

Safeguarding forest biodiversity in Finland: Citizens' and non-industrial private forest owners' views

Paula Horne, Terhi Koskela, Ville Ovaskainen and Taina Horne (eds.)

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Office

Post Box 18
FI-01301 Vantaa, Finland
tel. +358 10 2111
fax +358 10 211 2101
e-mail julkaisutoimitus@metla.fi

Publisher

Finnish Forest Research Institute
Post Box 18
FI-01301 Vantaa, Finland
tel. +358 10 2111
fax +358 10 211 2101
e-mail info@metla.fi
<http://www.metla.fi/>

Authors			
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Abstract			
<p>Safeguarding forest biodiversity has become an important issue internationally as well as in national forest and environmental policies. In Finland, the METSO Forest Biodiversity Programme for Southern Finland was accepted in 2002. METSO proposed a set of new incentive-based policy instruments, such as nature values trading and competitive tendering that were tested in 2003–2007. The METSO Forest Biodiversity Programme for Southern Finland for the period 2008–2016, approved by the Government in 2008, will continue to promote voluntary conservation schemes.</p> <p>The objective of this study was to examine the attitudes of Finnish citizens in general and the NIPF owners in particular towards the safeguarding of forest biodiversity, its socio-economic effects, compensation policy and policy instruments. This publication summarizes the results of three postal surveys carried out by the Finnish Forest Research Institute (Metla) in 2002, 2003 and 2005.</p> <p>Three out of four citizens supported an increase in forest conservation in Southern Finland from the current level. Nearly two thirds of citizens agreed that forest conservation should mainly be implemented by using instruments such as voluntary contracts and information. Given such instruments, citizens' willingness to pay for increased conservation would be greater than in the case of land acquisition. Three out of four citizens considered that the payments to the landowners should cover at least the full amount of forgone timber revenues. Thus, arrangements that involve a full compensation to landowners seem to be in line with citizens' perceptions of the fair distribution of the costs of conservation. Forest owners showed little support to an increase in traditional, land acquisition-based conservation in private lands. However, more flexible arrangements for safeguarding biodiversity were considered much more acceptable. In choice situations between the status quo and increased conservation based on voluntary contracts, one third of forest owners always chose a conservation option. The acceptability of conservation contracts was strongly affected by the terms of the contract, such as the initiator, duration, restrictions on forest use, and payment details. Generally, the ability to retain one's property rights and sovereignty was of particular importance.</p> <p>The emphasis on voluntariness may increase the social acceptability of conservation and thereby reduce the potential for conflicts. In principle, the incentive-based flexible instruments also give a chance to improve the cost-efficiency of nature conservation.</p>			
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Paula Horne, Pellervo Economic Research Institute, Eerikinkatu 28 A, FI-00180 Helsinki. E-mail paula.horne@ptt.fi Terhi Koskela and Ville Ovaskainen, Vantaa Research Unit, Post Box 18, FI-01301 Vantaa. E-mail terhi.koskela@metla.fi ; ville.ovaskainen@metla.fi			
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Foreword

This publication summarizes the results of three surveys carried out by the Finnish Forest Research Institute (Metla) in 2002, 2003 and 2005 as a part of a broader research project *Policy instruments for forest-based public goods*. This summary publication was prepared under Metla's research programme, *Safeguarding forest biodiversity - policy instruments and socio-economic impacts* (TUK).

The survey study on citizens received financial support from the Finnish Academy's FIBRE research programme as a part of a consortium headed by Olli Tahvonen. Professors Vic Adamowicz and Peter Boxall of University of Alberta, Canada, participated in planning and analysing this study. Eeva Ylinen wrote her master's thesis on the subject for the Department of Economics and Management, University of Helsinki, and participated in planning and analysis of the study as a research assistant. Professor Ilkka Hanski from the University of Helsinki and Juha Siitonen from the Finnish Forest Research Institute provided invaluable help in estimating the number of threatened species. Part of the questions used in the questionnaire were the same as those used by the Canadian Forest Service to enable comparisons between the two countries. The questionnaire was reviewed by Michel Haener of the Canadian Forest Service, and professor Jari Kuuluvainen, Eija Pouta, and Mika Rekola of University of Helsinki. Several people participating in testing the questionnaire gave valuable proposals for improvement.

The nation-wide private forest owner survey received financial support from the EU Fifth Framework Programme as part of the consortium *Biodiversity and Economics for Conservation* (BIOECON), headed by professor Timothy Swanson of University of London. Financial support was also received from the MOSSE research programme of the Ministry of Agriculture and Forestry together with a research team of University of Helsinki lead by researcher Päivi Tikka. PhD Taina Horne participated in planning the questionnaire. Juha Hakkarainen (Central Union of Agricultural Producers and Forest Owners), Harri Karjalainen (WWF Finland), Petri Ahlroth and Antti Otsamo (Ministry of Agriculture and Forestry) and Mikael Hildén (The Finnish Environment Institute) commented on and developed the study as members of the steering group of the MOSSE project. Valuable comments for the questionnaire were received from several private forest owners.

The nature values trading survey was conducted in collaboration with professor Mikko Mönkkönen, Artti Juutinen, Erkki Mäntymaa and Sari Matinaho from the University of Oulu. The survey was funded by the MOSSE project. The collaboration network of nature values trading provided useful comments to the manuscript.

For the citizen survey and the nationwide forest owner survey, the results have been published in Finnish in Finnish Forest Research Institute Research Papers 933 (Horne et al. 2004). The results for the nature values trading survey have been reported in Finnish in Working Papers of the Finnish Forest Research Institute 18 (Juutinen et al. 2005). The editors wish to thank all parties participating in the research and publication of the results.

Paula Horne, currently Research Director with Pellervo Economic Research Institute (PTT), worked as project leader and programme director at the Finnish Forest Research Institute during the research period and the compilation stage of this summary publication.

Editors Paula Horne, Terhi Koskela, Ville Ovaskainen and Taina Horne

1 Introduction

Terhi Koskela, Paula Horne and Ville Ovaskainen

1.1 Objectives of the study

The objective of this study was to examine the attitudes of Finnish citizens in general and the NIPF owners in particular towards the safeguarding of forest biodiversity, its socio-economic effects, compensation policy and policy instruments. Economically and socially sustainable forest policy can be achieved only if the policy instruments used are effective and acceptable to the general public as well as the forest owners (Manning et al. 1999). This study comprised three surveys, one targeted to the general public, one to non-industrial private forest (NIPF) owners all over the country, and one to NIPF forest owners that had taken part in a nature values trading pilot project. It was assumed that responses would reflect heterogeneity of preferences in populations. This heterogeneity is often explained by demographic factors, but in this study we wanted to find out how the respondents' values and attitudes towards nature and forest ownership affect their opinions and choices.

1.2 Forest sector in Finland

Of the total land area in Finland 86 percent (26.3 million ha) is classified as forestry land. Forestry land is divided in three categories according to its productivity: forest land (20.2 million), scrub land (2.7 million ha, potential volume increment is below 1.0 m³/ha but over 0.1 m³/ha/year) and waste land (3.2 million ha, potential volume increment less than 0.1 m³/ha/year) (Finnish statistical ... 2008). There are four forest vegetation zones in Finland: hemi-, south-, mid-, and north-boreal. The hemiboreal zone covers only the south-western coastal area of the country. The main forest, and forestry, tree species in Finland are Scots pine (*Pinus sylvestris*), Norway spruce (*Picea abies*) and downy (*Betula pubescens*) and silver birch (*Betula pendula*).

Of the total forestry land 52 percent is owned by non-industrial private forest (NIPF) owners. In the southern Finland the share is even greater, being 73 percent. The state owns 35 percent of the total forestry land and companies 8 percent. The remaining 5 percent belongs to municipalities, parishes and others. Most state-owned forests are situated in northern Finland where productivity is low, and thus the share of the growing stock volume in state land is only 21 percent. Sixty four percent of the growing stock volume is in NIPF owners' land (Finnish statistical... 2008). Since about 20 percent of Finnish households own a forest holding (> 5 ha) the economic and social significance of forest to private people is considerable. Over 60 percent of forest owners holdings had sold timber during last 5 years (Karppinen et al. 2002). The average size of privately owned forest holdings is 23.6 ha (forest land, including the forest holdings with minimum of 2 hectares of forest land) (Finnish statistical... 2008).

The economic importance of forest industry to Finland's national economy has declined during the past few decades but it is still one of the most important industries in the country. The share of the forest sector of the total GDP was 5.9 percent in 2007 (Finnish Statistical... 2008). The forests sector's share of total export value was 19 percent in 2007 (Finnish Statistical... 2008).

Forests are the most important habitats for threatened species in Finland. Forest is the primary habitat for 37.5 percent of threatened species and for 46 percent one of the habitats they inhabit (Rossi et al. 2001). In Finland herb-rich forests are uncommon and most of them (93 %) are situated in the southern part of the country (Virkkala et al. 2000). They are important habitats for many of the threatened species: herb-rich forests are primary habitat for over 50 percent of threatened forest species in Finland (Rassi et al. 2001).

In Finland 9 percent of the forest and scrub land is strictly protected. Forest conservation in Finland is geographically unevenly distributed so that most of protected forest and scrub land is situated in Northern Finland. In the North 16 percent of the forests are strictly protected whereas in southern Finland the percentage is two (Finnish Statistical... 2008). The biggest needs for improvement of the conservation network are in Southern and Central Finland. In the hemi- and south-boreal as well as in the western parts of the mid-boreal regions the proportion of protected forests is especially low (Virkkala et al. 2000).

2 Development needs for safeguarding forest biodiversity

Terhi Koskela, Paula Horne and Ville Ovaskainen

2.1 Forest Biodiversity Programme for Southern Finland (METSO): The pilot phase

Safeguarding biodiversity has become an important factor in forest and environmental policy both nationally and internationally (Rio Convention on Biological Diversity 1992). In Finland the main guidelines for forest policy were laid down in the Finland's National Forest Programme 2010 that took into account the ecological, social and cultural aspects in forest use (1999). In 1999 a team of experts was gathered to determine the conservation needs in forests in southern Finland and Ostrobothnia (ESSU). In their report (*Metsien suojelun tarve...* 2000) they concluded that the present network of protected areas is insufficient to safeguard all endangered and threatened forest species in hemi-, south- and midboreal regions. The protection network in northboreal zone was regarded to be sufficient.

In 2000 the Government appointed a working group to draw up a proposal for a plan for objectives, financing, and implementation of forest conservation. In 2002, on the basis of the plan presented by the working group, the Government decided to supplement the National Forest Programme 2010 with an action programme to safeguard biodiversity in forests in southern Finland, the western parts of the province of Oulu and the south-western region of the province of Lapland. The programme is called Forest Biodiversity Programme for Southern Finland (METSO). The programme is lead by the Ministry of the Environment and the Ministry of Agriculture and Forestry and the main executors are Metsähallitus (formerly Forest and Park Service), regional forestry centres and regional environment centres. The need for developing new conservation instruments is based on the objectives of METSO programme to increase the social acceptability of conservation measures as well as their compatibility with the forest ownership in Southern Finland. Since in southern Finland the proportion of protected forests is relatively low, and the forests are mainly owned by NIPF owners, the main emphasis of conservation is laid on privately owned forests in the southern part of the country.

The first phase of the programme (2003–2007) was a 17-point plan of action that aimed to improve the protection of habitats that are crucial for forested landscapes and threatened species, to create new areas and networks for biodiversity maintenance, and to increase the efficiency of conservation in present protected areas (Government decision... 2002). Some of the actions were based on biodiversity safeguarding measures currently at use; others were partially or completely new. The conservation means proposed in METSO programme are based on voluntary participation by forest owners and compensations for forgone revenue.

Common ecological criteria based on nature conservation biology were prepared in 2003 by an expert working group appointed by Ministry of the Environment to ensure cost-effective targeting of the actions. The criteria were based on forest structures and habitat types important for biodiversity. Sites that were protected in the programme were chosen according to these criteria.

The actions that were tested in the pilot phase of the METSO Programme are briefly described in the following.

Nature values trading was a procedure whereby a landowner made an agreement to maintain or improve specific nature values of their forest and in return receives a compensation. The action was always voluntary and based on the landowner's willingness to protect the site. The authorities considered the suitability of the proposed site. Forest owners had the opportunity to present their views on the price to be paid. If the forest owner and the authorities agreed about the price and the terms, the forest owner entered into a fix-term contract with the Regional Forestry Centre for 10 to 13 years. When the agreement ends, the area concerned can be used as the landowner sees fit. Natural values trading pilot project was launched in Southwest Finland in 2003 and it continued until the end of 2007 (Gustafsson 2007).

In competitive tendering, the environmental authorities determined the kinds of habitats to be protected in a certain area and invited landowners to submit tenders on specific sites and the price at which they are willing to offer their sites for conservation. Tendering was voluntary for landowners. The authorities approved the sites that best correspond to the criteria for conservation. Conservation was implemented in practice by establishing a privately owned nature conservation area, through a fixed-term agreement or by the state purchasing the area as a nature conservation area. The choice of method depended on the nature values of the site, its location and the proposal of the landowner. If the agreement is for a fixed-term, the landowner is free to use the area as their see fit in the end of the agreement.

The objective of the *cooperation network for forest biodiversity* was to promote innovation, cooperation and interaction and to create new operating traditions in biodiversity conservation between landowners, local authorities and NGOs. In the project forest biodiversity was protected at local level on the basis of voluntary participation and landowners' own initiatives. Cooperation centred on, for example, a national park, a hiking or recreation area or commercial forest. The area didn't need to be a continuous or clearly defined area, but all landowners interested in biodiversity conservation and willing to participate were allowed to join the network.

The new actions were evaluated through pilot projects and feasibility studies. One of the programme's 17 sub-programmes covered the monitoring and evaluation of the whole programme. Data was collected for the purposes of monitoring and evaluation from ecological surveys, questionnaires, public discussions, interviews, official statistics and project reports. Since many impacts will only become evident after a long time lag, or after measures are expanded to cover the whole country, the evaluators have also had to rely on research results and expert assessments. The recent research data used in this evaluation has been compiled in a special research report entitled METSO on jäljillä (Horne et al. 2006). The final monitoring and evaluation report (Syrjänen et al. 2007) examines how the measures within the whole programme have been implemented, and assesses their ecological, economic and socio-cultural impacts.

According to the evaluation temporary and permanent conservation measures that involve voluntary commitments from forest owners should be more widely applied as part of future efforts to safeguard forest biodiversity. It may be difficult, however, to ensure that such voluntary measures are extended both to cover a wider range of habitats, and to build up more extensive conservation networks. Short temporary agreements are more suitable for conserving sites that require active management and whose natural values may change over time; whereas long-term or permanent agreements can be applied where biodiversity values are permanent or only evolve slowly. The results were taken into account when the METSO Programme 2008–2016 was prepared.

2.2 Forest Biodiversity Programme for Southern Finland (METSO): 2008–2016

The new METSO Programme 2008–2016 aims to halt the ongoing decline in the biodiversity of forest habitats and species, and establish favourable trends in Southern Finland's forest ecosystems (Government resolution... 2008). The programme is 14-point plan of action to improve Finland's network of protected areas, to continue and enhance application of nature management methods in commercially managed forests, to improve the knowledgebase, to increase the collaboration between forest and environmental organizations, to advice forest owners, to train professionals, and to improve communication. Voluntary conservation schemes will be developed and continued in METSO 2008–2016, such as voluntary fixed-term and permanent conservation contracts and voluntary management practices to enhance biodiversity in commercially managed forests. The site selection criteria were updated by a working group (METSO-ohjelman luonnontieteelliset... 2008). The criteria define what kind of ecologically valuable habitats are to be protected in the programme - they form an 'ecological shopping list'. The criteria are based on structural features of forests and forest habitat types important for biodiversity. Also threatened species and the proximity to existing protected areas as well as cultural values and recreation are important and are to be taken into consideration.

The METSO Programme and the new National Forest Programme (Finland's National Forest Programme 2015, 2008) were launched at the same time to illustrate that the commercial use of Finland's forests and the conservation of biodiversity can be combined. METSO Programme is one element in the National Forest Programme. Forest Programme 2015 aims to ensure forest-based work and livelihoods, biodiversity and vitality of forests, and opportunities for recreation for all citizens.

3 Previous studies on attitudes towards forest conservation in Finland

Paula Horne and Terhi Koskela

Several studies on the opinions and attitudes of Finnish people to forest conservation and biodiversity protection have been conducted since the beginning of the 1990's (e.g., Tuomola 1993, Hänninen 1994, Kangas and Niemeläinen 1995, Hänninen and Karppinen 1996, Kajala 1996, Siikamäki 2001, Lehtonen et al. 2002, 2003, Valkeapää et al. 2009). These studies show that besides economic importance, the intangible and nature values of forest are also highly valued by many people. However, the attitudes of the general public seem to be divided between those that emphasise the economic role of forests and are not willing to compromise this for conservation, and those who emphasise ecological and other immaterial values and are even willing to pay for additional conservation. In general the results of these studies implicate that those that are more ecologically inclined are typically female, younger than average, highly educated and live in cities, whereas those that emphasise economic values are characteristically male, middle-aged or older and forest owners.

Studies on attitudes towards forest conservation targeted especially to private forest owners are less numerous than those targeted to the general public (Hänninen and Karppinen 1996, Kangas and Niemeläinen 1996, Hellström 2001, Karppinen et al. 2002, Paloniemi 2008). These studies (e.g., Hänninen and Karppinen 1996, Hellström 2001) show that even though forest owners were more likely to support the commercial use of forests than people not owning forest land, some still favoured increased conservation in forests. When asked about the benefits gained from their forests immaterial benefits such as forest vitality, scenery and biodiversity were ranked even higher than economic benefits (Kangas and Niemeläinen 1996).

