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Family Forest Owners' Opinions about Forest Management in Northern Finland

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Forest management guidelines changed at the end of the 1990's in Finland. Biodiversity, visual landscape, water systems, and different forms of forest use are now better taken into account. The objectives, outdoor recreation motives, and attitudes towards the present forest management activities of the non-industrial private forest owners called family forest owners in this article, whose forest holdings are located in northern Finland, were studied. In addition, a forest owner typology based on the above-mentioned motives, objectives, and attitudes was created, and the relationship between the typology and the forest owners' background was tested. Principal component analysis, log-linear models, canonical correlations, and K-means cluster analysis were used in the data analysis. The results showed that especially commercial timber production, but also multiple-use forestry, is important for forest owners. Non-timber products such as game, berries, and forest mushrooms were considered more important than biodiversity, conservation of endangered species, tourism, and reindeer herding. The current, more ecological forest management activities were widely accepted by the owners. The changes had been perceived in the forest management activities. Close relationships were found between the objectives, attitudes and motives of the forest owners. Those owners who emphasized ecological tourism and multiple-use forestry, more frequently accepted detailed conservation and other "softer" management methods than those who emphasized commercial timber production. Typologies, called conservationists, timber producers, and multi-objective forest owners, were identified. Forest owner's education and source of income were closely related to their typology. Highly educated forest owners and those who gained their money from tourism belonged to the groups named conservationists or multi-objective owners, whereas those who lived on forestry income represented timber producers.

Keywords forest management, family forest owner, northern Finland, forest owner typology, forest management objective, forest management activity, silviculture, tourism
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1 Introduction

Forestry and the forest industry have been the basis of the Finnish economy for more than a century. The economic importance of the forest sector is especially evident in the eastern part of the country, as well as in northern Finland (Toropainen and Uotila 2003). Although the number of people employed in the forest sector has continuously decreased during the last few decades, it is still an important employer in the North (Torvelainen 2003, Keskimölö and Pirkonen 2006).

As a result of the post-war forestry policy, the country has abundant young forests, with increased forest growth and production. However, the legislation and management guidelines changed at the end of the 1990's and beginning of the 2000's (Luonnonläheinen… 1994, Metsälaki 1996, Metsäasetus 1996, Hokajärvi 1997, Korhonen and Savonmäki 1997, Hyppönen et al. 2001). The main reason for changing the legislation and guidelines was to take aspects related to biodiversity, the visual landscape, and water systems, into account in forest management, in addition to timber production. According to the new guidelines and recommendations, the most important biotopes are to be delimited outside cutting areas, dead and living retained trees are to be left in regeneration areas, lighter soil scarification methods are to be used, the size of regeneration areas has to be decreased, clear-cutting areas are to be hidden by leaving intervening uncut forest strips, and mixed stands are to be established instead of monocultures. Natural regeneration is also recommended. In the state-owned forests, the use of landscape ecological planning that involves the participation of stakeholders is an important part of forest management planning (Wallenius 2000).

The most important reason for implementing these changes is undoubtedly the international demands for preserving biodiversity in the 1990's, expressed in the so-called Rio Convention (Ympäristöministeriö 1993). In addition, the strengthening of the nature conservation movement in the 1970's, 1980's and 1990's also had a considerable influence on changing forestry activities in Finland, as well as in many other parts of Europe (e.g. Hellström and Reunala 1995, Hellström 2001). Northern wilderness conflicts such as that at Kessi promoted the change. As a result, a special act covering wilderness conservation was passed in the beginning of the 1990's (Erämaakomitean mietintö 1988, Erämaalaki 1991).

The current legislation and guidelines have been used for about 10 years. The effect of the change in legislation and guidelines on forest management has been regularly monitored and reported by different organisations (e.g. Metsä- ja ympäristökertomus 2007). However, no studies have been carried out on whether forest owners' have noticed the change. As a hypothesis we assume that the majority of the forest owners have noticed the change, and that their attitude towards the change is, depending on their background, mostly positive.

During the last few decades, tourism, especially nature-based tourism, has increased its economic importance worldwide, as well as in Finland (Saarinen 2001, Konttinen 2005). The relative importance of tourism, income per capita, proportion of employees and entrepreneurs in the tourist industry, and the value added, has also increased in northern Finland (Saarinen 2001, Konttinen 2005). In northernmost Finland tourism provides more job opportunities than any other livelihood utilizing local natural resources (Vatanen et al. 2006, Saarinen and Kauppila 2008).

Today, rural tourism is a branch of nature-based tourism. This form of tourism has gained a position in the rural areas of Finland, where both forestry and tourism are the key livelihoods of the regional economy (Tyrväinen et al. 2001). The countryside, which is normally dominated by forests, attracts rural tourists who appreciate old pristine forests, an abundant admixture of deciduous trees, and relatively good visibility. The wilderness image and nature conservation areas have also been an important tourist attraction in Finnish Lapland and elsewhere (Butler 1991, Krippendorf 1991, Hallikainen 1998, Saarinen 1998, 2001). However, commercial forests are also important for outdoor recreation and tourism (e.g. Hallikainen 1998). Furthermore, many tourist activities, such as snow mobile driving or husky safaris, are not usually allowed in conservation areas.

Timber production and tourism have a competitive relationship with each other in the commercial forests (see Saastamoinen 1982). Intensive cutting and soil preparation have been found to decrease

the amenity and nature experience values of local outdoor recreationists (Kellomäki and Savolainen 1984, Hallikainen 1998). However, it is normal practice to use the same forest area simultaneously for several purposes (e.g. Hallikainen et al. 2008). Theoretically, a joint production model or multi-goal forestry is applied in this case (Saastamoinen 1982). Many entrepreneurs and people working in tourism are also forest owners and want to utilize their forest for timber production. We assume that they are willing to ensure the suitability of the forest environment for tourism and outdoor recreation, in addition to timber production. Our hypothesis is that especially those forest owners who also make their living from sources other than forestry, do not want to maximize their income from timber production only.

Many studies have been carried out in Finland concerning the values, objectives and attitudes of private forest owners, as well as some corresponding investigations on nature tourism entrepreneurs (e.g. Karppinen 2000, Tyrväinen et al. 2002). Questionnaires and interviews have focused on timber production, recreational use, and tourism. However, little attention has been paid to the relationships of forest owners' objectives, attitudes towards forestry, and outdoor recreation motives. Our hypothesis is that they are closely related to each other.

Forest owner typologies, based on their objectives, have also been constructed in other studies (e.g. Kuuluvainen et al. 1996, Karppinen 1998, Becker 2000, Kline et al. 2000a, 2000b, Bieling 2004, Boon et al. 2004, Ingemarson et al. 2006). The typologies developed in the individual studies differ from each other, but general categories such as economist, multi-objective owner, self-employed owner, recreationist, and passive owner, were clearly identifiable when all the typologies were summed together. As a hypothesis we assume that a forest owner's background (demographics), especially the sources of his/her income, is closely related to his/her objectives and attitudes.

The effects of the objectives and attitudes of family forest owners about the timber supply have also been studied in Finland and elsewhere (e.g. Adams et al. 1996, Kuuluvainen et al. 1996). Forest owner's satisfaction with the current management guidelines may enhance the timber supply. The effect of the income derived from forestry and/or tourism on forest owners' attitudes and objectives with respect to forest management in the context of the current rules and recommendations, has not been studied in Finland. Such a study was considered useful because of the contradictions between tourism and timber production, especially in northern Finland.

The goals of the research related to the above hypotheses were 1) to study whether forest owners have noticed the change in forest management during the last ten years, 2) to study forest owners' attitudes towards a decrease in their forestry income, 3) to study the relationships between the outdoor recreation motives, objectives and forest management attitudes, 4) to create a forest owner typology based on the motives, objectives and attitudes, and identify the differences between the groups, and 5) to study the effect of demographics (especially income from forestry and tourism) on forest owners' motives, objectives and attitudes reflected by the forest owner typologies. As a preliminary work towards achieving these goals, the forest owners' outdoor recreation motives, the objectives of forest owners towards their own forests and forests in general, and the forest owners' attitudes towards prevailing forest management, were investigated.

