and decision making tools have been developed to help in combining the various objectives (Kangas and Store, 2002; Seely et al., 2004; Kangas et al., 2005; Sturtevant et al., 2007). Participatory processes are used to identify the management preferences of interested parties (Kangas et al., 2001). Research is needed, however, in order to better understand which aspects influence the preferences of diverse groups and how they make trade-offs between different attributes of SFM.

We use a choice experiment approach that has proven useful in studying trade-offs in resource management settings (Horne et al., 2005). Choice experiments on forest use have been carried out mainly related to the recreational use of the forest (Boxall et al., 1996; Adamowicz et al., 1997, 1998a; Boxall and Macnab, 2000; Horne et al., 2005) and nature conservation (Li et al., 2004; Horne, 2006; Lehtonen et al., 2006). Some choice experiments related to SFM have also been conducted (Shapansky et al., 2008; Xu et al., 2003), but studies that compare different groups are rare.

Our study compares the preferences of various interest groups in each study region and similar groups across regions. Group membership is an important component of social identity (Turner and Oakes, 1989). Interest or user groups are thought to create subcultures based on their shared forest experiences, which would lead to group-specific preferences related to forest management (Berninger et al., 2009). For example foresters, representing the forest industry, have been shown to have a greater

preference for an economical use of the forest compared to than environmental and aboriginal groups (Kant and Lee, 2004; Kumar and Kant, 2007).

All above mentioned research concentrates on one study area at a time. Thus the influence of place-related factors on SFM preferences is unexplored. Earlier research indicates that forest use history and importance of commercial forestry in the region has an effect on rankings of SFM indicators and forest value orientations (Berninger et al., 2009, Chapter II; Berninger and Kneeshaw, under review). Theoretically, it has been stated that forest values are influenced by current and historical forest use through changing forest conditions and through forest experiences that modify cultural models about forests (Berninger et al., 2009). These held values are then thought to have an influence on preferences which can be defined as favoured options (Adamowicz et al., 1998b). Empirically, forest values and attitudes are shown to moderately predict respondent preferences for forest use or management alternatives (Brown and Reed, 2000; Horne et al., 2004a). This gives us reason to believe that forest use history and importance of commercial forestry has an effect on SFM preferences as well.

Our research questions are the following: Do SFM preferences differ across regions and can that be explained by differing current and historical forest use? How do the SFM preferences differ in the different interest groups within and across regions? Do inter-group differences in SFM preferences increase as the importance of commercial forestry increases in a region?

3.4 METHODS

3.4.1 The choice experiment method

In order to evaluate SFM preferences we used choice experiments where participants are given multiple choice tasks and for each task they are asked to choose their preferred alternative of two or more alternatives. The alternatives are described by various levels of a set of attributes. The attributes and their levels are designed to reveal individual preferences for SFM attributes and different management strategies. This method can be used to study both use and non-use values of natural resources (Grafton et al., 2004, p.264).

The choice experiment method is based on random utility theory and provides information on trade-offs between the attributes in question (Adamowicz et al., 1997, 1998a). Individuals are assumed to choose alternative that maximizes their utility.

According to random utility theory the utility (U) of alternative *i* is the sum of systematic (V_i) and error (ε_i) components. The systematic component (V) contains specific and observable attributes that in the case of a stated preference method are defined by the researcher and presented to the individual in the form of choice sets. The presence of an error component ε means that the overall utility is random and only the probability of choice of one alternative over another can be analyzed:

$P(i)=P(V_i+\varepsilon_i > V_j+\varepsilon_j) \quad \forall\ j \neq i,\ i,j \in C_n$

where C_n is the choice set of individual *n* (Adamowicz et al., 1997).

3.4.2 The survey instrument

The attributes were designed to represent each of the three dimensions of sustainable forest management: ecological, economic and social (Table 3.1). The attributes were based on a preliminary study conducted in 2005 where 4 to 10 persons from each interest group were asked to list and rank sustainable forest management indicators (Berninger, 2006; Berninger et al., 2009). The *proportion of forest land set aside for conservation* is an ecological variable. The attribute *wildlife species* that *the forest supports* combines ecological aspects of biodiversity maintenance with social aspects of the multiple use of the forest: Hunters want favourable conditions for game species, recreational users like to see charismatic species and nature observation enthusiasts seek rare species. The attribute *average size of clear cuts* is an ecological variable that was included because many people in the preliminary study were against big clear cuts and preferred selection cutting. It can also be considered an economic variable, since it affects logging costs. *Forest sector jobs* describe the socioeconomic role of forestry in the region and *the decrease or increase in annual household expenses* describes the costs of possible additional conservation areas or the gains in reducing conservation areas for the personal economy of the respondent.

The five attributes described above were used in the study and each attribute was assigned four levels, one of which represents the current situation (Table 3.1). Since the current level was different in each study region, as described in the study area section, most of the attributes were coded as a change from the current situation. Changes in annual expenses that were measured in euros were converted into Canadian dollars. Central Labrador is the only area where this attribute may have negative level referring to a situation of reducing conservation area from the existing level (Table 3.1). The wildlife attribute was dummy-coded, since it is a categorical variable, not continuous like the other attributes.

The questionnaire starts by asking background information of the participants and questions related to forest values and attitudes that were used to introduce the participants to the topic. The results of the value and attitude section are presented in Berninger (2007a, b and c) and Berninger and Kneeshaw (under review; Chapter II). In the choice experiment section, each participant was presented eight different choice tasks, where an individual compares the current situation with two possible future scenarios. The study included all together 16 different choice tasks. Thus two different versions of the questionnaire were used and were distributed alternately to the respondents. An example of a choice task is presented in Table 3.2. The combinations of the levels of different attributes used in the choice tasks were determined using orthogonal tables that are developed especially for choice experiments and which have been proven efficient (Sloane, 2006). The questionnaires were first written in English and then translated into Finnish and French. Thus each region had a different language version of the questionnaire. The explanation of the attributes was adjusted to the specific situation in each region. Before application, the questionnaires were tested by a small group of people in each region and adjusted to improve comprehension.

3.4.3 The study areas and interest groups

Our study areas were Southeastern Finland, the Mauricie in Central Quebec and Central Labrador (Figure 3.1). They all have an extensive cover of boreal forest and forest use is important for the local people. They form a gradient of importance of commercial forestry described by the forest sector's share of the labour force and total economic production as well as the amount of logging per forest area; Southeastern Finland being the most intensive, the Mauricie next and Central Labrador the least intensive (Berninger et al., 2009). Also the length of time forests have been commercially managed varies across regions, the longest history being in

Southeastern Finland and the shortest in Central Labrador (Chapter II; Berninger and Kneeshaw, under review).

The forest management strategy in each study region also differs due in part to the different forest use history and partly due to differing land ownership patterns. In Southeastern Finland, 80 % of the forest land is owned by families, the mean size of the holdings is about 20 ha and there are about 7 000 small holdings of less than 4 ha (Finnish statistical yearbook of forestry, 2006). This has led to management by small cut blocks, the average size being under 2 ha. Due to intensive forest management over a long time period, the forests in Southeastern Finland are dominated by even age stands and there is very little old forest in the area. About 3.4 % of the forest land is over 120 years old and only 0.9 % of the forest land is over 140 years old (Kaakkois-Suomen metsäkeskus, 2005). Less than 2 % of the forest land in Southeastern Finland is legally protected (Kaakkois-Suomen metsäkeskus, 2006) and there is little potential of increasing it through conventional methods.

In the Mauricie, where most of the forests are owned by the province of Quebec, very large cut blocks have been used for industrial forestry (Fall et al., 2004). At the moment the mean size of cut blocks is 25 ha. In the Mauricie only 2 % of the forest land is legally protected, but potential for increasing protected area coverage still exists in the region.

In Central Labrador almost all of the forest is provincially owned. The average cut block size is 10 ha as calculated by the Newfoundland and Labrador Department of Forest Resources and Agrifoods for logging carried out between 1975 and 2005. In Central Labrador there are no legally protected areas. The proportion of conservation area used in this study is based on the current management plan for District 19 A where most of the commercial logging takes place in Labrador (Forsyth et al., 2003). Under the current plan no logging is carried out in areas dedicated for conservation of

natural and cultural values (50 % of forest land), but the plan is revised periodically. Logging has been marginal in the area and there are few fires. Thus most of the forests can be considered old (Forsyth et al., 2003).

In Southeastern Finland and in the Mauricie the number of jobs offered by the forest sector is decreasing, whereas given the low level of forest sector employment there is a potential for an increase in Central Labrador (Kaakkois-Suomen metsäkeskus, 2005a; Halifax Global, 2006; Government of Quebec, 2008).

This study included the following groups in each area: 1) local or regional environmental groups; 2) multiple users of the forest; and 3) forestry professionals. In Southeastern Finland forest owners and in Central Labrador the Metis and the Innu were also included since they are important actors in forest policy in these regions. The multiple users group included hunters, berry and mushroom pickers, hikers and other recreational users of the forest. The forestry professionals group included both representatives of the government forest planning officers and the forest industry.

3.4.4 The recruitment of participants and meetings

The study consisted of separate meetings with a sample of each interest group in order to obtain information about their forestry preferences. We invited the participants to come to a central facility, to give them an opportunity to reflect thoroughly on the issues and questions at hand. The use of separate meetings for each group has proven to be effective, especially in conflict-prone settings (Sheppard and Meitner, 2005). The meetings with the different interest groups were organized in 2006: in Kouvola and Lappeenranta, Southeastern Finland from January 17th to January 26th, in La Tuque and Trois Rivières, Mauricie from July 4th to July 9th, in

Goose Bay and Sheshatshiu, Central Labrador from September 19th to September 22nd and on November 30th. Each meeting lasted about two hours.

The recruitment techniques used were adapted to the local conditions of each region and special characteristics of each group. The participants were invited using email, whenever possible, but also by traditional letters, telephone calls, a newspaper advertisement and posters distributed in the Innu community of Sheshatsiu in Central Labrador. The contact information was obtained through local forest planning networks in each region. We did not aim for a random sample, but instead tried to reach as many potential participants for each interest group as possible. For example, the base population of environmentalists or forestry professionals in Central Labrador was about 20 persons (Berninger, 2007c). Random sampling was only used to choose 200 forest owners to be invited from the forest owners register in Southeastern Finland since these were abundant (Berninger, 2007a). More details on recruitment in each region are available in Berninger 2007a, b and c.

In each meeting the participants were explained the objectives of the study and the contents of the questionnaire. Each attribute was described in detail and the idea of a choice experiment was explained. The questionnaire was distributed and participants had an opportunity to ask questions prior to its completion. In the meeting for the Innu in Sheshatsiu, questions presented in English were translated to innu-aimun when needed. Assistance was also provided in understanding and filling in the questionnaires. At the end of each meeting a de-briefing session was held. The discussion was focused mainly on the participant's impressions of the survey and the approaches they used in making choices and trade-offs, but the task also inspired discussion on important local issues related to forests and their use.

3.4.5 The participants

A total of 252 persons participated in the study (Table 3.3). The region with the most participants was Southeastern Finland, which is also the region with the largest population. Mean age and the percentage of women participants in the forestry professionals group were very similar in all three regions and also consistent with McFarlane and Boxall's (2000a) study. About half of the environmentalists were women both in Southeastern Finland and Central Labrador, but only one third of the environmentalists were women in the Mauricie, Central Quebec (Table 3.3). The mean age of the environmentalists in Central Labrador was higher than in the other regions due to a limited number of persons under 40 years among the active members of environmental organizations in the area. The multiple users group in Central Labrador had more women than men participants, while only one fifth of the multiple users group in the other regions were women (Table 3.3). There was a considerable difference in the mean age of the multiple user groups in the different regions with the oldest participants being in Southeastern Finland and the youngest in the Mauricie, Central Quebec.

3.4.6 Data analysis

The choice experiment data were analyzed using a conditional logit model with the MDC procedure of the SAS statistical package (SAS institute, 2001). Joint models for each region and separate models for each interest group were estimated. An alternative-specific constant (ASC) was estimated to measure the tendency to select options representing the current situation (Adamowicz et al., 1998a). Both linear and quadratic models were estimated for each data set and models with a best fit to the data are presented in the results. Pairwise likelihood ratio tests were conducted with SAS to test whether the estimated model parameters for interest groups within and

across regions differed significantly (Hensher et al., 2005, p. 335-337). Marginal values of attribute change were calculated by region and by group. For the wildlife categorical variable marginal values were calculated for the change from one category to another. The marginal value is the dollar amount an individual would be willing to trade for a change in an attribute and still maintain the same utility level. Marginal values are used to standardize attributes to a same unit (dollar) in order to enable comparisons across models. For each attribute, the groups in each region were ordered according to the resulting marginal value (Figure 3.2). We then analyzed visually which marginal values were similar.

3.5 RESULTS

3.5.1 Differences within regions

In Southeastern Finland, the parameter estimates for conservation area, cut block size and the alternative-specific constant (ASC) for the current situation contrast between the different groups (Table 3.4). Some groups have positive and significant parameter estimates which means that they prefer a situation with more of that variable, when all else is held constant. In contrast, other groups have negative and significant parameter estimates for the same variables demonstrating a preference for less of that variable. The joint model (column 'All' in Table 3.4) does not reflect this polarized setting (Table 3.4). According to pairwise likelihood ratio tests, the model estimated for environmentalists in Southeastern Finland is significantly ($p<0.0001$) different from those of other groups in the region (Table 3.5). The model estimated for forestry professionals differs significantly from the model estimated for multiple users (pairwise likelihood ratio test, $p=0.025$, Table 3.5).

In the Mauricie, the models estimated for each group are significantly different from each other (pairwise likelihood ratio test, $p<0.001$, Table 3.5), but there are no significant opposite parameter estimates like in Southeastern Finland (Table 3.4). In Central Labrador, none of the groups had a significant parameter estimate for conservation area (Table 3.4). According to the pairwise likelihood ratio test significant differences ($p<0.05$) were detected between most groups, but not between the multiple users and the Metis or environmentalists and forestry professionals (Table 3.5).

3.5.2 Comparison of groups across regions

When the models estimated for the same groups in different regions are compared, some similarities and differences are detected. Models estimated for environmentalists in Southeastern Finland and the Mauricie are similar in many aspects, for example in parameter estimates for conservation area and cut block size (Table 3.4), and they both differ significantly from the model estimated for the environmentalists in Central Labrador (pairwise likelihood ratio test, $p<0.001$, Table 3.6). The models estimated for forestry professionals and multiple users are significantly different in Southeastern Finland in comparison to both other regions (pairwise likelihood ratio test, $p<0.001$, Table 3.6). The biggest differences are found in the parameter estimates for the ASC for the current situation and cut block size (Table 3.4).

At least one level of the wildlife attribute was significant for all groups and generally the categories with more wildlife were preferred with the exception of multiple users in the Mauricie and the Innu in Central Labrador. The models for these groups showed preference of level 3 (forest conditions supporting common species, some

spectacular species and some rare species) over level 4 (which also includes endangered species, Table 3.4).

Our study areas are designed to form a gradient from smaller to greater importance of commercial forestry (for more information, see section on study areas) when moving form Central Labrador through the Mauricie to Southeastern Finland. When marginal values of attribute change for the same groups across regions are examined, some regional trends from smaller to greater importance of commercial forestry can be detected. The marginal value of cut block size for the environmentalists decreases from Central Labrador to Southeastern Finland, while the trend increases for the multiple users (Figure 3.2). This means that environmentalists in Southeastern Finland are willing to pay more for decreasing cut block size than the environmentalists from other regions, even if the current cut block size is already the smallest among the three regions (mean cut block size 2 ha in contrast to 25 ha in the Mauricie and 10 ha in Central Labrador).

For jobs, both forestry professionals and multiple users show a decreasing trend of marginal values from Central Labrador to Southeastern Finland (Figure 3.2). These positive marginal values indicate that people are willing to pay for additional jobs or to avoid losing jobs from the area. This trend may reflect differences in the way forest use generates employment and in the general economic opportunities in the region.

For wildlife, marginal values for moving from level 1 to level 3 show an increasing trend from Central Labrador to Southeastern Finland for environmentalists and a decreasing trend for forestry professionals (Figure 3.2). This means that environmentalists in Southeastern Finland are willing to pay more for moving from a situation with less wildlife species to a situation with more wildlife species than environmentalists in Central Labrador. The reverse is true for forestry professionals.

The tendency of selecting the status quo alternative was measured by the alternative-specific constant (ASC). The difference between groups in ASC parameter estimates within a region grows from Central Labrador through the Maurice to Southeastern Finland (Table 3.4, Figure 3.3). In Central Labrador the environmentalists favoured the status quo alternative all else held constant, while the ASC was not significant for other groups in the region. In the Mauricie the multiple users group had a tendency to select alternatives with changes in relation to status quo, all else held constant. For other groups in the region the parameter estimate for ASC was not significant. In Southeastern Finland forestry professionals, multiple users and forest owners had a tendency to choose the status quo alternative, while the environmentalists had a tendency to choose alternatives different from the current situation when all else was held constant.

3.5.3 Is the difference between groups greater than the difference across regions?

We used marginal values for attribute change for conservation area, cut block size, jobs and wildlife attributes to analyze visually, if the difference between groups is greater than the difference between regions (Figure 3.2).

For conservation area the marginal values cluster by group with the environmentalists being on one end and professionals on the other and multiple users in the middle (Figure 3.2). For cut block size the marginal values also cluster by group, but here multiple users and environmentalists are similar. For jobs, the marginal values seem to be clustered more by region than by group (Figure 3.2). For wildlife there is no clear pattern although there is some clustering for environmentalists and multiple users in some cases (Figure 3.2).

3.6 DISCUSSION

3.6.1 Preference differences within and across regions

We detected regional trends in marginal values of attribute change that seem to reflect regional differences in current and historical forest use. These results are in line with earlier research in which we reported trends in the differences between extreme groups in biocentric and anthropocentric value orientations (Chapter II; Berninger and Kneeshaw, under review) and in the weightings of environmental and economic components of sustainability (Berninger et al., 2009) along the same gradient. In it's incorporation of historical and cultural differences between regions, the above mentioned results suggest that the gradient of importance of commercial forestry parties an important factor in the variation across regions. The connection between the importance of commercial forestry and people's perceptions may be explained by the historical and current forest management that shapes individual and group forest experiences through local forest conditions (Hallikainen, 1998; Berninger et al., 2009). These forest experiences, in turn, modify cultural models about forests (Berninger et al., 2009). Thus regional preference differences are a result of a complex cyclical interaction of culture, forest use and physical conditions of the forest.

The aggregation of preferences of all individuals within a region does not reveal all of the information necessary for forest management planning since opposing viewpoints can cancel each other out, as demonstrated by results in Southeastern Finland, and lead to an interpretation that does not reflect possibly polarised views. Statistical analysis shows that the preferences of interest groups within a region are generally significantly different from each other; however preferences of interest groups across

regions are also significantly different. This illustrates the importance of assessing preferences by region and by group.

The same groups across regions seem to be closer to each other than different groups within regions in preferences related to conservation area and cut block size. For the environmentalists, this may reflect the global agenda of environmental groups which includes protection of old growth forests and elimination of clear cutting (Humphreys, 2004). The tendency of multiple users from the Mauricie and central Labrador, in addition to the environmentalists from all thee study areas, to select alternatives with smaller cut block sizes may reflect the general negative attitude of forest users towards clear cuts reported for example by Pâquet and Bélanger (1997) and Ribe (2006). In Southeastern Finland, the multiple users were neutral towards cut block size which could be due to the large number of forest owners within the multiple users group (Berninger, 2007a). Tahvanainen et al. (2001) report that forest owners have a greater acceptability of clear cuts in a recreational forest in comparison to non-forest owners. Forestry professionals showed greater preference for larger cut blocks than other groups. Bradley and Kearney (2007) report similar differences between groups in visual preferences with forestry professionals having a greater preference for large clearings than other groups.

3.6.2 Preferences possibly reflecting indigenous and multiple use values

The very low and/or insignificant parameter estimate for household costs for the Metis and Innu means that for these groups, in contrast to the other groups, money was not an important factor in their choice of preferred alternatives. This can be interpreted as reflecting cultural differences between indigenous and non-indigenous peoples. It has been suggested that indigenous cultures have common features like indifference to ownership and the value of sharing (Adamowicz et al., 1998b).

Specifically, the Innu culture does not encourage accumulating property, but money is used quickly, often for going out to the land (Mailhot, 1997, p. 69; Samson, 2003, p. 154).

The multiple users in the Mauricie and the Innu in Central Labrador showed a preference for a lower over a higher wildlife level. It seems confusing that a situation with less wildlife is preferred. The highest level in the wildlife attribute, however, adds endangered species to the picture, and this could be viewed as a threat to hunting, a very popular activity by these two groups.

3.6.3 Tendencies to select or to avoid the status quo alternative

It is common that participants exposed to a choice situation have a tendency to choose the status quo alternative. This observation is frequently explained by status quo bias, which means reluctance to move away from the current situation in order to avoid making choices; it is frequently reported as a common characteristic of difficult choice situations (Samuelson and Zeckhauser, 1988). However, the tendency of selecting the status quo alternative may also mean that participants genuinely prefer the current management regime over the alternatives presented (Horne et al., 2005). They may have their own interests embedded in the current system, for example income from logging or a job in the forest industry.

The tendency to favour the status quo has also been interpreted as a possible mistrust of the managing institution, or as a belief that resource managers would not be capable of carrying out the programs suggested (Adamowicz et al., 1998a). This interpretation, however, refers to a situation where a new project is carried out with the status quo alternative being the non-implementation alternative comparable to the zero alternative in the Environmental Impact Assessment (EIA, Pölönen, 2006). It

could be true in Central Labrador, where industrial forest management is new, and environmentalists favoured the status quo alternative. In the case of suggesting alternatives to management that may have been going on in the present form for decades, as is the case in Southeastern Finland and the Mauricie, the above mentioned interpretation may not be valid. The tendency of forestry professionals, multiple users and forest owners in Southeastern Finland to favour the current situation may in this case be interpreted more as a trust of the resource managers: they are doing a good job in managing the forests and no change is needed. Conversely, the environmentalists in Southeastern Finland and multiple users in the Mauricie systematically searched for change to the current situation, which can be interpreted as mistrust towards the current management regime.

3.7 CONCLUSIONS

We studied regional and group differences in SFM preferences in three boreal regions. One of our research questions was about how preferences differ between the different interest groups within and across regions. Statistical analysis shows that the preferences of interest groups within a region are generally significantly different from each other. Also preferences of the same interest groups across regions are significantly different in the majority of the cases. As a partial answer to another research question, this shows that preferences differ across regions. The second part of this question attempts to determine if the differences can be explained by differing current and historical forest use. Our results indicate that the preference structure of each group is influenced by both the local forest conditions and forest use, which is reflected in the gradient of importance of commercial forestry, and forest culture that is partially shared with similar groups in other regions. This illustrates the importance of assessing preferences by region and by group.

Environmentalists generally prefer smaller cut blocks and more conservation area and they put more weight on the wildlife attribute than forestry professionals. However, the higher level of importance of commercial forestry in the region seems to increase the nature orientation of environmentalists and the economic orientation of forestry professionals. This along with the trends detected in supporting or rejecting the status quo alternative indicates that there is an increasing trend in inter-group differences in SFM preferences from the little managed Central Labrador through the Mauricie to Southeastern Finland. This may, among other factors, reflect the influence of the current and historical forest use in shaping SFM preferences and the differences across groups.

Table 3.1 Components of sustainable forest management (SFM), related attributes and their levels in the three study regions. Since the current level was different in each study region, the attributes were coded as a change from the current situation except for the wildlife categorical attribute and the change in annual expenses attribute.

Component of SFM and attribute	**Levels (current situation in bold)**	**Coding**
Ecological Conservation area % forest land	*Southeastern Finland:* **2**, 3, 5, 8 *The Mauricie:* **2**, 5, 8, 12 *Central Labrador:* **50**, 40, 53, 56	Change from current in % units
Ecological and economic Average size of clear cuts, ha	*Southeastern Finland*: **2**, selective cutting, 1 (50 %), 4 (200 %) *The Mauricie:* **25**, selective cutting, 12.5 (50 %), 50 (200%) *Central Labrador:* **10**, selective cutting, 5 (50 %), 20 (200 %)	0=selective cutting 1=current situation 0.5= half the current 2= double the current
Ecological and social Wildlife species the forest supports	1. The forest supports common species, 2. The forest supports common species and also some spectacular large mammals and birds 3. The forest supports common sp., some spectacular species and some rare species 4. The forest supports common sp., some spectacular sp., some rare sp. and some endangered species	Categories, dummy coding
Social and economic Forest sector jobs at the local and regional level	*Southeastern Finland:* **15950**, 12760 (-20 %), 14355 (-10 %), 17545 (+10 %) *The Mauricie:* **8300**, 6640 (-20 %), 7470 (-10 %), 9130 (+ 10 %) *Central Labrador:* **60**, 54 (-10 %), 66 (+ 10 %), 72 (+ 20 %)	% change from current situation
Economic Increase/decrease in taxes, prices of goods and costs of services will cause an increase/decrease of your annual personal expenses, change $/€ per year per household	*Southeastern Finland*: **0**, 30 €, 100 €, 300 € *The Mauricie:* **0**, 42 $, 140 $, 420 $ *Central Labrador:* **0**, -140 $, 140 $ 420 $	Money, 1€ = CAD 1.4[1]

[1] Purchasing power parity conversion factor for Finland 1.1, for Canada 1

Table 3.2 An example of a choice set from the Central Labrador study area.

Please select one of these three options by checking the box below your preferred option.

Attributes	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	50 %	40 % (Current situation less 10%)
Average size of clear cuts	10 ha	Selective cutting	5 ha (Current situation/2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry only 	Species favored by or neutral to forestry, charismatic species and some species of late successional forests 
Forest sector jobs	60	66 (+10 %)	54 (-10 %)
Increase in your annual expenses, $ per household	$ 0	$ -140	$ 140

Preferred option: (Check one box)	1☐	2☐	3☐

Table 3.3 The number of participants, percentage of women and mean age in each region and each group. Env. = Environmentalists, Prof. = Forestry professionals.

	Env.	**Prof.**	**Multiple users**	**Forest owners**	**Metis**	**Innu**	**Total**
Southeastern Finland							
Participants	41	24	22	28	-	-	115
% of women	49	13	18	18			28
Mean age	45	43	58	50			49
The Mauricie							
Participants	13	20	18	-	-	-	51
% of women	31	11	20				20
Mean age	47	43	46				45
Central Labrador							
Participants	15	15	15	-	18	23	86
% of women	53	13	53		39	32	38
Mean age	52	45	50		52	40	47

Table 3.4 Parameter estimates (and standard errors) for models estimated for each group and joint models estimated for all participants in each region (column 'All'). Linear models were a better fit to the data than quadratic models. Thus all the results presented here are based on linear models. Cons.= Conservation area, Env.= Environmentalists, Prof.= Forestry professionals, Mult.= Multiple users, ASC= Alternative-specific constant for the current situation.

Attribute	**SE Finland**					**The Mauricie**				**Central Labr.**		
	Env. n=41	Prof. n=24	Mult. n=22	Owners n=28	All n=115	Env. n=13	Prof. n=20	Mult. n=18	All n=51	Env. n=15	Prof. n=15	Mult n=15
Cons.	0.107** (0.039)	-0.118 (0.081)	-0.014 (0.062)	-0.123* (0.059)	0.0023 (0.024)	0.204*** (0.053)	0.027 (0.038)	-0.013 (0.036)	0.056** (0.022)	0.028 (0.031)	-0.018 (0.028)	0.01 (0.02
Cut block size	-0.855*** (0.164)	0.680** (0.233)	-0.0499 (0.198)	0.046 (0.18)	-0.145** (0.0790)	-0.470* (0.254)	-0.068 (0.199)	-0.809*** (0.228)	-0.405*** (0.120)	-0.329 (0.269)	0.283 (0.232)	-0.85 (0.24
Wildlife1 [a]	-1.084*** (0.237)	-0.440 (0.318)	-0.601* (0.263)	-0.169 (0.226)	-0.585*** (0.110)	-0.878 (0.559)	-0.010 (0.456)	-0.613 (0.440)	-0.405 (0.261)	0.089 (0.644)	-2.06* (1.077)	-1.10 (0.56
Wildlife3 [a]	1.119*** (0.329)	1.334** (0.428)	0.742* (0.361)	0.755* (0.337)	0.881*** (0.148)	0.868 (0.571)	0.879* (0.456)	1.391** (0.438)	0.941*** (0.258)	0.700 (0.587)	0.478 (0.493)	0.46 (0.47
Wildlife4 [a]	1.904*** (0.267)	1.939*** (0.417)	1.14** (0.329)	1.15*** (0.306)	1.314*** (0.130)	1.87*** (0.475)	1.040* (0.409)	1.0381** (0.379)	1.179*** (0.224)	1.59** (0.517)	1.49*** (0.434)	0.94 (0.40
Jobs	0.0042 (0.0095)	0.040* (0.017)	0.033* (0.013)	0.017 (0.012)	0.0155** (0.00506)	0.028* (0.017)	0.021 (0.013)	0.036** (0.013)	0.027*** (0.0075)	0.026 (0.016)	0.024* (0.015)	0.03 (0.01
Money [b]	-0.132* (0.061)	-0.465*** (0.135)	-0.231* (0.093)	-0.386*** (0.097)	-0.163*** (0.0345)	-0.120 (0.114)	-0.221* (0.092)	-0.235** (0.0872)	-0.177*** (0.051)	-0.211* (0.092)	-0.111 (0.087)	-0.14 (0.07
ASC	-0.830** (0.292)	1.507*** (0.411)	1.20*** (0.312)	0.800** (0.275)	0.857** (0.124)	-0.212 (0.543)	0.134 (0.355)	-1.259*** (0.374)	-0.347 (0.219)	0.519* (0.303)	-0.058 (0.294)	-0.07 (0.07
Log-likelihood	-194.73	-131.18	-152.87	-184.76	-874.72	-72.13	-138.66	-136.26	-381.47	-95.43	-98.18	-111

*** significant at p ≤0.001; ** significant at p ≤0.01, * significant at p≤0.1

[a] This variable was dummy coded., the levels of the attribute are presented in Table 1.

[b] One unit is equivalent of 100 Canadian dollars.

Table 3.5 Results of the pairwise likelihood ratio test between groups in each region.

	Likelihood ratio	Degrees of freedom	p
Southeastern Finland			
Env-Prof	301.56	7	<0.0001
Env-Own	263.78	7	<0.0001
Env-Mult	197.46	7	<0.0001
Prof-Mult	16.00	7	0.0251
Prof-Own	12.32	7	0.0905
Mult-Own	6.16	7	0.5212
The Mauricie			
Env-Prof	52.24	7	<0.0001
Env-Mult	43.88	7	<0.0001
Prof-Mult	25.42	7	0.0006
Central Labrador			
Env-Innu	43.80	7	<0.0001
Prof-Innu	40.02	7	<0.0001
Mult-Innu	25.78	7	0.0006
Prof-Metis	22.64	7	0.002
Prof-Mult	21.80	7	0.0028
Metis-Innu	19.57	7	0.0066
Env-Metis	17.54	7	0.0142
Env-Mult	16.70	7	0.0195
Env-Prof	13.89	7	0.0532
Metis-Mult	7.85	7	0.3456

Table 3.6 Results of the pairwise likelihood ratio test between the same groups across regions.