4 Methods

Paula Horne and Terhi Koskela

4.1 Multivariate methods

In the citizen and nation-wide NIPF owner studies, the respondents were divided in segments based on their attitudes and values using factor analysis and cluster analysis (e.g. Afifi and Clark 1996). In factor analysis new combined variables were created on the basis of original variables of the attitude statements. The factor scores were further used as criteria in a cluster analysis (K-means clustering) to classify citizens and NIPF owners into different segments by their attitudes.

4.2 Choice experiment method

There are several methods by which the values and attitudes towards nature and the environment can be measured. The choice experiment method, developed during the last decade, enables description of the environmental goods on the basis of its components as well as the examination of trade-offs between these components. The choice experiment method uses questionnaires in which the respondent is presented with an imaginary choice set. A choice set consists of several different alternatives from which the respondent is asked to choose the preferred one. Each alternative is described by a set of attributes that define the object to be valued. Attributes can be quantitative (e.g. biodiversity index) or qualitative (e.g. scenery). In each choice set these attributes have different levels, so that the respondent must make a choice taking into account trade-offs between the attributes. The data are analysed using econometric models, such as the conditional logit model. A detailed description of the method can be found in Louviere et al. (2000).

5 Citizens' attitudes towards biodiversity conservation in forests

Paula Horne and Heimo Karppinen

5.1 Data description

5.1.1 Data collection

The data were collected by sending questionnaires to 3000 randomly selected 15–74 years old Finnish speaking citizens in summer 2002. The response rate after the first posting was 25 percent, and after a remainder with a questionnaire, the final response rate was 45 percent (1350 respondents) (see Blom 2003).

The questionnaire consisted of questions on the respondents' background information, their nature activities, knowledge about biodiversity and attitudes towards compensations paid to forest owners for costs of conservation. The respondents were also presented with a set of attitude statements concerning forest use and management in general and particularly in privately owned forests. A five-point Likert scale was used for response alternatives. The next section of the questionnaire consisted of the choice experiment and the attached glossary of attributes. Finally, the respondents were asked about their opinions on the extent of conservation areas, methods used for conservation and some socio-economic effects of conservation. In fall 2002 70 randomly chosen recipients who had not answered the questionnaire were interviewed on the telephone.

5.1.2 Background information of the respondents

The descriptive statistics of the background information of the respondents show that the respondents well represented the population in general (Tables 1 and 2).

Table 1. Respondents and non-respondents of the citizen survey and Finnish population by age, gender and present and childhood place of residence.

	Respondents	Non-respondents	Finnish population
Mean age (years)	45	44	
Median age (years)	45		
		Percentage	
Gender			
Male	46	53	49
Female	54	47	51
Age structure			
15–24	15	13	17
25–34	13	11	16
35–44	20	26	19
45–54	20	26	21
55–64	20	11	16
65–74	12	13	11
Childhood place of residence			
Rural area	52		
Town, less than 20 000 inhabitants	20		
Town, 20 000 – 100 000 inhabitants	17		
Town, over 100 000 inhabitants	10		
Present place of residence			
Rural area	22	13	
Town, less than 20 000 inhabitants	27	34	
Town, 20 000 – 100 000 inhabitants	26	27	
Town, over 100 000 inhabitants	25	26	

Table 2. Respondents and non-respondents of citizen survey and Finnish population by education, occupation, family size and gross household income.

	Respondents, %	Non-respondents, %	Finnish population, %
Education			
Primary school	28		34
Secondary school	9		19
Vocational education	21		28
Polytechnic education	22		10
University education	15		9
Other	5		
Occupation			
Farmers or forestry entrepreneurs	3	4	
Other entrepreneur	7	7	
Upper employee	12	1	
Clerical employee	13	11	
Worker	24	44	
Pensioner	19	17	
Student	13	11	
Unemployed	6	3	
House-spouse or other	3	0	
Family size			
1 person	16		38
2 persons	40		32
3 persons	15		13
4 persons	15		11
5 persons	9		4
6– persons	4		2
Dependents under 18 years old			
0	62		
1	16		
2	14		
3	6		
4–	2		
Household gross income, montly (euros)			
–1000	13		
1001–2000	22		
2001–3000	24		
3001–4000	19		
4001–5000	10		
5001–6000	6		
6000–	7		

Almost 20 percent of the respondents were forest owners (area of forest holding 5 ha or more). The average size of the forest holding was 40 ha and one in ten respondents owned 100 ha or more (Table 3). While the average size of the forest holding in the non-respondent segment was slightly larger, the forest property had more economic significance for those that answered the questionnaire.

The respondents were asked about their recreational activities related to nature and forests. Almost all (99 %) had undertaken one or more of the 11 activities listed in the questionnaire during the past 12 months, and 50 percent marked at least four activities. The most common activities were

Table 3. Size and economic significance of forest holding among respondents and non-respondents owning five hectares of more.

	Respondents	Non-respondents
Mean forest holding size (ha)	40	55
Median (ha)	23	
	Percentage	
Acreage (ha)		
5–19.9	37	
20–49.9	37	
50–99.9	16	
100–	10	
Forest owner's estimate of the economic significance of the forest holding		
Not significant	25	40
Some what significant	43	40
Significant	24	15
Very significant	8	5

nature observation (81%) and walking in the forest (75%). On average men and people with higher education were involved in more activities. Current or childhood place of residence and family size were not related with recreational activities.

The non-respondents that were interviewed were asked about the reason for not responding. The most common single reason was general lack of interest in surveys (Table 4). The non-respondents did not differ significantly from the respondents in their background information. Those non-respondents that were interviewed were more content with the current protection areas, less willing to pay more taxes to cover the costs of increased conservation and less willing to forsake employment than the respondents. One reason for the difference between the segments could be that the respondents had had more time to consider the matter while filling out the questionnaire.

5.1.3 Attitudes towards forests and forest conservation

Values explain people's behaviour and attitudes in general, and they can also be expected to be demonstrated in their relationship with nature and their preferences and choices related to forests. Values can be divided in anthropocentric and ecocentric conceptions. Anthropocentric conception views nature from the human point of view and gives nature only instrumental value.

Table 4. Reasons for non-response.

Reason	%
No interest in surveys	31
Lack of time, old age	19
Questions too complicated	16
No interest in subject matter	10
Did not receive the questionnaire	10
No particular reason	6
Claimed to have responded	4
Refused to give a reason	4

Biodiversity, for example can be seen valuable if it is beneficial to people. Ecocentric conception emphasised the intrinsic value of nature (Oksanen 1997, Pietarinen 2000).

Pietarinen (1987) applied value philosophy and found attitudes towards forest that reflect the different values people have: anthropocentric utilitarianism and humanism, ecocentric primitivism, and mysticism that belongs to both major segments.

Utilitarianism is based on pursuing material benefits i.e. increasing the amount of money and goods, which is presumed to be unlimited with the use of modern technology. Utilitarianism emphasises the role of forests as reserve of raw-materials for human use. Humanism also sees the value of forest in human terms, but the value is based on consummation of human spiritual development brought about by forests. People are to shape and consummate nature. Humanism emphasises pluralism as well as balance between production and natural functions. Traditions are important and thus traditional forests should be preserved. *Mysticism* aims at intuitive unity with the sacredness and divinity of nature. Through this unity oneness with nature can be reached. This view is not purely nature centred since it aims at reaching results desired by people. *Primitivism* is based on the intrinsic value of nature and equal rights of existence of all forms of life. Pursuing human well-being is against equality and therefore the only right solution is to settle for simple life that destroys nature as little as possible.

The questionnaire included a set of attitude statements developed in Canada (McFarlane and Boxall 2000), that presents 17 statements concerning the relationship with forests and their use. This set of statements was used to test Pietarinen's theory empirically. The attitude statements are answered on a five-point scale from 'very important' to 'not important at all' and the answers were analysed using factor analysis and latent attitude values based on Pietarinen's theory (Table 5). Of the 17 variables the communalities of five were below 0.3. These variables were, however, included in the analysis since they loaded to the factors according to the latent attitudes. The number of factors was chosen from those that had eigenvalues above one and the four chosen factors explained 41 percent of overall variability.

The first factor was interpreted as mysticism. Those statements that were loaded positively on the factor concerned experiencing nature. Statements loading to the second factor related to exploitation of forests for human benefit and to the sovereignty of forest owners. This factor was interpreted as utilitarianism. The third factor was primitivism and statements emphasising the intrinsic value of nature were strongly loaded on it. The fourth factor, humanism, included the statements that emphasised the multiple use and social functions of forests. Two of the statements did not load clearly to any of the factors. The statement defending equal rights of all living organisms was weakly loaded on other factors except utilitarianism. Rights of future generations was loaded positively on mysticism and negatively on utilitarianism.

5.1.4 Segmentation based on attitudes

Factors representing attitudinal dimensions were used as criteria in segmenting the respondents through K-means clustering. Since there is no reason to assume that people's attitudes fit to only one dimension, the analysis was tested using different numbers of clusters. Theoretically and also for interpretation purposes the best result was attained using two clusters (Table 6).

Respondents belonging to the first segment emphasised human needs and the role of forests as a source of raw-materials in accordance with human centred and utilitarian view. This segment,

Table 5. Factor analysis results on respondents' relationship with nature (maximum likelihood method, varimax rotation, n=1258). Loadings smaller than 0.2 are not shown. (Loadings used in the interpretation in bold face.)

	Mysticism	Utilism	Primitivism	Humanism
Forests rejuvenate the human spirit	0.727			
Forests let us feel close to nature	0.705			
Forests give humans a sense of peace and well-being	0.582			
Humans should have more respect and admiration for our forests	0.500		0.262	
Forests are sacred places	0.495		0.288	
The primary use of forests should be for products that are useful to humans		0.785		
Forests that are not used by humans are a waste of our natural resources		0.669	-0.256	
Forests exist mainly to serve human needs		0.652		
A forest owner should have the right to manage his/her forest the way he/she wants		0.481		
Nature conservation should be restricted to specific protection areas, not extended over all forests		0.471		
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans			0.767	
Forests have a right to exist without being managed by humans		-0.203	0.678	
Forests should be managed to meet the needs of as many people as possible				0.762
As many uses (e.g. forestry, wildlife habitat, recreation) should be made of as much forested land as possible				0.597
Expectations of recreationists should be taken into account in all forest planning			0.217	0.412
Wildlife, plants, and humans have equal rights to live and develop	0.261		0.285	0.205
It is important to maintain our forests so that future generations will enjoy the same benefits that we enjoy	0.356	-0.215		
Eigenvalue	2.139	2.125	1.465	1.251
Variance explained, %	12.6	12.5	8.6	7.4

Table 6. Value dimensions by clusters reflecting respondents' relationship with nature.

	Antropocentric	Ecocentric
Mysticism	-0.40065	0.33838
Utilism	0.50475	-0.42630
Primitivism	-0.46937	0.39642
Humanism	-0.11055	0.09337

called *anthropocentric*, comprised of 46 percent of the respondents. Respondents in the other segment saw forests as spiritually inspiring and sacred (mysticism) and emphasised the right of forests to exist without human intervention (primitivism). Fifty four percent of the respondents belonged to this segment called ecocentric. Humanistic view emphasising multiple use and social values did not define the two segments.

The segments were characterised by cross tabulating the clusters with the background information of the respondents. The significance level of cross tabulation was tested using Pearson's χ^2 test. Variables that were significantly related ($p < 0.05$) were forest ownership, current and childhood place of residence, gender, age, education, occupation and most of the recreational activities. Family income and size and some of the recreational activities (tendering meadows, picking berries and mushrooms, working in forests) did not differ between the segments.

Respondents in the anthropocentric segment were typically men, forest owners, above average age, farmers or pensioners, and practised hunting, fishing or leisure time silviculture. Their current and childhood place of residence was typically countryside.

Those emphasising immaterial values, the ecocentric segment, were mainly women, younger than average, had a secondary level or university degree and were clerical employees or students by occupation. Typical recreational activities in this segment were nature observation, hiking and walking, nature literature, visiting nature reserves and activism in environmental organizations.

These characteristics represent the attributes that predict which segment a respondent would most likely belong to, not necessarily a typical segment member. For example, those emphasising immaterial values were typically women and practised hiking, but overall men practised hiking more than women.

5.2 Citizen's conceptions of biodiversity

Biodiversity is commonly defined as variability at genetic, species and ecosystem level (Spash and Hanley 1995, Allem 2000). Measures of biodiversity are based on the number of species and individuals in a given area. Biodiversity has been topical on many forums, but it is often unclear how those taking part in the discussion, and especially the general public following it comprehend biodiversity (Spash and Hanley 1995).

This chapter examines the citizen's conceptions about biodiversity and factors threatening it. The respondents were asked to describe biodiversity in forest environment in their own words and also to answer a set of statements concerning biodiversity. The open-ended question was sent to 150 respondents, 61 of whom answered the question. The rest of respondents were presented with the statements. How people conceive threats to biodiversity was investigated using a set of multiple choice questions.

5.2.1 The definition of forest biodiversity as described by the respondents

Respondents' descriptions of biodiversity based on the *open-ended* questions were divided into eight segments according to e.g. what role people were given. Human-nature continuum was used loosely, not so much to describe relationship to nature in general (e.g. Rolston and Coufal 1991, Steel et al. 1994) but to emphasise the point of view in relation to biodiversity. Diversity in plant and animal species as well as variability of habitat types was often associated with pleasant and interesting environments from the human point of view. Human centrality was also apparent when the utility value of forest goods – timber as well as berries and mushrooms – was emphasised. Some respondents stressed the balance between people and nature, which reflects lesser human centrality. The fourth segment was characterised by a view that disapproved human intervention in natural processes. One out of three respondents described biodiversity mainly as abundance

of plant and animal species and different habitat types while people had not role in it. Some respondents had a narrower view to biodiversity naming only different kinds of forest stands. In the seventh segment respondents emphasised lighter forest management practises. Only one respondent mentioned all the three levels that comprise biodiversity.

The majority of the respondents were presented with six *statements* concerning the content of the definition of forest biodiversity. Three of the statements described the different levels of biodiversity, i.e. genetic, species and habitat variability, and three were so called placebo statements that suggested scenic variability, different-aged forest stands and multiple forest use to be part of biodiversity. The respondents were asked to mark which were/were not part of biodiversity. The purpose of these questions was to find out how people comprehend biodiversity and also to test for acquiescent response set (deVaus 1996). Acquiescent response refers to the respondent assuming all the alternatives to be ‘correct’.

Most respondents knew or believed species richness and habitat variability to represent biodiversity but many were uncertain about genetic variability (Table 7). Less than half of the respondents knew that genetic variability is part of biodiversity and one out of five stated that it is not. The majority of the respondents is under the impression that biodiversity also means different-aged forest stands (seedling stands, young stands and mature stands) and variable landscapes (hills, water-ways, swamps, heathland forests). Every second respondent believed that different forest uses like timber production, hiking and berry picking also reflect biodiversity. It seems that acquiescent response is not common, because two of the statements received significantly less yes-answers. Only 5 respondents (0.4%) gave the correct answer, knowing that genetic, species and habitat variability all are part of biodiversity, but the others are not.

Respondents that knew species richness and habitat variability to reflect biodiversity were typically well educated people living in cities, fewer were forest owners. They practiced nature observation, camping, hiking and read nature literature and watched nature programs. Those that knew genetic variability to be part of biodiversity were slightly older than average and mostly women. It must be noted, though, that these differences are just representative and rather small. These results indicate that people have the right kind but too broad a view of what biodiversity in forests means.

The open-ended questions showed that many people include a human point of view in their definition of biodiversity describing how they see and experience the environment.

Table 7. Citizens' conceptions on the content of biodiversity in forests.

	Genetic diversity	Species diversity	Habitat diversity	Forest stands of different age	Landscape diversity	Diversity of forest use
	Percent of respondents					
Part of biodiversity	44	84	77	76	79	49
Not part of biodiversity	21	3	6	9	9	32
Don't know	35	13	17	15	12	19
Total	100	100	100	100	100	100
n	1219	1229	1220	1221	1223	1218

5.2.2 Segmentation based on attitudes

Respondents were also asked what factors they considered to threaten biodiversity in Finland in the long run. The set of questions was adapted from a study conducted by the Canadian Forest Service (Watson et al. 2004). Climate change was considered the biggest threat to biodiversity (Figure 1). Also small population/habitat size, forest management and regeneration, decrease in average age of forest stands, decrease in the amount of decayed wood, and changes in forest tree compositions were seen to threaten biodiversity by at least two thirds of the respondents. The majority of respondents considered forest fires, hunting, grazing by cattle and sheep and picking and collecting renewable forest goods to present no threat to biodiversity. Thus there seems to be no acquiescent response.

These results can be compared with the expert estimates (Rassi et al. 2000, 2001). Unlike the respondents the experts estimated climate change to have a negligible effect on biodiversity in Finland. According to the experts the biggest threats are decrease in the amount of decayed wood and small population/habitat size. The latter was seen as a more serious threat than the former by the respondents. Rassi and others (2001) also listed changes in forest tree compositions, forest management and regeneration, and changes in forest age structure as threatening factors. This list is in good accordance with the views of the respondents. Both segments saw picking and collecting of renewable goods (plants, mushrooms, berries, moss) as a rather insignificant threat to biodiversity.

The results indicate that the general public has a fairly correct conception of the factors threatening biodiversity in Finnish forests. The fact that climate change was regarded as a serious threat by the respondents is not surprising, considering how much the topic has been discussed in the media. All of the serious threats listed by the team of experts were understood as such.