2 Materials and Methods

2.1 Data Collection

Three data sets were collected in winter 2003 for this study: 1) a random sample consisting of 1500 inhabitants of North Finland who were at least 18 years old, 2) a random sample of 1160 forest owners registered by the Forestry Centres of Lapland, Ostrobothnia and Kainuu, and 3) a random sample of 565 tourism enterprises. All of the data sets included forest owners and persons with tourism-related income in the provinces of Oulu and Lapland in North Finland. The forest owners investigated in this study were filtered out of data sets 1 and 3 in order to supplement the forest owners of data set 2.

The sampling proportion in data sets 2 and 3 was 10% of the registered forest owners and tourism enterprises in the study area. After filtering,

Table 1. The question sets. The abbreviations are used in the other figures and tables.

Question	Set of statements or things in the question	Abbreviation
How important do you regard the following objectives when you plan management alternatives in your own forest? (4-point ordinal scale and I cannot say)	– Income obtained by selling timber	Commercial timber
	– Timber production for household use	Household timber
	– Game management	Game management
	– Visual landscape experiences	Landscape
	– Biodiversity	Biodiversity
	– Conservation of endangered species	Endangered species
	– Outdoor recreation	Outdoor recreation
How important do you regard the following objectives in the decision making about forest management activities in general? (4-point ordinal scale and I cannot say)	– Game management	Game management
	– Berries and mushrooms	Berries and mushrooms
	– Timber production	Timber production
	– Watershed management	Watershed management
	– Tourism	Tourism
	– Employment rate	Employment rate
	– Reindeer husbandry	Reindeer husbandry
	– Biodiversity	Biodiversity
	– Conservation of endangered species	Endangered species
	– Visual landscape experiences	Landscape
	– Retaining wilderness character	Wilderness character
How good or bad do you regard the following forest management activities? (5-points ordinal scale and I cannot say)	– Clear-cuttings are designed as narrow, winding strips	Narrow clear-cutting strips
	– Short residual trees are removed from the regeneration areas at the time of regeneration or afterwards	Residual trees removed
	– Rocky outcrops in the middle of clear-cutting areas are left outside cuttings	Rocky hills left outside cuttings
	– Standing or lying snags are left on cutting areas	Retained snags
	– Standing or lying rotten snags are left on cutting areas	Retained rotten snags
	– Humus layer is mechanically broken exposing the mineral soil	Soil scarification
	– Prescribed burning is made on clear-cutting areas	Prescribed burning
	– A seedling stand will be obtained by seed from the seed trees left on the regeneration area	Natural regeneration
	– A forest strip along a brook in the middle of a clear-cutting area is left outside the cutting	Surroundings of brook conserved
	– Plenty of birches are left among the pines in forest thinning	Deciduous mixed forest
	– Natural pristine forests along brooks are thinned	Surroundings of brook thinned
	– Single or groups of old pines are left on the regeneration areas	Retained old pines
	– Forests are regenerated by removing the biggest trees periodically freeing room for smaller, younger trees	Selective cuttings
	– The size of clear-cutting areas is not restricted	Large clear-cuttings allowed
	– Deciduous trees around springs are left outside the cutting	Surroundings of spring conserved
	– Forest is regenerated by clear-cutting and planting trees	Artificial regeneration
	– Strip-shaped forest stands are left between clear-cutting areas	Intermediate forest strips

How important are the following outdoor recreation motives to you during your nature visits?	Peace and silence	-
	Beauty of nature	-
	Freedom	-
	Counterbalance to everyday life	-
	To see managed forests	-
	To see plants and animals	-
	Physical training	-
	Togetherness	-
	To see pristine forests	-
	To see pristine mires	-
	Solitude	-
	To get yield	-
	To test myself	-
How large a reduction in forestry income caused by less intensive forest management could you accept? Scale: none, minor, considerable, I cannot say.		
Have you noticed any changes in forest management in northern Finland during the last ten years? Scale: not at all, slight, considerable, very considerable, I cannot say.		
Have the changes been mainly positive or negative? Scale: very negative, negative, both negative and positive, positive, very positive.		
What kind of positive and negative changes have you noticed in forest management? An open-ended question.		

data set 1 included both registered forest owners and forest owners who did not belong to any available register because of the small area (two hectares or less) of their forest holding. However, they may utilize their forest holding in a similar manner to the registered forest owners. Data set 1 also included those owners who had tourism income or a source of income other than tourism or forestry. Thus, data sets 1 and 3 increased the value of the forest owner data, thereby ensuring the maximum number of forest owners obtaining income from tourism and also from the sources other than tourism or forestry. Using several sampling frames to pick out forest owners means that individuals may have a different probability of being sampled, and the results cannot be generalized similarly to a sample of an exactly known population. Thus, the sample should be regarded as a large case study sample.

The questionnaires were sent directly to the persons in data sets 1 and 2. These data sets included both entrepreneurs and people working in the tourism sector. The information about the respondent's tourism work was based on their own reply. In data set 3 it was not possible to identify a respondent personally. The receiver of the questionnaire was assumed to be a tourism entrepreneur or a key person working in a tourism enterprise. The person who answered the questionnaire was assumed to represent the motives, objectives, and attitudes predominating in the enterprise.

About 28% (324 respondents) of data set 2 and 19% (110) of data set 3 returned the questionnaire. The proportion of returned questionnaires in unfiltered data set 1 was about 23% (364). Of these respondents, 146 forest owners were filtered out for the forest owner data. Data set 3 also included 55 forest owners. Thus, the total number of forest owners available for this study was 525. It was not possible to determine the proportion of responding forest owners or the sampling proportion for data sets 1 and 3, because the forest owner population in the data sets remained unknown. As a result, the above-mentioned response rates are approximations only. Despite the low response rate, the resources available did not allow us to send a reminder. Instead, we carried out a relatively extensive telephone interview in order to reveal possible bias.

The questionnaire contained structured and open-ended questions. The questions revealing opinions or attitudes are presented in Table 1. The demographic questions included information about the respondents' sex, age, education, residential environment (city, village, scattered

settlement, the classification was based on the environmental planning system and legislation, and the urban areas right to call itself a town), region, and income (forestry, tourism, both, other). The question concerning tourism income reflects the person's profession as a tourism entrepreneur or worker and means a continuous income from tourism. Forestry income means that a forest owner sells timber continuously or occasionally.

Because of the low response rate, a random sample of 10% of the non-respondents was interviewed over the telephone in order to determine whether the demographics or the attitudes towards present forest management differed between the respondents and non-respondents. 82 of the 110 randomly chosen inhabitants (data set 1), 27 of whom were forest owners, were interviewed. All the sampled, non-responded forest owners and tourism entrepreneurs or employees in data sets 2 and 3 were interviewed. The number of registered forest owners in the non-respondent data (dataset 2) was 75, and the number of tourism entrepreneurs or employees who owned forest was 20. Thus, a total of 122 forest owners were interviewed.

The interviewed non-respondents were asked whether they had noticed any changes in forest management and how they regarded the changes. In addition, they were also asked the same demographic questions as in the postal questionnaire.

2.2 Data Analysis

Frequencies, distributions and cross-tabulations were used as the basic statistics in the data analysis. The interdependences in two-way cross-tabulations were tested using the asymptotic χ^2-test or Fisher's exact test with Monte-Carlo estimation based on the sample of 10 000 tables (sparse frequencies, Mehta and Patel 1983, SAS 2002–2008).