	Likelihood ratio	Degrees of freedom	p
Environmentalists			
Finland-Labrador	37.95	7	<0.0001
Mauricie-Labrador	23.14	7	0.0016
Finland-Mauricie	5.59	7	0.5889
Professionals			
Finland-Mauricie	46.99	7	<0.0001
Finland-Labrador	40.75	7	<0.0001
Mauricie-Labrador	12.98	7	0.0725
Multiple users			
Finland-Mauricie	50.84	7	<0.0001
Finland-Labrador	28.17	7	0.0002
Mauricie-Labrador	9.97	7	0.19

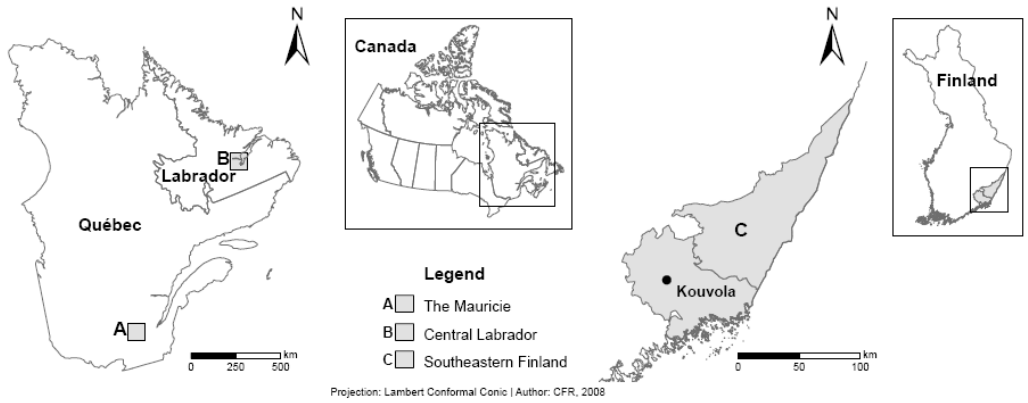
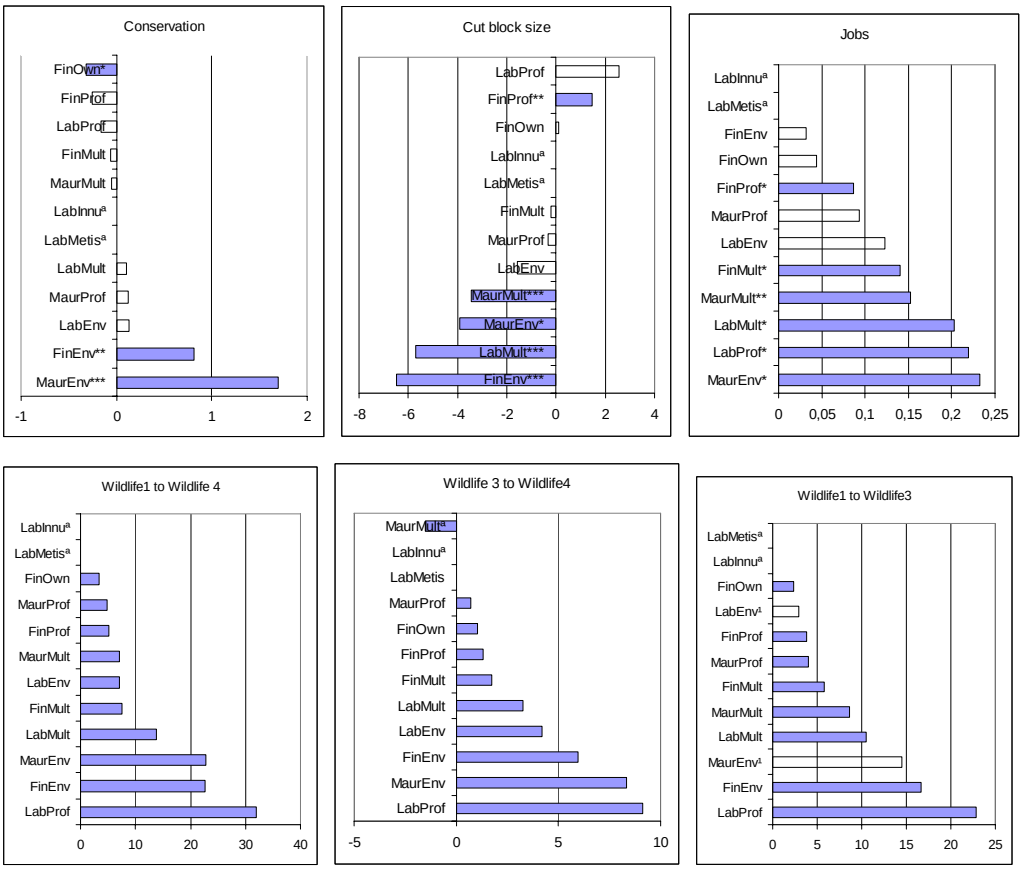


Figure 3.1 The study locations: The Mauricie region in Quebec, Central Labrador and Southeastern Finland.



*** significant at p ≤0.001; ** significant at p ≤0.01, * significant at p≤0.1

[a] = The parameter estimate for annual household costs was very small and not significant. It was thus treated as 0. Marginal values were not calculated.

[1] = None of the attribute levels was significant.

Figure 3.2 The marginal values (in CAD 100) of attribute change for conservation, cut block size, wildlife and jobs by region and by group. Those marginal values calculated using significant parameter estimates are marked with a grey fill. In wildlife attribute, no significance levels are marked, since attribute change is calculated as difference between two categories which may have different significance levels. Each category is explained in table 3.4.

Fin = Southeastern Finland, Maur = the Mauricie, Lab = Central Labrador, Env = Environmentalists, Mult = Multiple users, Prof = Forestry professionals, Own = Forest owners.

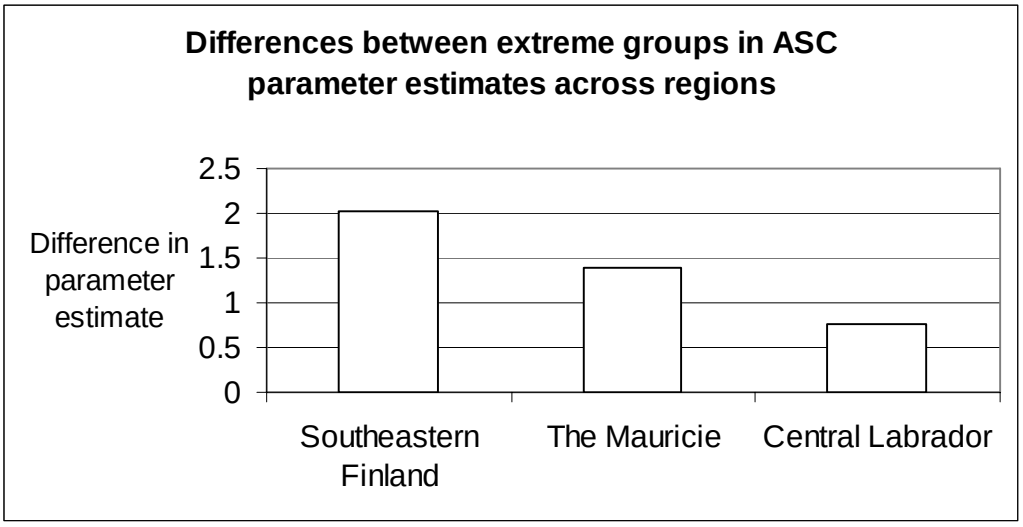


Figure 3.3 Differences between extreme groups in alternative-specific constant (ASC) parameter estimates across regions. Fin = Southeastern Finland, Maur = the Mauricie, Lab = Central Labrador, Env = Environmentalists, Mult = Multiple users, Prof = Forestry professionals, Own = Forest owners.

CHAPTER IV

EFFECTS OF PRESENTING FOREST SIMULATION RESULTS ON THE FOREST VALUES AND ATTITUDES OF FORESTRY PROFESSIONALS AND OTHER FOREST USERS IN CENTRAL LABRADOR

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4.1 RÉSUMÉ

Cette étude permet d'évaluer si la présentation des effets à long terme de différents scénarios d'aménagement forestier à l'intérieur d'une grande superficie change les valeurs et attitudes des gens. Des professionnels forestiers ainsi que d'autres utilisateurs de la forêt se sont fait présenter les résultats de simulations de trois scénarios alternatifs d'aménagement forestier qui illustrent les effets probables à long terme sur divers indicateurs. Les valeurs forestières et attitudes face à la foresterie ont été mesurées avant et après la présentation. Notre conception des valeurs et attitudes est basée sur le modèle d'hiérarchie cognitive du comportement humain qui affirme que les valeurs sont plus durables et plus difficiles à changer que les attitudes. Nous prévoyons que les attitudes changeront mais pas les valeurs. Une autre prévision suggérait l'augmentation du nombre de participants ayant une opinion sur l'aménagement forestier après la présentation. Dernièrement, nous prévoyons que les professionnels forestiers changeront moins que les autres utilisateurs de la forêt. Cette prévision se fonde sur l'entrainement des professionnels forestiers à considérer les effets à long terme ainsi que les processus se produisant à grande échelle des scénarios d'aménagement forestier. Ces trois prévisions furent partiellement supportées par les résultats. Nous avons trouvé quelques changements d'attitudes mais les valeurs ont aussi changé un peu. La majorité des changements significatifs se sont produit lorsque les personnes qui n'avaient pas a priori une opinion définie sur plusieurs questions reliées aux forêts se sont forgées une opinion. Les résultats des simulations à long terme et à l'échelle du paysage offrent une information précieuse et facilitent la compréhension des professionnels forestiers ainsi que des autres utilisateurs de la forêt. Cependant, après avoir reçu la même information, les deux groupes ont appris des choses différentes. Alors que les utilisateurs de la forêt ont gagné confiance face à l'aménagement actuel de la forêt ainsi qu'une motivation à participer dans le futur, les professionnels ont appris des choses plus spécifiques. Cette différence reflète la distinction entre les connaissances techniques et les connaissances locales.

4.2 ABSTRACT

This research tested whether demonstration of the long term effect of different forest management scenarios in a large forested area changes people's forest values and attitudes. Forestry professionals and other forest users in Central Labrador were shown simulation results of three alternative forest management scenarios illustrating possible long term effects on various indicators. Forest values and attitudes towards forestry were measured before and after the presentation. Our conception of values and attitudes is based on the cognitive hierarchy model of human behaviour which states that values are more enduring and more difficult to change than attitudes. It was thus hypothesized that attitudes would change but not values and that change in forestry professionals would be less than in other forest users since foresters are trained to think about long-term effects and large-scale processes of forest management scenarios. We also hypothesized that a greater number of people would have an opinion on forest management after the presentation. All three hypotheses were partially supported by the results. The results indicated that some attitude change occurred, but that values also changed somewhat. Most of the significant changes occurred when persons with no clear opinion on several forest-related questions formed an opinion. Long-term, landscape simulation results provide valuable information and enhance understanding of both forestry professionals and other forest users. However, being provided the same information, the two groups learned different things. While forest users gained more confidence in the current forest management plan and were motivated to further participate, professionals learned more specific things. This reflects differences between technical and local knowledge.

4.3 INTRODUCTION

In order to move toward sustainable forest management (SFM), we need to ensure intergenerational equity which means that future generations should have a forest environment and resources that offer the same opportunities as those that we have today (Adamowicz and Burton, 2003). Forest management planning therefore needs to consider the long-term effects of different scenarios on multiple attributes, not just wood fibre, at time-scales up to or exceeding several human generations. Research in forest ecology has also shown a need to better understand processes at large spatial scales (over 100 000 ha, Hunter, 1990; Levin, 2000; Turner et al., 2001). It is difficult for forest managers to understand all the changes and possible interactions that occur over large temporal and spatial scales that exceed our first-hand perceptions (Daniels and Walker, 1996; Messier and Kneeshaw, 1999). This is even more difficult for local people who are taking part in participatory planning processes; now a normal procedure in SFM planning. Modern technology in the form of modeling tools can be used to demonstrate the effect of different management options over the long term and for large scale processes (Messier et al., 2003b; Sturtevant et al., 2007).

The quality of the interaction between forest managers and local people is an important factor affecting the success of participatory planning processes (Buchy and Hoverman, 2000; Thompson et al., 2005). Interactions include communicating potential management alternatives of the plan at hand. Simulations produced with modeling tools that illustrate how forest conditions described by various key indicators are likely to change in the future allow us to compare and contrast the effects of different scenarios over long term and large spatial scales, which should improve the comprehension of the potential consequences of each forest management alternative (Fall et al., 2001). Recently, increasing efforts have been made to present simulation results to the public in an easily understandable form using appropriate graphic formats (Sheppard and Meitner, 2005). The approach is laborious and time-

consuming, and its efficiency in communicating forestry issues with different forest user groups has yet to be evaluated.

One way to assess the quality of communication is to examine if it changes the attitudes of the participants (Bright and Manfredo, 1997). Therefore, this study tests whether the presentation of the long term effects of different forest management strategies in a large area change people's forest values and attitudes.

4.4 THEORETICAL FRAMEWORK AND HYPOTHESES

Many theories in social psychology assume that attitudes are formed and modified through a process of cognitive learning when people gain information about attitude objects, in this case forests (Eagly and Chaiken, 1993, p. 257). Previous studies indicate that a high level of prior knowledge on an issue leads to more resistance to change (Petty and Cacioppo, 1986). On the other hand, familiarity creates mental structures that enable quicker development of solutions to similar problems; one knows what to pay attention to and this also facilitates the prediction of the consequences of planned management actions (Kaplan and Kaplan, 1982, pp. 164-166). This means that experts like forestry professionals should be able to more clearly understand and interpret information related to their technical knowledge compared to lay people. The readily available cognitive structures also involve increased risk of not seeing new things: experts have been shown to be highly selective of the new information they are willing to consider (Kaplan and Kaplan, 1982, p. 169). Thus we predict that the attitudes of forestry professionals should change less than those of other forest users.

In contrast to much of earlier work on attitude change like that of Eagly and Chaiken (1993), we differentiate between values and attitudes. Our study was thus based on

the cognitive hierarchy model of human behaviour that consists of values, value orientations, attitudes, behavioural intentions and behaviours that hierarchically build upon each other (Rokeach, 1973; Rokeach 1979; Fulton et al., 1996; Vaske and Donnelly, 1999). According to this theory, values are more enduring and more difficult to change than attitudes that are less fundamental in the cognitive hierarchy (Vaske and Donnelly, 1999). This theoretical basis leads us to assume that there would be no or little change in the responses for questions measuring values, whereas change would occur in questions measuring attitudes.

Earlier work on attitude change on forest-related issues shows that providing more information on issues often results in more people forming an opinion or, in other words, changing away from neutral or uncertain positions (Bright and Manfredo, 1997; Seekamp et al., 2006). We expect that providing more information would thus enhance opinion forming and that the greatest information effects would occur with undecided participants.

Following the theoretical and empirical basis presented above, we hypothesize that:
1. People will modify their attitudes, but not their values, following a presentation of simulation results.
2. Changes will be towards forming an opinion, and greatest changes will occur among undecided participants.
3. There will be less change among the forestry professionals than among the other forest users since forestry professionals are trained to think about long-term effects and large-scale processes

4.5 METHODS

4.5.1 Study area, modeling and simulations

The study was conducted on people living in or near Happy Valley - Goose Bay and based on modeling of forest management scenarios for the forest management District 19A in Central Labrador. Although District 19A has a forest cover of 1.2 million ha, the total land area extends to 2.1 million ha (Figure 4.1). The town of Happy Valley – Goose Bay has a population of about 8000 while the Innu community of Sheshatshiu has about 1200 inhabitants.

The forest management plan for District 19A has been elaborated and is being implemented in collaboration between the government of Newfoundland and Labrador and the Innu Nation. The plan was developed based on an approach where the maintenance of cultural and ecological values is a first priority that is addressed by an extensive network of conservation areas covering approximately 50% of the territory. The remaining areas, about half of the forest area, are available for logging (Forsyth et al., 2003). This is why we did not feel it was necessary to test a scenario with a greater proportion of conservation.

In order to provide a comprehensive tool for local planning needs, a forest management simulation model at the landscape scale for District 19A was developed as a joint venture involving various experts and local people (Sturtevant et al., 2007). Simulations were run using the SELES (Spatially Explicit Landscape Event Simulator) modeling tool (Fall and Fall, 2001). Three main forest management scenarios were simulated:

1) a no conservation scenario without protected areas to represent the previous status quo, with a harvest level of 581 900 m^3/year

2) a scenario based on the current 20 year management plan which was established in 2003 reflecting indigenous and other local values; harvest level 222 500 m^3/year, and 3) an alternative plan scenario established to reduce fragmentation and that includes large protected areas, but not the small habitats and special features that are protected in the current plan; harvest level 312 300 m^3/year.

We also evaluated two variations of scenario two (the current plan) based on different harvesting patterns within the management area. These variations include large (5-40 ha) and small (1-10 ha) cut blocks. The simulations were run from 200 to 400 years. All scenarios were designed for sustainable timber supply which means that no reduction in the volume of wood was permitted over the long term (400 years).

The long term effects of each scenario on area cut, volume of growing stock, stand age, road building and the area of old forest in each forest type was evaluated in order to present the results to the participants. The number of indicators used was limited since we wanted to reduce the cognitive load to the participants. The goal was to select indicators that reflect the important factors and preferred indicators suggested by the local people as described in Berninger et al. (2009). The amount of roads is both used as an economic indicator of logging costs and an ecological indicator of habitat fragmentation. Currently there are only few roads in the area and new roads will have to be built in order to access new logging areas. Road construction can be perceived as an advantage in terms of access or a disadvantage in terms of fragmentation and increase of human influence in areas previously inaccessible. The area of old-growth forest in each forest type is used as a coarse filter indicator of the maintenance of the ecological integrity of the forest. A significant decline in old-growth forest of any forest type is interpreted as a risk for some species to disappear from the area.

Our goal was to develop illustrations of the long term effects of each scenario on the above described indicators over the whole wide ranging planning area to be shown to the participants. Photorealistic visualization has been suggested as an effective method for making forestry planning information more understandable for lay people, including indigenous communities (Sheppard et al., 2004; Sheppard and Meitner, 2005). However, photorealistic visualization techniques are not necessarily the best solution in a large and heterogeneous area or when time series are required (Wilson and McGaughey, 2000). Photorealistic visualization may be appropriate at the stand level or when visual effects of logging are demonstrated at a landscape level. It has, however, certain limitations when it comes to illustrating time series at a landscape level, and its use is time intensive. In this study, we decided to use a combination of illustration techniques: simple maps as output from SELES at different time periods (20, 50, 100, 200 and for roads 400 years, an example is shown in Figure 4.3) showing the whole planning area as well as graphs and tables made using numerical data output from SELES (examples are presented in Table 4.1, Figures 4.2 and 4.3). It can be argued that graphs, as the one shown in Figure 4.2, are the most effective in showing time series.

4.5.2 Recruitment, meetings and participants

The target group for this research project included residents of the Happy Valley – Goose Bay region in Central Labrador that are either forestry professionals or other forest users. This second group includes environmentalists, hunters, berry and mushroom pickers, recreational users of the forest, the Metis and the Innu. The forestry professionals group includes representatives from both the government forest resource management division and the forest industry. The aim of comparing forestry and non-forestry groups was to contrast the forestry professionals' expert view with that of local knowledge (Failing et al., 2007). Some of the participants had previously

been active in the planning process, but they were assumed to have a different level of technical knowledge than forestry professionals. The Innu could have formed their own group, but their self-reported learning and opinion change was close to the average of other forest users (Sturtevant et al., 2007) and we chose to form one group of non-fibre forest users to enhance clarity and statistical power.

We organized five meetings on September 19th-22nd and November 30th, 2006 in Goose Bay and Sheshatsiu. The participants were invited by email, by telephone and using a newspaper advertisement. In Sheshatsiu, participants were invited by posters that were distributed in the community. We invited the participants to come to a central facility, since we wanted to present the simulation results in order to test their effect on forest values, attitudes and preferences. We also wanted to give the participants an opportunity to reflect thoroughly on the issue and questions at hand as well as to get their feedback immediately after presenting the simulation results. Our approach with meetings and discussions of the message content is similar to that of Seekamp et al. (2006). In the seminar for the Innu in Sheshatsiu, questions were interpreted by an Innu translator when needed. Assistance was also provided in filling in the questionnaires.

In the meetings, participants were explained the objectives of the study and the contents of the questionnaire and they were given time to fill in the first questionnaire. After that, simulation results were presented using PowerPoint slides including maps, tables and graphs of the effect of the three main scenarios and the effects of variations in the current plan as described above. After the presentation each group had an opportunity for discussion and for commenting on the results. Comments were used for further development of the model (Sturtevant et al., 2007). When there were no more issues to discuss, the participants filled in the second questionnaire. The first and second questionnaires were identical, but background information on the participants was only collected once and at the end of the second

questionnaire the participants were asked to do a self evaluation of their learning and change of opinions during the meeting.

We used self-administered questionnaires with questions adapted from McFarlane and Boxall (2000a) measuring forest values and attitudes towards forest management (Table 4.2). Questions on multiple uses of the forests and the effects of forestry on the visual quality of the landscape were added. A five-level Likert scale was used in the questions with the lowest point being “totally disagree”, the highest point “totally agree” and the middle point “not sure”.

A total of 80 persons answered both questionnaires (Table 4.3). There were only two women in the forestry professionals group, while about 42 % of the other forest users were women. The mean age of the forestry professionals was not significantly different from the mean age of other forest users but the annual income and the share of university education was higher in the forestry professionals group than among other forest users. The mean age of forestry professionals was slightly higher than in studies by McFarlane and Boxall (2000a) in Alberta, and Berninger (2007b) in Quebec. The proportion of forestry professionals with an income of $ 70 000 or more was lower than in a study carried out in Quebec (Berninger, 2007b). The Innu and Metis were represented in both groups.

4.5.3 Data analysis

Qualitative responses to the questions “What did you learn” and “How did your opinions change” were in a written form and they were generally short and clear. They were classified by the main researcher into groups according to their main message (Tables 4.4 and 4.5).

A Wilcoxon sign-rank test was used to test whether the answers before and after the presentation of the simulation results were different for each statement. The participants were classified according to their anthropocentric value orientations (Chapter II; Berninger and Kneeshaw, in review) into low (mean anthropocentric value score form 1 to 2.66), uncertain (mean anthropocentric value score from 2.67 to 3.33) and high groups (mean anthropocentric value score from 3.34 to 5).

A Wilcoxon rank sums test was used to test if the mean change in value and attitude scores were different in the professionals and the other forest users groups. Non parametric methods were used since the variances of the compared groups were different (Howell, 2004, p. 467). Statistical analyses were carried out using the JMP statistical package (SAS institute).

4.6 RESULTS

The participants were given an opportunity to state whether they learned something and whether they changed their opinion after seeing and discussing the simulation results. They also described in their own words what they learned and/or how their opinions changed. In most cases learning was reported, more often among the forest users than among the forestry professionals (Figure 4.4). Opinion change was reported only by one fifth of the forestry professionals, but by almost half of the other forest users (Figure 4.4). The description of learning and opinion change by forestry professionals was more specific than that of other forest users (Tables 4.4 and 4.5).

When all the participants where pooled together, few value and attitude statements has significant difference between the mean scores measured before and after presenting simulation results. When the participants were classified according to their answers to questions measuring anthropocentric value orientation, most change

occurred among the uncertain participants: Significant change ($p \leq 0.05$) occurred in four questions (Table 4.2, Figure 4.5). For the low or high groups, change towards less extreme positions or the mean of all participants was detected in three questions (Table 4.2, Figure 4.5). Attitudes (significant change in 31 % of the questions) changed more often than values (significant change in 18 % of the questions).

For the other forest users group, the mean change in answers to value questions was lower than to attitude questions, whereas there was no difference in the mean change in answers to value and attitude questions in the forestry professionals group (Figure 4.6). For the forestry professionals group, the mean change in answers to attitude questions was significantly less than for the other forest users group (Wilcoxon rank sums test, $p \leq 0.01$ Figure 4.6). For the value questions, the differences between groups were not significant.

4.7 DISCUSSION

4.7.1 Presentation of long-term effects and learning

The process applied in this research of first presenting information on implications of various forest management options and then discussing relevant issues with the participants involved two types of learning: cognitive learning by gaining new information on forests and their management and social learning by hearing other peoples' opinions about the issues (Eagly and Chaiken, 1993, p. 257; Schusler et al., 2003). Social learning can be defined as "learning that occurs when people engage one another, sharing diverse perspectives and experiences to develop a common framework of understanding and basis for joint action" (Schusler et al., 2003). Social learning is especially important when dealing with complex issues and uncertainty

such as in forest management planning (Schusler et al., 2003) however for this to be effective cognitive learning is also often required.

The demonstration of long-term effects that go beyond the current plan was considered a useful exercise by most of the participants as it increased their cognitive understanding of issues that exceed the spatial and temporal scales that most are used to dealing with. However, it is important to note that some participants expressed that they did not trust the model. The effects of the protection of small patches and of small cut blocks in contributing to the fragmentation of the forest were not obvious intuitively, in order to ensure that long term impacts were understood the effects of these strategies required a simulation period of over 200 years.

About 47 % of the forestry professionals reported having learned about the relationship between clear cut size or small-scale protection and the amount of roads required (Table 4.4) and 20 % of the forestry professionals reported having changed their opinion accordingly (Table 4.5). These results show that the complexity of forest management over a large area while considering long-term processes is such that forestry professionals also need to engage in a constant learning process (Daniels and Walker, 1996). To this end, landscape-scale models developed in collaboration with local people and simulations that show long-term development of relevant indicators are needed (Fall et al., 2001).

4.7.2 Quality and direction of change

There was partial support for the first hypothesis, since the results indicate that some attitude change occurred, but also values changed somewhat. The change in answers to value questions was weaker than the change in answers to attitude questions for the other forest users group, but not for the forestry professionals group. Contrary to the

work of Eagly and Chaiken (1993), the fact that we detected a difference between change in answers to value and attitude questions demonstrates the importance of differentiating between values and attitudes in measuring change.

The mean change for value questions was 0.4 points on a five point scale for both groups. This is a considerable change if we consider the expectation that values would be enduring and that they would be difficult to change as described in the cognitive hierarchy model of human behaviour (Vaske and Donnelly, 1999). It is possible that the questions used were not effective in measuring held values but instead they could have measured other less stable cognitions.

Another possible explanation for the magnitude of change in value questions is that the participants had relatively unstable opinions concerning certain questions, as also reported by Seekamp et al (2006). However, after receiving more information and hearing other people's points of view, they were able to form a more informed and more carefully considered opinion. They may have learned about the existence of more diversity of forest values than they were aware of (Daniels and Walker, 1996) or they may have learned about concepts related to forest management which helped them better understand the questions asked. The latter may be counter-argued by the fact that change in value questions was also measured in the forestry professionals group and foresters have a strong understanding of forest management concepts as they are using them daily.

The results give evidence, as indicated by Table 4.2 and Figure 4.4b, that the presentation and discussions moderated the most extreme positions. The group setting and hearing opinions of other participants may have influenced the views of some participants, even if consensus or a group opinion was not required. Most of the significant changes occurred when the persons uncertain in their answers to several questions measuring anthropocentric value orientation formed an opinion on the

question at hand. This is consistent with earlier research (Bright and Manfredo, 1997; Seekamp et al., 2006) and gives support for the second hypothesis. The opinion forming that we detected and the moderation of extreme opinions indicates that social learning occurred in the process.

4.7.3 Differences between groups

We found partial support for the third hypothesis, as forestry professionals changed less in attitude questions, but as much in value questions as the other forest users. The professionals also reported less learning and opinion change in self evaluation. Many of the other forest users were ignorant of the content of the current management plan and during the presentation they learned that it takes into consideration a broad set of values and leaves a large area of forest untouched. In the self evaluation several persons from the other forest users group mentioned that they learned that the current plan was better than they thought. Most of the forestry professionals had been involved in the planning process, so they had an in depth cognitive understanding of the plan, but the exercise may have shown them the effects of different scenarios that were not obvious without such a planning tool as SELES (Fall et al., 2001).

According to the results, it appears that presenting simulation results provides valuable information to both forestry professionals and other forest users. However, the two groups learned different things. While forest users gained more confidence in the current forest management plan and were motivated to further participate, professionals learned about the relationships between cut block size and the fine protection network and the amount of roads required. This shows how the same information provided to persons with different backgrounds can produce different outcomes.

The results indicate that more technical knowledge on forests and forest management leads to more detailed change and less technical knowledge leads to more general changes like a better understanding on the importance of forests. This reflects the differences between local knowledge and scientific knowledge described by Failing et al. (2007): local knowledge is expressed in more holistic and less reductionist ways than scientific or technical knowledge.

4.8 CONCLUSIONS

The current research tested the effects of presenting simulation results on forest values and attitudes towards forest management based on the cognitive hierarchy model of human behaviour. However, one of the main results of the study is related to learning. Our results indicate that the use of presentation of simulation results together with in-depth discussion enhances both cognitive and social learning among the participants. Our study demonstrates that although forestry professionals are more familiar with modeling tools than lay persons, they may also learn and change their opinions on forest management issues upon seeing simulation results, a mainly cognitive process. Forestry professionals also engage in discussions and gain insight on the values and viewpoints of other participants, a process of social learning. Both types of learning are needed in a process of adaptive management in order to write management plans that are based on the best available science and that integrate diverse values.

Providing information in a way that helps to make complex choices may also increase trust in managers which is considered a key factor in effective public participation processes (Arvai and Gregory, 2003; Davenport et al., 2007). Our results show that effective communication and open discussion on the implications of different

management options may enhance positive attitudes towards forestry among local people. Participants in this study gained an improved understanding of the complexity of the task of managing a large forest area for diverse values and their trust in forestry professionals increased accordingly.

Table 4.1 An example of simulation results shown to the participants: the annual level of harvesting and area harvested, mean harvest age and roads built in each of the three main scenarios.