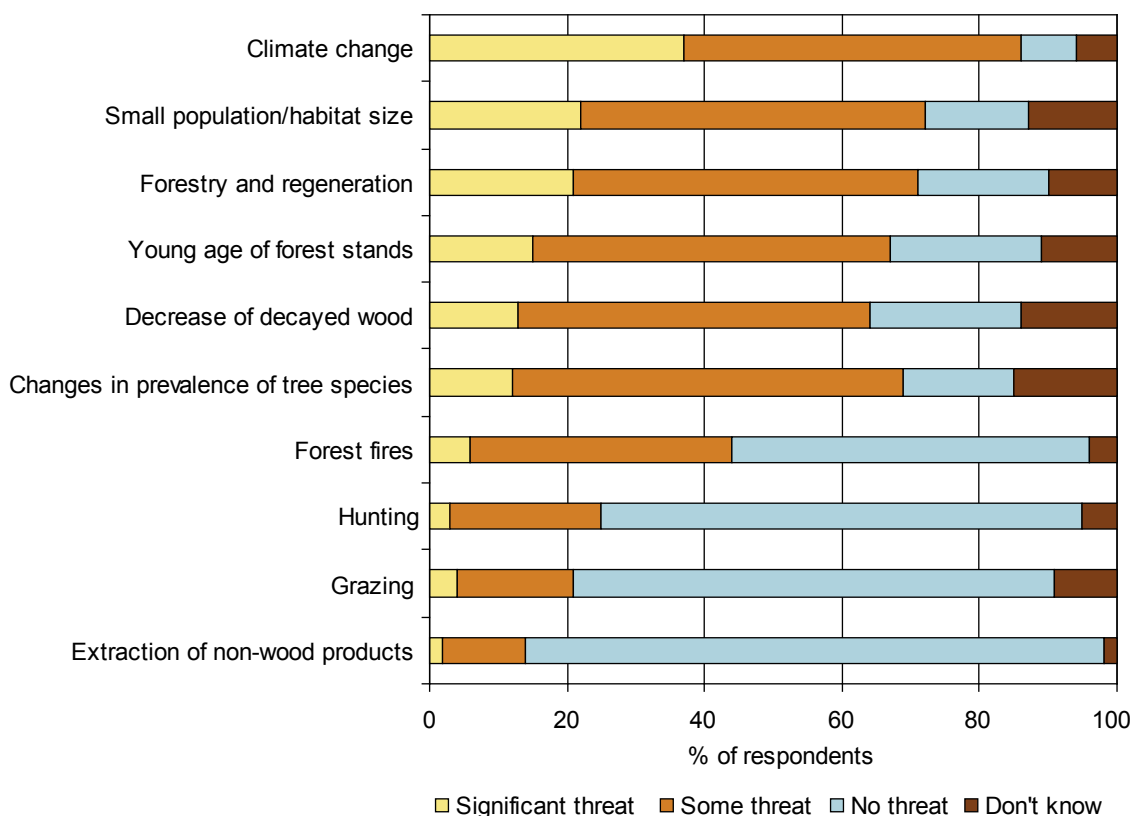


Figure 1. Citizens' conceptions on threats to biodiversity in Finland in the long run (% of respondents).

5.3 Citizens' attitudes towards forest use and conservation

5.3.1 Factors considered important in forestry and forest use

Attitudes of the respondents towards forest conservation and use forests were examined using a set of attitude statements and the respondents were segmented according to their answers (see chapter 5.1.4). The answers indicate that forests are regarded as providers of many important goods, both material and immaterial, and that they should be preserved for future generations (Figure 2). Two thirds of the respondents completely agreed with the statements 'forests create

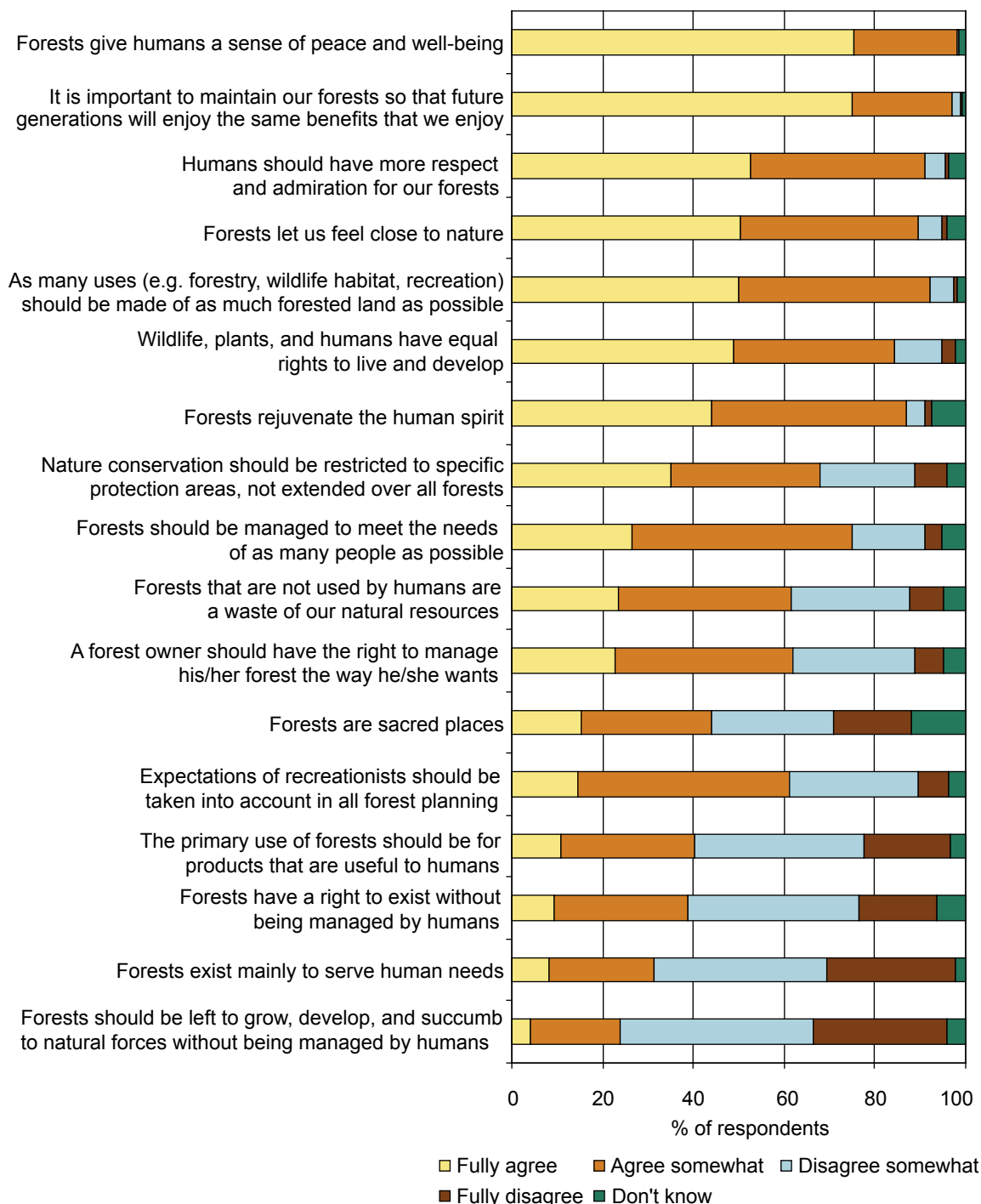


Figure 2. Citizens' responses to statements on forest use and conservation (% of respondents).

a feeling of peace and well-being’ and ‘forests should be preserved for the enjoyment of future generations’. Statements claiming that forests exist purely to fulfil human needs and that forests should be left to grow and develop naturally were most commonly disagreed with.

The respondents were asked about the importance of forest use and management in private forests on a number of environmental, social and economic variables as well as benefits accruing to private forest owners. Prior to this question there was an information box giving the percentages of forest ownership in Finland (private 61%, state 25%, companies 9%, municipalities, parishes, etc. 5%). A large majority considered all of the things listed as at least rather important (Figure 3). A majority (63%) of the respondents regarded the function of forests in delaying climate change as very important.

The results indicate that people understand that the impact of management practises in private forests on many environmental, social and economic variables is considerable, given the large proportion of private ownership in Finnish forests. The importance of forests to their owners was also acknowledged.

5.3.2 Conceptions of the conservation situation

To find out what proportions of land area the respondents considered appropriate for conservation both in southern and northern Finland an open-ended question was presented (the percentages of protected forests in 2003, when the survey was conducted, were given; 1.8% in the South and 17% in the North). The answers were divided into five segments. About three out of four respondents were in favour of increasing protection area in southern Finland – one out of six would increase it

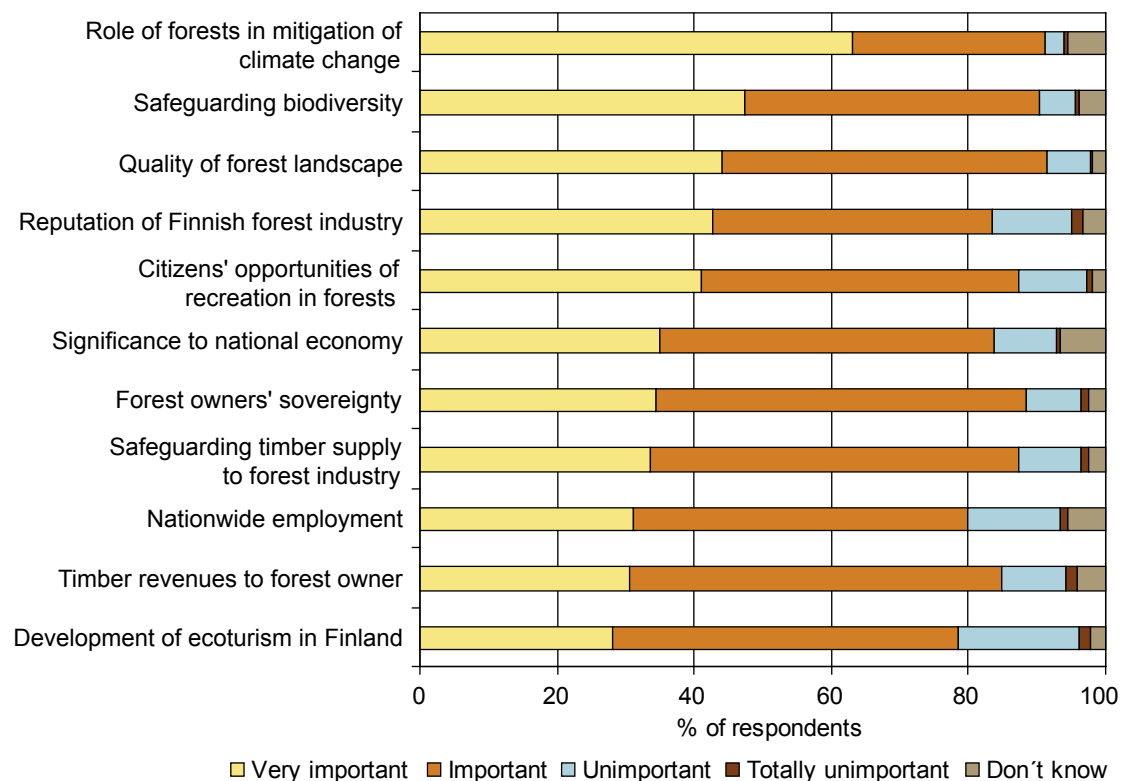


Figure 3. Citizens’ conceptions on the importance of different aspects on use and conservation of private forests (% respondents).

to over 5 percent. Twenty percent considered the current percentage as appropriate, and only few, 5% wanted to decrease the proportion of protected area (Figure 4). For southern Finland the mean of acceptable conservation percentage was 4.2 and the median 2.5 percent (Table 8). More than half of the respondents were willing to increase the protected area also in the northern Finland, while one out of three chose the current percentage (Figure 5). Both the mean and the median were 20 percent (Table 8). Those respondents that wanted to increase conservation in southern Finland wanted more conservation also in the North (correlation coefficient 0.342). Respondents categorized as anthropocentric regarded lower conservation percentages appropriate than those in the ecocentric segment.

Table 8. Mean and median conservation percentages considered appropriate by citizens, by attitude segments.

	Mean	Median	Present
Conservation percentage in Southern Finland			
All respondents	4.2	2.5	1.8
Anthropocentrics	3.3	2	
Ecocentrics	4.9	3	
Conservation percentage in Northern Finland			
All respondents	20	20	17
Anthropocentrics	18	17	
Ecocentrics	22	20	

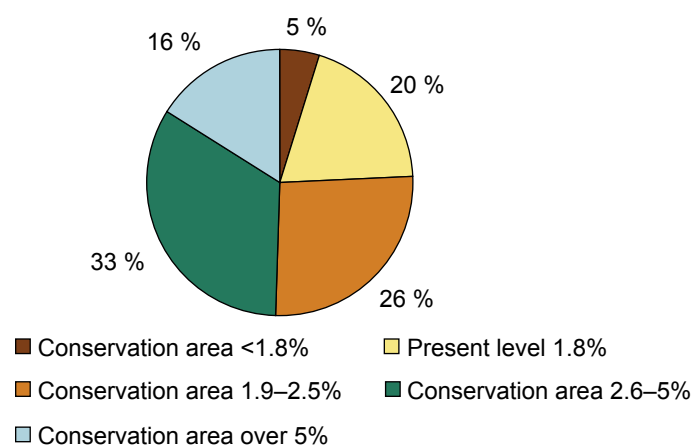


Figure 4. Citizens' view on appropriate percentage of conservation area in southern Finland (% of respondents).

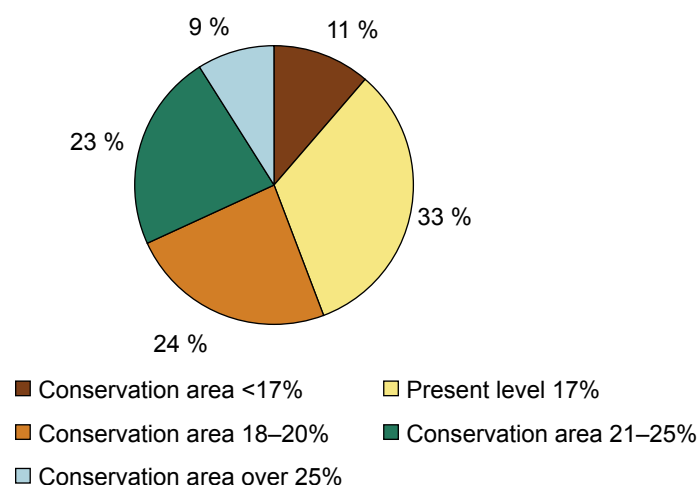


Figure 5. Citizens' view on appropriate percentage of conservation area in northern Finland (% of respondents).

5.3.3 Socio-economic effects of conservation

After the question about the appropriate conservation area the respondents were asked the loss of how many jobs they would accept and how much they would be ready to pay in increased taxes in order to attain the percentage of conservation they had chosen. Less than half of the respondents were ready to forsake employment for conservation. Only 12 percent were ready to tolerate a loss of more than 1000 jobs, the mean being 611. Paying more taxes during the next ten years in order to achieve the desired percentage of protected areas was clearly more acceptable to the respondents. Two out of three accepted an increase in taxes and 5 percent were ready to pay at least 200 € per annum. The mean was 70 euros and 50 percent would pay 20 € or more. People who accepted one effect were more likely to also accept the other (correlation coefficient 0.302, $p < 0.1$). There was a clear difference between the anthropocentric and ecocentric segments: the former were less ready to accept the socio-economic effects than the latter (Table 9).

5.3.4 Attitudes towards policy instruments and compensations paid to forest owners

The respondents were asked to choose the preferred policy instrument for conservation from three given options: land acquisition, conservation contract and nature management plan. There was no clear preference in the ecocentric segment; all of the given options (except 'other') were almost equally popular (Table 10). In the anthropocentric segment almost half chose conservation contract, which was also the most popular choice overall.

Table 9. Mean and median number of lost jobs and amount of additional taxes to households considered appropriate by citizens, by attitude segments.

	Mean	Median
Number of lost jobs		
All respondents	611	0
Anthropocentrics	366	0
Ecocentrics	840	100
Amount of additional taxes (euros/yr) over 10 years		
All respondents	70	20
Anthropocentrics	51	5
Ecocentrics	90	45

Table 10. Support to conservation policy instruments by attitude segments, percent of respondents.

	All respondents	Anthropocentrics	Ecocentrics
Land acquisition	32	36	29
Conservation contracts	41	31	49
Nature management plan	23	27	19
Other	4	6	3

To what extent should forest owners be compensated to maintain biodiversity on their property? Prior to this question there was an information box explaining the costs accrued to forest owners from conservation.

Forests produce different kinds of goods for all citizens to enjoy. Were biodiversity conservation to be included in forest use and management, forest owner would lose a part of timber revenues. Some conservation practises also cause direct costs to the landowner.

The majority of the respondents, 76 percent, thought that forest owners should receive compensation at least large enough to cover the lost income, and almost 20 percent were in favour of full compensation (both direct and indirect costs). Only 4 percent saw it unnecessary to pay any compensations for biodiversity conservation (Table 11).

Differences in attitudes towards compensations could be seen according to respondent's background information and to which segment they belonged. A larger part of the respondents in the anthropocentric segment (70%) were in favour of paying at least full compensation for lost income and accrued costs than in the ecocentric segment (56%). Forest owners naturally wanted high level compensations. Higher income groups took a more negative view of compensations than lower income groups. Of the occupational groups farmers and forestry entrepreneurs, workers, pensioners and students were most often in favour of full compensation. There was no significant difference between age groups. Women had a more positive attitude towards compensations than men, and a majority of those who were against any compensations were men. Respondents who had spent their childhood or currently lived in the countryside were on average in favour of compensations.

Table 11. Citizens' attitudes towards the amount of compensations and payments for conservation measures (% of respondents accepting).

	All respondents	Anthropo-centrics	Eco-centrics	Forest owners n=287
Societal value	18	23	13	28
Foregone revenue and incurred costs	45	47	43	54
Only foregone revenue	13	11	15	7
Only incurred costs	20	14	25	8
No compensation or payment	4	4	4	2

5.4 Conservation attitudes in relation to policy instruments and socio-economic impacts

5.4.1 Attributes used in the choice experiment

Choice experiment method was used to investigate citizens' preferences for conservation area, policy instruments and socio-economic impacts of conservation. The respondents were presented with a situation where they had to consider the trade-offs between conservation percentages and socio-economic impacts. The six attributes used along with the different levels are listed in Table 12. All attributes were explained to the respondents and they were also given instructions for answering. Three of the attributes were ecological in nature: *conservation percentage in southern Finland*, *conservation percentage in northern Finland* and a calculated *number of threatened*

Table 12. Attributes used in the study.