Log-linear models were used to test the interdependences in multi-way tables (e.g. Engelman 2004). The analysis was restricted to three-way tables because the number of cells in the tables, in proportion to the total number of observations, could not be more than 20%, and the minimum expected frequency had to be at least 0.5 (see Stelzl 2000). The log-linear models were used to distinguish the relationships between the three categorical variables supported by the data. A delta value of 0.5 was added to each cell frequency if one of the observed frequencies was 0 or many of the frequencies were small (see SPSS 2001, Engelman 2004). The log-linear models were used in the analysis of the inter-relationships between the categorical demographics, and when analysing the question concerning acceptance of the loss of income due to the changed forest management.

The interdependences in the question sets (omitting "I cannot say", Table 1) were studied using exploratory principal component analysis (e.g. Stenson and Wilkinson 2004). The correlation matrix used was based on the pairwise Spearman's rank order correlations. The scores of the variables in the question sets belonging to the same principal component were summed and divided by the number of variables of the principal component (Metsämuuronen 2005). The scores of the new variables (later called sum variables) were interpreted as normally distributed continuous variables and used in the further analysis. The consistency of a principal component was studied using Cronbach's alpha (e.g. Metsämuuronen 2005). If, according to the alpha value, the consistency was low, then the variables belonging to the principal component were used as single variables in the further analysis. The approach in this study was exploratory, which means that no hypothesis about the correlation or covariance structure was tested (Stapleton 1997). The main purpose of using PCA in this study, followed by the determination of Cronbach's alpha, was to identify the groups of variables needed in constructing the sum variables.

Canonical correlations (e.g. Cohen and Wilkinson 2004) were computed between the four sum variables: 1) respondent's outdoor recreation motives, 2) objectives for the respondent's own forest, 3) objectives for forest management activities in general, and 4) attitudes towards forest management. The analysis also gave more detailed information about the strength of the relationships between the independent set and the single sum variables belonging to the dependent set. In addition, the canonical beta-coefficients with significance tests revealed the relationships (quality and strength) between the single sum

variables in the dependent and independent sets. Some corresponding applications of canonical correlation analysis can also be found in the literature (e.g. Rousseau 1978).

Forest owner typologies were constructed using K-means cluster analysis (e.g. Boon et al. 2004) based on the outdoor recreation motives, objectives, and attitudes of the forest owners. Two to five groups were formed on the basis of previous studies on typologies (Kuuluvainen et al. 1996, Karppinen 1998, Becker et al. 2000, Kline et al. 2000, Bieling 2004, Boon et al. 2004, Ingemarson et al. 2006). Three interpretable typology groups based on forest owners' motives, objectives, and attitudes were formed. Furthermore, the relationship between the typology groups and persons' demographics were studied. The variables in the analysis were standardized before the analysis in order to homogenize the scales.

In order to avoid data loss caused by missing values in the data, the sum variables and the categorical demographics were imputed simultaneously. The multiple imputations (MI) were performed using a Markov Chain Monte Carlo (MCMC) method (described by Schafer 1997) for the data set of 21 variables with arbitrary missing patterns. MI is a Monte Carlo technique in which the missing values are replaced by $m > 1$ (e.g. 3–10) simulated versions, to obtain the best possible predictions for the missing values (see Rubin 1987). The categorical demographics were dummy-coded for the analysis. The mean values of the ten imputations were used for continuous variables, and mode values for the dummy variables in order to have the best predictions for the missing values. There are several imputation methods available for continuous and categorical variables, e.g. the logistic regression method, but MCMC imputation was expected to perform relatively well in this combination of continuous and categorical data when the categorical variables were dummy-coded for the analysis (SAS 2002–2008, Allison, P.D, personal comm. 8.8.2007). The SAS procedure MI was used in the imputation (SAS 2002–2008). The significance level used in all the analyses was 0.05, and the statistical analysis was run using SYSTAT (2007, v. 12), SPSS (2006, v. 15) and SAS (2002–2008, v. 9.1.3) software.

2.3 Data Description

The respondents in the data were characterized by a number of common features. They were elderly men, had a relatively low education and most of them lived in the countryside (see also Karppinen et al. 2002). The data covered the study area relatively well. Although forestry income was the most important source of income, about 15% of the respondents also had income from tourism. Slightly less than one quarter earned a living from other sources of livelihood (Table 2).

The demographic distributions were compared, on the one hand, between the respondents and the non-respondents of this study and, on the other hand, between the respondents of this study and those of Karppinen et al. (2002, Table 2). Despite slight differences in the categories, the distributions coincided relatively well.

The cross-tabulations (Fig. 1) based on the significant relationships, revealed by the three-way log-linear models, suggested that older people were less educated than the younger ones, and that the youngest respondents (< 35 years) more often lived in cities or towns than the older ones. Furthermore, the respondents living outside the study region more often lived in an urban or semi-urban environment. On the other hand, the Kainuu respondents more often lived in the countryside than the others (Fig. 1).

The income from tourism was slightly more important in Lapland than in the other parts of the study area. The proportion of tourism income was positively affected by a higher education level. Interestingly, tourism income was slightly more common in the countryside than in the urban or semi-urban environment. The respondents involved in tourism more often had a higher level of education than those who were not involved, as was the case for the respondents who had sources of livelihood other than forestry or tourism. These persons lived more often in an urban, or at least in a semi-urban environment (Fig. 1).

Table 2. The demographics and their categories, frequencies and proportions. All the variables except sex were used in the three-way log-linear models (Fig. 1). The number of non-respondents was calculated from the telephone interview data. The p-value denotes the significance of Pearson's χ^2-test. The distributions were also compared with the forest owner data for the northern part of the country published by Karppinen et al. (2002), despite the differences in the categories used.

Variable	Postal questionnaire, imputed counts and percentages in parentheses			Non-respondents			Karppinen et al. 2002	
	Categories	n	%	n	%	p	Categories	
Sex	Male	401 (404)	77.0 (77.0)	82	67.2	0.017	Male	74.0
	Female	119 (121)	23.0 (23.0)	40	32.8		Female	26.0
	Total	520 (525)	100.0	122	100.0			
Age	<35 years	23 (23)	4.4 (4.4)	3	2.5	0.034	<40 years	10.0
	35–50 years	144 (144)	27.7 (27.4)	26	21.5		40–59 years	45.0
	51–64 years	232 (236)	44.7 (45.0)	49	40.5		≥60 years	45.0
	≥65 years	120 (122)	23.1 (23.2)	43	35.5			
	Total	519 (525)	100.0	121	100.0			
Education	Primary school or less	312 (319)	60.5 (60.8)	-	-	-	Primary school or less	70.0
	Secondary school	127 (127)	24.6 (24.2)	-	-	-	Secondary school	19.0
	High school graduate	77 (79)	14.9 (15.0)	-	-	-	High school graduate	11.0
	Total	516 (525)	100.0	-	-	-		
Residential environment	City	112 (118)	25.0 (22.5)	21	17.4	0.130	Town or city (≥20 000)	17.0
	Village	107 (113)	23.9 (21.5)	37	30.6		Village or small town	23.0
	Scattered settlement	229 (294)	51.1 (56.0)	63	52.1		Scattered settlement	60.0
	Total	448 (525)	100.0	121	100.0			
Region	Lapland	170 (170)	32.8 (32.4)	39	32.0	0.008	-	-
	Ostrobothnia	181 (182)	34.9 (34.6)	51	41.8		-	-
	Kainuu	126 (126)	24.3 (24.0)	32	26.2		-	-
	Other	44 (47)	8.1 (9.0)	0	0		-	-
	Total	519 (525)	100.0	122	100.0		-	-
Source of income	Only forestry	308 (334)	63.5 (63.6)	-	-	-	-	-
	Only tourism	20 (20)	4.1 (3.8)	-	-	-	-	-
	Both (f. and t.)	44 (44)	9.1 (8.4)	-	-	-	-	-
	Other (than f. and t.)	113 (127)	23.3 (24.2)	-	-	-	-	-
	Total	485 (525)	100.0	-	-	-	-	-