	Harvest level/year	Mean annual area harvested in 400 years	Mean harvest age in 400 years	Roads built in 400 years
1. No conservation scenario	581 900 m^3	5 140 ha	133 years	2060 km
2. 20 year plan scenario	222 500 m^3	2 010 ha 39 % of scenario 1	121 years	1040 km
3. Alternative plan scenario	312 300 m^3	2 840 ha 55 % of scenario 1	119 years	990 km

Table 4.2 Questions used in the study and the ones included in the anthropocentric value score (Chapter II; Berninger and Kneeshaw, in review). Mean value and attitude scores for four statements measured before and after presenting forest simulation results by anthropocentric value orientation (low, neutral or positive anthropocentric value orientations). *=significant difference between before and after values according to Wilcoxon sign-rank test. $p \leq 0.05$, **= $p \leq 0.01$

	Included in the anthropocentric value score	**Low** *before*	n=28 *after*	**Neutral** *before*	n=19 *after*	**High** *before*	n=26 *after*
Questions measuring forest values							
Forests give me a sense of peace and well-being		4.82	4.89	4.53	4.47	4.46	4.42
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans		3.15	3.19	3.05	3.53	3.50	3.27
Forests should be managed to meet as many human needs as possible		2.54	2.25	3.26	2.84	4.15	4.23
Forests let me feel close to nature		4.89	4.89	4.77	4.58	4.68	4.44
Wildlife, plants, and humans should have equal rights to live and develop		3.75	3.75	4.00	4.05	4.38	4.04
It is important to maintain the forests for future generations		4.96	4.93	4.74	4.79	4.76	4.56
Forests should exist mainly to serve human needs	x	1.57	1.29	2.79	2.47	4.24	3.88
Forests should have the right to exist for their own sake, regardless of human concerns and uses		3.43	3.21	2.16	3.32	3.85	3.58
The primary function of forests should be for the products and services that are useful to humans	x	1.67	1.57	2.84	2.74	4.36	3.80*
Humans should have more respect and admiration for the forests		4.64	4.64	3.37	4.84*	4.73	4.58
It is a waste of our natural resources if forests are not used for human benefit	x	2.04	2.25	3.32	3.11	4.16	4.20
Questions measuring attitudes towards forest management							
Logging spoils the landscape		3.52	3.63	3.61	3.78	3.50	3.69

A managed forest is beautiful		3.04	3.55**	3.32	3.16	4.46	3.92*
Forests are currently being managed for a wide range of uses and values, not just timber		3.29	3.54	3.89	4.11	3.92	3.88
Current forest management does a good job in including environmental concerns		3.18	3.18	3.79	3.84	3.84	4.04
Central Labrador has enough protected areas		2.11	2.26	2.63	2.95	3.13	3.52
There will be sufficient wood in Central Labrador to meet our future needs		3.00	3.19	2.47	3.21*	3.76	3.52
The present rate of logging is too great to sustain our forests in the future		2.89	2.93	3.16	2.63	3.38	3.21
Forests are being managed successfully for the benefit of future generations		2.81	3.07	3.37	3.32	3.54	3.58
The economic benefits from forestry usually outweigh any negative consequences		2.07	2.07	2.53	2.53	3.76	3.76
Economic stability of communities is more important than setting aside forests from logging		1.71	1.85	3.33	2.33*	3.73	3.92
When making forest decisions, the concerns of communities close to the forest should be given higher priority than other distant communities		4.11	3.52*	3.50	3.56	4.38	3.88*
Forests in the region are currently managed in such a way that they are well suited for recreation use		3.29	3.25	3.11	3.68*	4.04	3.81
Forests in the region are currently managed in such a way that they are well suited for berry and mushroom picking		3.29	3.25	3.53	3.63	4.00	3.88
Forests in the region are currently managed in such a way that they are well suited for hunting		3.36	3.36	3.79	3.68	3.73	4.08

Table 4.3 The number of participants, the number of men and women, mean age and median income by group.

	Forestry professionals	**Other forest users**	**Total**
Participants	15	65[1]	80
Women	2 (13 %)	27 (42 %)	29 (37 %)
Men	13	37	50
Mean age	45	49	48
Innu	1	26	27
Metis	4	27	31
Median annual income	$ 55 000-69 999	$ 10 000-24 999	$ 25 000-39 999
Household income ≥ $ 70 000, %	40	14	19
University education, %	47	16	22

[1]The information on sex is missing for one person.

Table 4.4 Classification of the answers of forestry professionals and other forest users to the question "What did you learn?" The answers marked in italics represent the most specific answers.

	Forestry professionals n=15	Other forest users n=65
Learned about future scenarios	1	20
Clear cut size or coarse/fine protection and roads	7	3
Learned some other small fact	1	6
The current plan is better than I thought	0	6
Became concerned about the future of forests or want more protected area	0	6
Criticizes the model or presentation	0	3
Local processing etc.	0	2
Learned, but more info needed	0	1

Table 4.5 Classification of the answers of forestry professionals and other forest users to the question "How did your opinions change?" The answers marked in italics represent the most specific answers.

	Forestry professionals n=15	Other forest users n=65
Clearer understanding or change not specified	0	6
It's important to take care of the forests	0	5
Now prefer coarse protection/bigger cut blocks	3	1
The current plan is better than I thought	0	4
It's important to be active in the planning process	0	4
There should be more protected areas	0	3
Learned but more info needed	0	3
Keep benefits in Labrador	0	3
Criticizes the work or does not trust the model	0	3

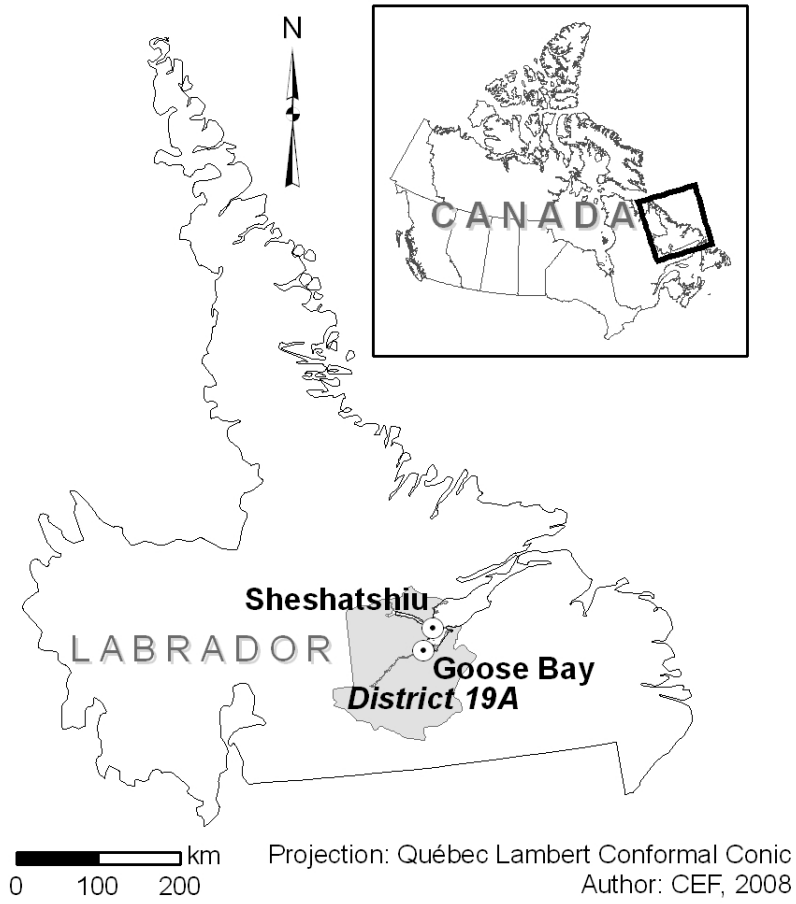
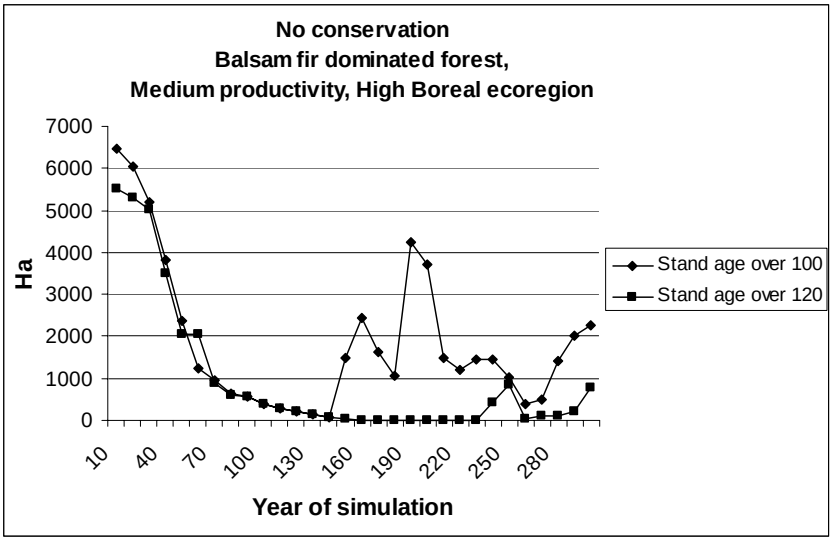
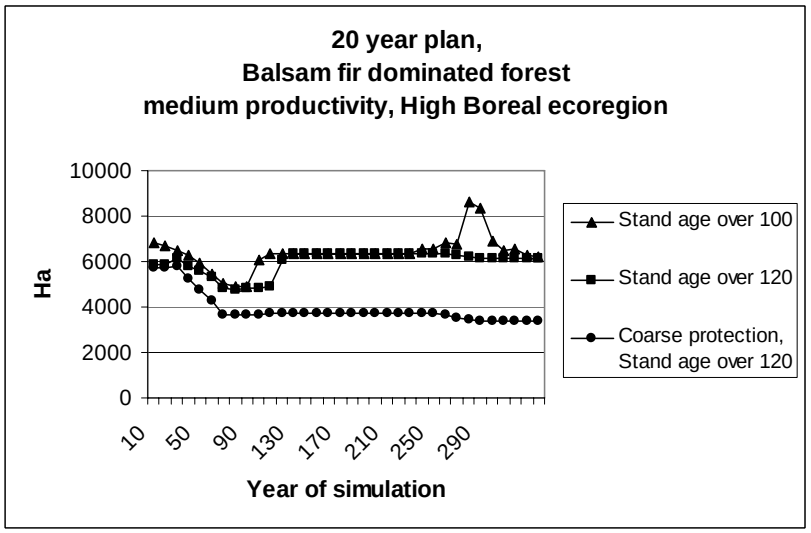


Figure 4.1 The study area constitutes the forest management District 19A in Central Labrador, Canada.



a. In Scenario 1 at least 4 forest types lose all of their old forest at some point of time



b. In Scenarios 2 and 3 none of the forest types lose all of their old forest

Figure 4.2 Example of simulation results presented in the meetings: Development of the area of a rare forest type over 100 years and over 120 years in the three main scenarios. In the no conservation scenario (a) there would be no forest over 120 years old left in this forest type for a long time period and very little forest over 100 years old around year 140 of simulation. In the 20 year plan scenario and the alternative plan scenario that includes the large protected areas, but not small habitats and special features (b), the area of old forest in this forest type is reduced but stabilizes over time.

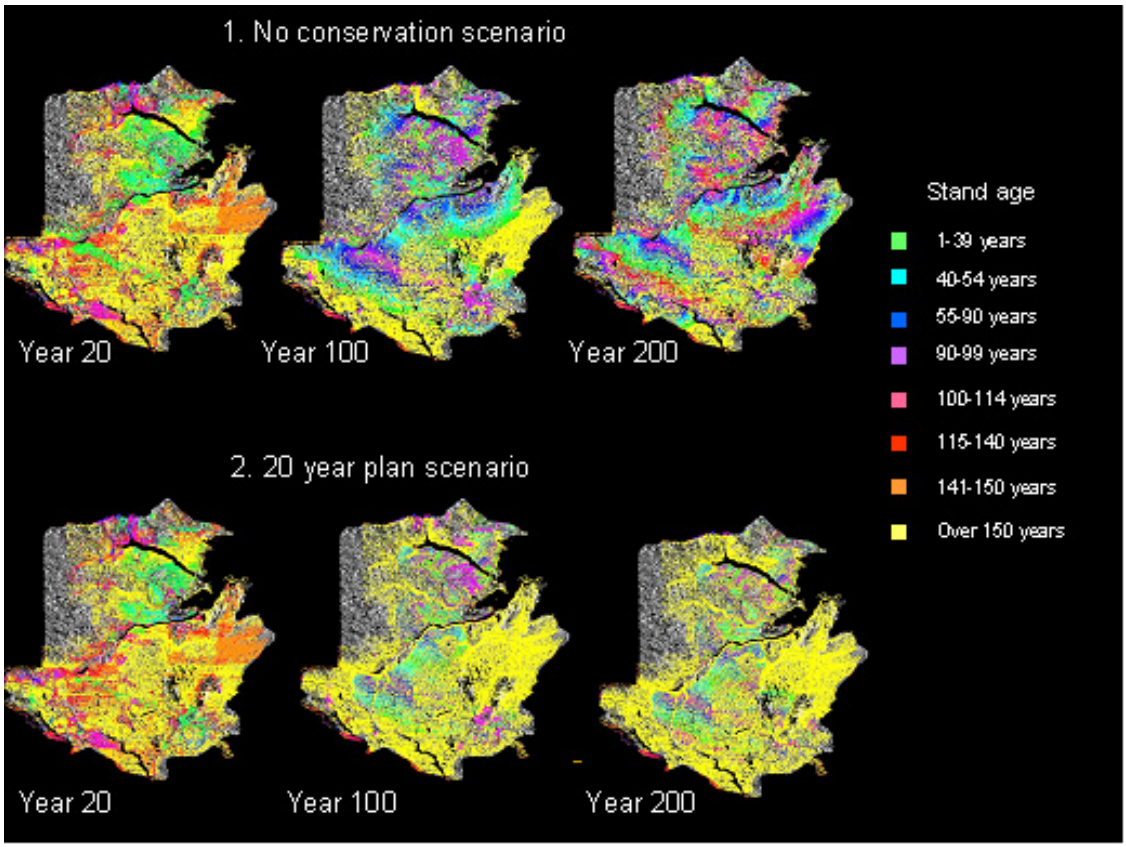


Figure 4.3 An example of simulation results shown to the participants: development of stand age under the no conservation and the 20 year plan scenarios from year 20 to year 200. *A colour copy of this figure is presented in Appendix C1, page 221*.

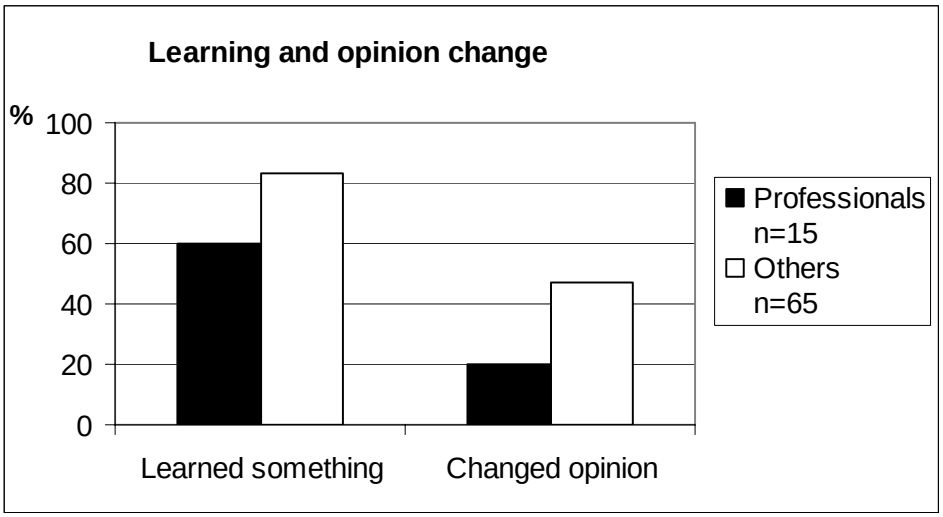


Figure 4.4 Self evaluation by forestry professionals and other forest users on learning and opinion change following discussion of simulation results of alternative management scenarios for district 19A.

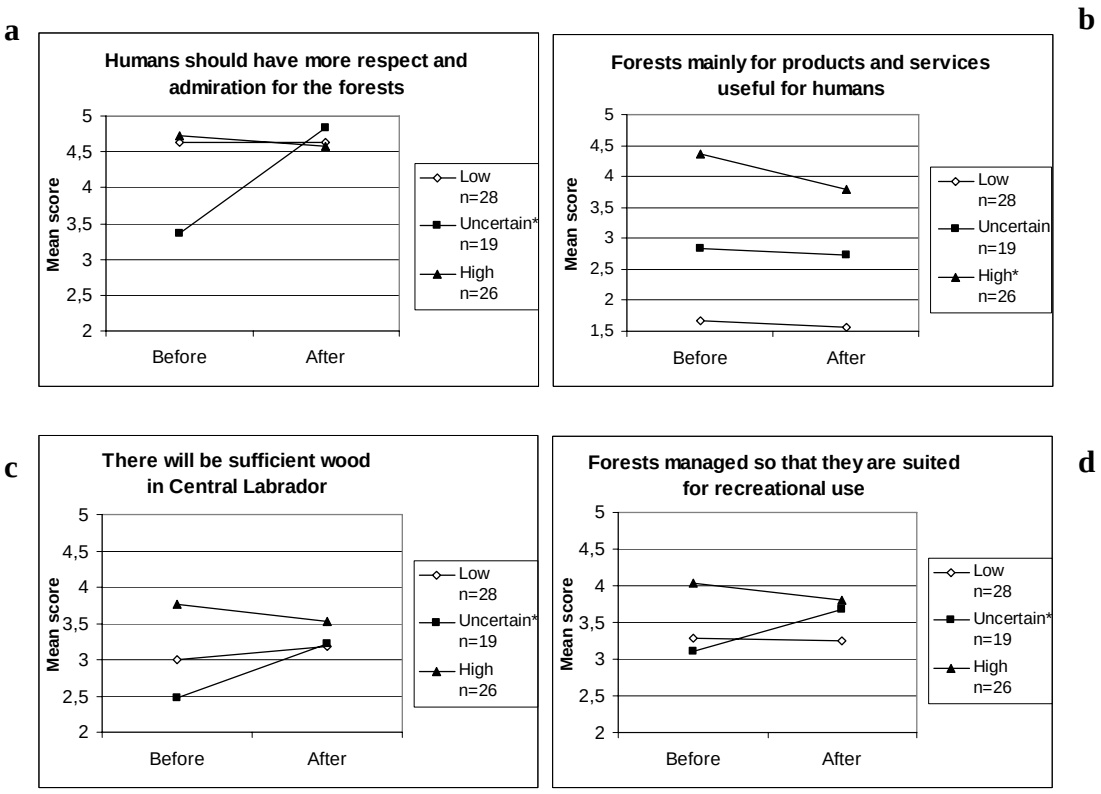


Figure 4.5 Mean value (a and b) and attitude scores (c and d) for four statements measured before and after presenting forest simulation results by anthropocentric value orientation. *=significant difference between before and after values $p \leq 0.05$, Wilcoxon sign-rank test.

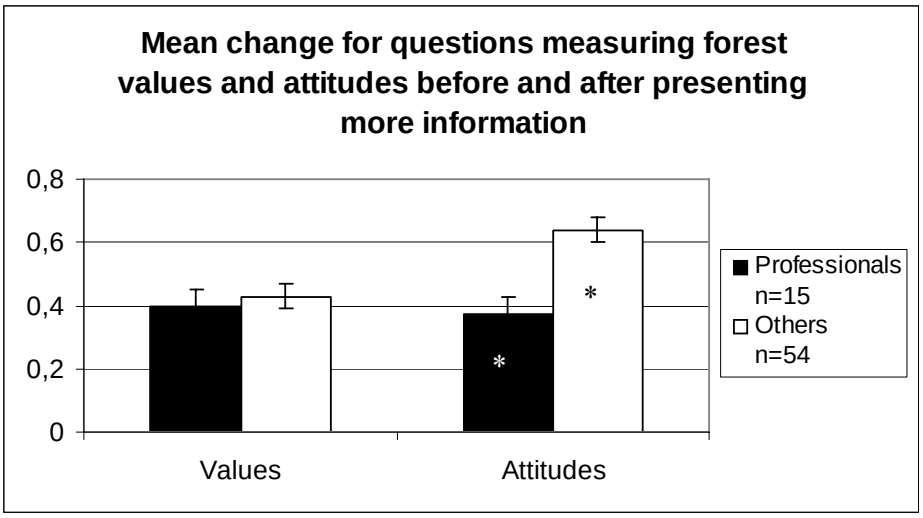


Figure 4.6 Mean change in answers to questions measuring forest values and attitudes towards forest management for forestry professionals and for other forest users. I don't know answers are excluded. Persons with 2 or more missing answers for value questions and persons with 4 or more missing values for attitude questions not are excluded. *= significant difference ($p \leq 0.01$) between groups according to the Wilcoxon rank sums test.

CHAPTER V

EFFECTS OF SHOWING FOREST SIMULATION RESULTS ON SFM PREFERENCES OF FOREST USERS IN CENTRAL LABRADOR

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5.1 RÉSUMÉ

Cette étude vise à évaluer l'efficacité de la présentation des résultats de recherche pour améliorer l'apprentissage. Pour ce faire, nous avons évalué si les préférences au niveau de l'aménagement durable des forêts (ADF) changent après la présentation des résultats de simulations qui illustrent les effets probables de scénarios alternatifs à long terme et à grande échelle. Nous avons présenté aux utilisateurs de la forêt du centre du Labrador les résultats de simulations montrant les impacts à long terme de trois scénarios d'aménagement sur divers indicateurs. Les préférences pour l'ADF ont été mesurées grâce à une expérience de choix basée sur les attributs avant et après la présentation des résultats. Selon les résultats des recherches antérieures et des problématiques étroitement liées aux attributs utilisés, nous nous attendions à d'importants changements de préférence et à plus de cohérence dans les choix après la présentation des résultats. Aucun changement significatif n'a toutefois été constaté. Ceci peut tout d'abord être dû à des préférences relativement stables au niveau de l'ADF dans la région. Il est également possible qu'un plus grand nombre de participants et une plus longue période d'étude auraient été nécessaires afin de révéler des changements. Toutefois, les changements détectés au niveau des estimations des paramètres pour la taille moyenne des coupes et pour la constante spécifique des alternatives, qui décrit la tendance de choisir le statut quo, indiquent que certains apprentissages ont eu lieu au cours du processus.

5.2 ABSTRACT

This research aims at evaluating the effectiveness of communicating simulation results to enhance learning. This was done by testing whether showing simulation results which demonstrate the long-term effects of different management strategies in a large area changes people's SFM preferences. Forest users in Central Labrador were shown simulation results of three alternative forest management scenarios illustrating possible long term effects on various indicators. SFM preferences were measured using an attribute-based choice experiment before and after the presentation. Based on earlier research and issues closely related to the attributes used in the choice experiment, we expected significant preference change and more consistent choices after presentation. No significant change was found, however. This may be due to the relative stability of SFM preferences in the region. It is also possible that more participants and a longer time frame would be needed to reveal change. However, detected changes in the parameter estimates for cut block size and alternative-specific constant (ASC), measuring the tendency of selecting the status quo alternative, indicate that some learning occurred during the process.

5.3 INTRODUCTION

Sustainable forest management (SFM) involves consideration of diverse values. In order to guide decision-making on SFM, stated preference methods have been used to elicit information on assigned forest values of the public or user groups (Xu et al., 2003; Shapansky et al., 2008). Forest management on public land typically includes decisions that have long term effects on large areas, and it is difficult to understand the possible effects of these decisions without sophisticated planning tools (Messier and Kneeshaw, 1999; Meitner et al., 2005a). It is highly probable that the preferences elicited in standard processes do not include insight into the long-term effects that extend to several generations on landscape-scale forest areas. Modeling tools may be used to enhance understanding of these complex issues and simulation results have been communicated to various publics as a part of public participation processes (Fall et al., 2001; Messier et al., 2003b; Sheppard and Meitner 2005; Berninger et al., accepted). Communication of simulation results has a potential for enhancing learning in forest management planning processes. In order to evaluate the effectiveness of communicating simulation results to enhance learning, we test whether showing simulation results which demonstrate the long term effect of different forest management strategies in a large area changes people's SFM preferences. Earlier work indicates that providing such information enhances learning and may change individual's forest values and attitudes towards forestry (Berninger et al., accepted).

Deliberative processes which involve hearing arguments on various sides of an issue and face-to-face discussion as a means of forming informed opinions have proven useful for informing public policy (Fishkin, 1991; Fishkin, 1995; Arvai et al., 2001). There is a growing stream of economists applying the deliberative approach of political sciences in economic valuation by providing the participants with relevant information and a possibility for deliberation in order to clarify their

economic values for the question at hand (Gregory and Wellman, 2001; James and Blamey, 2005; Howarth and Wilson, 2006; Shapansky et al., 2008).

Traditional economic theory assumes that people have well established and stable preferences, but this assumption is not always met for important, complex and often unfamiliar issues like environmental or resource management questions (Slovic, 1995, Norton et al., 1998). Preferences are often constructed, not just revealed, during the elicitation process and they are shown to be context sensitive (Slovic, 1995, Schläpfer, 2008). In the current research, issues related to the forest are very familiar to all participants, but planning methods and forest management may be unfamiliar to many. The issues of sustainable forest management are, however, complex and important to all participants. The multiattribute approach for preference construction used in this work is one way of improving valuation procedures through deliberation and information provision (Gregory and Slovic, 1997).

Mixed results exist on the effect of information or deliberation on forest management preferences. While for example Anderson (1981) and Kearney (2001) report a link between information and landscape preference change, Hill and Daniel (2008) found no effect of information on preferences. Tyrväinen et al. (2003) also reports that the landscape preferences of planning group members did not change during the planning process. These studies are all related to landscape preferences and no studies have so far been carried out on SFM preferences or on testing the effect of simulation results.

In this study, the role of additional information in stated preference experiments was examined by measuring the preferences of the same subjects before and after providing additional information in the form of forest simulation results. An earlier study with the same subjects reported some significant value and attitude changes

after presentation of simulation results (Berninger et al., accepted). Changes in preferences are the focus of this paper, and based on the earlier results on value and attitude changes, we expected significant preference changes.

5.4 METHODS

5.4.1 Multiattribute approach for preference construction

A multiattribute approach to preference construction has been used in order to improve valuation procedures (Gregory and Slovic, 1997; McDaniels and Roessler 1998; Shapasky et al., 2008). The approach is based on careful elicitation of informed judgments with the depth of the participants' understanding replacing the breadth of population sampling (Gregory and Slovic, 1997).

In this work, we applied a multiattribute process (Figure 5.1) inspired by Gregory and Slovic (1997). The process involved two phases of field work. The preliminary study helped to structure the problem and identified local objectives as well as potential indicators to measure sustainable forest management (Berninger et al. 2009). The choice experiment was designed to include the local objectives and measure them in a way understandable to the participants (Gregory and Slovic, 1997). Parallel to this, development of a forest management model and simulations were carried out; this process will be further described below. A broader field study including making tradeoffs across objectives and comparison of alternatives was carried out after a careful design and testing of the choice experiment (Figure 5.1). The choice experiment was repeated after a presentation of simulation results illustrating long-term effects of alternative scenarios. A sensitivity analysis is built in to the attribute based choice experiment method, since the options presented are described by a combination of various levels of the selected set of attributes.

5.4.2 Study area, modeling and simulations

The study area was the Happy Valley - Goose Bay region surrounding the forest management District 19A in Central Labrador which covers a land area of 2.1 million ha (Berninger et al., accepted). The forested area extends to 1.2 million ha. The biggest towns in the area are Happy Valley – Goose Bay with about 8000 inhabitants and the Innu community of Sheshatshiu with approximately 1200 inhabitants. The forest management plan for District 19A has been elaborated and is being implemented in collaboration between the government of Newfoundland and Labrador and the Innu Nation. As a result of this collaboration, the plan is based on an approach where the maintenance of cultural and ecological values is first taken care of by an extensive network of conservation areas covering approximately 50% of the territory. The remaining areas are available for logging (Forsyth et al., 2003).

A forest management simulation model at the landscape scale for District 19A was developed as a joint venture of various experts and local people to provide a comprehensive tool for local needs (Sturtevant et al., 2007). Simulations of three main forest management scenarios were run using the SELES (Spatially Explicit Landscape Event Simulator) modeling tool (Fall and Fall 2001):

1) a no conservation scenario without protected areas to represent the previous status quo (harvest level 581 900 m3/year)

2) a scenario that projects a continuation of the current 20 year management plan which was established in 2003 to better reflect indigenous and other local values (harvest level 222 500 m3/year), and

3) an alternative plan scenario established to reduce fragmentation that includes large protected areas, but without the small habitats and special features protected in the current plan (harvest level 312 300 m3/year).

In addition to the main scenarios, variations of the current plan scenario with large (5-40 ha) and small (1-10 ha) cut blocks were tested. The time-scale of the simulations was from 200 to 400 years. All scenarios were designed for sustainable yield which means that no reduction in the volume of wood was allowed over the long run (400 years).

Simulation results illustrating the different scenarios were shown to the participants. The long term effects of each scenario on area cut, volume of growing stock, stand age, road building and the area of old-growth forest in each forest type were presented using time series of maps, tables and graphs (an example is presented in Figure 5.2). Indicators were selected to reflect the views of the local people as described in Berninger et al. (2009) taking into account limitations set by the model and the availability of data. The quantity of roads was included as an economic indicator of logging costs and an ecological indicator of habitat fragmentation. There are few existing roads in the area and new roads will have to be built in order to access new logging areas. Area of old-growth forest in each forest type is used as a coarse filter indicator of the maintenance of the ecological integrity of the forest. A significant decline in old-growth forest is interpreted as a potential risk for key species.

5.4.3 Choice experiments and the survey instrument

We applied the choice experiment method which has been used to study trade-offs in natural resource management settings since the early 1990's (Adamowicz et al., 1994). In a choice experiment respondents are presented several choice sets which consist of different alternatives. Each alternative is described by various levels of selected attributes. The participants are asked to choose the alternative they prefer. The benefits of the method are the possibility to combine qualitative and

quantitative variables and the information it provides on trade-offs among the benefits provided by the choices (Adamowicz et al., 1997, 1998). It can be used for studying both the use values and existence values of natural resources (Grafton et al., 2004, p.264). The design and analysis of choice experiments is based on random utility theory, where individuals are assumed to choose the alternative that maximizes their utility (Adamowicz et al., 1997, 1998).

According to random utility theory the utility (U) of alternative *i* is the sum of systematic (V_i) and error (ε_i) components. The systematic component (V) contains specific and observable attributes that in the case of a stated preference method are defined by the researcher and presented to the individual in the form of choice sets. The presence of an error component ε means that the overall utility is random and only the probability of choice of one alternative over another can be analyzed:

$$P(i)=P(V_i+\varepsilon_i > V_j+\varepsilon_j) \quad \forall\ j\neq i,\ i,j\in C_n$$

where C_n is the choice set of individual *n* (Adamowicz et al., 1997).