Attributes	Levels
Percentage of protected area in Southern Finland	Present 1.8% 1.25 x present (2.3%) 1.5 x present (2.7%) 2 x present (3.6%) 4 x present (7.2%)
Percentage of protected area in Northern Finland	Present 17% 1.25 x present (21%) 1.5 x present (25%) 2 x present (34%)
Number of threatened species	Estimated from previous
Loss of jobs	-5000 -2000 No change +1000
Annual cost to households over 10 year period	No change 10 € 30 € 100 € 150 € 300 €
Policy instrument	Land acquisition Conservation contracts Nature management plan

species for each conservation percentage (Professor Ilkka Hanski from the University of Helsinki and Juha Siitonen (Metla) estimated the numbers of threatened species based on conservation areas). The number of threatened species correlated strongly with the conservation percentages, and therefore only one or the other was used in the model at a time.

Attributes representing socio-economic impacts were *effects of conservation on employment* and the amount of *annual extra costs per household for the next 10 years* caused by increased taxation. *Policy instrument* i.e. the method by which conservation would be implemented can be seen as a political variable. The three optional policy instruments were: land acquisition, conservation contracts, and nature management plan.

Land acquisition is where the landowner sells the land voluntarily or it is redeemed by the State. The value of the land is paid in full at the time of acquisition and it is thus an expensive measure. The landowner loses his/her rights to the land and the proprietary rights are transferred to the State. By land acquisition the conservation status and durability can be secured.

Conservation contract is a procedure where the landowner sets aside a forest site for conservational purposes and receives a compensation for the forgone revenue. If a forest owner incurs a significant financial loss from maintaining special characteristics of a habitat of special importance he/she is entitled to environmental support under the Act of the Financing of Sustainable Forestry. The contract is drawn up for 30 years. Even though the contract restricts forest utilisation, the owner maintains his/her proprietary rights. The conservation status is secure for the duration of the contract.

Nature management plan means drawing up a special plan for an individual forest holding that informs the forest owner in the management and conservation of important sites. The management

plan is free for the forest owner and maintains his/her sovereignty in management practises. In this case, the fulfilment of conservation goals is unsure.

In the choice experiment the respondents were presented with six choice situations, in each of which they were to choose the most preferable alternative out of three given alternatives. One of the alternatives in each choice situation represented the present situation, the *status quo*, and the two others were alternatives where conservation percentage was increased (Table 13). The choice-experiment described above, was presented to a sub-set of 640 respondents. In this paper the results of unnamed scenarios are reported (n=640). Since conservation percentage and the number of threatened species are correlated, in this report the number of threatened species is omitted from the model.

Table 13. Unnamed scenario.

	Alternative 1 (present)	Alternative 2	Alternative 3
Percentage of protected area in Southern Finland	Present 1.8%	2.7% (1.5 x present)	7.2% (4 x present)
Percentage of protected area in Northern Finland	Present 17%	Present 17%	21% (1.25 x present)
Number of threatened species	Present 958	675	654
Loss of jobs	No change	No change	1000 jobs more
Annual cost to households over 10 year period	No change	No change	100 €
Policy instrument	Land acquisition	Conservation contracts	Nature management plan

5.4.2 Conservation percentage preferences by segments

One out of four respondents chose the alternative describing the present situation in all choice situations, and about a third always preferred one of the alternatives with increased conservation (Figure 6). The rest, 46 percent, chose alternately. Most of the respondents always choosing the status quo alternative belonged to the anthropocentric segment whereas the majority of those choosing an alternative with increased conservation were ecocentric.

A conditional logit model was used to model the difference in preferences between the two segments (Table 14; also, Horne 2008). The alternative specific constant in the model defines the tendency to choose the present ‘no increased conservation’ alternative. This alternative specific constant clearly reflects the attitude differences between the segments: the constant was significant for both but with the opposite sign. The positive alternative specific constant in the anthropocentric segment reflects a high probability to choose the ‘no increased conservation’ alternative. Among the ecocentric segment this option was unpopular as indicated by the negative constant. The difference between the segments was most pronounced in attitudes towards conservation in southern Finland. An increase in the conservation percentage resulted in a decrease in acceptability in the anthropocentric segment and an increase among the ecocentrics. Both segments had a similar view as to the increased conservation in northern Finland: a higher conservation percentage decreased the probability to choose the alternative. It must be noted, though, that in the open-ended questions almost 70 percent of the respondents set the conservation percentage in northern Finland at a maximum of 20 percent. Since the proposed increase amounted

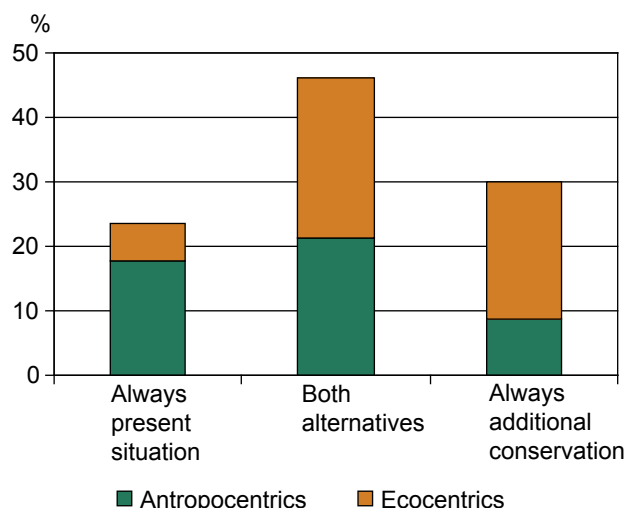


Figure 6. Distribution of respondents between the present situation and conservation alternatives, by attitude segments.

Table 14. The results of choice experiment by attitude groups.

Attributes	Antropocentrics	Ecocentrics
No additional conservation	0.6187*** (0.1310)	-0.5290*** (0.1118)
Percentage of protected area in Southern Finland	-0.0468* (0.0236)	0.0492* (0.0200)
Percentage of protected area in Northern Finland	-0.0198* (0.0074)	-0.0129* (0.0062)
Effect on employment	0.0002*** (0.00002)	0.0003*** (0.00002)
Effect on taxes	-0.0025*** (0.0005)	-0.0020*** (0.0004)
Conservation contracts	0.1607** (0.0619)	0.0401 (0.0503)
Nature management plan	0.0889* (0.0996)	0.0087 (0.0553)
Land acquisition	-0.2496	-0.0488
Log likelihood	-1483.497	-1874.047
R2 adjusted	0.1873	0.0787
Observations	1665	1855

*** Significant at 0.1% level, ** significant at 1% level, * significant at 5% level

to more than this in all alternatives (except *status quo*), the results do not show whether a smaller increase would be acceptable.

The effects of increased conservation on employment and taxes were considered as important and the coefficients for both were statistically significant. In the alternative where employment was decreased and taxes were increased the probability to be chosen decreased significantly in both segments. Attitudes towards policy instruments differed notably between the two segments. The ecocentrics were rather indifferent as to the policy instrument used whereas among the anthropocentric segment conservation contracts and nature management plans were preferred whereas land acquisition was highly unpopular.

5.4.3 Welfare impacts of conservation scenarios

Welfare impacts of a policy change can be estimated in monetary terms using the estimated model. This is done by comparing the situation before and after the hypothetical policy change. In this

study the effects of different policy instruments on the two segments composed according to their relationship with nature were examined.

The policy change examined would increase the conservation area in southern Finland to 4.2 percent, which is more than double the area at the time protected. This percentage was used because it was the average percentage chosen in the open-ended question (see 5.3.2). Conservation area in northern Finland was maintained at its present level in the scenario. The policy instrument used would be a fixed-term contract and no changes in employment were assumed. The point of interest was the amount of money the respondents would be prepared to pay as increased taxes so that their welfare would remain unchanged at the initial level. Over the 10-year period, the annual payments would equal 142 €. Based on this the total willingness to pay was calculated. In addition to the basic scenario the welfare impacts on different segments were examined separately. In the end, the effects of different policy instruments and compensation measures on welfare were investigated.

The base scenario

In the base scenario all respondents were examined as one segment and the policy instrument used was fixed-term conservation contracts. In this case the implementation of the scenario would not change the average welfare from the present level (Figure 7, All respondents, welfare change 0 €). However, it must be noted that some respondents want the percentage of the protected area increased while others do not.

Impacts on different segments

The welfare of some respondents would decrease due to increased taxation collected to cover the compensations paid to the forest owners while increased conservation would increase the welfare of others despite the costs. In the base scenario welfare would decrease in the anthropocentric segment by 270 € and increase in the ecocentric segment by 226 € (Figure 7, orange bars).

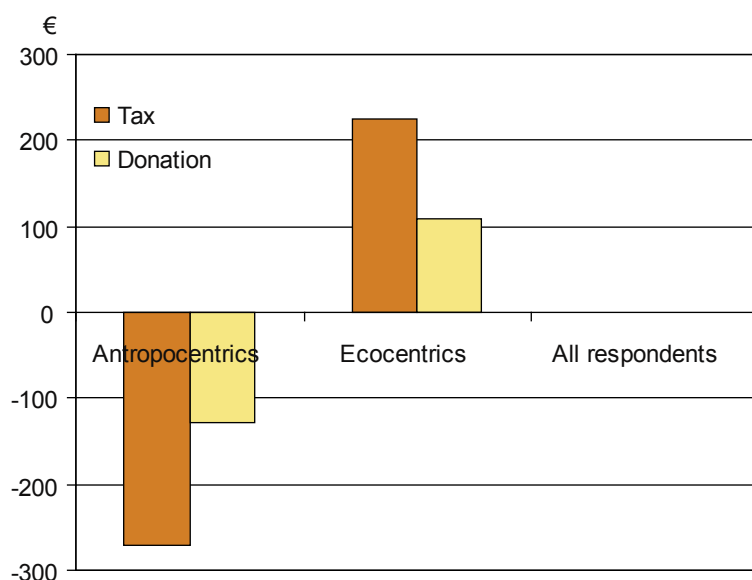


Figure 7. Welfare changes of the conservation scenario by attitude segments and by funding instrument.

Voluntary payments as the means of funding

The costs of conservation could be covered by voluntary payments instead of taxes. In this scenario compensations to forest owners would be paid from a conservation foundation based on voluntary donations. The policy instrument would be fixed-term contract. The same amount as in the base scenario could be collected if all the respondents in the ecocentric segment would donate 260 € annually. This scenario would even out the welfare impacts between the segments but the average effect would still remain 0 (Figure 7, all respondents).

Land acquisition as the policy instrument

If, instead of contracts, land acquisition would be used as the policy instrument to increase conservation the average welfare would decrease from the present level by 100 €. In the anthropocentric segment the decrease would be 434 € and the gain in the ecocentric segment 181 € on average.

In these results it should be noted that some of the respondents choosing the *status quo* scenario have probably done so as an easy way out of answering. Also, it is unlikely that all the respondents that expressed willingness for voluntary payments would actually pay. Thus a further analysis is needed in order to increase the reliability of the results for this part.

5.5 Conclusions of the citizen survey

The aim of this study was to explore the attitudes of Finnish people towards conservation of biodiversity and forest utilization in general and in privately owned forest in particular and also to find out what people know about biodiversity. It also examined the attitudes towards conservation, policy instruments used and some socio-economic impacts as well as trade-offs between these factors. Since it was expected that the opinions of the respondents would vary widely, they were divided into segments according to their attitudes and values. By using this approach the impacts of different conservation scenarios on different segments could be examined.

The results of this study indicate that Finnish citizens have, in general, a positive view to conservation. However, other forest uses and the rights of private forest owners are also regarded as important and should be taken into account in conservation decisions. The role of forests as providers of many material and immaterial goods as well as their spiritual meaning was emphasised by many respondents. The multiple uses of forests were also commonly linked to the definition of biodiversity which could partly explain why biodiversity conservation was regarded more preferable than an increase in conservation areas.

In the management of private forests the different functions and impacts should be taken into account. The respondents seemed to respect the rights of private forest owners to make decisions about their property and voluntary contracts were commonly preferred as policy instruments in conservation. Full compensation payments to forest owners for revenue forgone because of conservation appealed to the sense of justice of many respondents. Notably, several of the questions applied to privately owned forest and thus all the results may not be applicable to forests owned by the public sector or companies.

Even though Finnish people's relation to forests is commonly characterised by multiple values, the respondents were heterogeneous in the weights given to different aspects. A little less than half of the respondents emphasised utility aspects and the role of forests as providers of goods

for human needs. A good half of the respondents, on the other hand, put more emphasis on the spiritual well-being experienced in forest environment and the existence value of forests. The results show that an increase in the percentage of protected forests would have a different impact on the welfare of these segments. For those that are not in favour of increased conservation welfare would decrease, whereas in the other segment welfare would increase despite increased costs accrued by conservation measures. The latter would also accept a loss of jobs more readily. In case conservation measures are funded by additional taxes the costs would be paid by all citizens. The funding based on voluntary payments to conservation foundation would shift the financial burden to those (the segment of population) that would experience the most benefits from conservation.

In the ecocentric segment that emphasised immaterial and existence values of forest there were relatively more women, younger people and urban residents, whereas in the anthropocentric segment there were more forest owners and older age segments. This is in good accordance with previous studies (see chapter 3). A phone interview among those that had not returned the questionnaire revealed that the non-respondents were more often men and forest owners, and that they held a more negative view of conservation. On the other hand, both among the respondents and those interviewed by phone the younger age segments that commonly have a positive attitude towards conservation, were underrepresented. Thus non-response did not seem to affect the overall conclusions on citizens' attitudes towards conservation.

6 Forest owners' attitudes towards biodiversity conservation and policy instruments used in private forests

Paula Horne, Terhi Koskela, Ville Ovaskainen, Heimo Karppinen and Taina Horne

6.1 Data description

The data of the *nation-wide forest owner survey* were collected by a questionnaire sent to 3000 Finnish non-industrial private forest (NIPF) owners in spring 2003. A reminder with a new questionnaire was sent to those who had not responded. A total of 1241 forms were returned, the response rate being 42 percent.

The *nature values trading survey* was targeted to those NIPF forest owners in Satakunta, south-western Finland, who had offered their property to the nature values trading pilot program in 2003 and 2004. The data were collected by sending a questionnaire to all forest owners that had entered in a nature values trading contract ($n=61$) and to 76 owners who had offered a site but failed to enter in a contract. A total of 89 responses were received (response rate 65%), of which 50 were from those who had signed a contract (response rate 82%) and 39 from those who had not (response rate 51%).

The questionnaires in both surveys were similar – the same questions were used to a large extent so that the results of the two surveys could be compared. In the first part of the questionnaire the forest owners' attitudes towards the conservation of nature values, as well as acceptability of different policy instruments for safeguarding biodiversity were examined. The importance of and trade-offs between different attributes related to conservation instruments were then investigated using a choice experiment method. Questions concerning demographics (respondents' age, gender, place of residence, education, occupation, forest holding ownership) and the specifics of the forest holding (e.g. area, holder of the right of possession, residence on property, timber sales, forest management activities) were included for background information and cross-tabulations. Differences between the results of the two surveys were tested using χ^2 -test or Fishers' exact test and are reported in case they are statistically significant at $p<0.05$. These data are presented as percentages and averages. In the end of the questionnaire the respondents were given a chance to comment on the questionnaire or forest conservation issues.

6.1.1 Background information of the respondents

In the *nation-wide survey* the geographical distribution of respondents' forest holdings covered the whole country. The average total area of the properties was 55 ha whereas the forested area was 42 ha (Table 15). The forest holdings of the respondents in the *nature values trading survey* were significantly larger (average 133 ha) (Table 16). If the two largest properties are excluded, the average total area was 82 ha and the forested area 63 ha. The respondents in the nature values trading survey owned more large and less small forest holdings than NIPF owners in Satakunta on average ($p<0.001$). Also the forest holdings of those who had entered in a contract were larger than those who had not ($p=0.031$).

The demographic data of the respondents are presented in Table 16. The respondents of the nature values trading survey differed in some aspects from those of the nation-wide survey. A larger proportion lived in cities (over 100 000 inhabitants) than forest owners in south-western Finland

Table 15. Background information of respondents and non-respondents of nation-wide forest owner survey in comparison of Karppinen et al. (2002). Background information of non-respondents is based on phone interview.

	Respondents (n=1241)	Non-respondents (n=100)	Karppinen et al. 2002 (n=4819)
Mean size of forest holding (ha)	42	45	37
Mean cultivated area (ha)	13	20	13
Mean age (years)	58	58	57
	Percentage		
Ownership			
Owned by single person/family	87	92	75
Owned by concern	6	2	11
Owned jointly by heirs	7	6	14
Respondents position			
Owner	85	75	
Owner's husband/wife	3	12	
Other family member	2	6	
One of heirs	9	7	
Other	1	0	
Occupation			
Employee	28	22	30
Farmer or forestry entrepreneur	22	30	22
Other entrepreneur	5	9	6
Pensioner	41	36	37
Other	4	3	5
Gender			
Female	21	38	24
Male	79	62	76

($p=0.007$) or the whole country ($p=0.008$) on average. There were more respondents with a university degree and fewer with comprehensive school education only in the nature values trading survey compared to the nation-wide forest owner survey ($p=0.001$). One in ten respondents in had a degree in forestry, which is significantly more than among forest owners nation-wide ($p=0.016$). As for the other aspects of the respondents' background information there were no significant differences between the segments.