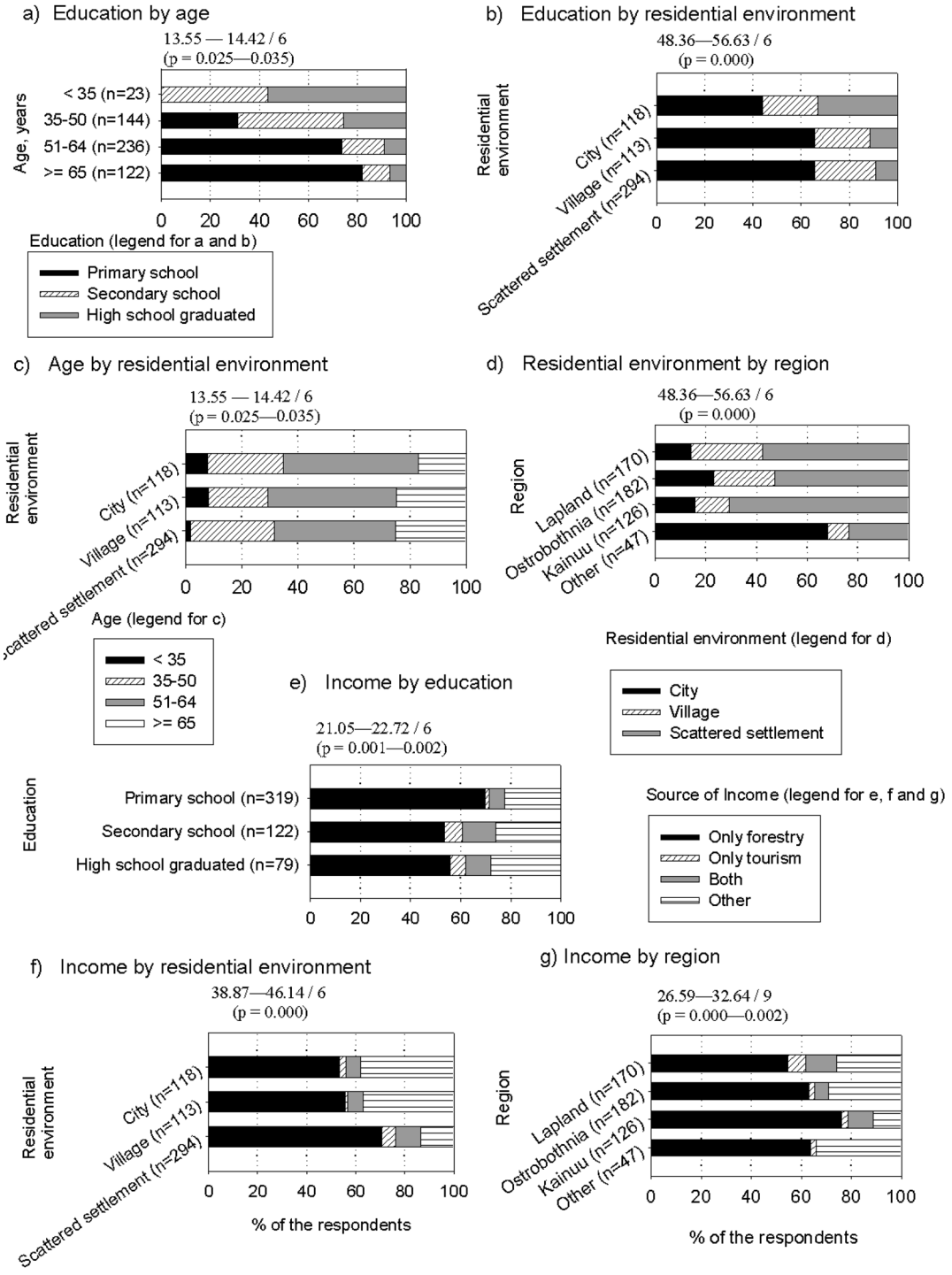

Fig. 1. The statistically significant interdependences of the demographics revealed by the three-way contingency tables and corresponding log-linear models. Chi-squared values, degrees of freedom, and significances of the models are presented above the bar charts.

3 Results

3.1 Importance of Experiences in Nature

Experiencing peace and silence, freedom, and a beautiful landscape were the most important motives of forest owners for their nature use. Pristine nature, solitude, and obtaining a harvest (game, berries and mushrooms) were relatively or very important motives for slightly more than half of the respondents. Testing oneself was the least important motive.

Three principal components were extracted on the basis of these motives (Table 3). The first was called biophilia, because it included the appreciation of living things, pristine nature, and the beauty of nature (the concept of biophilia includes the appreciation of living, original nature, see Wilson 1984). The second component was called the physical use of nature and included dimensions of physical exercise, yield, and togetherness. Experience of a managed forest landscape was closely related to this physical use dimension. The third component included the dimensions of mental recreation and refreshment, such as the experience of peace and silence, solitude, freedom, and a counterbalance to everyday life and stress.

Table 3. The principal component analysis for respondents' outdoor recreation motives. The principal components explained 54.7% of the total variance. The principal components are called: P1 = Biophilia, P2 = Physical use of nature, P3 = Mental recreation.

Variable	P1	P2	P3
To see pristine forests	**0.829**	0.016	0.114
To see pristine mires	**0.804**	0.155	0.126
To see plants and animals	**0.613**	0.170	0.369
Beauty of nature	**0.505**	0.123	0.425
To see managed forests	–0.051	**0.676**	0.020
Physical exercise	0.178	**0.676**	0.198
To test oneself	0.024	**0.644**	0.202
Togetherness	0.270	**0.448**	0.358
To obtain a harvest	0.311	**0.450**	0.008
Freedom	0.139	0.255	**0.785**
Counterbalance to everyday life	0.119	0.195	**0.783**
Peace and silence	0.353	–0.035	**0.750**
Solitude	0.101	0.130	**0.714**
Eigenvalue	2.34	1.92	2.86
Proportion variance	17.99	14.78	21.97
Cronbach's α	0.75	0.60	0.81
95% confidence limits for α	0.71–0.79	0.54–0.66	0.78–0.84

3.2 Objectives of Forest Owners in Their Own Forests and in Forests in General

Forest owners regarded multiple-use forestry, such as maintaining opportunities for outdoor recreation, a beautiful landscape, and game management, almost as important objectives in their own forest as commercial timber production (about 75–80% regarded these objectives as important). Timber production for household purposes was important to more than one half of the forest owners as well. About half of the forest owners considered biodiversity and endangered species as important, and the same proportion as not important or only slightly important.

The principal component analysis extracted two components of forest management objectives concerning the respondents' own forests (Table 4). These groups were called 1) nature conservation and multiple use, and 2) timber production.

Table 4. The principal component analysis for the management objectives of the forest owners for their own forests. The principal components (P1–P2) explained 58.3% of the total variance. The principal components are called P1 = Conservation and multiple use, and P2 = Timber production.

Variable	P1	P2
Biodiversity	**0.839**	–0.057
Endangered species	**0.800**	–0.106
Landscape	**0.771**	0.054
Game management	**0.742**	0.165
Outdoor recreation	**0.604**	0.090
Commercial timber	–0.152	**0.747**
Household timber	0.244	**0.730**
Eigenvalue	2.95	1.13
Proportion variance	42.12	16.16
Cronbach's α	0.82	0.12
95% confidence limits for α	0.79–0.85	0.06–0.35

Table 5. The principal component analysis for the management objectives of the forest owners in general. The principal components (P1–P3) explained 53.6% of the total variance. The principal components are called P1 = Ecological tourism, P2 = Commercial forestry, and P3 = Non-timber products.