In this study, five attributes were used and each attribute was assigned four levels, one of which represents the current situation (Table 5.1). We designed the attributes to represent each of the three dimensions of sustainable forest management, the ecological, the economic and the social. The attributes were based on a preliminary study conducted in 2005 where participants were asked to list and rank sustainable forest management indicators in five meetings (Berninger et al., 2009). The *proportion of forested land put into conservation areas* is an ecological variable, but *wildlife species the forest supports* combines both ecological aspects and social aspects in the form of multiple use of the forest. Hunters want favorable conditions for game species, recreational users like to see charismatic species and enthusiasts of nature observation seek rare species. The *average size of clear cuts* was included because many people in the preliminary study were against big clear cuts and

preferred selection cutting. *Forest sector jobs* describe the socioeconomic role of forestry in the region and the *decrease or increase in annual household expenses* describes the costs of possible additional conservation areas or the gains of reducing conservation areas for the personal economy of the respondent.

The questionnaire starts by asking the participants background information and questions related to forest values and attitudes that were used to introduce the participants to the topic of SFM. The results on value and attitude change are presented in Berninger et al. (accepted). In the choice experiment section, each participant was presented eight different choice tasks, where an individual compares the current situation with two possible future scenarios. The study included all together 16 different choice tasks. Thus two different versions of the questionnaire were used and were distributed alternately to the respondents. The combinations of the levels of different attributes used in the choice tasks were determined using orthogonal tables that are developed especially for choice experiments and proven efficient (Sloane, 2006). The questionnaires were tested by a small group of people and adjusted accordingly. Table 5.2 shows an example of a choice task.

The choice experiment data was analyzed using the conditional logit model with the MDC procedure of the SAS statistical package (SAS institute, 2001) as well as the statistical package Limdep (Greene, 2007). Models were estimated for preferences elicited before and after presenting the simulation results. An alternative specific constant (ASC) was estimated to measure the tendency to select options representing the current situation (Adamowicz et al., 1998). Both linear and squared models were estimated for each data set. Linear models were a better fit to the data than squared models. Thus all the results presented here are based on linear models. Pairwise likelihood ratio tests were conducted with SAS to test whether the parameters of the models estimated for the situations before and after presenting the simulation results differed significantly (Hensher et al., 2005, p. 335-337). Persons

who always selected status quo in the first questionnaire were excluded since it was interpreted that they didn't actually make any meaningful choices. This practice has been employed elsewhere, especially in cases where some choice alternatives appear to improve upon the status quo and yet are not chosen by respondents (see Adamowicz et al., 1998 or von Haefen et al., 2005 for a discussion of the issue and alternate strategies for dealing with this topic).

5.4.4 Recruitment of participants and meetings

The target group of this research project included residents of the Upper Lake Melville region around the town Happy Valley – Goose Bay in Central Labrador that are actively using the forest or working for its conservation. All together we organized four meetings between September 19th and 22nd 2006 in Goose Bay. The participants were invited by email, by telephone and using a newspaper advertisement. We invited the participants to a central facility, since we wanted to present them simulation results in order to test how they affected their SFM preferences. We also wanted to give participants an opportunity to reflect thoroughly on the issue and questions at hand as well as get feedback right after presenting the simulation results.

In the meetings the participants were first familiarized with the objectives of the study, and their written consent was obtained[7]. The contents of the questionnaire were then explained. In the meetings the participants were explained the objectives of the study and the contents of the questionnaire. Each attribute was described in detail and the idea of a choice experiment was explained. The participants were

[7] The procedure was approved by the Research Ethics Committee of Faculty of Science at Université du Québec à Montréal (UQAM) on March 16th 2006.

then given time to fill in the first questionnaire. After that the simulation results were presented using PowerPoint slides including maps, tables and graphs of the effect of different scenarios. After the presentation an opportunity for discussion was provided and when there were no more issues to discuss, the participants filled in the second questionnaire. The first and second questionnaires were identical with two exceptions. Background information on the participants was only collected in the first questionnaire while at the end of the second questionnaire the participants were asked to do a self evaluation of their learning and change of opinions during the meeting. The results of the self evaluation are reported in Berninger et al. (accepted).

5.4.5 Description of participants

The study included a total of 51 participants with slightly more men than women (Table 5.3). The education level of the participants was higher than average, since 6.9 % of the population in Central Labrador has a university degree (Jong, 2007).

5.5 RESULTS

In the situation before presenting more information, all attributes except conservation had significant parameter estimates (Table 5.4). The positive parameter estimate indicates that alternatives with more jobs were preferred over those with fewer jobs. Also situations with more wildlife were generally preferred over situations with less wildlife. Cut block size and household costs appeared negative and significant indicating a preference of smaller cut blocks and lower costs (Table 5.4). The parameter estimate for conservation was not significant

which indicates that it was relatively less important to the participants than the other attributes (Table 5.4).

When comparing parameter estimates of the models for before and after demonstration of simulation results, there were no significant changes according to the likelihood ratio test (Likelihood ratio=7.94, df=7, p=0.34). The wildlife attribute maintained its statistical significance and jobs also remained important. There are, however, some changes in parameter estimates: Before presentation the parameter estimate for cut block size was negative and significant, and it became insignificant after presentation of information. Also the ASC for the current situation, which measures the tendency to choose the alternative representing the current situation, became positive and significant.

In order to further explore the data, we examined interaction effects with the attributes before and after demonstration of simulation results. We also estimated a covariance heterogeneity model and random parameter models to assess whether the impact of information arose via covariance (or scale) heterogeneity and or helped explain preference parameter heterogeneity. None of these tests revealed difference between the situations before and after presenting simulation results[8]. Therefore, information provided via the presentation of simulation results does not appear to affect the variance of the random utility model nor does it shift preferences in a random parameter model of preference heterogeneity.

Even if there was no statistically significant change in the models, most participants (44, 86 %), changed their choices in one or more choice tasks. 27 persons (53 %) changed their choices in three or more choice tasks.

[8] The statistical results are not presented here but are available from the authors upon request.

5.6 DISCUSSION

This research aimed at evaluating the effectiveness of showing simulation results that demonstrate possible long-term effects of various management alternatives on several indicators in a large area. Based on earlier research (Berninger et al. (accepted), we expected the presentation of simulation results to have a significant effect on the SFM preferences of the participants. We also expected the choices to become more consistent after learning more about the long-term effects of different forest management alternatives in a large area. However, we detected no significant change in preferences or in variance following the presentation of the simulation results.

Even if there was no significant difference between the models calculated for situations before and after the presentation of simulation results, the parameter estimate for cut block size changed; there was a shift away from preferring smaller cut blocks. The attribute *cut block size* was directly related to the simulation results presented to the participants, since it was shown that smaller cut blocks increase the need for building roads. Our result is supported by the results of Berninger et al. (accepted) with the same subjects, where 12.5 % of participants reported having learned and 5 % having changed their opinions about the connection between the cut block size or small protected area patches and the amount of roads needed after presentation of simulation results. Previous research indicates that people may be more willing to accept larger cut blocks when they are provided with information on the benefits of avoiding forest fragmentation (Meitner et al., 2005b).

We also detected change in the parameter estimate for the alternative-specific constant (ASC) for the current situation towards preferring the current situation over change. A positive and significant parameter estimate for the ASC for the current situation has been interpreted as trust in the current management regime

(Chapter III; Berninger et al., under review). The stronger acceptance of the current situation seems to reflect the results by Berninger et al. (accepted) who report that after presenting simulation results the participants showed a greater trust in the current management plan. It is assumed that the presentation illustrated the complexity of the forest management planning task in a large area concerning long time-scales and in that way increased trust on managers (Berninger et al., accepted). Alternately, it is possible that the participants realized the complexity of the issues which led them to fall back on the status quo situation, a response that is found in various other literatures on choice behavior (Beshears et al., 2008).

It is possible that the additional information made the situation seem more complex and therefore increased the error variance. This effect may also have generated increased variances in some individuals and not in others and is thus a potential explanation for the lack of overall variance change in this study. It is an interesting issue worthy of further research.

There are several possible explanations for the lack of change in preferences in this study. First, the preferences related to SFM may be relatively stable and resistant to change, as has been shown for landscape preferences (Tyrväinen et al., 2003; Hill and Daniel 2008). Second, the context of studying trade-offs between different factors of SFM may not be effective in revealing changes in one specific factor. Third, it is also possible that a larger number of participants would have revealed some significant preference change. We found some changes in the parameter estimate for cut block size and the ASC for the current situation. Also 83 % of the participants changed their answers in at least one choice task. This indicates that there may have been changes that were not captured by the statistical methods used and the number of participants reached in the current study. In order to have more participants, a region with more inhabitants would be needed for further research efforts. Fourth, a significant change in preference might also need a longer time and

more deliberation to occur. Finally, considering that individuals have diverse learning styles (Biggs 2003), the form of presentation used in this study may have been useful for some individuals and not for others.

Table 5.1 Sustainable forest management themes, related attributes and their levels

Theme and attribute	Levels
Nature	50 % (current situation)
Conservation area, % forest land	40 %
	53 %
	56 %
Silviculture	10 ha (current situation)
Average size of clear cuts, ha	selective cutting,
	5 ha (50 %)
	20 ha (200 %)
Multiple use	1. The forest supports common species,
Wildlife species the forest supports	2. The forest supports common species and also some spectacular large mammals and birds
	3. The forest supports common sp., some spectacular species and some rare species
	4. The forest supports common sp., some spectacular sp., some rare sp. and some endangered species
Social	60 (current situation)
Forest sector jobs at the local and regional level	54 (-10 %)
	66 (+ 10 %)
	72 (+ 20 %)
Economic	0 (current situation)
Increase/decrease in taxes, prices of goods and costs of services will cause an increase of your annual personal expenses, change $/€ per year per household	-140 $
	140 $
	420 $

Table 5.2 An example of a choice task.

Please select one of these three options by checking the box below your preferred option.

Attributes	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	40 % (Current situation-10%)	53 % (Current situation+3 %)
Average size of clear cuts	10 ha	5 ha (Current situation/2)	20 ha (Current situationx2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp.	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp.	Species favored by or neutral to forestry and charismatic species
Forest sector jobs	60	60	66 (+10%)
Increase in your annual expenses, $ per household	$ 0	$ -140	$ 140
Preferred option: (Check one box)	1☐	2☐	3☐

Table 5.3 Demographic characteristics of the participants.

Number of participants	51
Number of women (% of all participants)	21 (41)
Number of men	30
Mean age	51
Innu	3
Metis	27
Representing environmental groups	9
Forestry professionals	14
Median annual income $	40 000-54 999
Household income ≥ $ 70 000, %	25
University education, %	33

Table 5.4 Parameter estimates (and standard errors) for linear models estimated for situations before and after showing forest simulation results. ASC= Alternative-specific constant for the current situation.

	Before	**After**
Conservation	-0.004119	0.006008
	(0.0139)	(0.0144)
Cut block size	-0.0267*	-0.0153
	(0.0122)	(0.0125)
Wildlife1[a]	-0.5342*	0.0159
	(0.3077)	(0.3171)
Wildlife3[a]	0.5178*	1.0652***
	(0.2588)	(0.2717)
Wildlife4 [a]	1.2176***	1.2857***
	(0.2230)	(0.2459)
Jobs	0.0333**	0.0238*
	(0.0117)	(0.0122)
Household costs[b]	-0.0772*	-0.1146**
	(0.011)	(0.0423)
ASC	0.0125	0.3216*
	(0.1570)	(0.1605)
Log-likelihood	-382.74	-371.36

*** significant at $p \leq 0.001$; ** significant at $p \leq 0.01$, * significant at $p \leq 0.1$

[a] This variable was dummy coded., the levels of the attribute are presented in Table 1.

[b] One unit is equivalent of 100 Canadian dollars

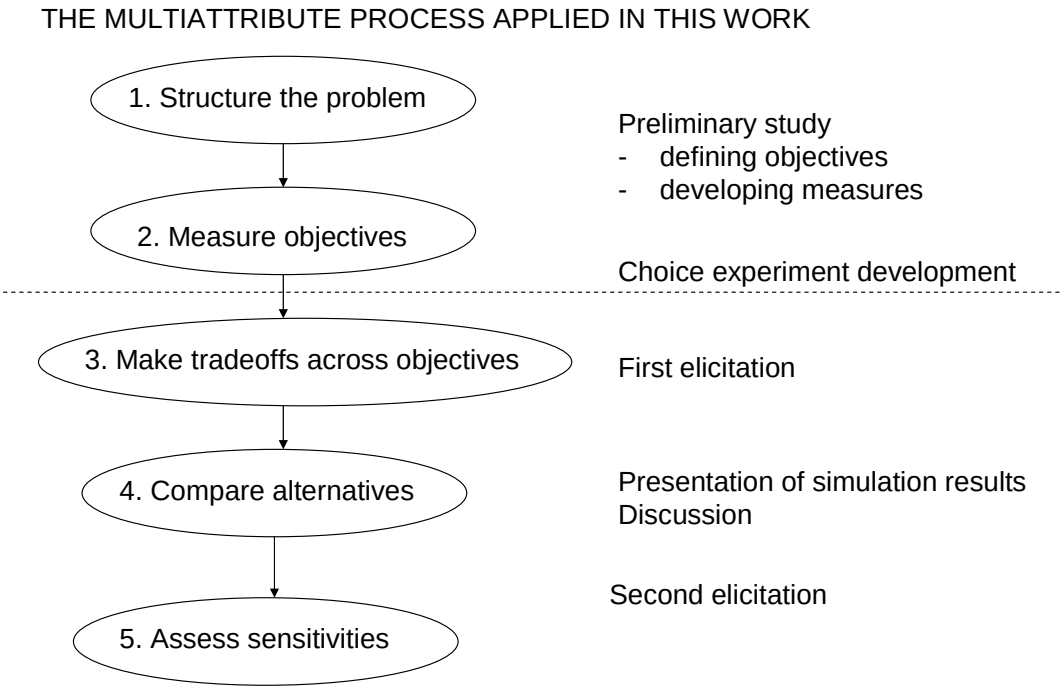


Figure 5.1 Description of the multiattribute process applied in this work (modified from Gregory and Slovic 1997).

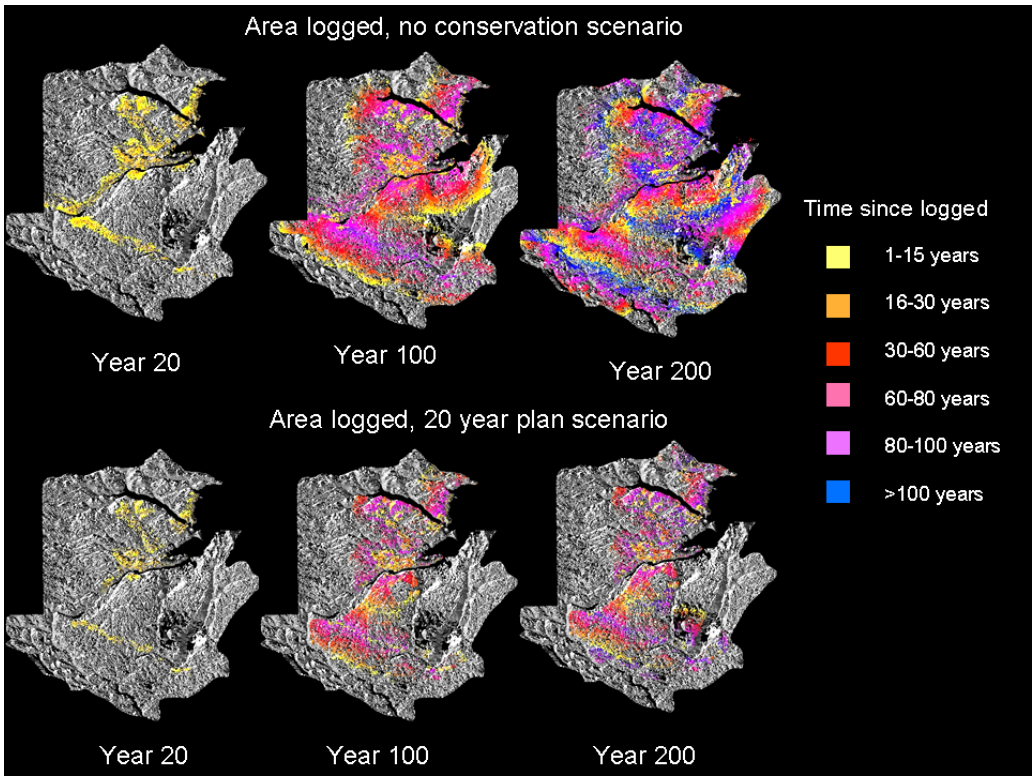


Figure 5.2 An example of simulation results shown to the participants: area logged under the no conservation and the 20 year plan scenarios from year 20 to year 200 of simulation. *A colour copy of this figure is presented in Appendix C1, page 218.*

GENERAL CONCLUSIONS

6.1 THE ROLE OF CULTURAL MODELS IN SHAPING PERCEPTIONS

The complexity of the factors affecting perceptions is such that it is not reasonable to include all parameters simultaneously. In this study, the effects of the multiple parameters were isolated by holding time constant in one part of the study (Figure 0.2, Chapters 1, 2 and 3) and holding place constant in another part of the study (Chapters 4 and 5). Interactions, described in the conceptual model on the relationships between the forest, cultural models on forests and forest management (Figure 1.1, Chapter 1) are, however, explored for both understanding groups within and across regions and for measuring change.

The cultural models were used to describe the relationship between the current and historical forest use and perceptions on the forest and forestry. They were also used to explain differences between groups and the creation of local subcultures. The conceptual model also explains how cultural models and perceptions change through time and the factors that affect this change. The demonstration of simulation results can be seen as a kind of a virtual forest experience which affects cultural models about forests and, in this way, perceptions on forests and forestry. Forest experience is influenced by the physical quality or attributes of the forest, activities carried out in the forest and knowledge about the forest. This means that different levels or types of knowledge would lead to different forest experiences. Demonstration of simulation results in this study aimed at increasing knowledge on the long-term effects of forest management in a large area.

6.2 REGIONAL DIFFERENCES

The first main research question was to determine whether there is a gradient in forest values, attitudes related to forest management and SFM preferences along a gradient of importance of commercial forestry. The results of Chapter 1, 2 and 3 show some indication of a gradient. There is a lot of variation in the results, but gradients were found in weighting of environmental and economic components of sustainability (Chapter 1) and some attributes of SFM (Chapter 3). The clearest result was found in relation to differences among groups which grew with increasing importance of commercial forestry. This pattern was detected in the weightings of the environmental, economic and social components of sustainability (Chapter 1), in biocentric and anthropocentric value orientations (Chapter 2) as well as in choosing alternatives in favour of or away from the current management regime (Chapter 3).

The detected trends in inter-group differences may, among other factors, reflect the influence of current and historical forest use in shaping SFM preferences and the differences across groups. Persons more involved in forest-related economic activities in a region may have felt a threat to their social identity from the conservation strategies suggested by environmentalists (who may not be local residents). This kind of a threat has been shown to strengthen group identification – in this case as economic users of the forest – and lead to attempts to more clearly differentiate between members of a group and non-members (Bonaiuto et al., 2002). This should be expected to happen more in a region where forestry is important for the local economy. On the other hand, long-term intensive forest management in Southeastern Finland has changed the forest considerably in comparison to Central Labrador, where the forest is near its natural state. The reduction in old-growth forest area and biodiversity created by intensive forest management in Southeastern Finland may have been perceived as a threat by the environmentalists thus

strengthening their conservation and wildlife preferences. This explains the mechanism through which the perceptions of interest groups can become more polarized in areas with high importance of commercial forestry.

This research is, however, based on data collected in only three research areas. In order to validate the idea of a continuum in importance of commercial forestry affecting local views, more research areas are required. In this study, Southeastern Finland was the only region with a high private forest ownership. It may be argued that some of the differences between Southeastern Finland and other research areas are mainly due to the forest ownership structure. However, results show that the perceptions of the studied groups in the Mauricie, which is the intermediate region in our study in terms of importance of commercial forestry, are sometimes similar to those in Southeastern Finland and sometimes nearer to those in Central Labrador. Thus it may be concluded that the forest ownership structure is one of the factors influencing differences across regions, but it does not appear to be a dominating driving factor. It has both a direct effect on perceptions of SFM and a broader indirect effect through cultural models about forests influencing the way people think about conservation, for example (Chapter 1). More research areas with high private forest ownership but intermediate importance of commercial forestry would enhance understanding concerning the role of forest ownership structure in shaping SFM perceptions.

In further research, it would also be useful to choose new research areas with similar forest ownership structures and varying importance of commercial forestry. If these areas were all in culturally similar regions, several factors affecting people's perceptions would be controlled and it would be easier to distinguish the effect of the gradient of importance of commercial forestry. It would also be possible to choose a region outside of the boreal forest i.e. temperate or even tropical regions. In such a case, the problematic with forest management may be

totally different and care should be taken to ensure that the questions asked are adapted to the context. For example, in Australia questions like reforestation with exotic pine species and control of forest fires are key issues in discussions on sustainable forest management (Attiwill and Adams, 2008).

This work focused on perceptions of interest groups active within or around the study areas. The approach was useful for pointing out similarities and differences between groups and for contrasting forestry professionals with other actors. In future research it would be interesting to compare the perceptions of the general public in several forested regions or in large cities. Taking the study areas of the current work, a comparison of the views of inhabitants in the metropolitan areas of Montreal and Helsinki would provide new information on the differences among urban populations.

6.3 EFFECT OF ADDITIONAL INFORMATION

The second main research question of this work was to determine whether there were changes in values, attitudes and preferences upon showing long-term forest simulation results on a large area. Some statistically significant change was detected in held values and attitudes (Chapter 4), but not in preferences (Chapter 5). Opinion forming was the most common change and participants themselves also reported having learned from the presentation. Both forestry professionals and other forest users learned, but learning was at different levels reflecting qualitative differences between technical knowledge and local knowledge (Failing et al., 2007). When it comes to forestry professionals, there is potential for a change in their way of thinking and managing the forest as a result of learning. This requires that the forest management agencies would be able to use the experiences gained by the

individuals, and individual learning would facilitate organizational learning[9] which could lead to changes in policy, rules or practices (Chess and Johnson, 2006).

Preference change was expected, since the message of the session was more directly related to different forest management options than to forest values and attitudes towards forestry. It was thus a surprise that the results did not show significant preference change (Chapter 5). It is possible that the trade-off situation inherent in the choice experiment method makes the preferences more stable. A choice model describes the relative importance of several attributes, and thus a change in one attribute does not necessarily have a significant effect on the whole. It is also possible that the preferences of participants were more stable than attitudes. As mentioned in the introduction, only a moderate link between attitudes and preferences has been found empirically, and the connection between these concepts has been both theoretically and empirically understudied. More research is thus needed to explore this link and especially differences in the stability of held values, attitudes and preferences.

In this research, the time between the two measurements was short: the two questionnaires were filled in during the same event. It is possible that a longer time is needed for significant preference change to occur. The deliberative process may stimulate search of more information which may lead to change in long term thinking which is not observed during the process (Niemeyer 2005). It is also possible that the observed change does not persist in time. Earlier research has, however, shown that messages with issues relevant to the participants increase temporal persistence of attitude change (Petty and Cacioppo 1986). All participants in this research project were personally interested in issues related to forests and

[9] Organizational learning is today seen as a dynamic process which is much more than just aggregation of the learning of individuals. Effective organizational learning is facilitated by interaction among the members of the organization and good leadership, for example.

their management in the area and thus it would be expected that change should be relatively persistent.

In further research, the effect of time between the measurements of people's perceptions could be studied by dividing the participants into groups subject to different delays between the first and the second measurement. This would require the commitment of all participants to be present at both meetings. There may, however, be intervening factors affecting the results like changes in the economic or political situation as happened in Central Labrador where logging ceased completely between the fall of 2006 and the summer of 2007 and the local forestry companies went out of business.

For practical reasons I studied changes in held values, attitudes and preferences in only one region. In future research it would be interesting to explore regional differences in attitude and preference change. It may be expected that in regions with high importance of commercial forestry people are more used to forest management planning and their perceptions would change less than in regions where commercial forestry is relatively new or less important.

6.4 GROUPS

The interest groups represented in this research are potential agents of change (Törnquist, 2006; Davies, 2008) as their ideas and input may change the prevalent way of thinking and practices in forest management.

This work studies the perceptions of local and regional groups on SFM in three regions. Both the local setting with certain forest conditions and forest use and more general issues shared by similar groups across regions have an effect on

perceptions. For example the environmental groups have a shared global agenda of old-growth forest conservation and avoidance of clear cuts (Humphreys, 2004).

There is a certain amount of overlap between groups within regions. Some participants belong to several groups simultaneously, and they may adopt different, even conflicting roles according to the group they are representing (Berninger, 2006). Participants could choose which group they felt they primarily represented. It is, however, possible that their views would have been somewhat different had they participated in a different meeting. This effect would have been strongest during the group discussions aimed at finding group consensus (Chapter 1) and discussions following the presentation of simulation results (Chapter 4 and 5).

Perceptions on Sustainable Forest Management are a result of an interaction of public and individual factors (Chapter 1; Brunson et al., 1997). The extent to which each of them is represented in the perceptions shared by a group varies according to the role of the group in the society. For example, the analysis in Berninger (2006) indicated that in Southeastern Finland the forest owners and multiple users may view SFM from a more individual point of view, whereas the forestry professionals and environmentalists take a broader societal point of view.

In this dissertation, the Metis and Innu indigenous groups were studied using the same methods as for other groups in order to ensure comparability of the results. Generally, research on indigenous peoples is conducted using distinct methodology and there are certain risks in using conventional research methods for studying indigenous groups (Natcher and Hickey, 2002; Davidson-Hunt and Berkes, 2003). For example, asking direct questions does not always work, since the answer may be given in form of a narrative; and the western approach does not appreciate the holistic understanding of the environment of indigenous peoples (Natcher and Hickey, 2002). I tried to minimize these risks in my work with the Innu by asking

two Innu forest guards, who have gained knowledge on concepts related to forestry, to help in the meetings in order to improve comprehension. During the meeting with the Metis, those with more experience with forestry issues provided help when needed. It is, however, possible that cultural differences affect the results, especially among the Innu participants. Although there may be some methodological problems, the results clearly demonstrate that the indigenous view is distinct from the non-indigenous view. In both indigenous groups money was not important when balance was sought among the aspects influencing SFM (Chapter 4). Indigenous societies have a different relationship with money than western peoples, and there may be goods or ecosystem services for which no substitutes will be accepted (Mailhot, 1993, p. 69; Adamowicz et al., 1998b; Samson, 2003, p.154). The distinct character of indigenous thinking is also demonstrated by the importance of social aspects of sustainability (Chapter 1) and high scores obtained for both biocentric and anthropocentric value orientations (Chapter 2) which reflects importance of non-timber forest products as well as a holistic view that nature and humans cannot be separated (Natcher and Hickey, 2002; Adam and Kneeshaw, 2008).

6.5 MANAGEMENT IMPLICATIONS

Some of the groups studied clearly showed their desire for changing the current management regime (Chapter 3). The challenge for managers is to take their views into consideration and critically review the current way of managing forests. Open discussion and providing opportunities for shared learning may help in building trust in managers (Hunt and McFarlane, 2007). A strong desire for change among certain groups indicates that it may be time to search for new innovative solutions that would accommodate conflicting views. Failure to do so may increase existing conflicts and make future collaboration more difficult. Examples of new solutions are trading in natural values used to motivate private forest owners to protect nature

in Finland (Juutinen et al., 2008). Trading in natural values means that private forest owners agree to maintain certain qualities of a forest area important for conservation for 10 to 20 years and receive compensation for it. Another new solution could be the TRIAD zoning approach which has a goal of increasing the areas of forests being protected and under ecosystem management by intensifying wood production in a part of the remaining area (Seymour and Hunter, 1999; Messier et al., 2003a).

My results show that forest management over a large area while considering long-term processes is so complex that forestry professionals also need to engage in a constant learning process (Chapters 4 and 5; Daniels and Walker, 1996). To this end, landscape-scale models developed in collaboration with local people and simulations that show long-term development of relevant indicators are needed (Fall et al., 2001). Repeated communication of simulation results should be part of an effective public participation process. The current research shows that this collaborative modeling approach (Fall et al., 2001) may enhance social learning both among forestry professionals and other forest users as well as increase the local acceptability of forest management (Chapters 4 and 5). It also facilitates two-way communication and inclusion of local knowledge by providing the participants with the opportunity to comment on the modeling results and alternatives presented (Fall et al., 2001; Sturtevant et al., 2007).

APPENDIX A DECISION OF THE ETHICAL COMMITTEE

A.1 LETTER OF APPROVAL OF THE ETHICAL COMMITTEE OF THE FACULTY OF SCIENCES, UQAM

UQÀM **Faculté des sciences**
Bureau du doyen
Université du Québec à Montréal

CONFORMITÉ À L'ÉTHIQUE EN MATIÈRE DE RECHERCHE IMPLIQUANT LA PARTICIPATION DE SUJETS HUMAINS

Le Comité facultaire d'éthique de la recherche sur les êtres humains de la Faculté des sciences de l'UQAM a examiné le projet de recherche suivant :

Responsable du projet :	Kati Berninger
Département ou École :	Doctorat en sciences de l'environnement, Institut des sciences de l'environnement
Superviseur :	Daniel Kneeshaw, Département des sciences biologiques
Titre du projet :	Une évaluation de la durabilité de l'aménagement forestier : une perspective locale

Ce projet de recherche est jugé conforme aux pratiques habituelles et répond aux normes établies par le *«Cadre normatif pour l'éthique de la recherche avec des êtres humains de l'UQAM»*.

Le projet est jugé recevable au plan de l'éthique de la recherche sur des êtres humains.

Membres du Comité facultaire d'éthique de la recherche avec des êtres humains

NOM	TITRE	DÉPARTEMENT
Achim, André	Professeur	Psychologie
Arvisais, Louise	Secrétaire du Comité institutionnel d'éthique de la recherche avec des êtres humains	Service recherche et création
Desrosiers, Richard	Professeur	Chimie
Kieran-Sauvé, Carolyn	Professeure	Mathématiques
Mayer, Francine M.	Professeure	Sciences biologiques
Vandelac, Louise	Professeure	Sociologie et Institut des sciences de l'environnement

16 mars 2006
Date

Francine M. Mayer
Présidente du Comité

Case postale 8888, succursale Centre-ville
Montréal (Québec) Canada H3C 3P8
Téléphone : (514) 987-3651
www.sciences.uqam.ca

APPENDIX B QUESTIONNAIRES USED IN THE STUDY

B.1 QUESTIONNAIRE FOR CENTRAL LABRADOR BEFORE SHOWING SIMULATION RESULTS, VERSION 1 OF THE CHOICE EXPERIMENT

SURVEY ON FOREST USE OPTIONS IN CENTRAL LABRADOR

The purpose of this research is to consult different interest groups regarding their forest management preferences in Upper Lake Melville. These results will be used to advise forest planning teams on how management can be improved and which aspects are considered in the forestry planning.

Thank you for taking time to complete this questionnaire. Please try to answer all the questions.

All information you provide is strictly confidential. Your name will be used only to combine your two questionnaires. After that your name will never appear together with your answers. Only a summary of the results will be publicized.

We appreciate your help on this project.