Due to a low response rate in the nation-wide forest owner survey, one hundred non-respondents were interviewed by phone in late fall 2003. The non-respondents differed from the respondents only slightly: non-respondents were more often female and spouses rather than property owners themselves, the forest holdings were slightly larger and more often owned by a single family rather than jointly owned. Attitudes towards additional conservation in privately owned forests were somewhat more favourable among the non-respondents. They also had small sites with specific conservation values (protected by section 10 of the Forest Act) on their property or had sold land to government conservation programs more often than the respondents. However, conservation on one's own initiative was less common among the non-respondents than among the respondents (11% and 37% respectively).

6.1.2 Segmentation of NIPF owners based on ownership objectives

In the *nation-wide survey* the objectives of forest ownership were examined using a set of 22 attitude statements belonging to six different categories, where the respondents were asked to evaluate the importance of each on a five-point Likert scale. The same or similar set has been

Table 16. Background information of respondents and their forest holdings. For those participating in the nature values trading, information is also given separately for those that had entered into a contract and those that had not. For the nation-wide survey information of the respondents living in the South-West (where the nature values trading pilot study was conducted) is also given separately.

	Nature values trading survey			Nation-wide survey	
	All respondents (n=89)	Contract (n=50)	No contract (n=39)	South-West (n=104)	All (n=1241)
Mean size of forest holding (ha)	133	199	43	26	42
Mean total area (ha)	163	239	60	44	55
Mean age (years)	57	57	56	58	58
		Percentage			
Present place of residence					
Rural area	51	49	51	60	60
Town, less than 20 000 inhabitants	17	24	9	27	20
Town, 20 000 – 100 000 inhabitants	15	11	20	9	13
Town, over 100 000 inhabitants	17	16	20	4	7
Education					
Primary school	35	34	36	46	46
Secondary school	1	0	3	1	3
Vocational education	19	20	17	22	24
Polytechnic education	21	22	19	16	16
University education	24	24	25	15	11
Degree in forestry	11	18	3	5	5
Occupation					
Farmers or forestry entrepreneurs	26	31	18	28	22
Other entrepreneur	7	5	11	4	5
Upper employee	13	12	14	10	8
Clerical employee	17	14	21	8	7
Worker	4	0	11	7	13
Pensioner	30	36	21	40	41
Other	3	2	4	3	4
Gender					
Female	18	16	20	14	21
Male	82	84	80	86	79

used in other forest owner surveys as well (e.g. Karppinen 2000, Hänninen et al. 2001). The six categories were ‘recreation and leisure’, ‘timber production and timber revenues’, ‘conservation and scenery’, ‘economic security’, ‘sentimental values’ and ‘investment’.

The objectives were reduced into three factors using factor analysis: recreation and conservation, economic security, and regular sales revenue and labour income (Table 17). Based on these factors the forest owners can be segmented according to their objectives. The K-means clustering method was used. Like in previous studies (e.g. Karppinen 2000, Karppinen et al. 2002) the forest owners in this study could be divided into four different segments (Table 18). *Multi-objective owners* considered recreational and conservational as well as economic objectives important in forest ownership. *Recreationists* emphasised the importance of forests as a source of recreation as well as conservational and scenic values. *Investors* emphasised the economic security provided by the forest as an asset, a source of security against old age and unexpected events, and a security for a loan. *Self-employed owners* considered the forest as a source of regular sales revenue and labour

Table 17. Factor analysis results on statements concerning objectives of forest ownership (maximum likelihood method, Varimax-rotation, n = 718, values below 0.20 not included).

	Recreation and conservation	Financial security	Source of regular income
Recreational possibilities	0.773	*	*
Scenery	0.767	*	*
Biodiversity	0.742	*	*
Relaxation	0.721	0.283	*
Berry and mushroom picking	0.676	*	*
Part of residential environment	0.654	*	*
Conservation	0.636	*	*
Link to childhood environment	0.526	0.365	*
Opportunity to do forestry work	0.466	*	0.343
Firewood	0.410	*	0.302
Hunting	0.286	*	0.213
Future security	*	0.816	0.267
Security for unusual conditions	*	0.784	*
Protection against inflation	*	0.735	*
Security for a loan	*	0.688	0.307
Heritage	0.228	0.556	*
Investment	*	0.546	*
Intrinsic value of ownership	0.386	0.430	*
Increase in site value	*	0.323	*
Regular income from sales	*	0.447	0.635
Salary	*	0.373	0.630
Financing source for large investments	*	0.518	0.563
Eigenvalue	4.607	4.127	1.729
Variance explained, %	20.9	18.8	7.9

Table 18. Segmentation of forest owners based on objectives of forest ownership (K-means clustering).

Group	n	Mean (standard deviation)		
		Recreation and conservation	Economic security	Regular sales and labor income
I Multiobjective owners	298	0.475 (0.470)	0.515 (0.575)	0.474 (0.573)
II Recreationists	171	0.641 (0.542)	-0.598 (0.822)	-0.804 (0.596)
III Investors	105	-1.182 (0.743)	0.725 (0.598)	-0.265 (0.863)
IV Self-employed owners	144	-0.882 (0.711)	-0.883 (0.639)	0.165 (0.721)
F-value		384.807	238.172	145.074
P-value <		0.000	0.000	0.000

income, as well as funding for big investments. These segments were used as classifying variables in cross-tabulations.

In the *nature values trading survey* the respondents were asked to evaluate the importance of the same six categories of ownership objectives as in the nation-wide survey, each on a five-point Likert scale. The six categories were 'recreation and leisure', 'timber production and timber revenues', 'conservation and scenery', 'economic security', 'sentimental values' and 'investment'. All the objectives, except 'investment', were considered important. The forest owners who had entered in a contract considered more often 'economic security' ($p=0,001$) and 'investment' ($p<0,001$) to be important objectives of forest ownership than those who had not signed a contract.

6.2 Forest owners' attitudes towards conservation of nature values

6.2.1 Views about present conservation status in private forests

The respondents in the nation-wide survey were asked how they felt about conservation in private forests in general. A clear majority was satisfied with the present level of conservation, but a significant proportion (more than one in five respondents) considered the present level too high. Thus a total of 86 percent did not want additional conservation in private forests while only seven percent were in favour of it.

At the time this survey was conducted, the METSO action programme and the proposed new instruments based on voluntary participation by forest owners were not widely known. Therefore, it is probable that the respondents thought of conservation as the traditional land acquisition. As can be seen later, attitudes towards biodiversity conservation appeared much more favourable in questions where more flexible measures and instruments were suggested.

Opinions on the current level of conservation were cross-tabulated with the respondents' background information. People who were in favour of additional conservation had higher education or silvicultural education, were young or middle-aged, owned small (less than 20 ha) forest holdings and had not sold timber during the last five years. Those not in favour of additional conservation were characteristically over 60 years of age, got their main livelihood from farming or forestry, and owned large (over 100 ha) forest holdings. The majority of respondents in favour of additional conservation belonged to recreationists, whereas self-employed owners were underrepresented.

Respondents that thought the present level of conservation to be too high had more often than average a lower education, they owned large forest holdings, and were farmers. People with forestry education were well represented not only among those that wanted additional conservation but also among those that considered the present conservation level too high. Thus in this group the opinions were more clearly divided than in others.

Of the respondents in the *nature values trading survey*, over 70 percent had a positive (36% 'very positive', 35% 'positive') attitude towards conservation in general and especially in forests. Only 6 percent had a negative attitude (5% 'negative', 1% 'very negative'). They were also asked whether their attitudes had changed due to the nature values trading pilot programme or conservation measures based on voluntary participation in general. Over two thirds stated that their attitude had become more positive and less than one third had not changed their attitude. Only two percent had a more negative attitude now than before the programme.

6.2.2 Conservation measures presently applied

The respondents in both surveys were asked about forest conservation measures presently applied at their own property. About 15 percent in the nation-wide survey and 36 percent in the nature values trading survey ($p < 0.001$) reported having small sites with specific conservation values (protected by section 10 of the Forest Act) at their property, while participation in other types of formal conservation programmes was much rarer in both groups. However, also selling areas for government conservation programmes ($p = 0.013$) and founding private nature conservation areas as part of government programmes ($p = 0.042$) were more common among the respondents in the nature values trading survey (Figure 8).

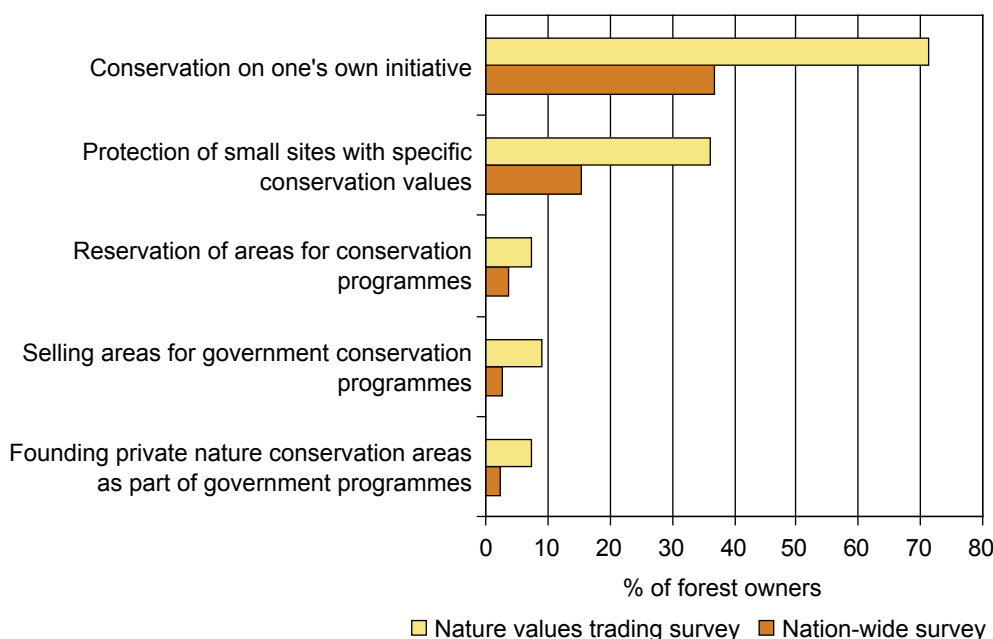


Figure 8. Frequency of currently applied conservation methods in respondents' own forests (% of forest owners).

Conservation based on one's own initiative was relatively common: over one third (37%) in the nation-wide survey and 71 percent in the nature values trading survey had applied some conservation measures at their property on their own initiative (Figure 8). Voluntary conservation on one's own initiative was significantly more common among the respondents of the nature values trading survey, including measures such as application of good nature management practises in commercial forests ($p < 0.001$), setting aside specific areas ($p = 0.001$), fixed-term conservation contracts ($p < 0.001$), and private nature conservation areas outside government programmes ($p = 0.044$).

6.3 Acceptability of conservation measures at one's own property

Nature values can be produced and protected by several different methods and applications. Conservation can be based on binding contracts or be practised without any contracts. The conservation status can be fixed-termed or permanent, and it can comprise different restrictions for use and management. The landowner may receive a compensation for conservation, either as a direct payment or as land exchange. Areas of high conservation value may alternatively be sold to the government.

The respondents were asked about their approval of different measures of producing nature values at their forest holding. It must be noted that the question applied to opinions in general, regardless whether or not there were any valuable sites in their property. Acceptability with or without compensation (and binding contract) was enquired separately for most conservation measures.

6.3.1 Conservation with compensation

Overall, acceptability of conservation measures with compensation was higher than without compensation – and binding contract – among forest owners. The most widely accepted measure was a fixed-term conservation contract for compensation after which the right of use will be returned (Figure 9). This option was favoured by men, the age group 40–59 years olds, and respondents with education higher than comprehensive school.

More than half of the forest owners considered leaving small areas of conservational value unmanaged in commercial forests (57%), managing commercial forests according to a nature management plan (52%) or exchanging an area with special conservation values for a similar forest holding (56%) as acceptable measures for producing and protecting nature values (Figure 9).

Foundation of a private conservation area where the area with conservational values would be permanently protected against compensation while the ownership of the land remains was acceptable to 45 percent of the respondents (Figure 9). The least favourable option among measures where the forest owner would be compensated for conservation was land acquisition by the government. About 40 percent were in favour of this option while as many were against it.

Overall, most of the above mentioned conservation measures including compensation were characteristically favoured by men, respondents under 60 years of age, and those with education higher than comprehensive school. Land exchange was acceptable also to those owning a large forest holding (over 100 ha) or farm (20 ha) or having a silvicultural degree. The latter were also in favour of setting aside small areas of conservational value unmanaged in commercial forests. For all the above mentioned measures the respondents considering them unacceptable

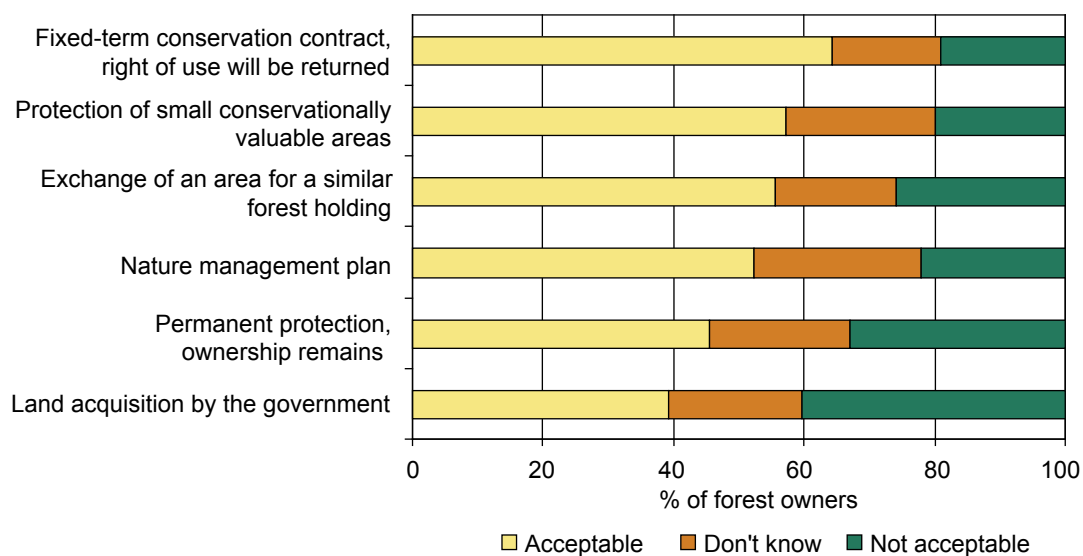


Figure 9. Acceptability of different conservation measures including a compensation or payment (% of forest owners).

were characteristically over 60 years of age, pensioners and had lower (comprehensive school) education. Of those that had no opinion, most were female. There were no clear differences between the groups having different objectives of forest ownership.

6.3.2 Conservation without compensation

Conservation measures that did not include compensation were not nearly as acceptable as those with compensation. However, even though in all cases the majority considered these measures unacceptable, some forest owners were willing to produce and protect areas with conservational value without compensation (and contract). The measure that was most acceptable to forest owners was setting aside small areas with conservational value (e.g. special habitats) in commercially managed forests. About 25 percent would consider this kind of conservation in their forests, while all other measures were considered acceptable by less than 20 percent of the respondents (Figure 10). People with higher education favoured setting aside small conservationally valuable areas and management of commercial forests according to a nature management plan. The latter was also acceptable to respondents under 40 years of age as well as pluralistic and recreational forest owners. A fixed-term conservation contract after which the right of use will be returned to the owner was most often favoured by respondents under 40 or over 60 years of age and recreational forest owners.

Overall, of those that found conservation without compensation unacceptable most were male, belonged to the age group 40–59 and had a degree in forestry. Respondents that had sold timber during the last five years were also against a fixed-term conservation contract and foundation of private nature conservation areas. The latter was also unpopular among forest owners emphasising economic security. In general, those that had no opinion were mostly female and had comprehensive school education.

For some forest owners maintaining sovereignty in decision-making was even more important than receiving compensation. Almost 20 percent of those that considered forest management according to a nature management plan for a compensation and bound by a contract unacceptable would accept this measure without compensation and contract. Similarly 30 percent of those that would not accept setting aside areas of conservational value when bound by a contract (and with compensation) would do so without a contract (and compensation). This indicates that binding contracts decrease the willingness of some forest owners to engage in conservational measures.

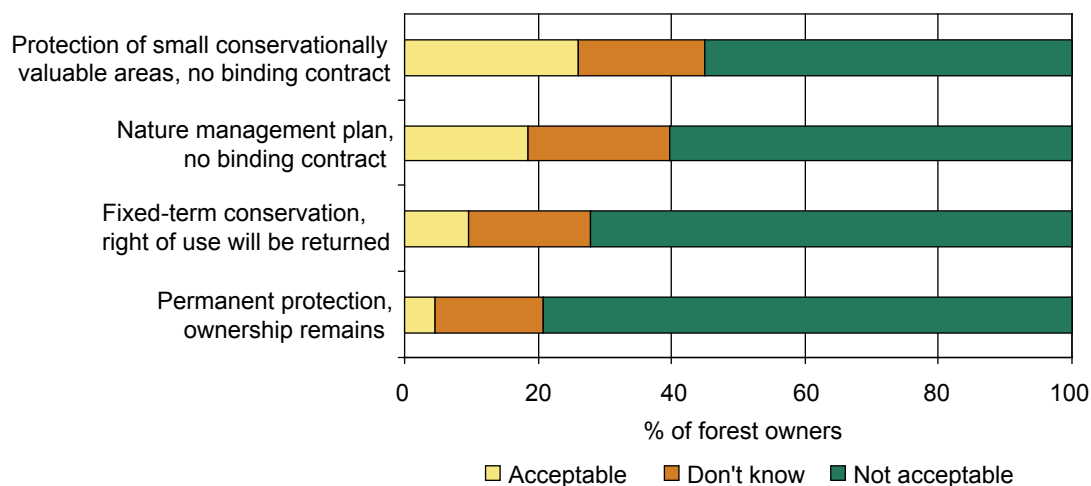


Figure 10. Acceptability of different conservation measures not including a compensation or payment (% of forest owners).