Variable	P1	P2	P3
Biodiversity	**0.792**	–0.099	0.050
Endangered species	**0.732**	–0.150	0.221
Reindeer husbandry	**0.632**	0.316	–0.080
Watershed management	**0.584**	0.103	0.292
Landscape	**0.558**	–0.049	0.389
Wilderness character	**0.501**	–0.176	0.450
Tourism	**0.487**	0.188	0.252
Employment	0.190	**0.781**	0.095
Timber production	–0.156	**0.764**	–0.009
Berries and mushrooms	0.119	0.051	**0.751**
Game management	0.162	0.067	**0.741**
Eigenvalue	2.80	1.41	1.68
Proportion variance	25.47	12.83	15.28
Cronbach's α	0.78	0.46	0.50
95% confidence limits for α	0.74–0.81	0.36–0.55	0.40–0.58

However, the Cronbach's alpha value for timber production (P2, Table 4) suggested poor compatibility between household and commercial timber production. Thus, these variables were subsequently treated separately in the analysis instead of a sum variable for timber production.

As far as forest management in general was concerned, timber production was regarded as the most important (90% regarded it as important), but also watershed management, berries and mushrooms, employment, and landscape were regarded almost as important as timber production (about 80% regarded these objectives as important). The majority of the respondents considered biodiversity, game management, and wilderness important, and almost half of the respondents wilderness character, endangered species, or tourism important. Reindeer husbandry was considered important by only every fourth of the respondents.

Three principal components were extracted for objectives in general, and named as 1) ecological tourism, 2) commercial forestry, and 3) non-timber products (Table 5). Ecological tourism included the features closely connected to this branch of tourism, such as respecting endangered species, biodiversity, a good landscape and watershed quality, wilderness character, and culturally valuable reindeer husbandry. The appreciation of timber production was associated with the appreciation of a high employment rate (P2). Appreciation of berries, mushrooms, and game characterized the third principal component of non-timber products (P3).

3.3 Forest Owners' Attitudes towards Forest Management Activities

The majority of the forest owners accepted most of the present forest management activities. Only large clear-cuttings were considered unpleasant.

Four principal components were formed from the original forestry attitude variables (Table 6) The first was called 1) detailed conservation, characterized by details according to which the forests in the vicinity of some natural objects should be excluded from clear-cutting areas. Although the highest loading for retained old pines occurred in the other component, the loading in the detailed conservation component was almost as high, indicating that retained old pines could also belong to the component of detailed conservation.

The second component, called 2) intensive forestry, emphasized the type of forest management

Table 6. The principal component analysis for the forest management attitudes of the forest owners. The principal components (P1–P4) explained 51.8% of the total variance. The principal components are called: P1 = Detailed conservation, P2 = Intensive forestry, P3 = Strip cuttings, and P4 = Natural regeneration (regeneration respecting forest coverage, natural regeneration and succession).

Variable	P1	P2	P3	P4
Retained snags	**0.816**	–0.019	–0.020	0.157
Retained rotten snags	**0.795**	0.193	–0.042	–0.003
Surroundings of brooks conserved	**0.627**	–0.137	0.299	0.106
Rocky outcrops excluded from cuttings	**0.557**	–0.065	0.338	0.167
Surroundings of springs conserved	**0.522**	0.039	0.408	0.031
Soil scarification	0.093	**0.700**	0.226	–0.093
Artificial regeneration	–0.155	**0.635**	–0.042	–0.202
Residual trees removed	0.094	**0.579**	–0.066	–0.149
Large clear-cuttings allowed	–0.269	**0.559**	–0.418	0.093
Surroundings of brooks thinned	–0.308	**0.499**	–0.267	0.410
Prescribed burning	0.159	**0.464**	0.260	0.141
Intermediate forest strips	0.139	–0.101	**0.760**	0.084
Narrow clear-cutting strips	0.096	0.247	**0.640**	0.169
Selective cuttings	0.001	–0.276	0.062	**0.721**
Natural regeneration	0.121	0.007	0.039	**0.703**
Deciduous mixed forests	0.338	0.004	0.254	**0.537**
Retained old pines	0.426	–0.077	0.277	**0.432**
Eigenvalue	4.00	2.18	1.53	1.09
Proportion variance	23.53	12.89	9.01	6.42
Cronbach's α	0.74	0.64	0.49	0.59
95% confidence limits for α	0.70–0.77	0.58–0.69	0.37–0.60	0.53–0.65

based on artificial regeneration that was practiced in the 1960's, 70's and 80's. The third principal component emphasized 3) the existence of forest strips between open cutting areas. Furthermore, the fourth component, called 4) natural regeneration, was characterized by naturalness and retaining the forest coverage.

3.4 Forest Owners' Opinions about the Changes in Forest Management

Almost all (94%) of the respondents recognized changes in forest management during the last ten years. Almost half of them (46%) considered that forest management had changed slightly, and 37% had observed considerable changes. The rest of the respondents had no opinion about the magnitude of the change.

About half of the respondents (47%) considered the changes positive, 7% negative, and one third (31%) both positive and negative. The rest of the respondents could not answer the question. The only differences between the groups of respondents were those between the income groups (Fisher's exact test's $p = 0.009$). The most positive attitude towards the changes was expressed by those who had both forestry and tourism income. On the other hand, the respondents who earned a living from sources other than forestry or tourism had the most negative attitude towards the changes.

Administration, guidance and regulations issued by the authorities divided the opinions of the respondents; almost one fifth of them considered these things positive and the same proportion negative. Similarly, the respondents' opinions about economic support and the profitability of forestry varied. Better young stand management, increased maintenance of biodiversity and a positive attention towards nature conservation and multiple-use forestry were considered positive

things, as well as the forest owner's increased power to decide about the management of their own forests. On the other hand, clear cutting and soil scarification were considered negative by many of the respondents. Only about 20% of the respondents answered the open-ended question.

About 73% of the 122 non-respondents had noticed the changes in forest management during the last ten years, and about 85% of them considered the changes positive. The positive changes perceived by the non-respondents were better soil scarification, decreased size of clear-cutting, increased forest coverage, better young stand management, retained trees and more pro-environmental forest management, in general. On the other hand, some had noticed increased mechanization in forestry.

3.5 Forest Owners' Willingness to Accept a Loss of Income Caused by Current Forest Management

About one third of the respondents were not prepared to accept any decrease in their forestry income as a result of the changed forest management activities (Fig. 2a). Current forest management represents less intensive forest management than earlier, and does not maximize the income from timber production. However, about one half of the respondents were willing to accept a small loss in their forestry income. Only the minority of the respondents were prepared to accept an appreciable loss. An appreciable loss was accepted more frequently in the management of state-owned forests than in a respondent's own forests (Fig. 2a).