Thank you,
Kati Berninger
Ph.D. candidate
E-mail: kati_berninger@yahoo.ca

Directors:
Dr. Daniel Kneeshaw
Professor
kneeshaw.daniel@uqam.ca

Dr. Christian Messier
Professor
messier.christian@uqam.ca

Université de Québec à Montréal
Dep. Sciences Biologiques
C.P. 8888, Succ. Centre-ville
Montréal, Québec H3C 3P8
Canada

SEMINAR

Your name (It will only be used to combine your two questionnaires, the name will then be deleted and replaced by a code):

_____

PART I INFORMATION ABOUT YOU

These questions will help determine if there are connections between peoples' backgrounds and their opinions. Your name will not be associated with the answers however if there is a question you do not want to answer, just leave it blank and proceed to the next question.

1. Age _____ years
2. Gender □ female □ male
3. In addition to this seminar's interest group I belong to the following groups:

□ Environmental groups
□ Forestry professionals
□ Multiple users of the forest
□ Innu
□ Metis

4. Education

□ Cultural based education
□ Never attended school
□ Grade School (grades 1 to 9)
□ High School
□ Technical school
□ University Degree (Bachelors)
□ Graduate University Degree
□ Other, please state _____

5. Occupation

□ Agriculture/forestry entrepreneur
□ Nature guide
□ Other independent entrepreneur
□ Senior official, manager, professional
□ Technician, associate professional
□ Clerk or secretary
□ Bank counsel/other governance
□ Service or sales worker
□ Craft or related trades worker
□ Plant and machine operator/assembler
□ Retired
□ Student
□ Unemployed
□ Taking care of own household
□ Other, please state _____

6. My total annual household income before taxes

□ Less than $ 10 000
□ $ 10 000-24 999
□ $ 25 000-39 999
□ $ 40 000-54 999
□ $ 55 000-69 999
□ $ 70 000-84 999
□ $ 85 000-99 999
□ $ 100 000-114 999
□ Over $ 115 000

7. I participate in the following activities in Upper Lake Melville forests (Check all that apply):

□ Berry or mushroom picking
□ Hunting
□ Fishing
□ Wildlife viewing
□ Hiking or camping
□ Cross country skiing
□ Canoeing or boating
□ Snowmobiling

PART II FOREST MANAGEMENT OPINIONS AND BELIEFS

There are no right or wrong answers to these questions; rather we need your considered response to each question. Please feel free to comment on any question that you feel deserves additional attention. Use the additional space on the back of the survey or attach your own notes, for any such comments.

Please try to answer all of the questions. If there are any questions you do not wish to answer, please leave it blank and move on to the next question.

1. We are interested in how people feel about forests. Please indicate how you feel about each statement by checking the related box.

	Totally agree	Partly agree	Partly disagree	Totally disagree	Not sure
Forests give me a sense of peace and well-being	□	□	□	□	□
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans	□	□	□	□	□
Forests should be managed to meet as many human needs as possible	□	□	□	□	□
Forests let me feel close to nature	□	□	□	□	□
Wildlife, plants, and humans should have equal rights to live and develop	□	□	□	□	□
It is important to maintain the forests for future generations	□	□	□	□	□
Forests should exist mainly to serve human needs.	□	□	□	□	□
Forests should have the right to exist for their own sake, regardless of human concerns and uses	□	□	□	□	□
The primary function of forests should be for the products and services that are useful to humans	□	□	□	□	□
Humans should have more respect and admiration for the forests	□	□	□	□	□
It is a waste of our natural resources if forests are not used for human benefit	□	□	□	□	□
Logging spoils the landscape	□	□	□	□	□
A managed forest is beautiful	□	□	□	□	□
Forest management diminishes populations of game species	□	□	□	□	□
Forest management diminishes the harvest of berries and mushrooms	□	□	□	□	□

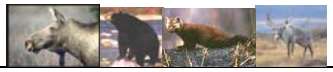
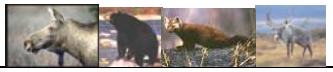
2. The following asks your opinion about forest management in Upper Lake Melville. Please indicate how you feel about each statement by checking the related box.

	Totally agree	Partly agree	Partly disagree	Totally disagree	Not sure
Forests are currently being managed for a wide range of uses and values, not just timber	□	□	□	□	□
Current forest management does a good job in including environmental concerns	□	□	□	□	□
Central Labrador has enough protected areas	□	□	□	□	□
There will be sufficient wood in Central Labrador to meet our future needs	□	□	□	□	□
The present rate of logging is too great to sustain our forests in the future	□	□	□	□	□
Forests are being managed successfully for the benefit of future generations	□	□	□	□	□
The economic benefits from forestry usually outweigh any negative consequences	□	□	□	□	□
Economic stability of communities is more important than setting aside forests from logging	□	□	□	□	□
When making forest decisions, the concerns of communities close to the forest should be given higher priority than other distant communities	□	□	□	□	□
Upper Lake Melville forests are currently managed in such a way that they are well suited for recreation use	□	□	□	□	□
Upper Lake Melville forests are currently managed in such a way that they are well suited for berry and mushroom picking	□	□	□	□	□
Upper Lake Melville forests are currently managed in such a way that they are well suited for hunting	□	□	□	□	□

PART III CHOOSING BETWEEN FOREST USE OPTIONS

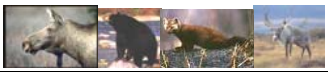
Next you will be asked to answer eight different choice situations. Each situation will be described using five attributes. The descriptions of the attributes and choice set instructions are presented on a separate colorful sheet.

Choice set 1: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	56 % (Current situation+6%)	40 % (Current situation-10%)
Average size of clear cuts	10 ha	5 ha (Current situation/2)	Selective cutting
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry only 
Forest sector jobs	60	54 (-10 %)	66 (+10 %)
Increase in your annual expenses, $ per household	$ 0	$ 420	$ -140

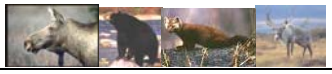
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 2: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	50 %	40 % (Current situation-10%)
Average size of clear cuts	10 ha	5 ha (Current situation/2)	20 ha (Current situationx2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry only 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 
Forest sector jobs	60	54 (-10 %)	72 (+20%)
Increase in your annual expenses, $ per household	$ 0	$ 140	$ 420

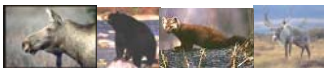
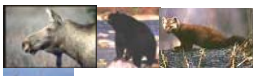
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 3: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	40 % (Current situation-10%)	53 % (Current situation+3 %)
Average size of clear cuts	10 ha	10 ha	Selective cutting
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry only 	Species favored by or neutral to forestry, charismatic species and some species of late successional forests 
Forest sector jobs	60	54 (-10%)	72 (+20%)
Increase in your annual expenses, $ per household	$ 0	$ 420	$ 0

Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 4 Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	40 % (Current situation-10%)	53 % (Current situation+3 %)
Average size of clear cuts	10 ha	5 ha (Current situation/2)	20 ha (Current situationx2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp.  	Species favored by or neutral to forestry and charismatic species 
Forest sector jobs	60	60	66 (+10%)
Increase in your annual expenses, $ per household	$ 0	$ -140	$ 140

Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 5: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	53 % (Current situation+3 %)	56 % (Current situation+6%)
Average size of clear cuts	10 ha	10 ha	Selective cutting
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry, charismatic species and some species of late successional forests 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 
Forest sector jobs	60	72 (+20%)	60
Increase in your annual expenses, $ per household	$ 0	$ -140	$ 140

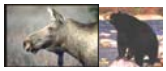
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 6: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	53 % (Current situation+3 %)	56 % (Current situation+6%)
Average size of clear cuts	10 ha	5 ha (Current situation/2)	20 ha (Current situationx2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry and charismatic species 	Species favored by or neutral to forestry only 
Forest sector jobs	60	66 (+10%)	54 (-10%)
Increase in your annual expenses, $ per household	$ 0	$ 420	$ 0

Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 7: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	56 % (Current situation+6%)	50 %
Average size of clear cuts	10 ha	10 ha	Selective cutting
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry and charismatic species 
Forest sector jobs	60	66 (+10%)	54 (-10%)
Increase in your annual expenses, $ per household	$ 0	$ 140	$ 420

Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 8: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	56 % (Current situation+6%)	50 %
Average size of clear cuts	10 ha	5 ha (Current situation/2)	20 ha (Current situationx2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry only 	Species favored by or neutral to forestry, charismatic species and some species of late successional forests 
Forest sector jobs	60	72 (+20%)	60
Increase in your annual expenses, $ per household	$ 0	$ 0	$ -140

Preferred option: (Check one box)	1☐	2☐	3☐

B2 QUESTIONNAIRE FOR CENTRAL LABRADOR AFTER SHOWING SIMULATION RESULTS, VERSION 2 OF THE CHOICE EXPERIMENT, MODIFIED FOR THE INNU

SURVEY ON FOREST USE OPTIONS IN CENTRAL LABRADOR

The purpose of this research is to consult different interest groups regarding their forest management preferences in Upper Lake Melville. These results will be used to advise forest planning teams on how management can be improved and which aspects are considered in the forestry planning.

Thank you for taking time to complete this questionnaire. Please try to answer all the questions.

All information you provide is strictly confidential. Your name will be used only to combine your two questionnaires. After that your name will never appear together with your answers. Only a summary of the results will be publicized.

We appreciate your help on this project.

Thank you,

Kati Berninger
Ph.D. candidate
E-mail: kati_berninger@yahoo.ca

Directors:
Dr. Daniel Kneeshaw
Professor
kneeshaw.daniel@uqam.ca

Dr. Christian Messier
Professor
messier.christian@uqam.ca

Université de Québec à Montréal, Dep. Sciences Biologiques
C.P. 8888, Succ. Centre-ville
Montréal, Québec H3C 3P8, Canada

PART I INFORMATION ABOUT YOU

Your name (It will only be used to combine your two questionnaires, the name will then be deleted and replaced by a code):

_____

PART II FOREST MANAGEMENT OPINIONS AND BELIEFS

1. We are interested in how people feel about forests. Please indicate how you feel about each statement by checking the related box.

	Totally agree	Partly agree	Partly disagree	Totally disagree	Not sure
Forests give me a sense of peace and well-being	□	□	□	□	□
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans	□	□	□	□	□
Forests should be managed to meet as many human needs as possible	□	□	□	□	□
Forests let me feel close to nature	□	□	□	□	□
Wildlife, plants, and humans should have equal rights to live and develop	□	□	□	□	□
It is important to maintain the forests for future generations	□	□	□	□	□
Forests should exist mainly to serve human needs.	□	□	□	□	□
Forests should have the right to exist for their own sake, regardless of human concerns and uses	□	□	□	□	□
The primary function of forests should be for the products and services that are useful to humans	□	□	□	□	□
Humans should have more respect and admiration for the forests	□	□	□	□	□
It is a waste of our natural resources if forests are not used for human benefit	□	□	□	□	□
Logging spoils the landscape	□	□	□	□	□
A managed forest is beautiful	□	□	□	□	□
Forest management diminishes populations of game species	□	□	□	□	□
Forest management diminishes the harvest of berries and mushrooms	□	□	□	□	□

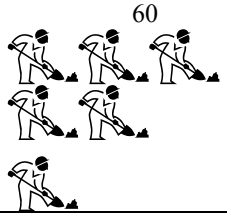
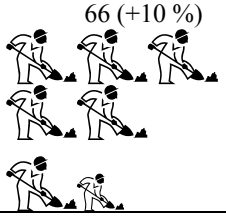
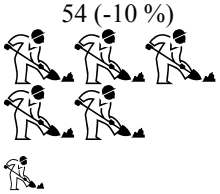
2. The following asks your opinion about forest management in Upper Lake Melville. Please indicate how you feel about each statement by checking the related box.

	Totally agree	Partly agree	Partly disagree	Totally disagree	Not sure
Forests are currently being managed for a wide range of uses and values, not just timber	□	□	□	□	□
Current forest management does a good job in including environmental concerns	□	□	□	□	□
Central Labrador has enough protected areas	□	□	□	□	□
There will be sufficient wood in Central Labrador to meet our future needs	□	□	□	□	□
The present rate of logging is too great to sustain our forests in the future	□	□	□	□	□
Forests are being managed successfully for the benefit of future generations	□	□	□	□	□
The economic benefits from forestry usually outweigh any negative consequences	□	□	□	□	□
Economic stability of communities is more important than setting aside forests from logging	□	□	□	□	□
When making forest decisions, the concerns of communities close to the forest should be given higher priority than other distant communities	□	□	□	□	□
Upper Lake Melville forests are currently managed in such a way that they are well suited for recreation use	□	□	□	□	□
Upper Lake Melville forests are currently managed in such a way that they are well suited for berry and mushroom picking	□	□	□	□	□
Upper Lake Melville forests are currently managed in such a way that they are well suited for hunting	□	□	□	□	□

PART III CHOOSING BETWEEN FOREST USE OPTIONS

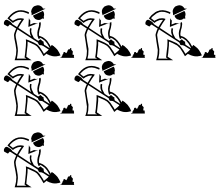
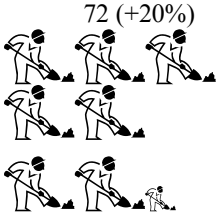
Next you will be asked to answer eight different choice situations. Each situation will be described using five attributes. The descriptions of the attributes and choice set instructions are presented on a separate colorful sheet.

Choice set 1: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	50 %	40 % (Current situation-10%)
Average size of clear cuts	10 ha	Selective cutting	5 ha (Current situation/2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry only 	Species favored by or neutral to forestry, charismatic species and some species of late successional forests 
Forest sector jobs	60 	66 (+10 %) 	54 (-10 %) 
Increase in your annual expenses, $ per household	$ 0	$ -140 	$ 140 

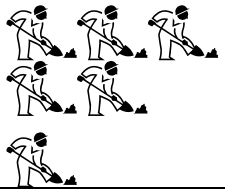
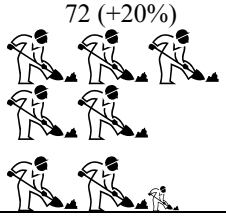
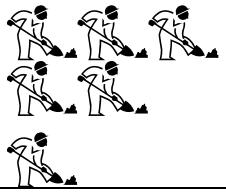
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 2: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	50 %	40 % (Current situation -10%)
Average size of clear cuts	10 ha	20 ha (Current situationx2)	10 ha
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry and charismatic species 
Forest sector jobs	60 	72 (+20%) 	60 
Increase in your annual expenses, $ per household	$ 0	$ 420 	$ 0

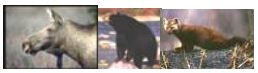
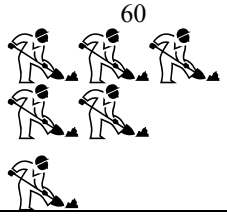
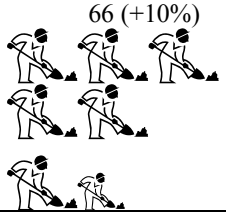
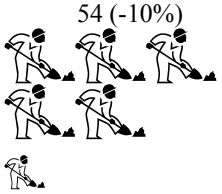
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 3: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	40 % (Current situation-10%)	53 % (Current situation+3%)
Average size of clear cuts	10 ha	Selective cutting	5 ha (Current situation/2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry and charismatic species 	Species favored by or neutral to forestry only 
Forest sector jobs	60 	72 (+20%) 	60 
Increase in your annual expenses, $ per household	$ 0	$ 140 	$ 420 

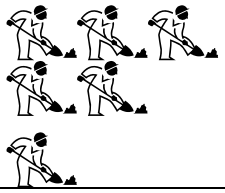
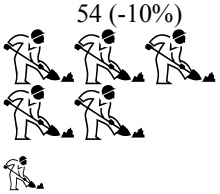
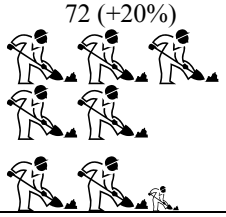
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 4: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	40 % (Current situation-10%)	53 % (Current situation+3 %)
Average size of clear cuts	10 ha	20 ha (Current situationx2)	10 ha
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry, charismatic species and some species of late successional forests 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 
Forest sector jobs	60 	66 (+10%) 	54 (-10%) 
Increase in your annual expenses, $ per household	$ 0	$ 0	$ -140 

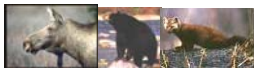
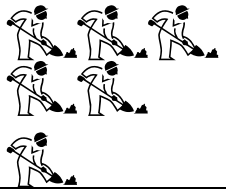
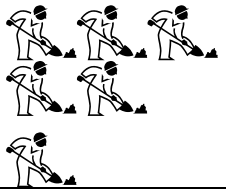
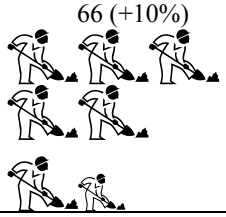
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 5: *Please select one of these three options by checking the box below your preferred option.*

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	53 % (Current situation+3 %)	56 % (Current situation+6%)
Average size of clear cuts	10 ha	Selective cutting	5 ha (Current situation/2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry and charismatic species 
Forest sector jobs	60 	54 (-10%) 	72 (+20%) 
Increase in your annual expenses, $ per household	$ 0	$ 0	$ -140 

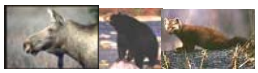
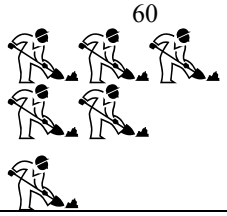
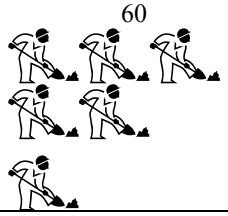
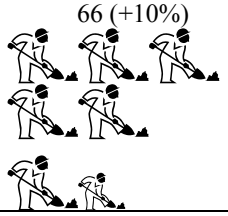
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 6: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	53 % (Current situation+3 %)	56 % (Current situation+6%)
Average size of clear cuts	10 ha	20 ha (Current situationx2)	10 ha
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry only 	Species favored by or neutral to forestry, charismatic species and some species of late successional forests 
Forest sector jobs	60 	60 	66 (+10%) 
Increase in your annual expenses, $ per household	$ 0	$ 140 	$ 420 

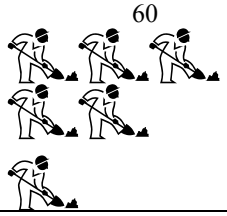
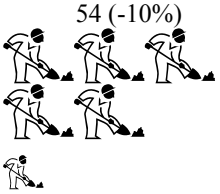
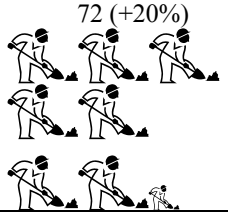
Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 7: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	56 % (Current situation+6%)	50 %
Average size of clear cuts	10 ha	Selective cutting	5 ha (Current situation/2)
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry, charismatic species and some species of late successional forests 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 
Forest sector jobs	60 	60 	66 (+10%) 
Increase in your annual expenses, $ per household	$ 0	$ 420 	$ 0

Preferred option: (Check one box)	1☐	2☐	3☐

Choice set 8: Please select one of these three options by checking the box below your preferred option.

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	56 % (Current situation+6%)	50 %
Average size of clear cuts	10 ha	20 ha (Current situationx2)	5 ha
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry and charismatic species 	Species favored by or neutral to forestry only 
Forest sector jobs	60 	54 (-10%) 	72 (+20%) 
Increase in your annual expenses, $ per household	$ 0	$ -140 	$140 

Preferred option: (Check one box)	1☐	2☐	3☐

PART IV YOUR OWN ESTIMATE OF OPINION CHANGE

You have been presented additional information on the effects of different forest management alternatives in long term and large scale.

Did you learn something new during the presentation and the discussion after the presentation?

Yes ☐ No ☐

If you answered yes, please explain what you learned

_____
_____
_____
_____
_____
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_____
_____

Do you think this information changed your opinions on forests or forestry?

Yes ☐ No ☐

If you answered yes, please explain how your opinions changed

_____
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B.3 CHOICE EXPERIMENT INSTRUCTIONS FOR CENTRAL LABRADOR

CHOICE SET INSTRUCTIONS FOR PART III

In the following exercise, we would like your opinions about forest scenarios in Upper Lake Melville. In each case, we would like you to compare the current state of the forest against two possible future scenarios.

Each set of options will be described by five attributes that are explained on the following page. Please consider the importance of these attributes for you and compare the options given in each situation. You will be presented eight different choice sets. Please treat each set as one choice to be made, unrelated to all previous and future sets. The present situation or Option 1 is always the same and you may also choose it if you think it is the best option.

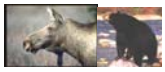
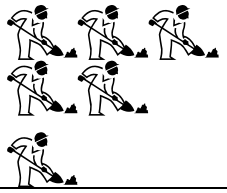
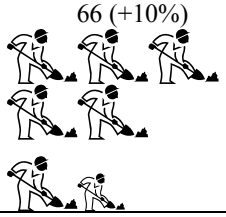
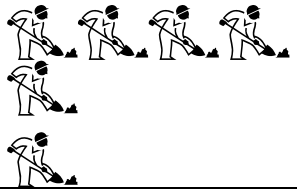
In each case, choose the option you like the best (or dislike the least) based on your opinion and mark it by checking the box below the option.

Some combinations of attributes may not always appear to “make sense” but assume they are possible due to uncertain relationships between some attributes.

You will probably have to select an option that according to your opinion is not optimal for all the attributes. In this case your selection will be based on the attribute or attributes you consider the most important.

Example:

1. Compare the options offered in each situation

Attributes of Upper Lake Melville	**Option 1** Current situation	**Option 2**	**Option 3**
Conservation area % forest land	50 %	56 % (Current situation+6%)	53 % (Current situation+3%)
Average size of clear cuts	10 ha	10 ha	Selective cutting
Wildlife species the forest supports	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 	Species favored by or neutral to forestry and charismatic species 	Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp. 
Forest sector jobs	60 	66 (+10%) 	60 
Increase in your annual expenses, $ per household	$ 0	$ 140 	$ 420 

Preferred option: (Check one box)	1□	2 x	3□

I like option 2 because it offers what I feel is the best combination

2. Indicate your choice by checking the box

DESCRIPTION OF ATTRIBUTES FOR PART III

1. Proportion of conservation area of forest land in Upper Lake Melville

The conservation area includes the areas set aside from harvesting activities according to the present forest management plan for nature protection or cultural reasons. These areas do not include the buffer zones surrounding rivers and lakes or leave areas within cutovers.

Level 1 40 % Current situation – 10 %
Level 2 50 % Current situation
Level 3 53 % Current situation + 3 %
Level 4 56 % Current situation + 6 %

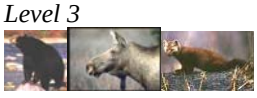
2. Average size of clear cuts in Upper Lake Melville

This attribute describes how logging is done. It is possible to cut the same amount of wood using any level of this attribute, both selective and clear cutting. The current situation of the average size of clear cuts is based on the works carried out between 1975 and 2005. Here the clear cut is defined as a regeneration logging of a continuous area bigger than 1 ha where almost all trees are removed. 5-20 trees per hectare may be left standing. 1 ha is equivalent to about 2 football fields.

Level 1	Selective cutting		
Level 2	5 ha	Current situation/2	
Level 3	10 ha	Current situation	
Level 4	20 ha	Current situationx2	

3. Wildlife species the forest supports in Upper Lake Melville

This attribute describes animals that are characteristic of forests in Upper Lake Melville and it is used to indicate the habitat availability for wildlife species. This classification is made according to the level of threat in the national level: certain species are classified of special concern, endangered or threatened because of the decline of their population. Here we are concerned about species likely to be negatively affected by changing forest conditions due to forestry, for example changes in age structure, tree species composition and the amount of dead wood in the forest. Forest management typically reduces the proportion of the late successional stages and increases the proportion of early successional stages.

Level 1 	*Species favored by or neutral to forestry only* The forest supports only species favored or those unaffected by forestry. They are typically species of early successional forests. For example rabbits, moose. Other species have disappeared due to the changed conditions in the forest.
Level 2 	*Species favored by or neutral to forestry and charismatic species* In addition to the first category, the forest supports charismatic large mammals and birds that are moderately affected by forestry, for example black bears and great-horned owls.
Level 3 	*Species favored by or neutral to forestry, charismatic species and some species of late successional forests* In addition to the above categories, the forest supports some species of late successional forests or species of special concern, for example

	marten, boreal owl
Level 4 	*Species favored by or neutral to forestry, charismatic species, some species of late successional forests and some endangered sp.* This is the current situation. In addition to the above categories, the forest supports some endangered or threatened species, for example woodland caribou

4. Forest sector jobs in Central Labrador

The attribute forest sector jobs include the local and regional jobs in forestry and forest industry in Central Labrador. The current situation of 60 jobs is based on the information presented in the current management plan.

Level 1 54 Current situation -10 %

Level 2 60 Current situation

Level 3 66 Current situation +10 %

Level 4 72 Current situation +20 %

5. Decrease/increase in annual household expenses in Central Labrador

The decrease/increase in annual household expenses consists of the decrease/increase in taxes, prices of goods and costs of services. The decrease of expenses is caused by increasing forestry income due to increased commercial forestry and its effect on the local and regional economy. The increase of expenses is caused by decreasing forestry income due to increased conservation and its effect on the local and regional economy.

Level 1 $ - 140

Level 2 $ 0 Current situation

Level 3 $ 140

Level 4 $ 420

B.4 QUESTIONNAIRE FOR THE MAURICIE, VERSION 1 OF THE CHOICE EXPERIMENT

Sondage sur les options de l'utilisation de la forêt en Mauricie

Le but de cette recherche est de consulter les différents groupes d'intérêt afin de connaître leurs préférences sur l'aménagement de la forêt en Mauricie. Les résultats ont potentiellement un effet sur l'aménagement futur des forêts et les aspects qui seront considérés en planification forestière.

Nous vous remercions du temps que vous prendrez pour compléter ce questionnaire. Nous vous demandons d'essayer de répondre à toutes les questions.

Toutes informations que vous nous transmettrez sont strictement confidentielles. En aucun cas votre nom sera divulgué lors de la synthèse des résultats. Nous publierons seulement le résumé des résultats.

Nous apprécions grandement votre participation au projet.

Merci,

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GROUPE D'INTÉRÊT QUE VOUS REPRÉSENTEZ PRINCIPALEMENT

Groupes environnementaux □
Sous-groupe: □ Ornithologues
Professionnels forestiers □
Sous-groupe: □ Industrie □ Gouvernement
Autochtones □
Utilisateurs des produits non ligneux de la forêt (chasseurs, villégiateurs, cueilleurs des baies et champignons etc.) □

PARTIE I INFORMATIONS PERSONNELLES

Ces questions permettront de faire une corrélation entre le profil des répondants et leurs opinions. Votre nom ne sera associé à vos réponses en aucun cas. Par ailleurs s'il y a une question à laquelle vous ne désirez pas répondre, laissez l'espace vide et poursuivez à la question suivante

1. Âge _____ ans
2. Sexe □ F □ M
3. Identifiez les autres groupes d'intérêt dont vous faites partie:

□ Groupes environnementaux
□ Professionnels forestiers
□ Utilisateurs des produits non ligneux
□ Autochtones

4. Domicile actuel

□ Région rurale
□ Village
□ Ville, 20 000-50 000 habitants
□ Ville, plus de 50 000 habitants

5. Le plus haut niveau de scolarité que vous avez atteint:

□ Aucune scolarité
□ Primaire ou secondaire
□ Cégep (formation générale)
□ Cégep professionnel
□ Université (Baccalauréat)
□ Université (2ème ou 3ème cycle)
□ Autre, spécifiez _____

6. Quelle est votre position sur le marché du travail?

□ Entrepreneur forestier ou agriculteur
□ Guide de nature
□ Autre entrepreneur indépendant
□ Officier supérieur, directeur, spécialiste
□ Technicien, professionnel associé
□ Employé de bureau
□ Personnel de service et vendeur
□ Artisan/ouvrier de métier type artisanal
□ Conducteur d'installations et de machines et ouvrier de l'assemblage
□ Retraité
□ Étudiant
□ Chômeur
□ Pas sur le marché du travail
□ Autre, spécifiez _____

7. Quel est le revenu annuel total de votre ménage avant les impôts ?

□ Moins que $ 10 000
□ $ 10 000-24 999
□ $ 25 000-39 999
□ $ 40 000-54 999
□ $ 55 000-69 999
□ $ 70 000-84 999
□ $ 85 000-99 999
□ $ 100 000-114 999
□ Plus de $ 115 000

8. Quelles sont vos activités dans les forêts de la Mauricie? (Cochez tous les énoncés qui correspondent à vos activités):

□ Cueillette de fruits ou de champignons
□ Chasse et/ou piégeage
□ Pêche
□ Observation de la nature
□ Randonnée en forêt ou camping
□ Ski de fond
□ Sortie en canot ou en bateau
□ Motoneige/Véhicule tout terrain

PARTIE II OPINIONS ET CROYANCES SUR L'AMÉNAGEMENT FORESTIER

Il n'y a pas de bonnes ou de mauvaises réponses dans cette partie. Par contre, nous aimerions connaître votre opinion à chaque question. Si vous le désirez, vous pourrez commenter les questions qui vous semblent mériter une attention particulière. Vous pourrez utiliser l'espace au dos des feuilles ou joindre des pages supplémentaires afin de nous faire part de vos opinions supplémentaires ou vos commentaires. Veuillez essayer de répondre à toutes les questions. Si jamais il y avait une question à laquelle vous ne désirez pas répondre, laissez l'espace vide et passez à la question suivante.

1. Nous sommes intéressés par vos convictions vis-à-vis de la forêt. Veuillez indiquer votre niveau d'accord pour chaque situation décrite.

	Totalement en accord	Partiellement en accord	Partiellement en désaccord	Totalement en désaccord	Incertain
1. La forêt suscite chez moi un sentiment de paix et de bien-être	□	□	□	□	□
2. Nous devrions laisser les forêts croître, se développer et vieillir naturellement sans intervention humaine	□	□	□	□	□
3. Les forêts devraient être aménagées afin de répondre à un maximum de besoins humains	□	□	□	□	□
4. La forêt suscite chez moi un sentiment de lien étroit avec la nature	□	□	□	□	□
5. La faune, la flore et les humains devraient avoir les mêmes droits pour vivre et de se développer	□	□	□	□	□
6. Les propriétaires de forêts privées devraient pouvoir aménager leurs forêts selon leurs désirs	□	□	□	□	□
7. Il est important de maintenir les forêts pour les générations futures	□	□	□	□	□
8. Les forêts devraient exister principalement pour servir aux besoins des humains	□	□	□	□	□
9. Les forêts devraient exister indépendamment des intérêts et des utilisations des humains	□	□	□	□	□
10. La fonction première des forêts devrait être la production de produits et de services pour les humains	□	□	□	□	□
11. Les humains devraient avoir plus de respect et d'admiration pour les forêts	□	□	□	□	□
12. Il y a une perte de nos ressources naturelles lorsque les forêts ne sont pas utilisées pour le bénéfice des humains	□	□	□	□	□
13. Les coupes forestières détruisent le paysage	□	□	□	□	□
14. La forêt aménagée est esthétique	□	□	□	□	□
15. L'aménagement de la forêt diminue les populations de gibier	□	□	□	□	□
16. L'aménagement de la forêt diminue la récolte de fruits et de champignons	□	□	□	□	□

2. Les questions suivantes requièrent votre opinion à propos de la gestion forestière en Mauricie. Veuillez indiquer votre niveau d'accord pour chaque situation décrite en cochant la case appropriée.