Fixed-term conservation contracts and permanent protection in private nature conservation areas that had no no-contract option were acceptable without compensation to very few of those that would not accept them with compensation.

Thirty seven percent of the respondents had applied some conservation measures on their own initiative (see above). These forest owners considered especially measures without compensation more acceptable than others: about 30 percent of them were willing to manage their forests according to a nature management plan without compensation while among others the percentage was 12. Also setting aside small areas with conservational value without compensation was more acceptable among them (38%) than others (20%). Of other measures setting aside small areas for a compensation, fixed-term conservation contract without compensation and permanent protection with compensation were more acceptable among those that had practised conservation on their own initiative.

6.3.3 Reasons for non-acceptance of conservation measures

Those forest owners that considered all the given conservation measures as unacceptable (about 15% of the respondents), were asked to choose the most important reasons for not accepting them. The most common reason was that the respondent thought that forest environments are already sufficiently protected (Figure 11). Other common (all over 50% of the respondents) reasons were related to the characteristics of the forest holding: no areas with conservational value, too small for conservation, owner wants to maintain the property in commercial use. Lack of confidence in conservational objectives and methods as well as problems with their application – insufficient compensations, delayed payments or distrust in regaining the right of use after the contract – were less common (all under 30%) reasons for not accepting the conservation measures presented.

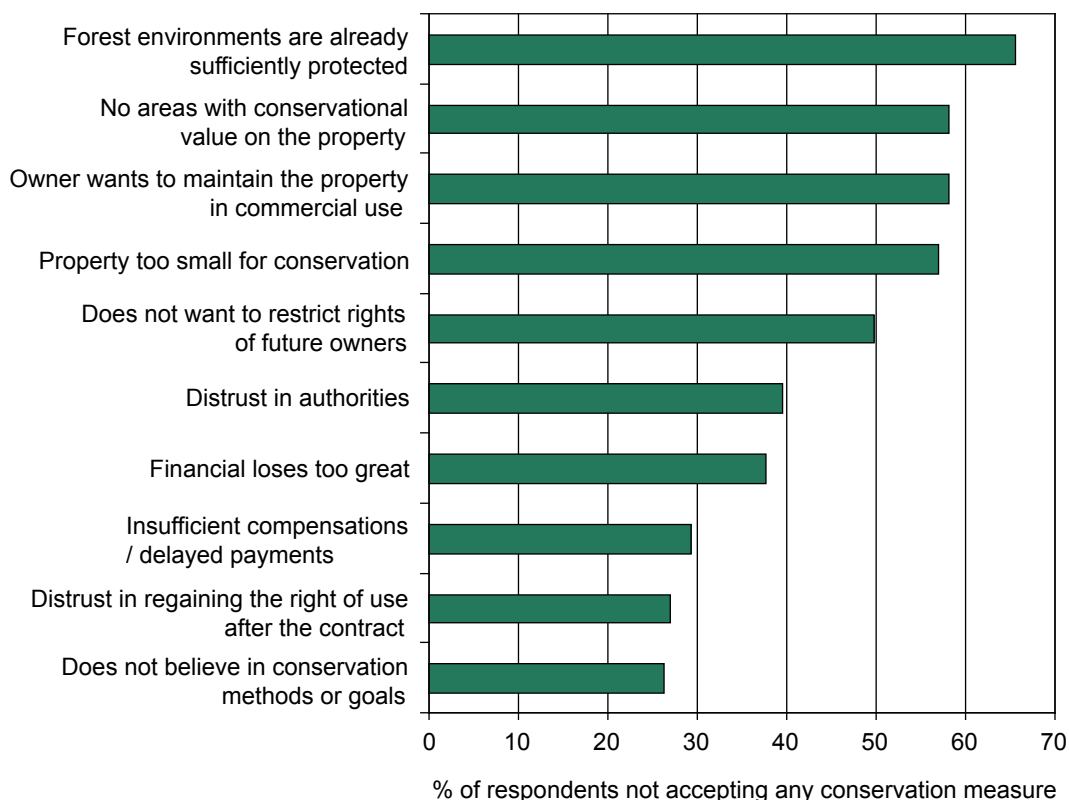


Figure 11. Reasons for not accepting any conservation measure (frequency among those that considered all measures unacceptable).

6.3.4 Reasons for protecting nature values on one's own property

Those respondents that would accept at least one of the conservation measures presented (about 85%) were asked how important different reasons for conservation would be when considering production and protection of nature values on their own property. The most common reason was man's obligation to protect nature (Figure 12). More than three out of four respondents considered this at least somewhat important, and almost half as a very important reason for practising conservation measures on their property. Overall, ethical reasons as well as reasons associated with producing public goods were among the ones most commonly considered as important, whereas the more 'self serving' reasons were less so (Figure 12). Preservation of nature for future generations was considered important by a majority (73%) of respondents, but conservation for potential, unknown future benefits by only 25 percent.

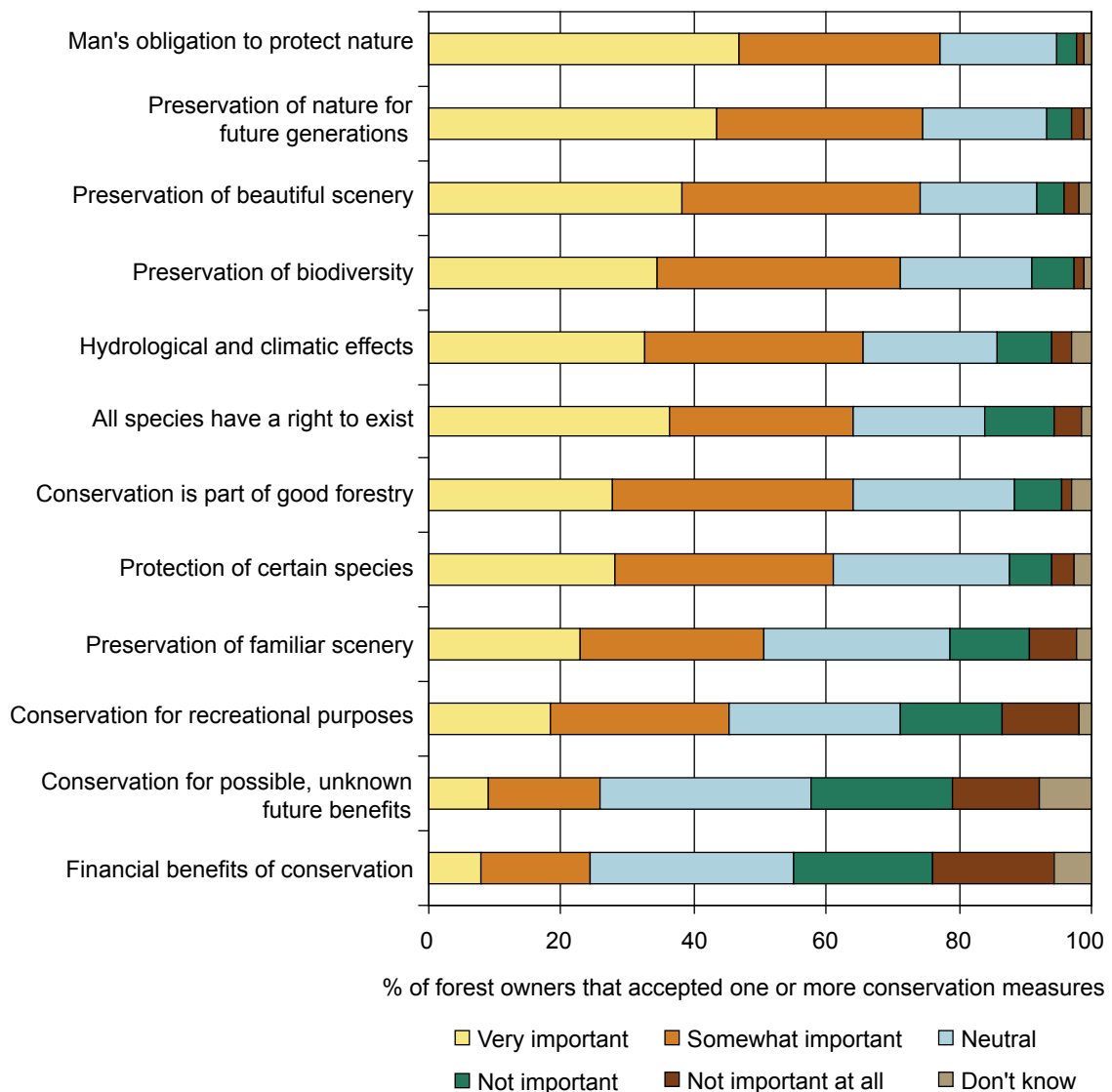


Figure 12. Importance of different reasons for conservation (frequency among those that accepted one or more conservation measures).

6.3.5 Factors explaining willingness for conservation

As conservation policies are drawn up it is useful to understand how attitudes towards conservation on private land differ with socio-economic factors. The background information of those who had applied conservation measures on their own initiative and those who considered all conservation measures unacceptable for their forest property was investigated in order to identify factors that characterise these groups.

Those that had practised conservation had typically higher education (university or secondary school graduates) or a degree in forestry. Not surprisingly, owners of large (especially over 100 ha) forest holdings were well represented in this group. Conservation on one's own initiative was less common among female than male forest owners, but this difference may be partly related to smaller property size.

Objectives of forest ownership were also linked with the probability of conservation on one's own initiative. Among multi-objective owners and recreationists conservation practises were rather common (over 40%) while in the other groups they were much rarer (investors 32%, self-employed owners 17%). No significant differences were found in relation to place of residence, age, occupation, timber sales, residential status of the property or area of farmed land.

Those that found all conservation measures unacceptable were typically female, of older age groups, pensioners, primary school graduates and owners of small forest holdings. They also considered the present level of conservation to be too high more often than did those who accepted at least one of the conservation measures presented.

6.4 Attitudes towards conservation measures in private forests in general

6.4.1 Factors affecting acceptability of conservation measures

The respondents were asked to rate the importance of certain factors on acceptability of conservation measures. Overall, factors describing policy instruments used and terms of conservation contracts (e.g. amount, type and timing of compensation, duration of the contract, property rights issues and sovereignty) were considered more important than factors related to the effects and outcomes of conservation (certainty of reaching conservation goals, effects on local employment) (Figure 13). Even though the order of acceptability was similar in the two surveys, there were some significant differences between the two. Maintenance of land ownership and sovereignty in decision making was very important to 77 percent and important to 21 percent in the nature values trading survey and very important to 82 percent and important to 10 percent nation-wide survey ($p=0.015$). The amount of compensation was very important to 53 percent, important to 34 percent and neutral to 11 percent in the nature values trading survey, whereas in the nation-wide survey the percentages were 64, 19 and 6 – to about 4 percent the amount of compensation was not important ($p=0.001$). Determination of the compensation and restrictions on forest use were considered very important more often in the nation-wide survey (for both $p<0.001$). Also the effects on local employment were more important to forest owners nation-wide (42%) than to those that had participated in the nature values trading pilot study (13%, $p<0.001$).

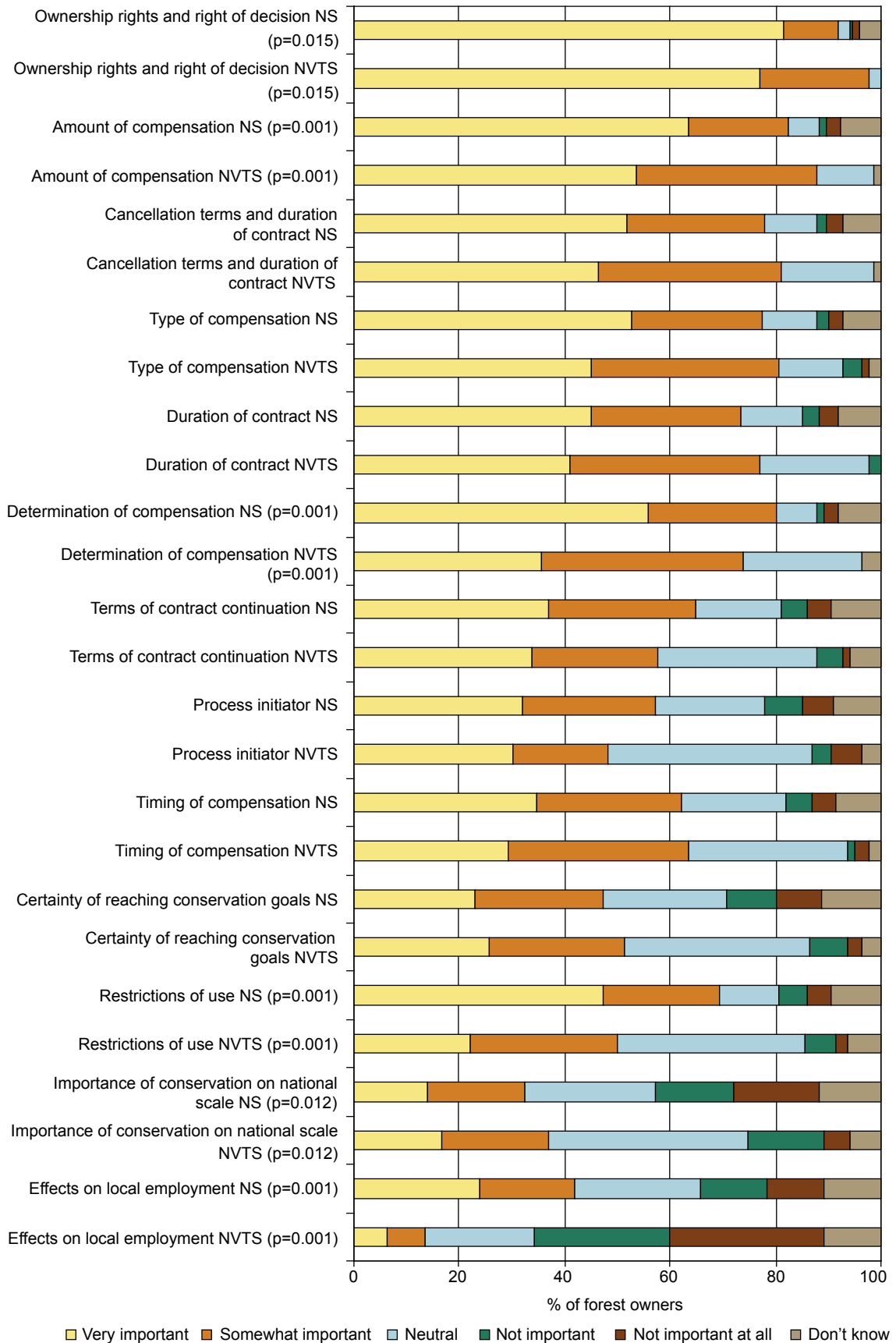


Figure 13. Importance of different attributes on the acceptability of conservation measures (% of forest owners). (NS= national survey, NVTS= nature values trading survey). Differences between the results of the two surveys are reported in case they are statistically significant at $p < 0.05$.

6.4.2 Acceptability of different policy instruments

Conservation process begins when an initiative for conservation is taken by one of the parties involved. The initiator can be, for example, the owner of the property or some public authority. Previous studies have shown that for many forest owners it is of significant importance who the initiator is (Riikka Paloniemi, Univ. of Helsinki, pers. comm.). In the conservation contract the property rights and right of decision, limitations on forest use and actions possibly required for increasing nature values, as well as contract duration and parties it binds, are determined. In addition, the amount and terms of payment of compensations are agreed upon. The respondents of both the nature values trading and the nation-wide forest owner surveys were asked to rate the acceptability of different alternatives of contract terms on a five-point scale.

Process initiator

Landowner's own initiative was most often (69%) regarded as the best way to start up a conservation project. About one in three forest owners would accept a joint initiative by a group of local forest owners, and less than one in three an initiative by forestry organizations. Initiatives made by the regional environment centre or a forest conservation foundation (both about 13%) and by municipal authorities (8%) were less acceptable.

Property rights and sovereignty

Maintenance of property rights and sovereignty in decision making were important to forest owners. This was reflected in attitudes towards different conservation measures in which these rights varied. Contracts in which land ownership is maintained by the forest owner, were acceptable to forest owners in both the nature values trading and the nation-wide surveys – however, significantly more so in the former survey ($p < 0.001$) (Figure 14). Government acquisition of areas with conservation value was less popular among respondents in the nature values trading (5%) than in the nation-wide survey (17%) ($p = 0.001$). In both surveys a clear majority regarded this option as very unacceptable.