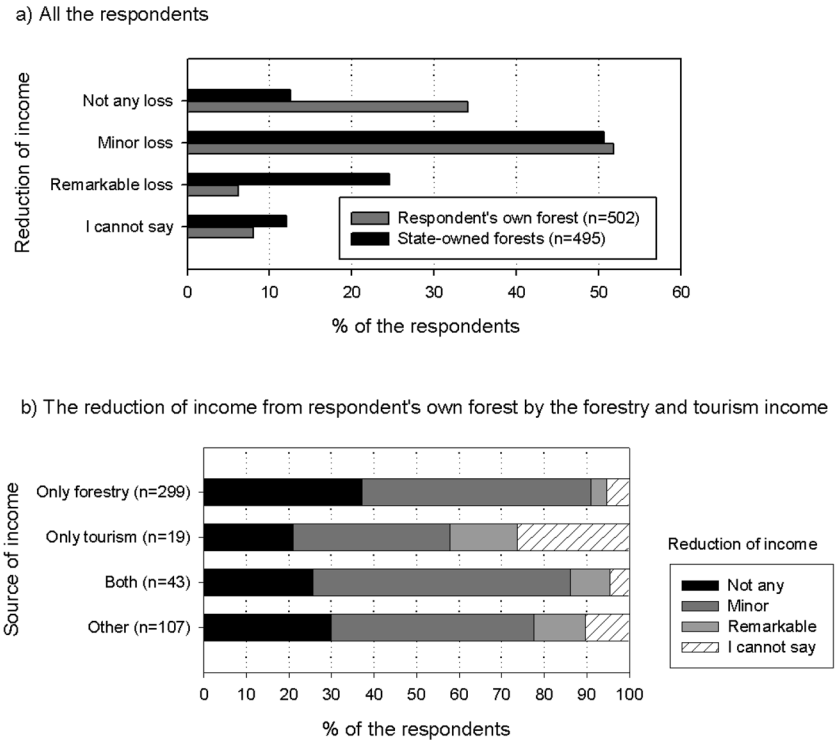

Fig. 2. The acceptability of the reduction in forestry income from the respondents' own forests and from state-owned forests (a), and the reduction for the respondents' own forests by the forestry and tourism income (b). Only the significant differences between the groups revealed by a log-linear model are presented (<5% risk level). The model fit (in b) given by log-linear model was: $\chi^2=26.36$, df=36, p=0.879. Test of the terms: region * income $\chi^2=29.24$, df=9, p=0.001 and source of income * reduction of income $\chi^2=30.51$, df=9, p=0.000.

Table 7. Canonical correlation analysis between the sets of sum variables for outdoor-recreation motives, forest management objectives, and management activities. In addition to Wilk's lambda and its significance, R^2 values for the overall models and R^2 values between the sets of independent variables and dependent variables, betas (without parentheses) and p-values of the t-statistics for the betas (in parentheses) are given.

Dependent / Independent set of variables				
	Motives / Objectives for own forest Lambda = 0.639, p = 0.000, R^2 = 0.36			
	Multiple use, conservation	Commercial timber	Household timber	
Mental recreation	0.052 (0.232)	0.077 (0.143)	–0.003 (0.958)	
Biophilia	**0.510 (0.000)**	**–0.183 (0.000)**	0.040 (0.440)	
Physical use of nature	0.068 (0.097)	**0.164 (0.001)**	**0.181 (0.000)**	
R^2 between independent set and dependent variables	0.325	0.039	0.040	
	Motives / Objectives in general Lambda = 0.459, p = 0.000, R^2 = 0.54			
	Ecological tourism	Commercial forestry	Non-timber products	
Mental recreation	0.050 (0.212)	0.004 (0.940)	0.036 (0.444)	
Biophilia	**0.639 (0.000)**	**–0.144 (0.004)**	**0.342 (0.000)**	
Physical use of nature	0.008 (0.822)	**0.365 (0.000)**	**0.152 (0.001)**	
R^2	0.448	0.113	0.200	
	Motives / Forest management activities Lambda = 0.635, p 0 0.000, R^2 = 0.37			
	Detailed conservation	Intensive forestry	Strip cuttings	Natural regeneration
Mental recreation	0.018 (0.706)	–0.068 (0.175)	0.049 (0.350)	**0.134 (0.000)**
Biophilia	**0.521 (0.000)**	**–0.299 (0.000)**	**0.122 (0.020)**	**0.259 (0.000)**
Physical use of nature	–0.175 (0.000)	**0.336 (0.000)**	–0.042 (0.392)	–0.016 (0.735)
R^2	0.238	0.130	0.020	0.117
	Objectives for own forest / Objectives in general Lambda = 0.489, p = 0.000, R^2 = 0.51			
	Ecological tourism	Commercial forestry	Non-timber products	
Multiple use, conservation	**0.590 (0.000)**	0.012 (0.762)	**0.446 (0.000)**	
Commercial forestry	–0.070 (0.052)	**0.382 (0.000)**	–0.056 (0.147)	
Household timber	–0.044 (0.231)	0.039 (0.357)	**0.092 (0.021)**	
R^2	0.349	0.151	0.232	
	Objectives for own forest / Forest management activities Lambda = 0.743, p = 0.000, R^2 = 0.26			
	Detailed conservation	Intensive forestry	Strip cuttings	Natural regeneration
Multiple use, conservation	**0.424 (0.000)**	**–0.192 (0.000)**	**0.117 (0.010)**	**0.294 (0.000)**
Commercial forestry	0.024 (0.540)	**0.143 (0.001)**	0.019 (0.660)	–0.036 (0.391)
Household timber	–0.049 (0.242)	0.062 (0.160)	0.012 (0.783)	**0.106 (0.014)**
R^2	0.172	0.061	0.015	0.114
	Objectives in general / Forest management activities Lambda = 0.671, p = 0.000, R^2 = 0.33			
	Detailed conservation	Intensive forestry	Strip cuttings	Natural regeneration
Ecological tourism	**0.356 (0.000)**	**–0.243 (0.000)**	0.029 (0.556)	**0.206 (0.000)**
Commercial forestry	**–0.122 (0.002)**	**0.317 (0.000)**	0.021 (0.623)	**–0.081 (0.049)**
Non-timber products	0.078 (0.079)	–0.009 (0.833)	0.077 (0.113)	**0.201 (0.000)**
R^2	0.165	0.152	0.009	0.122

The source of income was the only demographic factor affecting the attitude towards accepting a decreased income in the respondent's own forest (Fig. 2b). Those respondents who had tourism income or income other than that from tourism or forestry were more willing to accept a decrease in income than those who had only forestry income. One quarter of those who had tourism income only had no opinion on this question (Fig. 2b).

3.6 Relationships between the Outdoor Recreation Motives, Forest Management Objectives and Attitudes

Canonical correlation analysis indicated that there were significant interrelationships between the outdoor recreation motives, objectives, attitudes, and opinions (Table 7). The strongest relationships were found between the motives and general forest management objectives. The objectives for the respondents' own forests and forests in general were also closely related to each other. The respondents' motives were, as a whole, related especially to their attitudes towards multiple-use forestry, nature conservation, and ecological tourism, the motive dimension of biophilia being the strongest factor correlating positively with these attitudes (Table 7). On the other hand, biophilia was negatively related to commercial timber production and intensive forestry. Furthermore, the forest owners who were interested in the physical use of nature appreciated intensive commercial forestry, household timber production, and non-timber products such as berries and mushrooms. Biophilia or mental recreation oriented respondents appreciated the forest management activities that would retain considerable forest coverage during the forest regeneration phase (Table 7).

The objectives of multiple use and conservation in the respondents' own forests correlated strongly with the objectives for enhancing the opportunities for ecological tourism, traditional products, detailed conservation, and retaining forest coverage in management activities. The appreciation of commercial forestry in the respondent's own forest correlated positively with the appreciation of intensive commercial forestry in other forests as well. Finally, increasingly positive attitudes towards ecological tourism, nature conservation, and the other branches of multiple-use forestry were positively connected with the attitudes towards detailed conservation in forest management activities and retaining forest coverage (Table 7).

3.7 Forest Owner Typologies and Their Relationships to the Demographics of the Respondents

Three interpretable forest owner groups were found using K-means cluster analysis. They were named as 1) conservationists, 2) timber producers, and 3) multi-objective forest owners (Table 8, Fig. 3). A timber producer wants to produce timber for commercial markets. He is not very interested in forest products other than timber, forest management supporting multiple-use, or personal outdoor recreation experiences. A

Table 8. The K-means cluster solution revealing the final cluster centres. The values are based on standardized variables. F-values reveal the contribution of the variables in the clustering biophilia having the strongest effect on the clustering.