	Totalement en accord	Partiellement en accord	Partiellement en désaccord	Totalement en désaccord	Incertain
17. Les forêts sont actuellement gérées pour plusieurs utilisations et valeurs et non seulement pour le bois	□	□	□	□	□
18. La gestion forestière actuelle considère bien les préoccupations environnementales	□	□	□	□	□
19. La Mauricie possède suffisamment d'aires protégées	□	□	□	□	□
20. Il y aura suffisamment de bois en Mauricie pour répondre aux besoins futurs	□	□	□	□	□
21. Le taux actuel de coupe forestière est trop élevé pour permettre le maintien des forêts dans le futur	□	□	□	□	□
22. La forêt est gérée de façon à ce que les générations futures puissent en bénéficier	□	□	□	□	□
23. Les profits provenant de la forêt ont généralement une plus grande importance que les conséquences négatives	□	□	□	□	□
24. La stabilité économique des communautés est plus importante que la conservation des forêts	□	□	□	□	□
25. Quand des décisions sont prises concernant une forêt, les intérêts des communautés les plus près de la forêt devraient être priorisés par rapport aux intérêts des communautés plus éloignées	□	□	□	□	□
26. Les forêts de la Mauricie sont actuellement gérées de manière appropriée afin de permettre leurs utilisations à des fins récréatives	□	□	□	□	□
27. Les forêts de la Mauricie sont actuellement gérées de manière appropriée afin de permettre la cueillette de fruits et de champignons	□	□	□	□	□
28. Les forêts de la Mauricie sont actuellement gérées de façon appropriée afin de permettre la chasse	□	□	□	□	□
29. Les forêts de la Mauricie sont actuellement gérées de façon appropriée afin de permettre l'expérience de vie de haute qualité dans la forêt	□	□	□	□	□

Quels sont les facteurs les plus importants qui contribuent à la qualité de l'expérience de vie en forêt?

PARTIE III LE CHOIX DES OPTIONS

Nous vous demandons maintenant de répondre à huit mises en situation différentes. Chaque situation est décrite à l'aide de cinq attributs. Les descriptions des attributs et les instructions pour le choix des groupes d'options sont présentées sur les pages qui suivent.

INSTRUCTIONS POUR LE CHOIX DES OPTIONS DE LA PARTIE III

Dans l'exercice suivant, nous aimerions connaître votre opinion à propos des scénarios de la forêt en Mauricie. Dans chaque cas, nous aimerions que vous compariez la situation actuelle de la forêt avec deux scénarios futurs possibles.

Chaque groupe d'options est décrit par cinq attributs qui sont expliqués sur la page suivante. Veuillez considérer l'importance des attributs selon vous et comparez ensuite les options données pour chaque situation. Nous vous présentons huit choix de groupes d'options différents. Veuillez traiter chaque groupe d'options comme un seul choix en ne tenant pas compte des choix que vous avez fait précédemment, ni des choix futurs. La situation actuelle ou l'Option 1 est toujours la même et vous pouvez la choisir si vous pensez qu'elle est la meilleure option.

Pour chaque groupe d'options, choisissez l'option que vous préférez le plus (ou qui vous semble la moins inappropriée) selon votre opinion personnelle et cochez la case correspondant à l'option choisie. Certaines combinaisons d'attributs n'apparaissent pas toujours sensées. Cependant, assumez qu'il est possible que ce soit dû à une relation incertaine entre certains attributs.

Vous aurez probablement à choisir une option qui ne correspond pas à tous vos attributs optimaux. Dans ce cas, votre choix doit être basé sur l'attribut ou les attributs que vous considérez le ou les plus importants.

1. Comparez les options offertes à chaque situation

Exemple:

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	8 % (Situation actuelle+6%)	12 % (Situation actuelle+10%)
Taille moyenne des coupes de régénération	25 ha	25ha	Coupe sélective ou partielle seulement
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes et espèces vedettes	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées
Nombre d'emplois forestiers	8 300	9 130 (+10%)	8 300
Augmentation de vos dépenses annuelles, $ par foyer	0 $	42 $	140 $

Option préférée: (Cochez une seule case)	1□	2 x	3□

J'aime l'option 2 parce qu'elle offre la meilleure combinaison

2. Indiquez votre choix en cochant la case appropriée

DESCRIPTION DES ATTRIBUTS POUR LA PARTIE III

1. Proportion des aires protégées du territoire forestier en Mauricie

La situation actuelle est calculée en utilisant les données des aires protégées qui forment une partie du réseau national d'aires protégées. La proportion actuelle du territoire forestière est de 2 %. Les niveaux futurs plus élevés peuvent inclure des aires protégées qu'on déciderait d'implanter dans les unités d'aménagement forestier pour la protection de la biodiversité.

Niveau 1	2 %	Situation actuelle
Niveau 2	5 %	Situation actuelle + 3 %
Niveau 3	8 %	Situation actuelle + 6 %
Niveau 4	12 %	Situation actuelle + 10 %

2. Taille moyenne des coupes de régénération en Mauricie

Une coupe est définie comme étant une surface de plus de 1 hectare où la majorité des arbres est coupée (5 à 20 arbres par hectares peuvent être laissés sur les aires de coupe). 1 h hectare est équivalent d'environ 2 terrains de football.

Niveau 1	Coupe sélective ou partielle seulement	
Niveau 2	12.5 ha	Situation actuelle /2
Niveau 3	25 ha	Situation actuelle
Niveau 4	50 ha	Situation actuelle x2

3. Espèces d'animaux vivant dans les forêts de la Mauricie

Cet attribut décrit quelles espèces de mammifères et d'oiseaux vivent dans les forêts de la Mauricie. Cela permet d'indiquer les habitats disponibles pour les diverses espèces d'animaux. Ici nous considérons les espèces qui sont probablement affectées négativement par les changements dans les conditions forestières causées par la foresterie, comme par exemple des changements dans la structure d'âge, dans la composition des espèces d'arbres et de la quantité de bois mort dans la forêt. L'aménagement forestier réduit la proportion des vielles forêts et augmente la proportion de forêts au stade de succession primaire.

Niveau 1 Espèces communes seulement

Les forêts supportent seulement les espèces les plus communes, comme l'orignal et le lièvre, qui sont favorisées ou non affectées par la foresterie. Les autres espèces ont disparues dû aux changements de conditions dans les forêts.

Niveau 2 Espèces communes et espèces vedettes

En addition des espèces plus communes, les forêts supportent des espèces vedettes, c'est-à-dire des espèces de grands mammifères et d'oiseaux qui souffrent moyennement des activités forestières, comme par exemple l'ours noir, le tétras, le grand pic et le grand-duc d'Amérique.

Niveau 3 Espèces communes, espèces vedettes et quelques espèces de vieilles forêts

Ce niveau correspond à la situation actuelle. En addition des espèces plus communes et des espèces vedettes, les forêts supportent quelques espèces de vieilles forêts et quelques espèces susceptibles, comme par exemple la martre et le loup de l'Est.

Niveau 4 Espèces communes, espèces vedettes, quelques espèces rares et quelques espèces menacées

En addition des espèces plus communes, des espèces vedettes et de quelques espèces de vieilles forêts, les forêts supportent quelques espèces vulnérables ou menacées, comme par exemple le carcajou et le pygargue à tête blanche.

4. Nombre d'emplois forestiers en Mauricie

L'attribut du secteur d'emploi forestier inclut les emplois locaux et régionaux en foresterie et l'industrie forestière de la Mauricie. La situation actuelle est de 8 300 emplois. Cette donnée est basée sur les informations de l'année 2002.

Niveau 1	6 640	Situation actuelle -20 %
Niveau 2	7 470	Situation actuelle -10 %
Niveau 3	8 300	Situation actuelle
Niveau 4	9 130	Situation actuelle +10 %

5. Augmentation des dépenses annuelles des foyers en Mauricie

L'augmentation des dépenses annuelles des foyers résulte de l'augmentation des taxes, des prix de la marchandise et des coûts des services. Ce fait est causé par une diminution des revenus provenant du milieu forestier due à l'augmentation de la conservation. Cela a des impacts sur l'économie locale et régionale.

Niveau 1	0 $	Situation actuelle
Niveau 2	42 $	
Niveau 3	140 $	
Niveau 4	420 $	

Groupe d'options 1: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	12 % (Situation actuelle +10%)	5 % (Situation actuelle +3%)
Taille moyenne des coupes de régénération	25 ha	12.5 ha (Situation actuelle /2)	Coupe sélective ou partielle seulement
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées	Espèces communes seulement
Nombre d'emplois forestiers	8 300	6 640 (-20 %)	7 470 (-10 %)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	420 $	42 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 2: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	2 %	5 % (Situation actuelle +3%)
Taille moyenne des coupes de régénération	25 ha	12,5 ha (Situation actuelle /2)	50 ha (Situation actuelle x2)
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes seulement	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées
Nombre d'emplois forestiers	8 300	6 640 (-20 %)	9 130 (+10%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	140 $	420 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 3: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	5 % (Situation actuelle +3 %)	8 % (Situation actuelle +6 %)
Taille moyenne des coupes de régénération	25 ha	25 ha	Coupe sélective ou partielle seulement
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes seulement	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts
Nombre d'emplois forestiers	8 300	6 640 (-20%)	9 130 (+10%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	420 $	0 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 4: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	5 % (Situation actuelle +3 %)	8 % (Situation actuelle +6 %)
Taille moyenne des coupes de régénération	25 ha	12,5 ha (Situation actuelle /2)	50 ha (Situation actuelle x2)
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées	Espèces communes et espèces vedettes
Nombre d'emplois forestiers	8 300	8 300	7 470 (-10%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	42 $	140 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 5: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	8 % (Situation actuelle +6 %)	12 % (Situation actuelle +10%)
Taille moyenne des coupes de régénération	25 ha	25 ha	Coupe sélective ou partielle seulement
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées
Nombre d'emplois forestiers	8 300	9 130 (+10%)	8 300
Augmentation de vos dépenses annuelles, $ par foyer	0 $	42 $	140 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 6: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	8 % (Situation actuelle +6 %)	12 % (Situation actuelle +10%)
Taille moyenne des coupes de régénération	25 ha	12.5 ha (Situation actuelle /2)	50 ha (Situation actuelle x2)
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes et espèces vedettes	Espèces communes seulement
Nombre d'emplois forestiers	8 300	7 470 (-10%)	6 640 (-20%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	420 $	0 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 7: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	12 % (Situation actuelle +10%)	2 %
Taille moyenne des coupes de régénération	25 ha	25 ha	Coupe sélective ou partielle seulement
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées	Espèces communes et espèces vedettes
Nombre d'emplois forestiers	8 300	7 470 (-10%)	6 640 (-20%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	140 $	420 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 8: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	12 % (Situation actuelle +10%)	2 %
Taille moyenne des coupes de régénération	25 ha	12.5 ha (Situation actuelle /2)	50 ha (Situation actuelle x2)
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes seulement	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts
Nombre d'emplois forestiers	8 300	9 130 (+10%)	8 300
Augmentation de vos dépenses annuelles, $ par foyer	0 $	0 $	42 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

B.5 THE MAURICIE, VERSION 2 OF THE CHOICE EXPERIMENT

Groupe d'options 1: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	2 %	5 % (Situation actuelle +3%)
Taille moyenne des coupes de régénération	25 ha	Coupe sélective ou partielle seulement	12,5 ha (Situation actuelle /2)
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes seulement	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts
Nombre d'emplois forestiers	8 300	7 470 (-10 %)	6 640 (-20 %)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	42 $	140 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 2: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	2 %	5 % (Situation actuelle +3%)
Taille moyenne des coupes de régénération	25 ha	50 ha (Situation actuelle x2)	25 ha
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées	Espèces communes et espèces vedettes
Nombre d'emplois forestiers	8 300	9 130 (+10%)	8 300
Augmentation de vos dépenses annuelles, $ par foyer	0 $	420 $	0 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 3: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	5 % (Situation actuelle +3 %)	8 % (Situation actuelle +6 %)
Taille moyenne des coupes de régénération	25 ha	Coupe sélective ou partielle seulement	12,5 ha (Situation actuelle /2)
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes et espèces vedettes	Espèces communes seulement
Nombre d'emplois forestiers	8 300	9 130 (+10%)	8 300
Augmentation de vos dépenses annuelles, $ par foyer	0 $	140 $	420 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 4: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	5 % (Situation actuelle +3 %)	8 % (Situation actuelle +6 %)
Taille moyenne des coupes de régénération	25 ha	50 ha (Situation actuelle x2)	25 ha
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées
Nombre d'emplois forestiers	8 300	7 470 (-10%)	6 640 (-20%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	0 $	42 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 5: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	8 % (Situation actuelle +6 %)	12 % (Situation actuelle +10%)
Taille moyenne des coupes de régénération	25 ha	Coupe sélective ou partielle seulement	12.5 ha (Situation actuelle /2)
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées	Espèces communes et espèces vedettes
Nombre d'emplois forestiers	8 300	6 640 (-20%)	9 130 (+10%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	0 $	42 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 6: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	8 % (Situation actuelle +6 %)	12 % (Situation actuelle +10%)
Taille moyenne des coupes de régénération	25 ha	50 ha (Situation actuelle x2)	25 ha
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes seulement	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts
Nombre d'emplois forestiers	8 300	8 300	7 470 (-10%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	140 $	420 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 7: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	12 % (Situation actuelle +10%)	2 %
Taille moyenne des coupes de régénération	25 ha	Coupe sélective ou partielle seulement	12.5 ha (Situation actuelle /2)
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes, espèces vedettes, quelques espèces de vieilles forêts et quelques espèces menacées
Nombre d'emplois forestiers	8 300	8 300	7 470 (-10%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	420 $	0 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

Groupe d'options 8: Veuillez sélectionner l'une des trois options en cochant la case correspondant à l'option que vous préférez.

Attributs de la Mauricie	**Option 1** Situation actuelle	**Option 2**	**Option 3**
Aires protégées, % de territoire forestier	2 %	12 % (Situation actuelle +10%)	2 %
Taille moyenne des coupes de régénération	25 ha	50 ha (Situation actuelle x2)	25 ha
Espèces d'animaux supportées par la forêt	Espèces communes, espèces vedettes et quelques espèces de vieilles forêts	Espèces communes et espèces vedettes	Espèces communes seulement
Nombre d'emplois forestiers	8 300	6 640 (-20%)	9 130 (+10%)
Augmentation de vos dépenses annuelles, $ par foyer	0 $	42 $	140 $

Option préférée: (Cochez une seule case)	1☐	2☐	3☐

B.6 QUESTIONNAIRE FOR SOUTHEASTERN FINLAND, VERSION 1 OF THE CHOICE EXPERIMENT

KYSELYTUTKIMUS KAAKKOIS-SUOMEN METSIEN KÄYTÖN VAIHTOEHDOISTA

Tämän tutkimuksen tarkoituksena on selvittää, millainen on metsien käytön tärkeysjärjestys Kaakkois-Suomen eri toimijaryhmien keskuudessa. Tuloksilla on vaikutusta siihen, miten metsiä hoidetaan tulevaisuudessa ja mitä seikkoja otetaan huomioon metsien käytön suunnittelussa. Tutkimus toteutetaan yhteistyössä Kaakkois-Suomen metsäohjelmatyötä koordinoivan Kaakkois-Suomen metsäkeskuksen kanssa.

Kiitos, kun käytätte aikaanne tämän kyselylomakkeen täyttämiseen. Yrittäkää vastata kaikkiin kysymyksiin.

Kaikki antamanne tiedot käsitellään luottamuksellisina. Nimenne ei koskaan esiinny vastaustenne yhteydessä. Tutkimuksesta julkaistaan vain yhteenvetotietoja.

Kiitos avustanne !

Kati Berninger
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TILAISUUS

Päivämäärä: _____ Paikkakunta _____

luonnonsuojelijat	□	metsien monikäyttäjät	□
metsäammattilaiset	□	metsänomistajat	□

OSA I VASTAAJAN TAUSTATIEDOT

Seuraavat kysymykset auttavat selvittämään, onko vastaajien taustan ja mielipiteiden välillä yhteyksiä. Nimenne ei esiinny vastaustenne yhteydessä. Jos joukossa on kuitenkin mielestänne liian henkilökohtaisia kysymyksiä, voitte jättää niihin vastaamatta ja siirtyä seuraaviin kysymyksiin.

Ikä _____ vuotta

1. Sukupuoli
□ nainen □ mies

2. Kuulun tämän tilaisuuden intressiryhmän lisäksi myös seuraaviin intressiryhmiin:
□ luonnonsuojelijat
□ metsäammattilaiset
□ metsien monikäyttäjät
□ metsänomistajat

3. Asuinpaikka
□ maaseutu
□ taajama tai pieni kaupunki
□ kaupunki, 20 000-50 000 as.
□ kaupunki, yli 50 000 as.

4. Koulutus
□ perus- tai kansakoulu
□ ylioppilas
□ ammattikoulu
□ opistotasoinen tutkinto
□ yliopisto- tai korkeakoulututkinto
□ muu koulutus

5. Asema työelämässä
□ maa- tai metsätalousyrittäjä
□ luontoyrittäjä
□ muu itsenäinen yrittäjä
□ erityisasiantuntija/johtava asema
□ asiantuntija
□ toimisto- tai asiakaspalvelutyöntekijä
□ palvelu-, myynti- tai hoitotyöntekijä
□ rakennus-, korjaus- tai valmistustyöntekijä
□ prosessi- tai kuljetustyöntekijä
□ eläkeläinen
□ opiskelija
□ työtön
□ omaa kotitaloutta hoitava
□ muu, mikä _____

6. Kotitalouteni yhteenlasketut tulot kuukaudessa ennen verotusta
□ alle 500 €
□ 501-1000 €
□ 1001-2000 €
□ 2001-3000 €
□ 3001-4000 €
□ 4001-5000 €
□ 5001-6000 €
□ 6001-7000 €
□ yli 7000 €

7. Harrastan Kaakkois-Suomen metsissä (voitte valita useampia kohtia):
□ marjastusta tai sienestystä
□ metsästystä
□ kalastusta
□ luonnon tarkkailua
□ retkeilyä

OSA II MITÄ AJATTELETTE METSISTÄ JA METSIEN HOIDOSTA

Seuraaviin kysymyksiin ei ole oikeita tai vääriä vastauksia. Haluamme tietää teidän oman, harkitun mielipiteenne asiasta. Voitte myös halutessanne kommentoida kysymyksiä lomakkeessa olevaan tyhjään tilaan. Yrittäkää vastata kaikkiin kysymyksiin. Jos joukossa on kuitenkin kysymyksiä, joihin ette halua vastata, voitte jättää ne väliin ja siirtyä seuraavaan kysymykseen.

1. Meitä kiinnostaa, mitä ihmiset ajattelevat metsistä ja tuntevat metsiä kohtaan. Olkaa hyvä ja valitkaa jokaisesta väittämästä se vaihtoehto, joka parhaiten kuvastaa mielipidettänne.

	Täysin samaa mieltä	Jonkin verran samaa mieltä	Jonkin verran eri mieltä	Täysin eri mieltä	En osaa sanoa
Metsät antavat rauhan ja hyvänolon tunteen	□	□	□	□	□
Metsien tulisi antaa kasvaa ja kehittyä luontaisesti ilman ihmisen tekemiä hoitotoimia	□	□	□	□	□
Metsien hoidolla tulisi pyrkiä tyydyttämään mahdollisimman monia erilaisia ihmisten tarpeita	□	□	□	□	□
Metsässä tunnen olevani osa luontoa	□	□	□	□	□
Eläimillä, kasveilla ja ihmisillä pitäisi olla yhtäläiset oikeudet elää ja kasvaa	□	□	□	□	□
Metsänomistajan pitäisi saada hoitaa metsäänsä haluamallaan tavalla	□	□	□	□	□
On tärkeää säilyttää metsät, jotta tulevillakin sukupolvilla olisi mahdollisuus nauttia niistä	□	□	□	□	□
Metsät ovat pääasiassa ihmisten tarpeita varten	□	□	□	□	□
Metsillä on olemassaolon oikeus ja itseisarvo, joka on ihmisen käytöstä ja tarpeista riippumaton	□	□	□	□	□
Metsien tärkein tehtävä on ihmisille hyödyllisten raaka-aineiden tuottaminen	□	□	□	□	□
Ihmisten tulisi kunnioittaa ja arvostaa metsiämme nykyistä enemmän	□	□	□	□	□
On luonnonvarojen tuhlausta, jos metsää ei käytetä ihmisten hyödyksi	□	□	□	□	□
Metsien päätehakkuut rumentavat maisemaa	□	□	□	□	□
Hoidettu metsä on kaunis	□	□	□	□	□
Metsätalous vähentää riistakantoja	□	□	□	□	□
Metsätalous vähentää marja- ja sienisatoja	□	□	□	□	□

2. Seuraavassa teiltä kysytään mielipiteitänne Kaakkois-Suomen metsien hoidosta. Olkaa hyvä ja valitkaa jokaisesta väittämästä se vaihtoehto, joka parhaiten kuvastaa mielipidettänne.

	Täysin samaa mieltä	Jonkin verran samaa mieltä	Jonkin verran eri mieltä	Täysin eri mieltä	En osaa sanoa
Kaakkois-Suomen metsiä hoidetaan nykyisin monia käyttötarkoituksia eikä vain puuntuotantoa varten	□	□	□	□	□
Metsien hoidossa otetaan nykyisin hyvin ympäristöasiat huomioon	□	□	□	□	□
Kaakkois-Suomessa on riittävästi luonnonsuojelualueita	□	□	□	□	□
Kaakkois-Suomen puuvarat riittävät tulevaisuudenkin tarpeisiin	□	□	□	□	□
Nykyiset hakkuumäärät ylittävät kestävän tason	□	□	□	□	□
Kaakkois-Suomen metsiä hoidetaan siten, että tulevat sukupolvet hyötyvät niistä	□	□	□	□	□
Metsätaloudesta saatava taloudellinen hyöty on yleensä tärkeämpää kuin sen haitalliset vaikutukset	□	□	□	□	□
Maaseudun säilyttäminen elinvoimaisena on tärkeämpää kuin metsien suojelu	□	□	□	□	□
Metsien käyttöä koskevassa päätöksenteossa lähialueen ihmisten näkemyksiä tulisi pitää tärkeämpinä kuin kauempana asuvien näkemyksiä	□	□	□	□	□
Kaakkois-Suomen metsiä hoidetaan nykyisin siten, että ne soveltuvat hyvin virkistyskäyttöön	□	□	□	□	□
Kaakkois-Suomen metsiä hoidetaan nykyisin siten, että ne soveltuvat hyvin marjastukseen ja sienestykseen	□	□	□	□	□
Kaakkois-Suomen metsiä hoidetaan nykyisin siten, että ne soveltuvat hyvin metsästykseen	□	□	□	□	□

OSA III VALINTA METSIEN KÄYTÖN VAIHTOEHTOJEN VÄLILLÄ

Seuraavaksi saatte vastattavaksenne kahdeksan erilaista valintatilannetta. Jokaista valintatilannetta kuvataan viiden tekijän avulla. Tekijöiden vastausohjeet löydätte erilliseltä värilliseltä paperilta.

Valintatilanne 1: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	8 % (nykyinen + 6 %)	3 % (nykyinen + 1 %)
Uudistusalan keskimääräinen koko	2 ha	1 ha (nykyinen/2)	Poimintahakkuu
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja	Vain yleiset lajit
Metsäsektorin työpaikat	15 950	12 760 (-20 %)	14 355 (-10 %)
Vuosittainen lisäkustannus kotitaloudelle	0 €	300 €	30 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 2: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	2 %	3 % (nykyinen + 1 %)
Uudistusalan keskimääräinen koko	2 ha	1 ha (nykyinen/2)	4 ha (nykyinenx2)
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Vain yleiset lajit	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja
Metsäsektorin työpaikat	15 950	12 760 (-20 %)	17 545 (+10%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	100 €	300 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 3: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	3 % (nykyinen + 1 %)	5 % (nykyinen + 3 %)
Uudistusalan keskimääräinen koko	2 ha	2 ha	Poimintahakkuu
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Vain yleiset lajit	Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja
Metsäsektorin työpaikat	15 950	12 760 (-20%)	17 545 (+10%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	300 €	0 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 4: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	3 % (nykyinen + 1 %)	5 % (nykyinen + 3 %)
Uudistusalan keskimääräinen koko	2 ha	1 ha (nykyinen/2)	4 ha (nykyinenx2)
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja	Yleiset lajit ja näyttävät lajit
Metsäsektorin työpaikat	15 950	15 950	14 355 (-10%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	30 €	100 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 5: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	5 % (nykyinen + 3 %)	8 % (nykyinen + 6 %)
Uudistusalan keskimääräinen koko	2 ha	2 ha	Poimintahakkuu
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja
Metsäsektorin työpaikat	15 950	17 545 (+10%)	15 950
Vuosittainen lisäkustannus kotitaloudelle	0 €	30 €	100 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 6: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	5 % (nykyinen + 3 %)	8 % (nykyinen + 6 %)
Uudistusalan keskimääräinen koko	2 ha	1 ha (nykyinen/2)	4 ha (nykyinenx2)
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit ja näyttävät lajit	Vain yleiset lajit
Metsäsektorin työpaikat	15 950	14 355 (-10%)	12 760 (-20%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	300 €	0 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 7: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	8 % (nykyinen + 6 %)	2 %
Uudistusalan keskimääräinen koko	2 ha	2 ha	Poimintahakkuu
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja	Yleiset lajit ja näyttävät lajit
Metsäsektorin työpaikat	15 950	14 355 (-10%)	12 760 (-20%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	100 €	300 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 8: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	8 % (nykyinen + 6 %)	2 %
Uudistusalan keskimääräinen koko	2 ha	1 ha (nykyinen/2)	4 ha (nykyinenx2)
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Vain yleiset lajit	Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja
Metsäsektorin työpaikat	15 950	17 545 (+10%)	15 950
Vuosittainen lisäkustannus kotitaloudelle	0 €	0 €	30 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

B.7 QUESTIONNAIRE FOR THE SOUTHEASTERN FINLAND VERSION 2 OF THE CHOICE EXPERIMENT

Valintatilanne 1: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	2 %	3 % (nykyinen + 1 %)
Uudistusalan keskimääräinen koko	2 ha	Poimintahakkuu	1 ha (nykyinen/2)
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Vain yleiset lajit	Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja
Metsäsektorin työpaikat	15 950	14 355 (-10 %)	12 760 (-20 %)
Vuosittainen lisäkustannus kotitaloudelle	0 €	30 €	100 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 2: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	2 %	3 % (nykyinen + 1 %)
Uudistusalan keskimääräinen koko	2 ha	4 ha (nykyinenx2)	2 ha
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja	Yleiset lajit ja näyttävät lajit
Metsäsektorin työpaikat	15 950	17 545 (+10%)	15 950
Vuosittainen lisäkustannus kotitaloudelle	0 €	300 €	0 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 3: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	3 % (nykyinen + 1 %)	5 % (nykyinen + 3 %)
Uudistusalan keskimääräinen koko	2 ha	Poimintahakkuu	1 ha (nykyinen/2)
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit ja näyttävät lajit	Vain yleiset lajit
Metsäsektorin työpaikat	15 950	17 545 (+10%)	15 950
Vuosittainen lisäkustannus kotitaloudelle	0 €	100 €	300 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 4: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	3 % (nykyinen + 1 %)	5 % (nykyinen + 3 %)
Uudistusalan keskimääräinen koko	2 ha	4 ha (nykyinenx2)	2 ha
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja
Metsäsektorin työpaikat	15 950	14 355 (-10%)	12 760 (-20%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	0 €	30 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 5: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	5 % (nykyinen + 3 %)	8 % (nykyinen + 6 %)
Uudistusalan keskimääräinen koko	2 ha	Poimintahakkuu	1 ha (nykyinen/2)
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja	Yleiset lajit ja näyttävät lajit
Metsäsektorin työpaikat	15 950	12 760 (-20%)	17 545 (+10%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	0 €	30 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 6: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	5 % (nykyinen + 3 %)	8 % (nykyinen + 6 %)
Uudistusalan keskimääräinen koko	2 ha	4 ha (nykyinenx2)	2 ha
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Vain yleiset lajit	Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja
Metsäsektorin työpaikat	15 950	15 950	14 355 (-10%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	100 €	300 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 7: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	8 % (nykyinen + 6 %)	2 %
Uudistusalan keskimääräinen koko	2 ha	Poimintahakkuu	1 ha (nykyinen/2)
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja
Metsäsektorin työpaikat	15 950	15 950	14 355 (-10%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	300 €	0 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

Valintatilanne 8: Valitkaa näistä kolmesta vaihtoehdosta se, jota pidätte parhaana laittamalla rasti alla olevaan ruutuun.

Metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	8 % (nykyinen + 6 %)	2 %
Uudistusalan keskimääräinen koko	2 ha	4 ha (nykyinenx2)	2 ha
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit ja näyttävät lajit	Vain yleiset lajit
Metsäsektorin työpaikat	15 950	12 760 (-20%)	17 545 (+10%)
Vuosittainen lisäkustannus kotitaloudelle	0 €	30 €	100 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1☐	2☐	3☐

B.8 CHOICE EXPERIMENT INSTRUCTIONS FOR SOUTHEASTERN FINLAND

OSAN III VALINTATILANTEIDEN VASTAUSOHJEET

Seuraavan tehtävän avulla haluamme selvittää mielipiteitänne metsien käytön vaihtoehdoista Kaakkois-Suomessa. Jokaisessa valintatilanteessa on tarkoitus verrata nykytilaa kahden vaihtoehtoisen kehityskuvan kanssa. Tehtävä sisältää kahdeksan erilaista valintatilannetta.

Jokaista vaihtoehtoa kuvataan seuraavalla sivulla esitettävien viiden tekijän avulla. Miettikää näiden tekijöiden merkitystä omalta kannaltanne ja vertailkaa kussakin valintatilanteessa esitettyjä vaihtoehtoja. Tarkastelkaa jokaista valintatilannetta itsenäisenä, vaikka ne vaikuttavatkin toistensa kaltaisilta. Nykytilanne eli vaihtoehto 1 on aina sama ja sen voitte halutessanne myös valita parhaaksi vaihtoehdoksi.

Valitkaa vaihtoehdoista se, joka on mielestänne paras (tai vähiten huono) ja merkitkää valitsemanne vaihtoehto laittamalla rasti sen alla olevaan ruutuun.