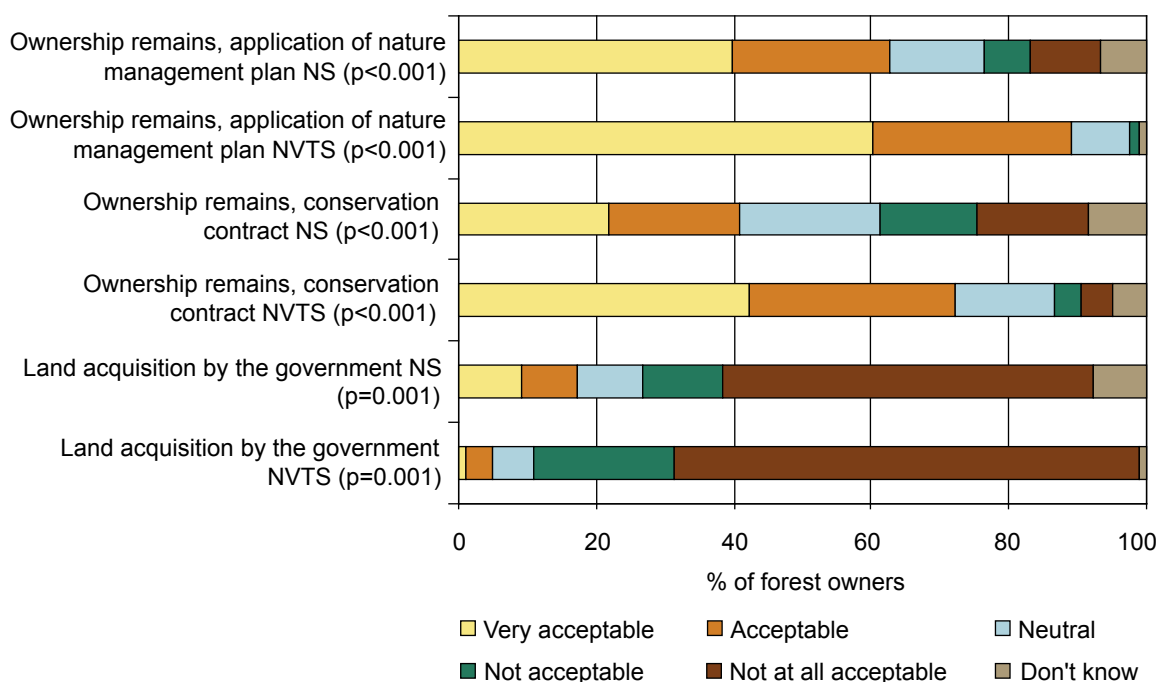


Figure 14. Acceptability of conservation contracts with different effects on property rights and right of decision (% of forest owners). (NS= national survey, NVTs= nature values trading survey).

Duration and terms of cancellation of conservation contract

The respondents were presented with four different alternatives concerning the duration and terms of cancellation of conservation contract. The three alternatives which offered the possibility of the contract to be cancelled, were almost equally acceptable (about 50%), whereas a contract that binds also the new owner was regarded as acceptable significantly less often (Figure 15). This may be explained by the high average age among the respondents and the fact that forest ownership is often passed on as inheritance – parents do not want to constrain the rights of their descendants especially through long term contracts.

Restrictions on forest use

In both surveys alternatives that restricted the use of forests the least were the most acceptable ones (setting aside small sites of special value, management according to nature management plan). Also the order of popularity was similar in both surveys, even though all alternatives were considered slightly more acceptable by the respondents in the nature values trading survey (Figure 16).

Contract duration

In general short-term contracts were more popular than long-term contracts in both surveys. In the nation-wide survey there was a trend between acceptability and duration – the shorter the contract, the more acceptable. However, in the nature values trading survey contract duration of 10 years – duration used in the pilot study – was the most acceptable alternative. A majority (58%) considered a 10-year contract ‘very acceptable’, whereas only few (17%) did so in the nation-wide survey ($p < 0.001$). A 20-year contract was also significantly more acceptable in the nature values trading survey ($p < 0.001$) (Figure 17).

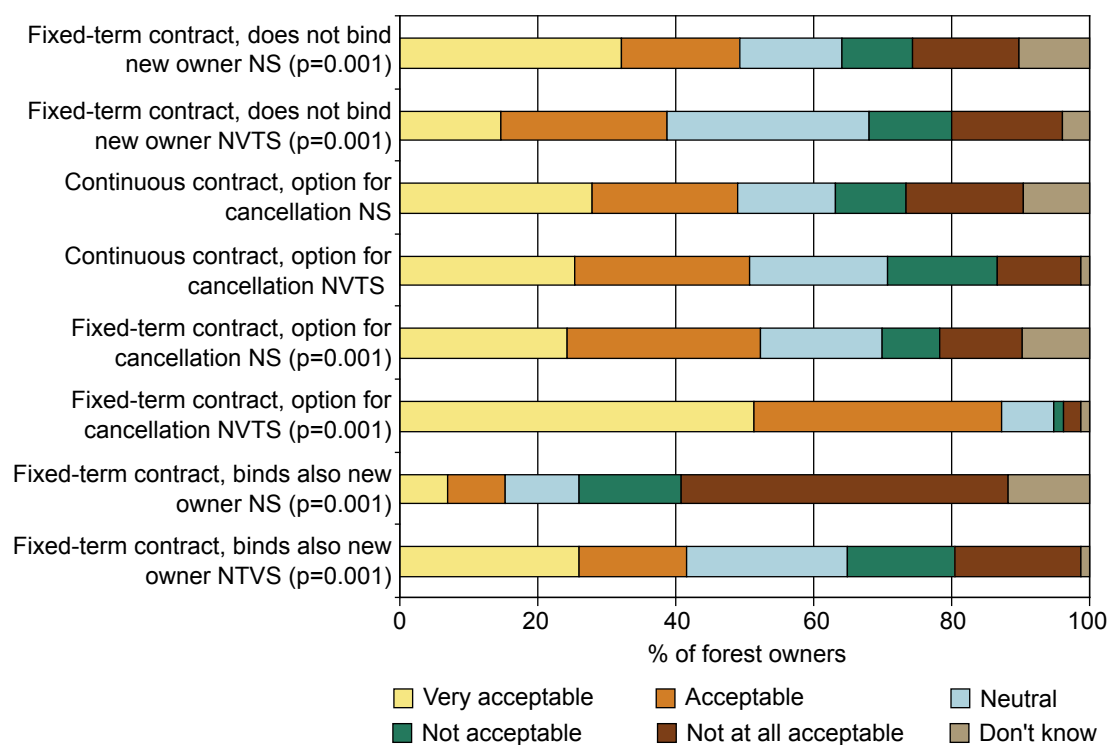


Figure 15. Acceptability of different contract types (% of forest owners). (NS= national survey, NVTs= nature values trading survey). Differences between the results of the two surveys are reported in case they are statistically significant at $p < 0.05$.

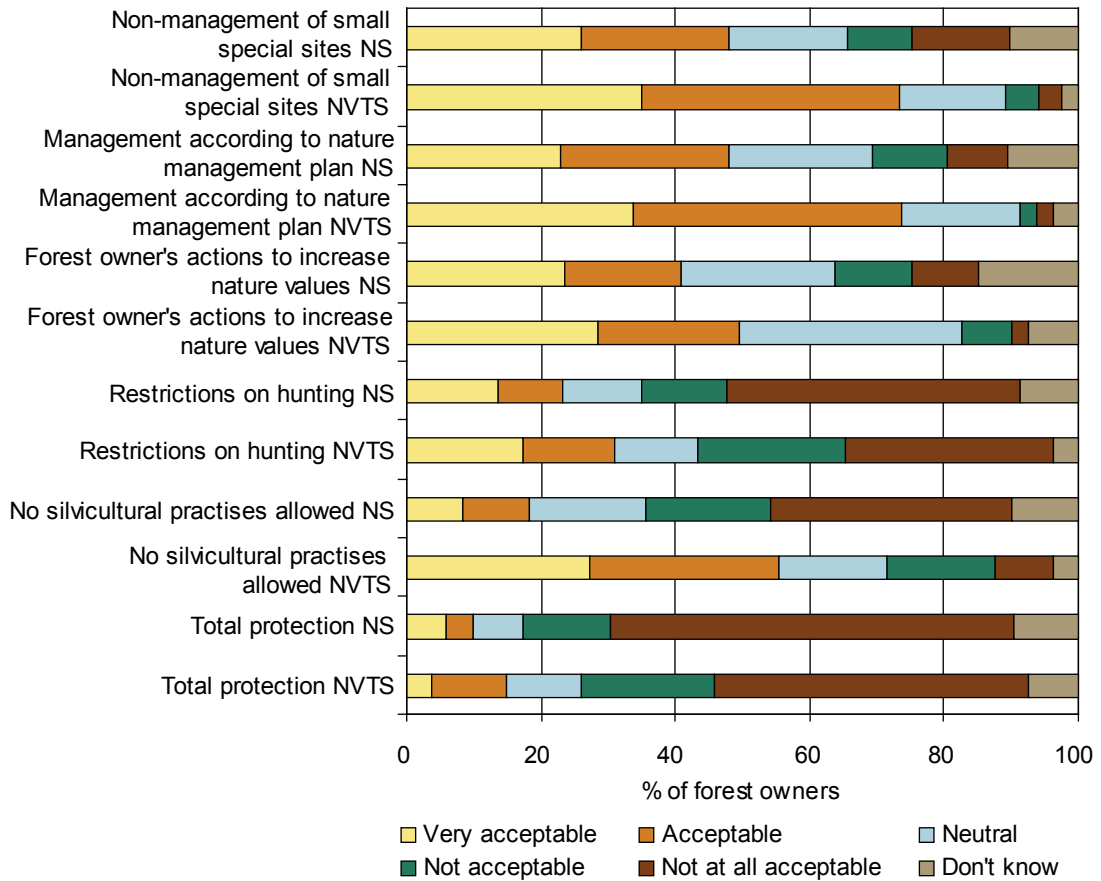


Figure 16. Acceptability of conservation measures with different restrictions on use (% of forest owners). (NS= national survey, NVTS= nature values trading survey).

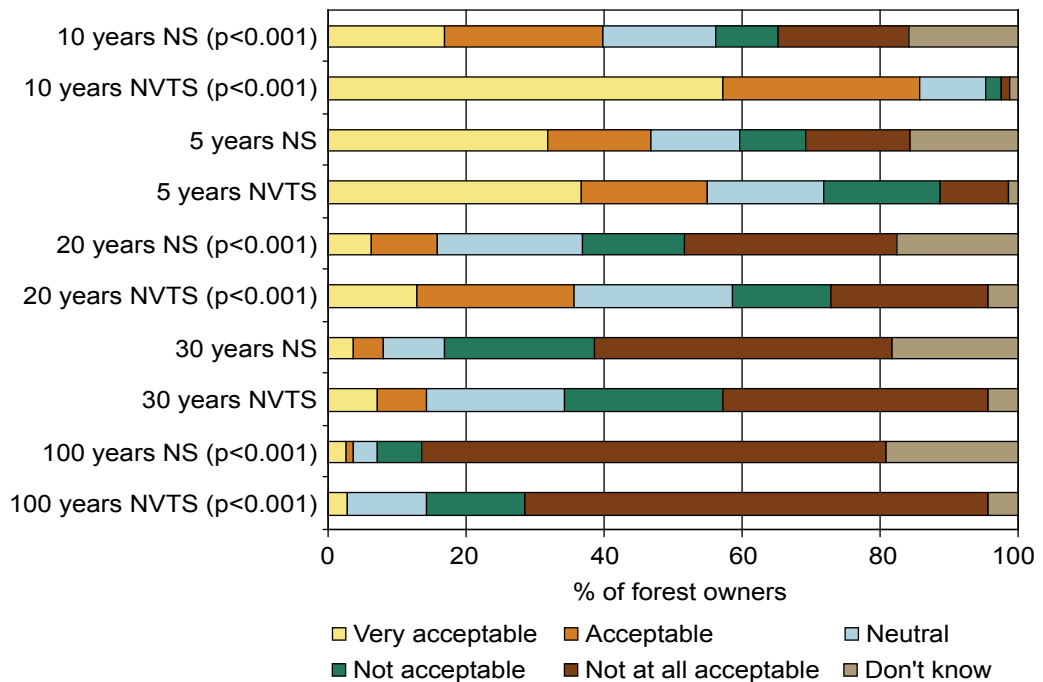


Figure 17. Acceptability of conservation contracts by contract duration (% of forest owners). (NS= national survey, NVTS= nature values trading survey). Differences between the results of the two surveys are reported in case they are statistically significant at $p < 0.05$.

Compensation determination, type and terms of payment

Forest owners thought that the best way to determine the amount of compensation was an offer made by the landowner. However, all given alternatives were acceptable to the majority of respondents in the nature values trading survey, whereas an estimate made by forest centres was accepted by less than half and by environment centres by a quarter of respondents nation-wide (for the latter, $p < 0.001$) (Figure 18).

Compensation in money was the most acceptable form of compensation in both surveys, but significantly more so in the nature values trading survey ($p < 0.001$). Land exchange was more popular in the nation-wide survey ($p = 0.003$) and tax reduction the most unpopular alternative in both surveys, accepted by less than half of the respondents (Figure 19).

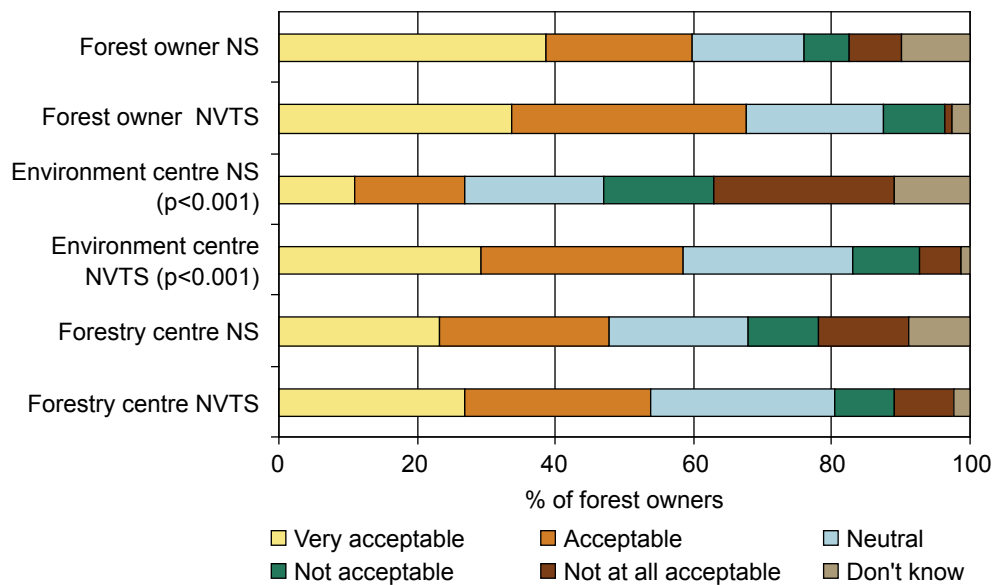


Figure 18. Determination of the amount of compensation, acceptability of different alternatives (% of forest owners). (NS= national survey, NVTs= nature values trading survey). Differences between the results of the two surveys are reported in case they are statistically significant at $p < 0.05$.

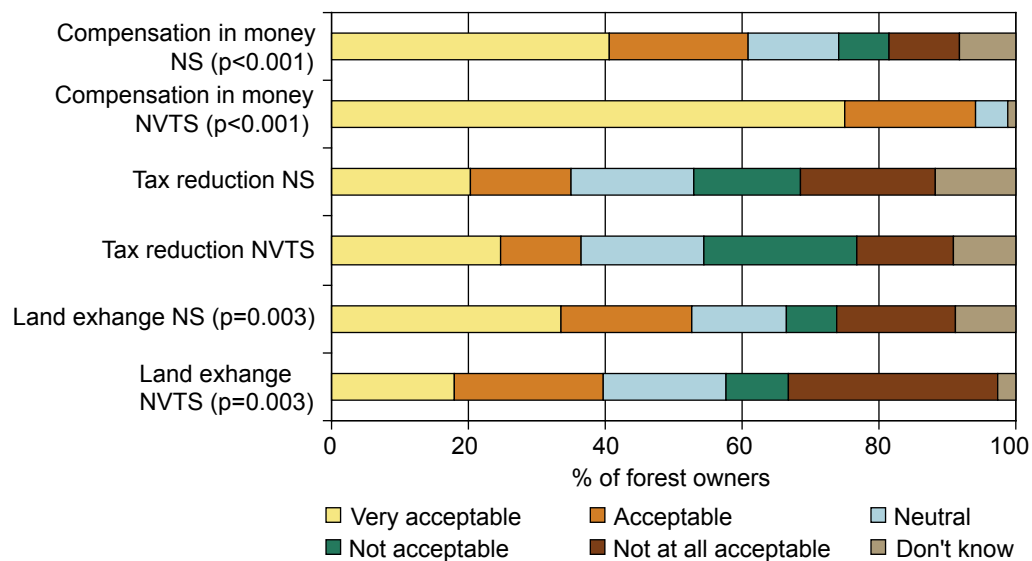


Figure 19. Acceptability of different forms of compensation (% of forest owners). (NS= national survey, NVTs= nature values trading survey). Differences between the results of the two surveys are reported in case they are statistically significant at $p < 0.05$.

As for the terms of payment, the two surveys are not completely comparable, since the option that was clearly most popular in the nature values trading survey and actually used in the pilot programme, full payment at the beginning of the contract, was not offered in the nation-wide survey. However, there was a significant difference between those that had entered in a contract (very acceptable 67%, acceptable 24%) and those that had not (very acceptable 46%, acceptable 11%) ($p=0.005$). The second popular alternative, yearly payments, was clearly the most widely accepted by forest owners nation-wide. In both groups alternatives in which payments were weighted more towards the end of the contract were least popular, which is understandable, especially for long-term contracts.

Contract continuation

In both surveys forest owners a clear majority accepted the alternative in which the forest owner had an option to continue the contract. The proportion of those that regarded this alternative as very acceptable was larger in the nature values trading survey ($p=0.028$). On the other hand, the alternative in which the government is obliged to buy the land at the end of the contract period if the landowner wishes so was more popular among the respondents in the nation-wide survey ('very acceptable' 37% as opposed to 15% in the nature values trading survey).

6.5 Effects of contract terms on welfare and required compensation

6.5.1 Contract terms and acceptability of conservation measures

The effects of different terms (attributes) of the contract and their levels on the acceptability of conservation measures were investigated using a choice experiment. The main results of the choice experiment have also been published in Horne (2006). The respondents were presented with six choice sets, each including a status quo option in which the level of conservation in private forests would not be increased. The two other options described conservation contracts made up of five attributes. The attributes used were contract initiator, contract duration, amount of compensation, restrictions on forest use and cancellation policy. The levels of each attribute are shown in Table 19.

The data were analysed using multinomial logit model. Variables other than the amount of compensation were effects coded. Since the status quo option was conservation level at present, the sign and value of the alternative specific constant (ASC) in the estimated model describe the respondents' tendency to choose the 'no additional conservation' option.