Variable	Cluster			$F_{2,522}$
	Conservationist (n = 137)	Timber producer (n=214)	Multi-objective (n=174)	
Commercial timber	–0.773	0.226	0.330	70.82
Household timber	–0.116	–0.171	0.303	12.57
Multiple use, conservation	0.476	–0.744	0.541	161.50
Ecological tourism	0.493	–0.739	0.520	157.58
Commercial forestry	–0.857	0.101	0.551	110.28
Non-timber products	0.186	–0.568	0.552	83.46
Detailed conservation	0.484	–0.608	0.366	90.10
Intensive forestry	–0.768	0.276	0.265	68.91
Strip cuttings	0.122	–0.250	0.212	12.11
Natural regeneration	0.262	–0.483	0.388	50.98
Mental recreation	0.095	–0.562	0.616	90.30
Biophilia	0.483	–0.830	0.640	239.10
Physical usage of nature	–0.478	–0.412	0.883	165.37

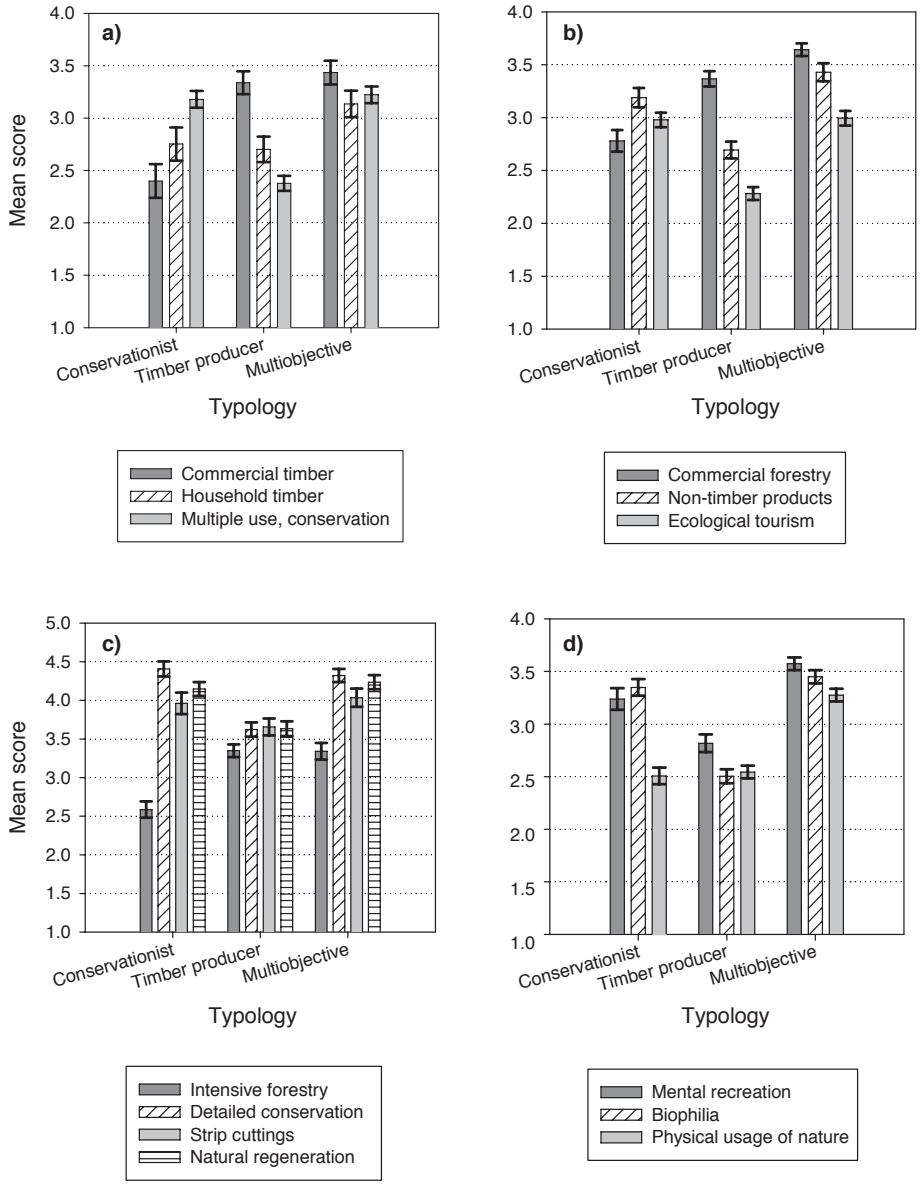

Fig. 3. Characterizing multi-objective-, timber production-, and conservation-oriented forest owners by their objectives in the management of their own forests (a), by the objectives in forest management in general (b), by their attitudes towards forest management activities (c), and by their personal motives in their own outdoor recreation (d). The error bars describe the 95% confidence intervals.

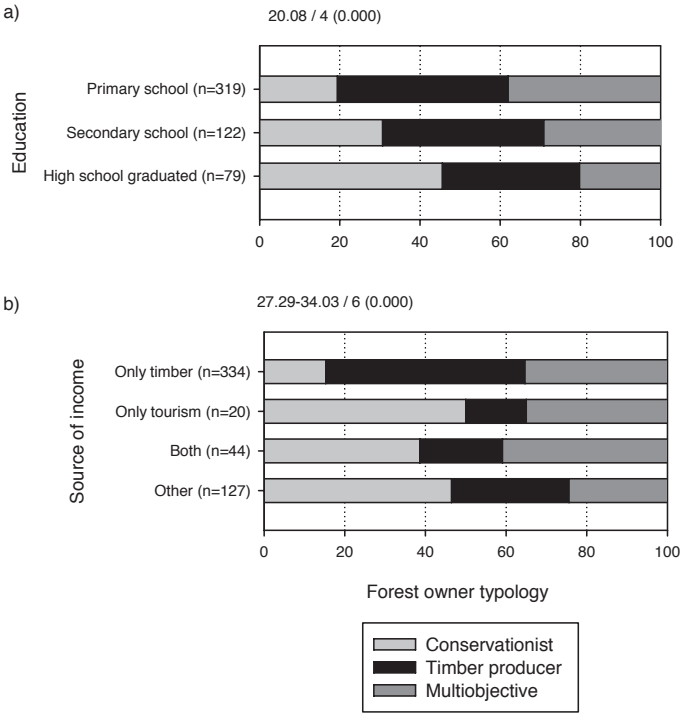

Fig. 4. The relationships between the forest owner typologies and the forest owners' demographics. Only statistically significant relationships indicated by three-way contingency tables and corresponding log-linear models are shown (under 5% risk level). Chi-squared values, degrees of freedom and significances (in parentheses) are located above the bar charts (a–d).

conservationist, and especially a multi-objective forest owner, appreciates multiple-use forestry, biodiversity and mental nature experiences. A multi-objective forest owner appreciates natural products in addition to timber and personal physical exercise in a forest environment. A conservationist is not very interested in timber production, unlike a multi-objective forest owner (Fig. 3).

A clear relationship was found between the forest owner typology groups and forest owners' education and the source of income (Fig. 4). The proportion of conservationists increased and the proportion of multi-objective owners decreased with increasing education. The proportion of timber producers slightly decreased with increasing education. The effect of tourism income on the typology group was clearly evident, similarly to the effect of the sources of income other than tourism or forestry. Only a minority of the tourism workers belonged to the timber producers, and were mostly conservationists or multi-objective forest owners (Fig. 4)

4 Discussion

4.1 Generalization of the Results

The proportions of respondents varied only slightly by data set, and the response rates in all the data sets remained low, as has been the case in some other surveys directed at northern Finland (e.g. Korhonen et al. 2004). In some recent studies concerning private forest owners, the response rates were higher, 45 to 80% (e.g. Butler and Leatherberry 2004, Boon et al. 2004). The distribution of the forest owner population remained

unknown because several data sets were used in order to filter out the forest owners for the study. This weakened the possibility of generalizing the results to cover the whole population. However, no restrictions were set on the size of the forest area owned because the owner of a small forest holding was also expected to be interested in his forest property, its multiple use, and household timber and forest management in addition to monetary income. The aim was also to find as many as possible forest owners who earn their living from tourism or from sources other than forestry or tourism.