Kaikki yhdistelmät eivät ehkä vaikuta järkeviltä, mutta voitte olettaa, että ne ovat mahdollisia siksi, ettei kaikkien tekijöiden välisiä vuorovaikutussuhteita tunneta kovin hyvin.

Todennäköisesti joudutte valitsemaan vaihtoehdon, jossa kaikki tekijät eivät mielestänne ole parhaalla mahdollisella tasolla. Tällöin valintanne perustuu tärkeimpinä pitämiinne tekijöihin tai vaikka vain yhteen tekijään.

Esimerkki valintatilanteeseen vastaamisesta

1. Vertailkaa näitä kolmea vaihtoehtoa

Kaakkois-Suomen metsien käytön vaihtoehtoja kuvaavat tekijät	**Vaihtoehto 1** Nykytilanne	**Vaihtoehto 2**	**Vaihtoehto 3**
Suojelualueiden osuus metsämaasta	2 %	5 % (nykyinen + 3 %)	8 % (nykyinen + 6 %)
Uudistusalan keskimääräinen koko	2 ha	2 ha	Poimintahakkuu
Metsässä viihtyvät eläimet	Yleiset lajit ja näyttävät lajit	Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja	Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja
Metsäsektorin työpaikat	15 950	17 545 (+10%)	15 950
Vuosittainen lisäkustannus kotitaloudelle	0 €	30 €	100 €

Paras vaihtoehto on: (rastittakaa vain yksi ruutu)	1 ☐	2 X	3 ☐

2. Merkitkää valintanne rastilla

Pidän vaihtoehdosta 2, sillä siinä on mielestäni paras yhdistelmä

OSAN III VAIHTOEHTOJA KUVAAVAT TEKIJÄT

1. Suojelualueiden osuus metsämaasta Kaakkois-Suomessa

Suojelualueet sisältävät luonnonsuojelulain nojalla rauhoitetut alueet ja niiden lisäksi metsälain tarkoittamat erityisesti suojeltavat elinympäristöt. Metsämaahan ei lasketa kitu- ja joutomaata, kuten soita.

Taso 1	2 %	Nykytila
Taso 2	3 %	Nykytila + 1 %
Taso 3	5 %	Nykytila + 3 %
Taso 4	8 %	Nykytila + 6 %

2. Uudistusalan keskimääräinen koko Kaakkois-Suomessa

Uudistusala tarkoittaa tässä vähintään hehtaarin kokoisia alueita, joilla tehdään avo- tai siemenpuuhakkuita. Alle hehtaarin alat katsotaan poimintahakkuiksi. Uudistusalan keskimääräisen koon nykytila on tässä laskennallisista syistä pyöristetty ylöspäin kahteen hehtaariin.

Taso 1	Poimintahakkuu	
Taso 2	1 ha	Nykytila/2
Taso 3	2 ha	Nykytila
Taso 4	4 ha	Nykytilax2

3. Metsässä viihtyvät eläimet Kaakkois-Suomessa

Tämä muuttuja kuvaa sitä, millaisia nisäkkäitä ja lintuja elää Kaakkois-Suomen metsissä ja sitä kautta miten monimuotoisen elinympäristön kaakkoissuomalainen metsä muodostaa. Yli kol-manneksella Suomen uhanalaisista lajeista metsätalous on pääasiallinen uhkatekijä. Tärkeimpinä metsälajien uhanalaisuuden syinä pidetään lahopuun vähenemistä ja puulajisuhteiden muutoksia.

Taso 1 *Yleiset lajit*

Metsissä elää vain yleisimpiä lajeja, kuten hirvi ja jänis, jotka joko hyötyvät metsätaloudesta tai ovat sen suhteen neutraaleja. Muut lajit ovat muuttuneen elinympäristön takia hävinneet.

Taso 2 *Yleiset lajit ja näyttävät lajit*

Nykytilanne. Metsissä elää yleisimpien lajien lisäksi näyttäviä suuria nisäkkäitä ja lintuja, jotka kärsivät jonkin verran metsätaloudesta, esimerkiksi mäyrä, palokärki, pyy

Taso 3 *Yleiset lajit, näyttävät lajit ja joitakin harvinaisia lajeja*

Metsissä elää yleisimpien ja näyttävien lajien lisäksi joitakin harvinaisia tai uhanalaisuusluokituksen mukaan silmälläpidettäviä lajeja, esimerkiksi karhu, teeri, metso

Taso 4 *Yleiset lajit, näyttävät lajit, joitakin harvinaisia lajeja ja joitakin uhanalaisia lajeja*

Metsissä elää yleisimpien, näyttävien ja harvinaisten lajien lisäksi joitakin erittäin uhanalaisia tai vaarantuneita lajeja, esimerkiksi pikkutikka, liito-orava, maakotka

4. Metsäsektorin työpaikat Kaakkois-Suomessa

Metsäsektorin työpaikat sisältävät sekä metsätalouden että metsäteollisuuden työpaikat Kaakkois-Suomessa. Nykytilaa kuvaava luku on vuodelta 2002, jolloin metsätalouden työpaikkoja oli 1 370 kappaletta ja metsäteollisuuden työpaikkoja 14 580 kappaletta.

Taso 1	12 760	Nykytila -20 %
Taso 2	14 355	Nykytila -10 %
Taso 3	15 950	Nykytila
Taso 4	17 545	Nykytila +10 %

5. Vuosittainen lisäkustannus kotitaloudelle Kaakkois-Suomessa

Vuosittainen kustannus kotitaloudelle koostuu verojen sekä tavaroiden ja palveluiden hintojen noususta. Kustannus johtuu lisääntyneen suojelun takia vähentyneistä metsätalouden tuloista ja niiden heijastusvaikutuksista paikalliseen ja alueelliseen talouteen.

Taso 1	0 €	Nykytila
Taso 2	30 €	
Taso 3	100 €	
Taso 4	300 €	

APPENDIX C SIMULATION RESULTS THAT WERE PRESENTED TO THE PARTICIPANTS IN CENTRAL LABRADOR

C.1 COPY OF THE POWERPOINT PRESENTATION

ALTERNATIVE FUTURES FOR THE DISTRICT 19A

Simulation results

Kati Berninger
September 2006

Why simulation?

- Computer models provide a simplified illustration of the forest
  - our model does not predict the future
  - our model does not tell us what will happen to a given plot of land

BUT we can use the model to

- show trends
- illustrate possible outcomes of our actions in the forest
  - long term: 200-400 years, 3-6 generations
    - What kind of forest will your grandchildren's' children have?
  - large scale: 1.1 million ha of forest land
- contrast possible outcomes of different management alternatives

Uncertainties in the model

- uncertainty in the input data
- uncertainty in our overall knowledge on the important factors and how they interact in the forest
- uncertainty in the stand dynamics
  - leads to uncertainty in the growth and yield information

District 19A

- Land area 2.1 mill. ha
- Forest area 1.2 mill. ha
- Limits:
  - East Kenamu River watershed
  - West Red Wine Mountains
  - North Mulligan and Red Wine Rivers
  - South Minipi Lake

20 year plan

- 2001 process agreement between the Innu Nation and the Department of Natural Resources
  - public meetings increased
- strategic plan 2003-2023
  - attempt to balance ecological, cultural and economic values
  - being revised

Scenarios

1. No plan scenario

- Harvest level 581 900 m^3/year
- No protected areas beyond legal requirements
- Block size 5-40 ha

2. Scenario continuing the 20 year plan

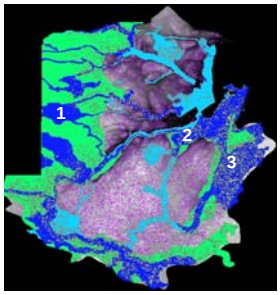
- Harvest level 222 500 m^3/year
  - calculated with growth and yield information
  - 38 % of scenario 1
- Protected forest area 698 809 ha
  - 59 % of the forest land

2a. Block size 5-40 ha
2b. Block size 1-10 ha

3. Scenario with only coarse protected areas

- Harvest level 312 300 m^3/year
  - 54 % of scenario 1
- Protected forest area 556 463 ha
  - 47 % of the forest land

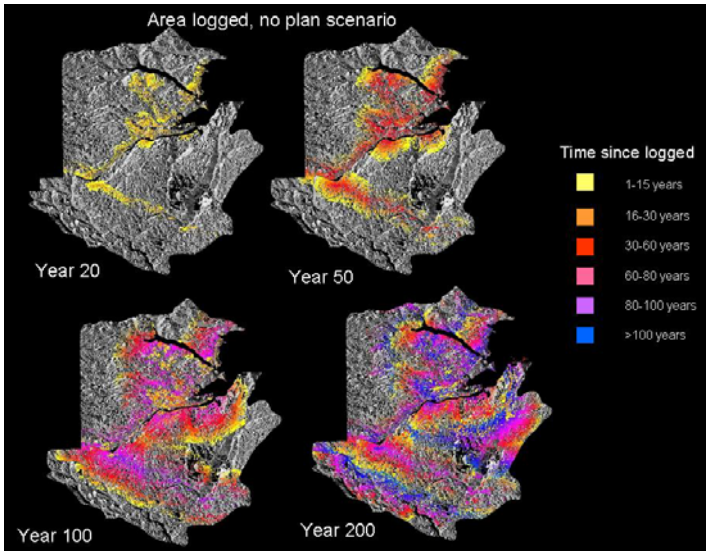
Protected areas network

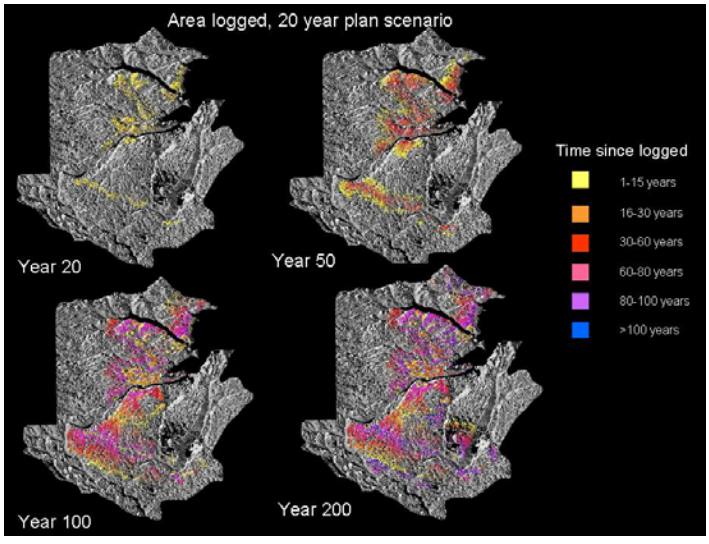


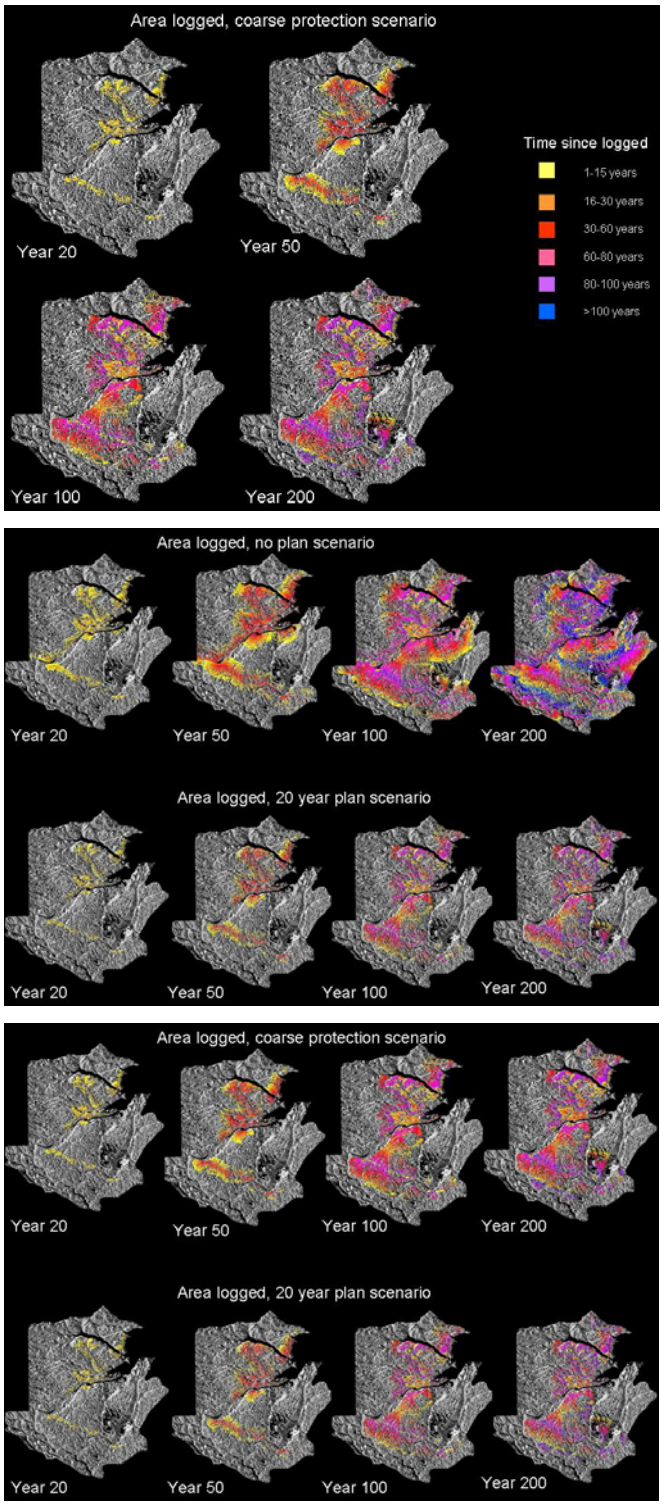
Ecological
Cultural
Ecological + cultural
Fine

1. Red Wine Caribou Reserve
2. Churchill River
3. Mealy Mountains

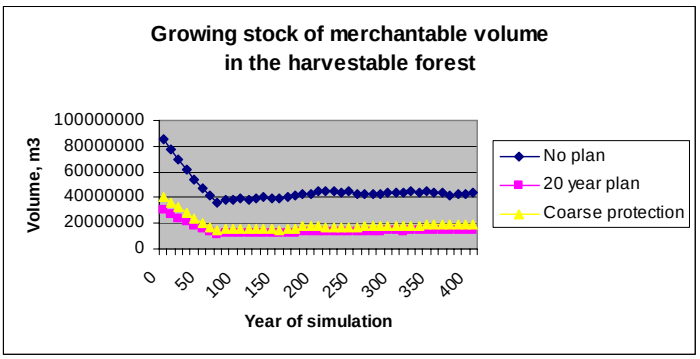
Simulation results follow…






Area logged, coarse protection scenario
Year 20
Year 50
Year 100
Year 200
Time since logged
1-15 years
16-30 years
30-60 years
60-80 years
80-100 years
>100 years
Area logged, no plan scenario
Year 20
Year 50
Year 100
Year 200
Area logged, 20 year plan scenario
Year 20
Year 50
Year 100
Year 200
Area logged, coarse protection scenario
Year 20
Year 50
Year 100
Year 200
Area logged, 20 year plan scenario
Year 20
Year 50
Year 100
Year 200

Is forest management economically sustainable?

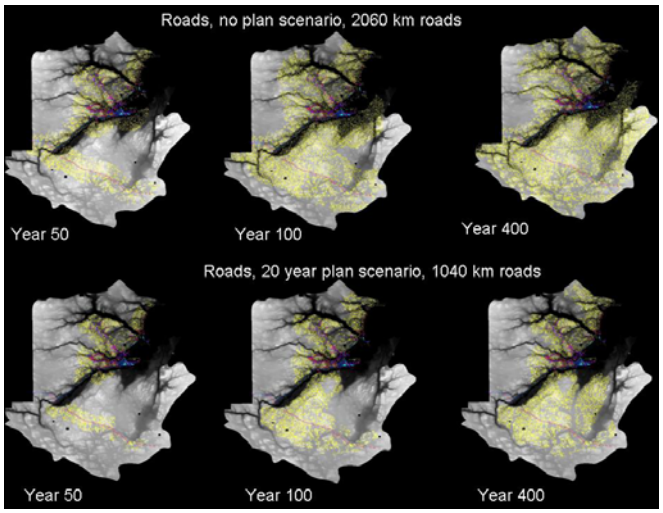


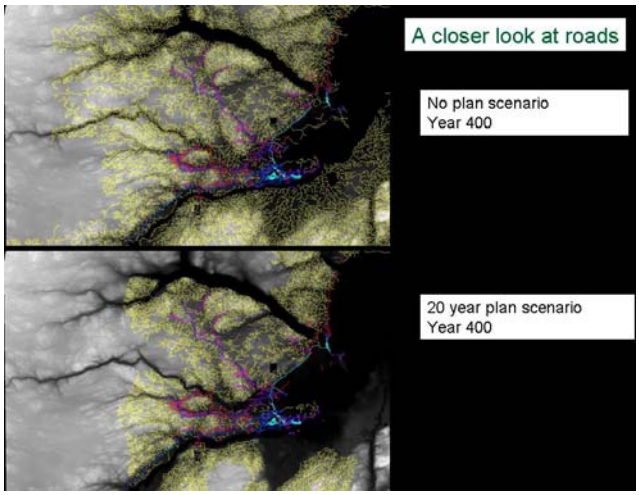
Harvesting and roads

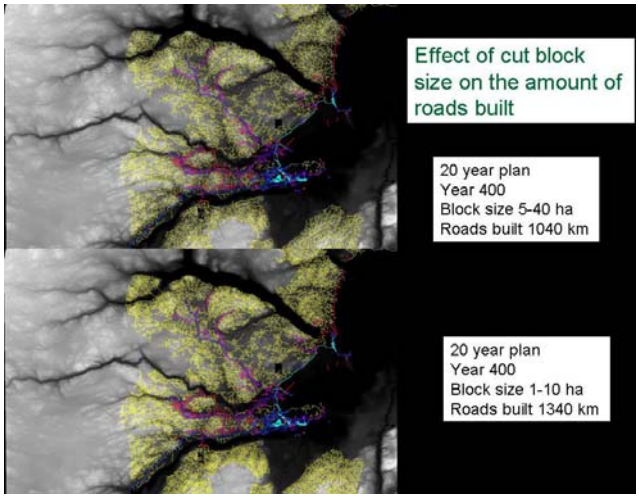
	Harvest level/year	Mean annual area harvested in 400 years	Mean harvest age in 400 years	Roads built in 400 years
1. No plan scenario	581 900 m^3	5 140 ha	133 years	2060 km 8,85 m/1000 m^3
2. Plan scenario	222 500 m^3	2 010 ha 39 % of scenario 1	121 years	1040 km 11,7 m/1000 m^3
3. Coarse protection scenario	312 300 m^3	2 840 ha 55 % of scenario 1	119 years	990 km 7,93 m/1000 m^3

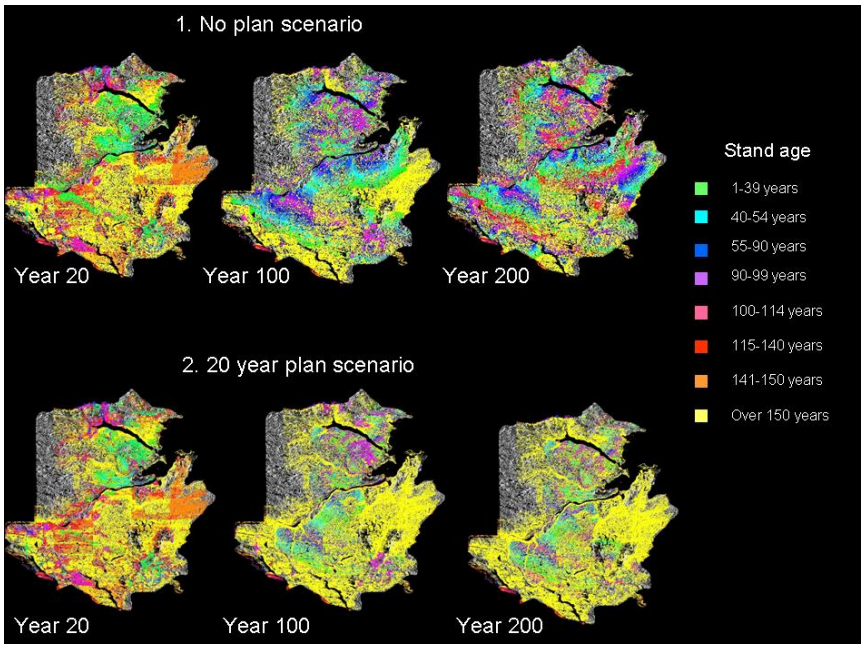
Roads

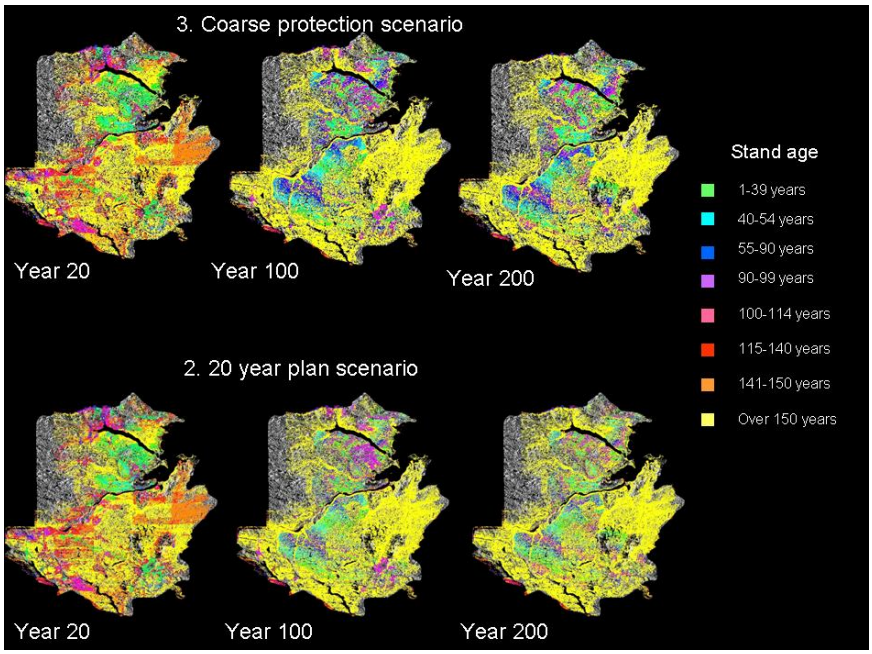
- Trade-off between road access to forest and habitat fragmentation
- Trade-off between road access and illegal hunting
- Road building is costly


Roads, no plan scenario, 2060 km roads
Year 50
Year 100
Year 400
Roads, 20 year plan scenario, 1040 km roads
Year 50
Year 100
Year 400

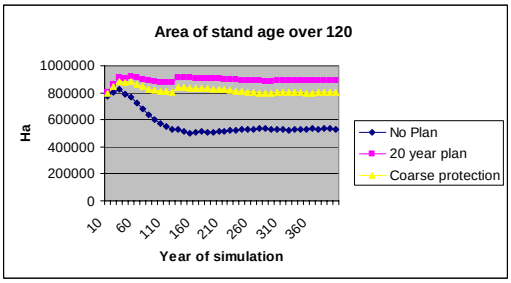

A closer look at roads
No plan scenario
Year 400
20 year plan scenario
Year 400


Effect of cut block size on the amount of roads built
20 year plan
Year 400
Block size 5-40 ha
Roads built 1040 km
20 year plan
Year 400
Block size 1-10 ha
Roads built 1340 km


1. No plan scenario
Year 20
Year 100
Year 200
2. 20 year plan scenario
Year 20
Year 100
Year 200
Stand age
1-39 years
40-54 years
55-90 years
90-99 years
100-114 years
115-140 years
141-150 years
Over 150 years


3. Coarse protection scenario
Year 20
Year 100
Year 200
2. 20 year plan scenario
Year 20
Year 100
Year 200
Stand age
1-39 years
40-54 years
55-90 years
90-99 years
100-114 years
115-140 years
141-150 years
Over 150 years

Will there be old forest for future generations?

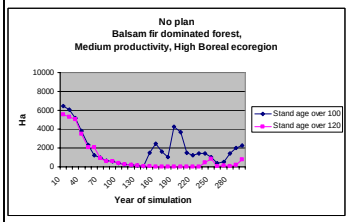


Forest types

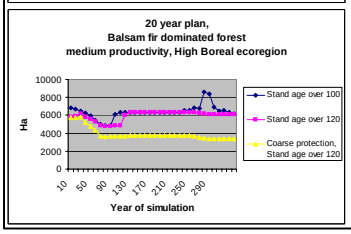
- Classification of the area according to
  - The dominant tree species
  - Soil productivity
  - Ecoregion
    - High boreal
    - Mid subarctic
    - Low subarctic

- The most common sites have medium or poor productivity and are dominated by black spruce

Area of old forest through time



In scenario 1 at least 4 forest types lose all their old forest at some point of time



In scenario 2 and 3 none of the forest types lose all their old forest

Summary of the scenarios

- No plan scenario
  - Maximizing the wood cut
  - Negative effects on biodiversity
  - A lot of roads built
- 20 year plan scenario
  - The lowest quantity of wood cut
  - Different forest types well protected
  - Medium km of roads built
  - The use of small cut blocks produces more roads than big cut blocks
- Coarse protection scenario
  - Medium quantity of wood cut
  - Different forest types protected
  - The least km of roads built

REFERENCES

Adam, M.C. and Kneeshaw, D. 2008. Local level criteria and indicator frameworks: A tool used to assess aboriginal forest ecosystem values. Forest Ecology and Management 255 (7): 2024-2032.

Adamowicz, W.L. and Burton, P.J. 2003. Sustainability and sustainable forest management. In: Burton, P.J., Messier, C., Smith, D.W., Adamowicz, W.L. (Eds.), Towards sustainable management of the boreal forest. NRC Research Press, Ottawa, pp. 41-64.

Adamowicz, W.L., Louviere, J. and Williams, M. 1994. Combining revealed and stated preference methods for valuing environmental amenities. Journal of Environmental Economics and Management 26(3): 271–292.

Adamowicz, W.L., Swait, J., Boxall, P.C., Louviere, J. and Williams, M. 1997. Perceptions versus objective measures of environmental quality in combined revealed and stated preference models of environmental valuation. Journal of Environmental Economics and Management 32: 65–84.

Adamowicz, W.L., Boxall, P., Williams, M. and Louviere, M. 1998a. Stated preference approaches for measuring passive use values: Choice experiments and contingent valuation. American Journal of Agricultural Economics 80(1): 64-75.

Adamowicz, W., Beckley, T., MacDonald, D.H., Just, L., Luckert, M., Murray, E. and Phillips, W. 1998b. In search of forest resource values of indigenous peoples. Society and Natural Resources 11: 51-66.

Ananda, J. and Herath, G. 2003. Incorporating stakeholder values into regional forest planning: a value function approach. Ecological Economics 45(1): 75-90.

Anderson, L.M. 1981. Land use designations affect perception of scenic beauty in forest landscapes. For. Sci. 27: 392-400.

Arvai, J. and Gregory, R. 2003. Testing Alternative Decision Approaches for Identifying Cleanup Priorities at Contaminated Sites. Environmental Science & Technology 37(8): 1469-1476.

Arvai, J.L., Gregory, R. and McDaniels, T.L. 2001. Testing a structured decision approach: Value-focused thinking for delibereative risk communication. Risk Analysis 21(6): 1065-1076.

Attiwill, P.M. and Adams, M.A. 2008. Harnessing forest ecological sciences in the service of stewardship and sustainability. A perspective from “down-under”. Forest Ecology and Management 256(10): 1636-1645.

Bechtel, R.B., Corral-Verdugo, V. and Pinheiro, J.Q. 1999. Environmental belief systems: United States, Brazil and Mexico. Journal of Crosscultural Psychology 30: 122-128.

Bechtel, R.B., Corral-Verdugo, V., Asai, M. and Gonzalez, A. 2006. A crosscultural study of environmental belief structures. International Journal of Psychology 41: 145-151.

Berninger, K. 2006. Millaisia teemoja ja painotuksia sisältyy kaakkoissuomalaisten mielestä kestävään metsätalouteen? Neljän intressiryhmän ajatuksia. Metsätieteen aikakauskirja 3: 399-410. (Which themes and rankings do forest users in Southeastern Finland include in SFM? Thoughts of four interest groups, In Finnish).

Berninger, K. 2007a. Neljän intressiryhmän näkemyksiä Kaakkois-Suomen metsien hoidosta. Alue ja ympäristö 36(1): 45-50. (Views of four interest groups on forest management in Southeastern Finland, In Finnish).

Berninger, K. 2007b. Attitudes des trois groupes d’intérêt sur les forêts et la foresterie en Mauricie. Rapport pour le projet TRIADE. Available at: http://www.projettriade.ca/recherche_doc.php Viewed 17.4. 2007.

Berninger, K. 2007c. Forest attitudes and preferences of five interest groups in Central Labrador. Report for the LFMI Project. Available at: http://www.lfmi.uqam.ca/report/report/Forest_attitudes_and_preferences.pdf Viewed 13.8. 2007.

Berninger, K., Kneeshaw, D. and Messier, C. 2009. The role of cultural models in local perceptions of SFM– differences and similarities of interest groups from three boreal regions. Journal of Environmental Management 90: 740-751.

Berninger, K. and Kneeshaw, D. Under review. Forest value orientations and attitudes towards forestry of interest groups in three regions varying in importance of commercial forestry. Submitted to Environmental Management.

Berninger, K., Kneeshaw, D. and Messier, C. Accepted. Effects of presenting forest simulation results on the forest values and attitudes of forestry professionals and other forest users in Central Labrador. Accepted in Forest Policy and Economics.

Berninger, K., Adamowicz, W.L., Kneeshaw, D. and Messier, C. Under review. SFM preferences of interest groups in three regions varying in importance of industrial forestry: An attribute-based choice experiment. Submitted to Journal of Environmental Management.

Beshears, J., Choi, J.J., Laibson, D. and Madrian, B.C. 2008. How are preferences revealed? Journal of Public Economics 92: 1787-1794

Biggs, J. 2003. Teaching for quality learning at university. Society for Research into Higher Education. Open University Press, Buckingham.

Bonaiuto, M., Martorella, H., Bonnes, M. 2002. Local identity processes and environmental attitudes in land use changes: The case of natural protected areas. Journal of Economic Psychology 23, 631–653

Bonnell, B. 2000. Assessing public opinion on sustainable forest management in Western Newfoundland. Results of the 1999 Western Newfoundland Model Forest public opinion survey on sustainable forest management. Western Newfoundland Model Forest, Corner Brook.

Boxall, P.C. and Macnab, B. 2000. Exploring the preferences of wildlife recreationists for features of boreal forest management: a choice experiment approach. Canadian Journal of Forest Research 30: 1931–1941.

Boxall, P.C., Adamowicz, W.L., Swait, J., Williams, M. and Louviere, J.J. 1996. A comparison of stated preference methods for environmental valuation. Ecological Economics 18: 243–253.