Comparison of the demographic distributions of the respondents and non-respondents indicated that the opinions and attitudes of the oldest age group, men, and village dwellers were slightly underestimated (Table 2, see also Bellin et al. 2005). The demographic distributions in this study rather closely resembled those obtained by Karppinen et al. (2002, see Table 2), even though the definitions of the categories differed slightly in the two studies. Furthermore, the perceptions of the change and attitudes towards the change in the forest management of respondents and non-respondents were rather similar. Thus, taking into account the slight biases revealed by the non-response analysis, the problems in the sampling and the low response rate, this study should be considered primarily as a case study that does not represent the whole population of northern forest owners. However, our study reliably revealed the differences between the forest owners that were also outlined by different typology groups closely related to education and sources of income. The differences in the attitudes, objectives, and especially the effect of the sources of livelihood such as tourism income on the attitudes and objectives, should be taken into account when forest policy and regulations are outlined.

4.2 Discussion of the Results

The forest owners considered objectives enhancing good landscape and multiple-use possibilities, in addition to timber production, to be important in their own forests. Safeguarding biodiversity and the survival of endangered species were not regarded as primary objectives. The importance of a beautiful landscape for forest owners has also been reported in an earlier Finnish study (Kangas and Niemeläinen 1996). In that study biodiversity was given a higher value than in our study. The importance of watershed management reflected forest owners' environmental consciousness, as noticed in an earlier study directed at the inhabitants of Finnish Lapland (Kajala 1997).

The objectives of the forest owners reflected the dimensions of 1) multiple-use forestry, including a beautiful landscape, nature conservation, and biodiversity, 2) commercial forestry with job opportunities, and 3) non-timber products, such as household timber, berries, mushrooms and game. In a study directed at Finnish forest owners, forestry income was connected to household timber supply, hunting possibilities, and forest management (Karppinen et al. 2002). In that study forests were found to have the dimension of an investment object and economic security. However, the objectives presented to the respondents in these two studies were different. Karppinen et al. (2002) asked about forest ownership, while we asked about forest management. Despite the differences in the questionnaires, Karppinen et al. (2002) found a dimension of multiple use, landscape, nature conservation, and biodiversity, similarly to this study.

Karppinen (2000) found that the forest owners, who live in North Finland, can be described using two objective dimensions: non-timber and economic ones. The clustering was weak, suggesting that the northern forest owners are not clearly separated from each other economically or in non-timber aspects. The results coincide with the results of this study; multiple-use was found to be important to most of the forest owners, in addition to timber production. According to Karppinen (2000), different objective groups are more clearly distinguishable in South Finland.

Horne et al. (2004) reported that only a few forest owners were interested in nature conservation and were ready to increase the area of statutory nature conservation. Instead, many forest owners were willing to promote small-scale nature conservation in their own forests by preserving small objects, as rich biotopes, springs etc. This positive attitude toward small-scale conservation was also found in our study. About one half of the respondents also accepted at least a

minor loss of income as a result of conservation. The respondents' sources of income had an influence on their opinion. Thus, the hypothesis about the loss of income was confirmed. Karppinen (2000) found that one fifth of the forest owners supported nature conservation, and the proportion was slightly higher among the non-owners.

The forest owners in our study widely supported the current forest management guidelines. At least some of the respondents had noticed positive changes in the managed forests in the North. The finding confirmed the hypothesis about the perception of the change. Most of the observed changes coincided with the current management guidelines. The respondents also emphasized increased freedom in managing their own forests. Freedom of choice is a positive thing for different forest owner groups, like "traditional" and tourism-oriented owners who have different objectives and attitudes.

The relationships between the outdoor recreation motives, objectives, and forest management attitudes were noticeable, thereby confirming the hypothesis about the existence of such relationships. A person's motives towards pristine living nature (biophilia) correlated strongly with multiple-use and conservation-oriented objectives and attitudes. Furthermore, the appreciation of ecological tourism as a forest management objective was closely related to positive attitudes towards nature-oriented forest management.

The forest owner typologies found in earlier studies (Kuuluvainen et al. 1996, Karppinen 1998, Becker et al. 2000, Kline et al. 2000a, 2000b, Bieling 2004, Boon et al. 2004, Ingemarson et al. 2006) include many similarities with the typologies of this study. For example, Becker et al. (2000) referred to an ecological type of forest owner group, characterized by an orientation to nature conservation and natural experiences. Bieling (2004) described a forest owner type that was economically interested, and Kline et al. (2000a, 2000b) called an owner type a timber producer. This forest owner valued investments and forestry income. Furthermore, Kline et al. (2000a, 2000b) characterized a multi-objective forest owner as a person who values timber production and investment, but also recreation and owner gratification. Kuuluvainen et al. (1996) defined a multi-objective forest owner as a person who is interested in monetary and amenity values. The forest owner categories of timber producer, multi-objective, and conservationist in our study also related relatively well to the categories presented by Boon et al. (2004): the classic forest owner, the hobby owner, and the indifferent farmer.

Ingemarson et al. (2006) called Swedish forest owner groups traditionalists, economists, conservationists, passive owners and multi-objective owners. Similarly to our study, the multi-objective owners were interested in multiple-use forestry and nature conservation, but they also wanted to obtain income by producing timber. The economists in the study of Ingemarson et al. (2006) were interested in timber production, but not so much in multiple-use forestry and conservation. The conservationists, similarly to those in our study, were interested in nature conservation, but not very much in multiple-use of the forests or timber production. They were also younger and city-dwellers, which are features closely related to a high level of education. The conservationists in our study were also characterized by some features of the passive owners.

Differences in environmental attitudes towards ecosystem-based management between rural and urban respondents, and also the differences based on their agricultural affiliation, have been described in many earlier studies (e.g. Kajala 1997, Boon et al. 2004, Bellin et al. 2005). Public discussion in Finland has emphasized the attitudinal differences between the forest owners living in towns and those in rural areas. However, private forest owners in northern Finland may have a closer connection to their rural origins than the city-dwellers in the southern part of the country. Education and the sources of livelihood were the only significant factors explaining the typology groups in this study as regards the relationships between the demographics. The results clearly confirmed the close positive connection between tourism income and/or appreciation of ecological tourism and the environmental-oriented attitudes towards forest management. Furthermore, those who earned their living from tourism were more willing to accept a decrease in forestry income than those who lived on their forestry income. The hypothesis about the typology and its relationship with forest owners' background was confirmed.

Environmental, cultural, and economical con-

ditions vary between the provinces of Lapland, Ostrobothnia and Kainuu. Agriculture has traditionally been the most important in Ostrobothnia, and tourism and outdoor recreation in Lapland (see also Kajala 1997). In Kainuu both of these sources of livelihood are important, but the forest sector has traditionally been the most important nature-based livelihood in the province (Tolonen and Tuovinen 2006). This study and that of Korhonen et al. (2004) also confirmed this fact. This study suggested that a higher proportion of those who live on forestry income may explain the timber production oriented attitudes in Kainuu especially.

In conclusion, this study suggests that the forest owners who live in the northern part of Finland appreciate timber production. The new forest management guidelines have made it easier to accept forestry activities. The current methods allow the choice of more multiple-use and conservation-oriented forestry than the previous forest management regimes.

The main results of this study suggest that, although the majority of the forest owners are "traditional" owners who want to obtain high, perhaps maximized forestry income, an increasing proportion of the forest owners will obviously earn their living from other sources of livelihood, such as tourism, especially nature-oriented tourism. The latter forest owners have more nature-oriented objectives and attitudes compared to the "traditional" owners. Current forestry guidelines and practices are also rather suitable for these nature-oriented forest owners, including tourism workers and entrepreneurs.

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