Bradley, G.A. and Kearney, A.R. 2007. Public and Professional Responses to the Visual Effects of Timber Harvesting: Different Ways of Seeing. Western Journal of Applied Forestry 22: 42-54.

Bright, A.D. and Manfredo, M.J. 1997. The influence of balanced information on attitudes toward natural resource issues. Society and Natural Resources 10: 469-483.

Bright, A.D., Manfredo, M.J. and Fulton, D.C. 2000. Segmenting the public: An application of value orientations to wildlife planning in Colorado. Wildlife Society Bulletin 28: 218-226.

Brown, G. and Raymond, C. 2007. The relationship between place attachment and landscape values: Toward mapping place attachment. Applied Geography 27(2): 89-111.

Brown, G. and Reed, P. 2000. Validation of a forest values typology for use in national forest planning. Forest Science 46(2): 240-247.

Brown, P.J. and Manfredo, M.J. 1987. Social values defined. In: Decker, D.J. and Goff, G.R. (eds.) Valueing wildlife: economic and social perspectives. Westview Press, Oxford. Pp. 12-23.

Brown, K., Adger, N.W., Tompkins, E., Bacon, P., Shim, D. and Young, K. 2001. Trade-off analysis for marine protected area management. Ecological Economics 37: 417-434.

Brunson, M.W. 1996. A definition of "social acceptability" in ecosystem management. In: Brunson, M.W.; Kruger, L.E.; Tyler, C.B. and Schroeder, S.A. (tech. eds.) Defining social acceptability in ecosystem management: a workshop proceedings. Gen. Tech. Rep. PNW-GTR-369. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 7-16.

Brunson, M.W., Shindler, B. and Steel, B. 1997. Consensus and dissension among rural and urban publics concerning forest management in the Pacific Northwest. In: Steel, B. (Ed.), Public Lands Management in the West. Greenwood Publishing, Westport, Connecticut, pp. 83-94.

Brynn, A. and Cramer, J.C. 1990. Quantitative data analysis for social scientists. Routledge, London and New York.

Buchy, M. and Hoverman, S. 2000. Understanding public participation in forest planning: a review. Forest Policy and Economics 1: 15-25.

Canada's Model Forest Program (CMFP). 2000. A User's Guide to Local Level Indicators of Sustainable Forest Management. Natural Resources Canada. CMFP.

Chess, C. and Johnson, B.B. 2006. Organizational learning about public participation: "Tiggers" and "Eeyores". Human Ecology Review 13(2): 182-192.

Clawson, M. 1975. Forest for whom and for what? John Hopkins University Press, Baltimore.

Corral-Verdugo, V., Carrus, G., Bonnes, M., Moser, G. and Sinha, J.B.P. 2008. Environmental beliefs and endorsement of sustainable development Principles in water conservation: Toward a New Human Interdependence Paradigm Scale. Environment and Behavior 40(5): 703-725.

Côté, M.-A. and Bouthillier, L. 1999. Analysis of the relationship among stakeholders affected by sustainable forest management and forest certification. Forestry Chronicle 75(6): 961-965.

Creswell, J.W. 2005. Research design: Qualitative, quantitative and mixed methods approaches. Sage Publications, Thousand Oaks.

Daniels, S.E. and Walker, G.B. 1996. Collaborative learning: improving public deliberation in ecosystem-based management. Environmental Impact Assessment Review 16(2): 71-102.

Davenport, M.A., Leahy, J.E., Anderson, D.A. and Jakes, P.J. 2007. Building trust in natural resource management within local communities: A case study of the Midewin National Tallgrass Prairie. Environmental Management 39(3): 352-368.

Davidson-Hunt, I. and Berkes, F. 2003. Learning as You Journey: Anishinaabe Perception of Social-ecological Environments and Adaptive Learning. Conservation Ecology 8(1): 5.

Davies, A.R. 2008. Civil society activism and waste management in Ireland: The Carranstown anti-incineration campaign. Land Use Policy 25(2): 161-172.

Eagly, A.H. and Chaiken, S. 1993. The psychology of attitudes. HBJ Publishers, Fortworth et al.

Elands, B.H.M., O'Leary, T.N., Boerwinkel, H.W.J. and Wiersum, K.F. 2004. Forests as a mirror of rural conditions. Forest Policy and Economics 6: 469-482.

Failing, L., Gregory, R., Harstone, M. 2007. Integrating science and local knowledge in environmental risk management: A decision-focused approach. Ecological Economics 64 (1): 47-60.

Fall, A. and Fall, J. 2001. A domain-specific language for models of landscape dynamics. Ecological Modelling 141: 1-18.

Fall, A., Daust, D. and Morgan, D.G. 2001. A framework and software tool to support collaborative landscape analysis: Fitting square pegs to square holes. Transactions in GIS 5 (1): 67-86.

Fall, A., Fortin, M.-J., Kneeshaw, D., Yamasaki, S., Messier, C., Bouthillier, L. and Smyth, S. 2004. Consequences of various landscape-scale ecosystem management strategies and fire cycles on age-class structure and harvest in boreal forests. Canadian Journal of Forest Research 34: 310-322.

Finnish statistical yearbook of forestry, 2006. SVT Agriculture, forestry and fishery 2006. Finnish Forest Research Institute, Vantaa.

Fischer, A. and van der Wal, R. 2007. Invasive plant suppresses charismatic seabird – the construction of attitudes towards biodiversity management options. Biological Conservation 135: 256–267.

Fishkin, J. 1991. Democracy and deliberation – New directions for democratic reform. Yale University Press, New Haven and London.

Fishkin, J. 1995. The voice of the people – public opinion and democracy. Yale University Press, New Haven and London.

Forsyth, J., Innes, L., Deering, K. and Moores, L. 2003. Forest Ecosystem Strategy Plan for Forest Management District 19 Labrador/Nitassinan. Innu Nation and Newfoundland and Labrador Dept.of Forest Resources and Agrifoods. Northwest River.

Freudenburg, W.R., Frickel, S. and Gramling, R. 1995. Beyond the nature/society divide: Learning to think about a mountain. Sociological Forum 10(3): 361-392.

Fulton, D.C., Manfredo, M.J. and Lipscomb, J. 1996. Wildlife value orientations: A conceptual and measurement approach. Human Dimensions of Wildlife 1: 24-47.

Gagnon-Thompson, S. and Barton, M. 1994. Ecocentric and anthropocentric attitudes toward the environment. Journal of Environmental Psychology 14: 149-157.

Goodland, R. 1995. The concept of environmental sustainability. Annual Review of Ecology and Systematics 26: 1-24.

Government of Quebec. 2004. Comission d'étude sur la gestion de la forêt publique québecoise. Rapport. Quebec City.

Government of Quebec. 2008. Forests: Building a Future for Québec. Green Paper. Ministère des Ressources naturelles et de la Faune (MRNF), Quebec City.

Grafton, R.Q., Adamowicz, W., Dupont, D., Nelson, H., Hill, R.J. and Renzetti, S. 2004. The economics of the environment and natural resources. Blackwell PublishingMalden, Oxford and Carlton. 503 p.

Greene, W. 2007. LIMDEP 9.0 Reference Guide. Econometric Software, Inc., Plainview.

Gregory, R. and Slovic, P. 1997. A constructive approach to environmental valuation. Ecological Economics 21: 175-181.

Gregory, R. and Wellman, K. 2001. Bringing stakeholder values into environmental policy choices: a community-based estuary case study. Ecological Economics 39: 37–52.

Groot, A., Gauthier, S. and Bergeron, Y. 2004. Stand dynamics modelling approaches for multicohort management of eastern Canadian boreal forests. Silva Fennica 38(4): 437–448.

Halifax Global. 2006. Strategic plan to develop Labrador secondary manufacturing and value added wood products industry. Available at: http://www.nr.gov.nl.ca/forestry/publications/labrador_wood_products_report_1.pdf Viewed 29.5. 2007

Hallikainen, V. 1998. The Finnish wilderness experience. Finnish Forest Research Institute, Research Papers 711, Rovaniemi.

Harshaw, H.W. and Tindall, D.B. 2005. Social structure, identities, and values: A nework approach to understanding people's relationship to forests. Journal of Leisure Research 37(4): 426-449.

Hellström, E. 2001. Conflict cultures. Silva Fennica Monogr. 2.

Hellström, E. and Reunala, A. 1995. Forest conflicts from the 1950's to 1983 – A review of a comparative study between USA, Germany, France, Sweden, Finland and Norway. European Forest Institute, EFI Research Report 3.

Hensher, D.A., Rose, J-M. and Greene, W.H. 2005. Applied Choice Analysis: A primer. Cambridge University Press, Cambridge et al.

Hill, D. and Daniel, T. 2008. Foundations for an ecological aesthetic: Can information alter landscape preferences? Society Nat. Resources 21: 34-49.

Horne, P. 2006. Forest owners' acceptance of incentive based policy instruments in forest biodiversity conservation – A choice experiment based approach. Silva Fennica 40: 169-178.

Horne, P. 2008. Use of choice experiments in assessing the role of policy instruments in social acceptability of forest biodiversity conservation in Southern Finland. In: Birol, E. & Koundouri, P. (eds.). Choice experiments informing environmental policy – A European perspective. Edward Elgar, Cheltenham & Northhampton. Pp. 178-197.

Horne, P., Karppinen, H. and Ylinen, E. 2004a. Kansalaisten mielipiteet metsien monimuotoisuuden turvaamisesta. In: Horne, P., Koskela, T. and Ovaskainen, V. (eds.). Metsänomistajien ja kansalaisten näkemykset metsäluonnon monimuotoisuuden turvaamisesta. Finnish Forest Research Institute Report 933, Vantaa. Pp. 25-46. In Finnish.

Horne, P., Koskela, T., Ovaskainen, V., Karppinen, H. and Naskali, A. 2004b. Metsänomistajien suhtautuminen yksityismetsien monimuotoisuuden turvaamiseen ja sen toteutuskeinoihin. In: Horne, P., Koskela, T. and Ovaskainen, V. (eds.). Metsänomistajien ja kansalaisten näkemykset metsäluonnon monimuotoisuuden turvaamisesta. Finnish Forest Research Institute Report 933, Vantaa. Pp. 47-73. In Finnish.

Horne, P., Boxall, P.C. and Adamowicz, W.L. 2005. Multiple-Use Management of Forest Recreation Sites: A Spatially Explicit Choice Experiment. Forest Ecology and Management 207: 189-199.

Howarth, R.B. and Wilson, M.A. 2006. A theoretical approach to deliberative valuation: Aggregation by mutual consent. Land Economics 82(1): 1-16.

Howell, D.C. 2004. Fundamental statistics for the behavioral sciences. Thomson, Brooks/Cole. Belmont et al. 5. edition.

Humphreys, D. 2004. Redefining the Issues: NGO Influence on International Forest Negotiations. Global Environmental Politics 4: 51-74.

Hunt, L. and McFarlane, B. 2007. Understanding self-evaluations of effectiveness by forestry advisory committee members: A case of Ontario's Local Citizens Committee members. Journal of Environmental Management 83: 105-114.

Hunter, M.L. Jr. 1990. Wildlife, forests, and forestry: Principles of managing forests for biological diversity. Englewood Cliffs, NJ, USA, Prentice Hall.

Hänninen, H. and Karppinen, H. 1996. Kansalaismielipide metsien suojelusta ja talouskäytöstä. Folia Forestalia 1: 27-39. In Finnish.

James, R.F. and Blamey, R.K. 2005. Deliberation and economic valuation: National park management. In: Getzer, M., Spash, C. and Stagl, S. (eds.) Alternatives for environmental valuation. Routledge, London & New York. Pp. 225-243.

Jong, C. 2007. Post-secondary education in Labrador. Prepared for Memorial University of Newfoundland. Available at: http://www.mun.ca/vpacademic/PSE_Labrador__final_Jan07.doc Viewed 16.4. 2007.

Juutinen, A., Mäntymaa, E., Mönkkönen, M. and Svento, R. 2008. Voluntary agreements in protecting privately owned forests in Finland - To buy or to lease? Forest Policy and Economics 10: 230-239.

Kaakkois-Suomen metsäkeskus (The Forest Centre of Southeastern Finland). 2005. Metsä- ja ympäristökertomus 2005. Kouvola. In Finnish.

Kaakkois-Suomen metsäkeskus (The Forest Centre of Southeastern Finland). 2006. Metsäohjelma 2006-2010. Kouvola. In Finnish.

Kangas, J. and Niemeläinen, P. 1995. Kansalaismielipide Suomen metsistä sekä metsien hoidosta ja käytöstä. Metsäntutkimuslaitoksen tiedonantoja 561, Kannus. In Finnish.

Kangas, J. and Store, R. 2002. Socioecological landscape planning: An approach to multi-functional forest management. Silva Fennica 36: 867– 871.

Kangas, J., Kangas, A., Leskinen, P. and Pykäläinen, J. 2001. MCDM Methods in Strategic Planning of Forestry on State-Owned Lands in Finland: Applications and Experiences. J. Multi-Crit. Decis. Anal. 10: 257–271.

Kangas, J., Store, R. and Kangas, A. 2005. Socioecological landscape planning approach and multicriteria acceptability analysis in multiple-purpose forest management. Forest Policy and Economics 7: 603-614.

Kant, S. and Lee, S. 2004. A social choice approach to sustainable forest management. Forest Policy and Economics 6: 215-227.

Kaplan, S. and Kaplan, R., 1982. Cognition and environment – functioning in an uncertain world. Praeger, New York.

Karjalainen, E. 2001. Metsänhoitovaihtoehtojen arvostus ulkoilualueilla. In: Kangas, J. and Kokko, A. (eds.). Metsän eri käyttömuotojen arvottaminen ja

yhteensovittaminen, Finnish Forest Research Institute Report 800, Kannus. Pp. 183-185. In Finnish.

Kearney, A.R. 2001. Effects of an informational intervention on public reactions to clear-cutting. Society and Natural Resources 14: 777-790.

Klenk, N., Bull, G. and Cohen, D. 2008. What is the ‘‘END’’ (emulation of natural disturbance) in forest ecosystem management? An open question. Canadian Journal of Forest Research 38(8): 2159-2168.

Kumar, S. and Kant, S. 2007. Exploded logit modeling of stakeholders' preferences for multiple forest values. Forest Policy and Economics 9: 516-526.

Lehtonen, E., Kuuluvainen, J., Pouta, E., Rekola, M. and Li, C.-Z. 2006. Non-market benefits of forest conservation in southern Finland. Environmental Science & Policy 6: 195–204.

Leskinen, P., Leskinen, L.A. and Tikkanen, J. 2004. Assessing objectives of regional forest policy in Northern Finland. Scandinavian Journal of Forest Research 19: 180-190.

Levin, S.A. 2000. Multiple scales and the maintenance of biodiversity. Ecosystems 3: 498-506.

Li, C.-Z., Kuuluvainen, J., Pouta, E., Rekola, M. and Tahvonen, O. 2004. Using Choice Experiments to Value the Natura 2000 Nature Conservation Programs in Finland. Environmental & Resource Economics 29: 361–374.

Linnros, H. and Hallin, P. 2001. The discursive nature of environmental conflicts: the case of the Øresund link. Area 33: 391-403.

Mailhot, J. 1997. The people if Sheshatshit, In the land of the Innu. Institute of Social and economic Research, Memorial University, St. John's Newfoundland.

Manning, R., Valliere, W. and Minteer B. 1999. Values, ethics, and attitudes toward national forest management: An empirical study. Society and Natural Resources 12: 421-436.

Margerum, R.D. 1995. Integrated environmental management: Moving from theory to practice. Journal of Environmental Planning and Management 38: 371-392.

Maxwell, J.W. and Reuveny, R. 2000. Resource scarcity and conflict in developing countries. Journal of Peace Research 37(3): 301-321.

McDaniels, T. and Roessler, C. 1998. Multiattribute elicitation of wilderness preservation benefits: a constructive approach. Ecological Economics 27: 299-312.

McDonald, G.T. and Lane, M.B. 2002. Forest management systems evaluation: using ISO14000. Journal of Environmental Planning and Management 45: 633-652.

McFarlane, B. and Boxall, P. 2000a. Forest values and attitudes of the public, environmentalists, professional foresters, and members of public advisory groups in Alberta. Can. For. Serv. Northern For. Cen. Inf. Rep. NOR-X-374.

McFarlane, B. and Boxall, P. 2000b. Factors influencing forest values and attitudes of two stakeholder groups. Society and Natural Resources 13: 649-661.

Meitner, M., Sheppard, S., Harshaw, H. and Wilson, N. 2001. Arrow Forest District Social Values Survey Final Report. Department of Forest Resources Management, University of British Columbia, Vancouver.

Meitner, M.J., Sheppard, S.R.J., Cavens, D., Gandy, R., Picard, P., Harshaw, H. and Harrison, D. 2005a. The multiple roles of environmental data visualization in evaluating alternative forest management strategies. Computers and Electronics in Agriculture 49: 192–205.

Meitner, M.J., Gandy, R. and D'Eor, R.G. 2005b. Human perceptions of forest fragmentation: Implications for natural disturbance management. Forestry Chronicle 81(2): 256-264.

Messier, C. and Kneeshaw, D. 1999. Thinking and acting differently for sustainable management of the boreal forest. Forestry Chronicle 75(6): 929-938.

Messier, C., Bigue, B. and Bernier, L. 2003a. Using fast-growing plantation to promote forest ecosystem protection in Canada. Unasylva 214/215(54): 59–63.

Messier, C., Fortin, M.-J., Schmiegelow, F., Doyon, F., Cumming, S.G., Kimmins, J.P., Seely, B., Welham, C. and Nelson, J. 2003b. Modelling tools to assess the sustainability of forest management scenarios. In: Burton, P.J., Messier, C., Smith, D.W. and Adamowicz, W.L. (eds.). Towards sustainable management of the boreal forest. NRC Research Press, Ottawa. Pp. 531-580.

Milton, K. 1996. Environmentalism and cultural theory. Exploring the role of anthropology in environmental discourse. Routledge, London and New York.

Morgan, D.L. 1997. Focus Groups as Qualitative Research. In: Qualitative Research Method Series, second ed., vol. 16. Sage Publications, Thousand Oaks, London.

MRNF. 2007. Synthèse des possibilités forestières et des attributions par aire commune et par essence, Région de la Mauricie (04) – Centre du Québec (14). Available at: http://www.mrn.gouv.qc.ca/forets/amenagement/amenagement-planification-droits-CAAF-synthese.jsp Viewed 17.5. 2007.

Myers, G. and McNaghten, P. 1998. Rhetorics of environmental sustainability: commonplaces and places. Environment and Planning A 30: 333-353.

Mäntymaa, E. 1998. Kainuulaisten metsäasenteet 1997. University of Oulu, Development Center of Kajaani. Research Reports 5. In Finnish.

Nadeau, S. 2002. Characterization of community capacity in a forest-dependent community: The case of the Haut-St.-Maurice. Ph.D. Dissertation. Oregon State University. 115 p.

Nadeau, S., Beckley, T.M., Huddard Kennedy, E., McFarlane, B.L. and Wyatt, S. 2007. Public views on forest management in New Bruswick: report from a provincial survey. Information Report M-X-222E. Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre, Fredericton.

Natcher, D.H. and Hickey, C.G. 2002. Putting the community back into community-based resource management: A criteria and indicators approach to sustainability. Human Organization 61(4): 350-363.

Niemeyer, S. 2005. Preference transformation through deliberation. Protecting world heritage. In: Getzner, M., Spash, C.L. and Stagl, S. (eds.) Alternatives for environmental valuation. Routledge, London & New York. Pp. 263-289.

Norton, B., Constanza, R. and Bishop, R. 1998. The evolution of preferences: Why 'sovereign' preferences may not lead to sustainable policies and what to do about it. Ecological Economics 24: 193–211.

O'Brien, E.A. 2005. Publics and woodlands in England: well-being, local identity, social learning, conflict and management. Forestry 78(4): 321-336.

Pâquet, J. and Bélanger, L. 1997. Public Acceptability Thresholds of Clearcutting to Maintain Visual Quality of Boreal Balsam Fir Landscapes. Forest Science 43: 46-55.

Park, A. and Wilson, E. 2007. Beautiful Plantations: Can intensive silviculture help Canada to fulfil ecological and timber production objectives. Forestry Chronicle 83(6): 825-839.

Petäjistö, L., Aarnio, J., Horne, P., Koskela, T. and Selby, A. 2004. Hirvenmetsästäjien motiivit ja käsitykset sopivasta hirvikannan koosta. Finnish Forest Research Institute Report 928, Vantaa. In Finnish.

Petty, P.E. and Cacioppo, J.T. 1986. The elaboration likelihood model of persuasion. Advances in Experimental Social Psychology 19, 123-205.

Pobihuschchy, S.I. 1986. A perspective on the Indian nations in Canada. Can. J. Native Stud. 6: 105-128.

Purcell, A.T. 1987. Landscape perception, preference, and schema discrepancy. Environment and Planning B: Planning and Design 14: 67-92.

Pykäläinen, J. and Rantala, E. 1997. Pohjoiskarjalaisten kansalaismielipide metsien hoidon ja käytön kehittämistarpeista. University of Joensuu, Faculty of Forestry. Tiedonantoja 64. In Finnish.

Pölönen, I. 2006. Quality control and the substitutive influence of environmental impact assessment in Finland. Environmental Impact Assessment Review 26: 481-491.

Raitio, K. 2008. You can't please everyone – Conflict management practices, frames and institutions in Finnish state forests. Dissertation in Social Policy, Faculty of Social Sciences and Regional Studies, University of Joensuu.

Rantala, T. and Primmer, E. 2003. Value positions based on forest policy stakeholders' rhetoric in Finland. Environmental Science & Policy 6: 205-216.

Reuveny, R. and Maxwell, J.W. 2001. Conflict and natural resources. Journal of Conflict resolution 45(6): 719-742.

Ribe, R.G. 2006. Perceptions of forestry alternatives in the US Pacific Northwest: Information effects and acceptability distribution analysis. Journal of Environmental Psychology 26: 100-115.

Robinson, D.W. and Hawley, A.W.L. 1997. Social Indicators and Management Implications Derived from the Canadian Forest Survey '96. McGregor Model Forest Ass., Prince George, BC.

Robinson, J. 2004. Squaring the circle? Some thoughts on the idea of sustainable development. Ecological Economics 48: 369-384.

Rokeach, M. 1973. The nature of human values. Free Press, New York.

Rokeach, M. 1979. Understanding human values. Free Press, New York.

Samson, C. 2003. A way of life that does not exist, Canada and the extinguishment of the Innu. Social and Economic Studies 67. Institute of Social and Economic Research, Memorial University, St. John's Newfoundland.

Samuelson, W. and Zeckhauser, R. 1988. Status Quo Bias in Decision Making. Journal of Risk and Uncertainty 1: 7-59.

SAS institute. 2001. Documentation for the 8.2 release of the MDC procedure. Available at: http://support.sas.com/rnd/app/doc.html Viewed 11.5.2007.

Schläpfer, F. 2008. Contingent valuation: A new perspective. Ecological Economics 64(4): 729-740.

Schultz, P.W. and Zelezny, L. 1999. Values as predictors of environmental attitudes. Evidence for consistency across 14 countries. Journal of Environmental Psychology 19: 255-265.

Schusler, T.M., Decker, D.J. and Pfeffer, M.J. 2003. Social learning for collaborative natural resource management. Society and Natural Resources 15: 309-326.

Seekamp, E., Hall, T., Harris, C. and Cole, D. 2006. Attitudes and changes in attitudes about visitor management at the Green Lakes/South Sister area of the Three Sisters Wilderness: A study of four stakeholder involvement meetings in Oregon. Wilderness Research Center, University of Idaho. Available at: http://www.cnr.uidaho.edu/wrc/Publications/publications.htm Viewed 5.11. 2007.

Seely, B., Nelson, J., Wells, R., Peter, B., Meitner, M., Anderson, A., Harshaw, H., Sheppard, S., Bunnell, R.L., Kimmins, H. and Harrison, D. 2004. The application of a hierarchical, decision-support system to evaluate multi-objective forest management strategies: a case study in northeastern British Columbia, Canada. Forest Ecology and Management 199: 283-305.

Selby, A., Koskela, T. and Petäjistö, L. 2007. Evidence of lay and professional forest-based development discourses in three contrasting regions of Finland. Forest Policy and Economics 9: 633-646.

Seymour, R.S. and Hunter, M.L., Jr. 1999. Principles of ecological forestry. In: Hunter, M.L., Jr. (Ed.) Maintaining biodiversity in forest ecosystem. Cambridge: Cambridge University Press. Pp. 22-61.

Shapansky, B., Adamowicz, W.L. and Boxall, P. 2008. Assessing information provision and respondent involvement effects on preferences. Ecological Economics 65(3): 626-635.

Sheppard, S. 2003. Knowing socially sustainable forest when you see one: implications for results-based forestry. Forestry Chronicle 79: 866-875.

Sheppard, S. and Meitner, M. 2005. Using multi-criteria analysis and visualisation for sustainable forest management planning with stakeholder groups. Forest Ecology and Management 207: 171-187.

Sheppard, S.R.J., Lewis, J.L. and Akai, C. 2004. Landscape visualization: An extension guide for First Nations and rural communities. Sustainable Forest Management Network, Edmonton.

Shindler, B.A., Brunson, M., and Stankey, G.H. 2002. Social acceptability of forest conditions and management practices: a problem analysis. Gen. Tech. Rep. PNW-GTR-537. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 68 p.

Shore, B. 1996. Culture in Mind. Oxford University Press, New York and Oxford.

Sloane, N.J.A. 2006. Www pages. A Library of Orthogonal Arrays. Available at: http://www.research.att.com/~njas/oadir/ Viewed 18.4.2006.

Slovic, P. 1995. The construction of preference. American Psychologist 50: 364–371.

Smith, P.D. and McDonough, M.H. 2001. Beyond public participation. Society and Natural Resources 14: 239-249.

Stedman, R.C. 2003a. Sense of Place and Forest Science: Toward a Program of Quantitative Research. Forest Science 49(6): 822-829.

Stedman, R.C. 2003b. Is it really just a social construction? The contribution of the physical environment to sense of place. Society and Natural Resources 16(8): 671-684.

Stern, P.C. and Dietz, T. 1994. The value basis of environmental concern. Journal of Social Issues 50: 65-80.

Stern, P.C., Dietz, T. and Kalof, L. 1993. Value orientations, gender and environmental concern. Environment and Behavior 25, 322-348.

Strauss, C. and Quinn, N. 1997. A Cognitive Theory of Cultural Meaning. Cambridge University Press, Cambridge, New York, Oakleigh.

Sturtevant, B., Fall, A., Kneeshaw, D., Simon, N., Papaik, M., Berninger, K., Doyon, F., Morgan, D. and Messier, C. 2007. A toolkit modeling approach for sustainable forest management planning: Achieving balance between science and local needs. Ecology and Society 12(2): 7. [online]
URL: http://www.ecologyandsociety.org/vol12/iss2/art7/

Tahvanainen, L., Tyrväinen, L., Ihalainen, M., Vuorela, N. and Kolehmainen, O. 2001. Forest management and public perceptions - visual versus verbal information. Landscape and Urban Planning 53: 53-70.

Tasanen, T. 2004. Läksi puut ylenemähän. Metsien hoidon historia Suomessa keskiajalta metsäteollisuuden läpimurtoon 1870 e luvulla. Summary: the History of silviculture in Finland from the Medieval to the Breakthrough of Forest Industry in 1870s. Finnish Forest Research Institute Report 920, Vammala.

Teel, T., Dayer, A., Manfredo, M. and Bright, A. 2005. Regional results from the research Project entitled “Wildlife Values in the West.” Project Report for the Western Association of Fish and Wildlife Agencies. Fort Collins, CO: Colorado State Univ., Human Dimensions in Natural Resources Unit.

Thompson, J.R., Elmendorf, W.F., McDonough, M.H. and Burban, L.L. 2005. Participation and conflict: Lessons learned from community forestry. Journal of Forestry 103 (4): 174-178.

Tindall, D.B. 2001. Variation in public values and visual quality preferences. In: Compendium of the Visual Resource Management Conference, Seeing beyond the Trees, Kamloops, BC, 17-19 April 2001. Pp. 215-234.

Tindall, D.B. 2003. Social values and the contingent nature of public opinion and attitudes about forests. Forestry Chronicle 79: 692-705.

Tuan, Y.-F. 1974. Topophilia: A study of environmental perception, attitudes, and values. Prentice Hall, Englewood Cliffs.

Turner, J.C. and Oakes, P.J. 1989. Self-categorization theory and social influence. In: Paulus, S.B. (ed.). Psychology of group influence. Erlbaum, Hillsdale. Pp. 233-275.

Turner, M.G., Gardner, R.H. and O'Neill, R.V. 2001. Landscape ecology in theory and practice. Springer-Verlag, New York.

Tyrväinen, L., Silvennoinen, H. and Kolehmainen, O. 2003. Ecological and aesthetic values in urban forest management. Urban Forestry and Urban Greening 1: 135-149.

Törnquist, O. 2006. Assessing democracy from below: A framework and Indonesian pilot study. Democratization 13(2): 227-255.

Vaske, J. and Donnelly, M. 1999. A value-attitude-behavior model predicting wildland preservation voting intentions. Society and Natural Resources 12:523-537.

Vaske, J., Donnelly, M., Williams, D. and Jonker, R. 2001. Demographic influences on environmental value orientations and normative beliefs about national forest management. Society and Natural Resources 14: 761-776.

Von Haefen, R., Massey, D.M. and Adamowicz, W.L. 2005. Serial nonparticipation in repeated discrete choice models. American Journal of Agricultural Economics 87(4): 1061-1076.

Wang, S. 2004. One hundred faces of sustainable forest management. Forest Policy and Economics 6: 205-213.

Warren, W.A. 2007. What is a healthy forest? Definitions, rationales, and the lifeworld. Society and Natural Resources 20: 99-117.

Watson, D.O.T. and McFarlane, B.L. 2004. Stakeholder Considerations for Recreation and Forest Management in the Sunpine Forest Products Forest Management Agreement Area of Alberta. Canadian Forest Service, Northern Forest Centre Information Report NOR-X-400.

Webb, T.J., Bengston, D.N. and Fan, D.P. 2008. Forest value orientations in Australia: An application of computer content analysis. Environmental Management 41: 52-63.

Wilson, J.S. and McGaughey, R.J. 2000. Landscape-scale forest information: What is sufficient and what is appropriate? Journal of Forestry 98 (12): 21-27.

Xu, W., Lippke, B.R. and Perez-Garcia, J. 2003. Valuing biodiversity, aesthetics, and job losses associated with ecosystem management using stated preferences. Forest Science 49: 247-257.

Xu, Z. and Bengston, D.N. 1997. Trends in natural forest values among forestry professionals, environmentalists, and the news media 1982e1993. Society and Natural Resources 10: 43-59.

Zinn, H.C., Manfredo, M.J., Vaske, J.J. and Wittmann, K. 1998. Using normative beliefs to determine the acceptability of wildlife management actions. Society and Natural Resources 11: 649-662.