Coefficients of all variables in the model were statistically significant (Table 19). A positive significant ASC indicates a preference for no additional conservation in private forests. As the amount of compensation in an alternative was increased, the probability of the alternative being chosen increased as well. Forest owner as the initiator also increased the probability of the conservation alternative to be chosen, whereas the environment centre as initiator decreased it (negative coefficient). Respondents were willing to set aside small areas of conservation value and manage their forests according to a nature management plan, but more restrictive contracts were considered unacceptable. Short contract periods were preferred, and a hundred years contract – extending over generations – was highly unpopular. An option for contract cancellation was regarded as desirable, whereas contracts that bind the new owner were undesirable.

Table 19. Results of the choice experiment: attributes, parameter estimates, standard errors and significance levels.

Attributes	Attribute levels	Coefficient, S.E. and significance	
Constant		1.7385***	(0.0762)
Amount of compensation	0–350 €/ha/year	0.0033***	(0.0003)
Contract duration	5 years	0.4841***	(0.0592)
	10 years	0.2865***	(0.0609)
	30 years	0.0713	(0.0637)
	100 years	-0.8419 a	
Contract initiator	Forest owner	0.4626***	(0.0607)
	Forest organisation	0.0573	(0.0664)
	Environmental organisation	-0.2503***	(0.0642)
	Conservation trust	-0.1550 a	
Restrictions on forest use	Protection of small sites	0.4601***	(0.0580)
	Nature management plan	0.2373***	(0.0695)
	No silvicultural practises allowed	-0.1379**	(0.0660)
	Total conservation	-0.5595 a	
Cancellation policy	Option for cancellation	0.1725***	(0.0497)
	Does not bind new owner	0.0591	(0.0537)
	Binds also new owner	-0.2316	
Log likelihood		-2490.18	
R ² -squared adjusted		0.1889	

***p<0.1%, ** p<1%, p<5%, a base value for dummy variable

6.5.2 Effects on welfare and required compensation

The results from the choice experiment enable welfare analyses, in which different policy scenarios are created by changing the levels of the attributes and examining their effects on the welfare of the forest owner. Changes in welfare are represented as monetary value, which in this study was derived from the amount of compensation by using the estimated model (Table 19). In order for the welfare of the forest owner to remain unchanged the compensation should equal the monetary value of welfare change. Thus the basis of the analysis is to keep the forest owner's welfare unchanged during a fixed-term contract.

The base scenario was built up so that the forest owner was the initiator, contract duration was 30 years, with no option for cancellation, and small areas of conservational value were set aside. For this base scenario the amount of compensation that would maintain the level of welfare was 168 euros per hectare per year.

If the contract terms are changed, the welfare impact, and thus also the amount of compensation required shift accordingly. Changing contract duration to five years, with other attributes held constant, would decrease the required compensation to 50 €/ha/y, whereas a duration of 100 years would increase it to 450 €/ha/y. Similarly, if the restrictions of forest use are changed from setting aside small areas into managing the forest according to nature management plan compensation increases by little more than 50 €/ha/y. Stricter restrictions would, on the other hand, double or triple the amount of compensation required. Whether or not the current owner can cancel the contract does not much change the welfare impact (increase of 30 €/ha/y), for as long a new owner is able to do it. A contract that binds also the new owner would be significantly more expensive, and would require an increase of 130 €/ha/y.

6.6 Conclusions of the forest owner survey

The results of this study indicate that private forest owners are not in favour of increasing conservation in private forests by governmental land acquisition. However, this does not suggest that forest owners have a negative attitude towards conservation in general. A majority saw the current level of conservation in private forests to be appropriate, and many considered alternative conservation measures acceptable in their own forests. Conservation contracts that are based on voluntariness and offer more flexible terms were considered much more acceptable than land acquisition. Thus, the results clearly support a need for developing new, flexible conservation measures.

Conservation on one's own initiative was markedly common – one in three respondents reported having done so. Forest owners who had practised some conservation measures on their own initiative had often higher education or a degree in forestry. Even though owners of large forest holdings were more sceptical about additional conservation, they were well represented among those that had practised conservation outside official conservation programmes. This may be partly due to the fact that larger properties offer an opportunity to set aside some areas without compromising economic objectives. Also, the larger the forest holding, the more likely it is to have areas of conservational value. The objectives of forest ownership were also reflected in conservation on one's own initiative. Forest owners that emphasised multiple objectives or recreational values had practised conservation on their own initiative more often than those that emphasised the monetary objectives of forest ownership.

As expected, conservation for a compensation was far more acceptable than without compensation. A large proportion of the respondents were willing to accept a fixed-term conservation contract or leave small areas of conservational value unmanaged in cases where compensation was offered. Over half of the forest owners were also in favour of managing their forests according to a nature management plan against compensation. The least popular of the options with compensation, but still acceptable to about two in five respondents, were permanent protection through private conservation area and selling ecologically valuable areas to the government. This indicates that, in principle, private forest owners are willing to offer sites for different conservational needs if they receive a compensation.

Conservation without compensation was also accepted by some forest owners. Most respondents that were ready to accept conservation without compensation favoured measures in which small areas were set aside. Practises involving stricter restrictions were clearly less acceptable. For some forest owners sovereignty was even more important than compensations: some accepted conservation of small areas and management according to nature management plan without compensation and binding contract but not when those were included. Thus small-scale conservation could be possible even without compensation.

Forest owners considered maintaining property rights and sovereignty in decision-making important for the acceptance of conservation. Most preferred contracts were those that are initiated by forest owners, and that expire by the change of ownership. Preference for the expiry might be explained by the fact that in Finland, forest ownership usually exchanges through a transfer of a holding to a descendent, and parents do not wish to restrict their descendents' decision making. This might also be a reason for the preference for shorter rather than longer contract lengths. The payment is important for the acceptance of a contract, too. Most prefer the payment or compensation to be paid directly, and at least part of it in the beginning of the contract period. After the first contract period, forest owners would prefer an option that the state commits to continuation if the forest owner wishes to continue the contract.

7 Summary and conclusions

Paula Horne, Ville Ovaskainen, Terhi Koskela and Heimo Karppinen

7.1 Background of the study

A significant part of biodiversity in Finland is associated with forests and forestry. Safeguarding biodiversity in forests at genetic, species and ecosystem level is important for both ecological reasons and forest use. Because of their species richness forests in Southern Finland have a significant role in preserving biodiversity. However, the large proportion of privately owned forests in southern parts of the country makes planning a socially and economically acceptable conservation policy challenging.

National and international resolutions, activity of non-governmental organizations and the increasing interest of private citizens on conservational issues create a social demand for conservation. A private forest owner does not gain direct economic benefits from safeguarding natural values, even though they may protect parts of their property based on their own attitudes and values. In order to accomplish quantitatively and qualitatively sufficient level of conservation, decision making of private forest owners may be directed and restricted. This can be done through forest and environmental policies. In addition to ecological objectives, the METSO action programme for biodiversity in the forests of southern Finland aims at increasing the social acceptability of conservation policies and reducing the potential for conflicts. The methods of achieving these goals include new, more flexible conservation measures that emphasise voluntariness and forest owners' own initiative.

This report presents the results of three surveys on conservation of forest biodiversity aimed at the general public and non-industrial private forest owners in Finland. The studies were conducted by the Finnish Forest Research Institute. The objective of these studies was to examine citizens' and especially private forest owners' attitudes towards safeguarding biodiversity in forests, the socio-economic effects of conservation, the compensations paid to forest owners, and the instruments of policy implementation. All three studies were postal surveys. The citizen survey was conducted in 2002, a nation-wide forest owner survey in 2003 (when the METSO programme was being started) and the one to participants of the nature values trading pilot project in 2004.

In the citizen survey and the nation-wide forest owner survey the respondents' attitudes towards forest use and conservation were investigated. As expected, attitudes were clearly divided. In the general public survey respondents were asked about their opinions about forest use and management. Based on the responses the citizens were divided into two segments: one emphasising the use values of forests (anthropocentric group) and the other immaterial and ecological values (ecocentric group). In the nation-wide forest owner survey a set of attitude statements developed by Karppinen (e.g. Karppinen et al. 2002) concerning objectives of forest ownership was used. Based on this the forest owners were segmented into multi-objective owners, recreationists, investors, and self-employed owners. The segmentations were used in cross tabulations with attitudes and opinions. As expected, the results revealed significant heterogeneity of attitudes among the general public as well as private forest owners.

7.2 Main results

Attitudes towards safeguarding forest biodiversity and factors affecting the acceptability of conservation were investigated both among Finnish citizens in general and private forest owners in particular. The forest owner survey focused on conservation in privately owned forests and on the new policy instruments introduced in the METSO programme. Measures based on voluntariness are expected to increase the social acceptance and cost-efficiency of biodiversity conservation. A goal of this study was to find out whether the expectations laid on the proposed new policy instruments are likely to be fulfilled.

In the following sections the main results in regard to Finnish people's attitudes towards safeguarding forest biodiversity and the conclusions concerning the effects and potential benefits of the proposed new policy instruments are presented. Five issues essential to conservation policy are considered: property rights and fairness, welfare impacts on citizens and private forest owners, cost-efficiency of conservation policy, social acceptability of conservation, and the level of knowledge about biodiversity. The results suggest that the new policy instruments that emphasise voluntary participation of forest owners and financial incentives can complement the available mix of policy instruments for safeguarding forest biodiversity.

7.2.1 Property rights and fairness

Nearly two thirds of respondents in the citizen survey accepted conservation measures based on voluntariness (i.e. contracts and information and planning) over governmental land acquisition. This can be interpreted as preference for policy instruments that respect the sovereignty of private forest owners. This is in accordance with the results of Lehtonen et al. (2002, 2003) and Pouta et al. (2002) that showed that the planning and implementation process of conservation was of major importance and conservation based on contracts was the preferred instrument of policy implementation. Further, conservation measures that include full compensation to the landowner seem to correspond to citizens' perceptions of a fair division of conservation costs. Three out of four respondents in the citizen survey regarded compensations fully covering the forgone revenue as appropriate. Many thought that compensations should also cover the costs of special conservation practises or even the full societal of the forest, including the value of biodiversity.

7.2.2 Welfare impacts

The results of the citizen survey suggest that the use of incentive-based instruments can increase general welfare in comparison to the traditional measures. The results and the method used also enable calculation of the welfare impacts at different attribute levels for a hypothetical conservation contract. As an example the welfare impacts at different attribute levels were calculated for a scenario in which the conservation area in southern Finland was increased to 4.2 percent (the percentage of protected forests was 1.8%, in 2003 when the survey was conducted). The welfare impacts were calculated by segments (labelled anthropocentric and ecocentric). For the anthropocentric group the welfare impact was negative, and for the ecocentric group positive at all attribute levels tested. When the two groups are combined, the overall welfare would be maintained by using contract-based instruments for conservation. Governmental land acquisition would, on the other hand, decrease average welfare. This suggests that citizens' willingness to pay for contract-based conservation is higher than for conservation based on land acquisition. If conservation were financed at least partly by voluntary payments instead of increasing taxes

the welfare impacts of the two groups could be balanced while the overall impact would remain unchanged.

The results of the nation-wide forest owner survey suggest that the use of incentive-based measures would increase also the welfare of private forest owners. In general, forest owners consider the current level of conservation sufficient and do not want it increased in private forests. However, acceptability of conservation depended strongly on the amount of compensation and other contract terms (initiator, restrictions on use, duration and terms of cancellation). Long-term (or permanent) and restrictive contracts were not acceptable to most private forest owners whereas short-term, more flexible contracts were more readily accepted. Unacceptable contract terms increased the forest owner's potential welfare loss manifold compared to the more flexible alternatives. Hence, much higher compensation would be required to maintain the forest owner's initial welfare.

7.2.3 Cost-efficiency

Conservation measures based on voluntariness and flexible contract terms increased the acceptability of conservation for private forest owners. Thus the potential negative welfare impact of a conservation measure was significantly smaller when the terms were more flexible and acceptable. Accordingly, the compensation required to maintain the forest owner's welfare is also smaller in monetary terms. This means that by developing the instruments of policy implementation it is possible, in theory, to increase the cost-efficiency of conservation. In other words, the required amount of conservationally valuable sites could be attached to different biodiversity conservation programmes with less governmental expenditure while maintaining the overall welfare of forest owners.

7.2.4 Social acceptance of conservation

Three out of four respondents in the citizen survey were in favour of increasing the current level of conservation (the percentage of protected forests was 1.8%, in 2003 when the survey was conducted) in southern Finland. Most often (33%) the respondents chose the option of 2.5–5 percent and the average was around 4 percent. The results support the findings of Lehtonen et al. (2002, 2003) which showed that 90 percent of Finnish citizens considered an increase of conservation in southern Finland to increase welfare.

In general, forest owners were not in favour of increasing conservation in privately owned forests with traditional land acquisition based means. Two out of three considered the present level of conservation to be sufficient and more than one in five (23%) considered it too high. About seven percent were in favour of additional conservation. This does not mean that forest owners are against conservation, or even additional conservation per se, since other, more flexible measures were clearly more acceptable. Almost one third always chose an option proposing additional conservation over the 'no additional conservation' alternative. Thirty seven percent reported having practised conservation measures on their own initiative. It is likely that forest owners regarded this to be included in the level of present conservation in addition to official conservation programmes and thought, like the general public, that conservation should be carried out primarily in forests owned by the state or some other public sector.

Conservation measures should be developed so that they are more acceptable to forest owners and also other citizens in order to fulfil the objectives for biodiversity conservation in the long run. For many forest owners one of the most important factors determining the acceptability of

conservation contract was maintaining the sovereignty, and for some it was even more important than compensation. This indicates that some forest owners that are not willing to sell land to official conservation programmes, could accept a fixed-term, more flexible contract based on voluntary participation.

7.2.5 Citizens' conceptions of biodiversity

Respondents understood the concept of biodiversity in different ways, and many included also other than the 'official' elements (genetic, species and ecosystem variability) into the definition. This may have implications that need to be taken into account when planning conservation policies. For example, if biodiversity is confused with multiple-use forestry, in theory one can support conservation without realizing the possible conflicts between conservation and recreational use or scenic values. People may regard the level of biodiversity as better than in reality, or alternatively, support and carry out practises that are of little or no use in terms of biodiversity.

7.3 Generalizability of the results

This report presents the results of three fairly extensive surveys on attitudes towards biodiversity conservation in Finland. Factors affecting the attitudes of the general public and private forest owners towards biodiversity conservation and policy instruments used will be investigated in more detail in further analyses of the data. In examining the results presented and the conclusions drawn certain reservations should be kept in mind.

Apart from the natural values trading survey, the response rate of the surveys was rather low, less than 50 percent. A low response rate may compromise the generalizability of the results if it reflects selectiveness in the responses. For this reason, a random selection of non-respondents were interviewed by phone to find out if there were systematic differences between the respondents and non-respondents.

The most common reason for non-response was a general lack of interest in public opinion surveys. In the citizen survey those interviewed by phone had on average a more negative attitude towards additional conservation than the respondents. On the other hand, young people, who, on the basis of previous studies, generally have a positive attitude towards conservation were somewhat underrepresented in the sample. In the nation-wide forest owner survey those interviewed by phone favoured additional conservation on average more than those who returned the questionnaire. However, the respondents had practised conservation on their own initiative more often than the non-respondents. For some of the non-respondents the reason for not responding to the questionnaire was a negative attitude towards conservation. Since these opposite effects partly neutralize each other, there is no reason to believe that there was significant selectiveness in the responses which would bias the results. Furthermore, the main conclusions concern the acceptability of conservation and its dependence on different factors related to policy instruments used. Even if slight selection did occur, it would probably have no effect on these dependences.

The results so far seem to support the expectations set on the actions and policy instruments proposed and used in the METSO programme. Further analyses are required for more specific estimates of how much these actions will eventually further the realization of conservation objectives. The choice experiment method used enables investigation of different policy scenarios and their effects.

7.4 Conclusions

The objective of the reported studies was to investigate attitudes towards different kind of measures for safeguarding forest biodiversity and their socio-economic impacts. The results are applicable in designing new and developing the existing policy instruments that private forest owners and the general public would find acceptable. The main conclusions drawn from the results presented in this report are summarised in the following.

1. Conservation measures based on voluntary participation and incentive-based instruments seem to correspond to the general perception of property rights and fair division of costs and benefits accruing from biodiversity conservation.
2. Use of measures based on voluntary participation and more flexible contract terms can increase the welfare of both private forest owners and citizens in general in comparison to the traditional conservation measures. It is important to recognize the heterogeneity of opinions on conservation and forest use among both private forest owners and the general public. Thus, measures aimed at biodiversity conservation will have different welfare impacts on different segments of the society.
3. Using measures based on voluntary participation and transferring the initiative more to the landowners may increase the acceptability of biodiversity conservation among the general public and especially among private forest owners. This will most likely reduce the probability of conservation-related conflicts.
4. Measures emphasising voluntary participation of forest owners can, in theory, increase the cost-efficiency of conservation. If forest owners participate voluntarily and consider the contract terms acceptable, the amount of compensation required will be smaller. It is important to recognize that the objectives of forest ownership and attitudes towards conservation vary among private forest owners. Then, conservation measures and contract terms need to be flexible to suit to the varying conditions of individual forest owners.
5. In addition to financial incentives, successfully safeguarding biodiversity calls for dissemination of information. This comprises increasing general knowledge on biodiversity and planning and extension services. In policy making it is important to notice that the general conceptions of biodiversity are not necessarily very accurate and often too broad.

Overall, these studies suggest that the voluntary approach applied in the METSO programme provides a welcome addition to the set of policy instruments aimed at safeguarding forest biodiversity. Even though fixed-term conservation contracts for relatively small areas cannot replace permanent conservation areas as the basic network for biodiversity conservation, they complement the selection of policy instruments significantly. In the long run one of the most important benefits is the fact that a new approach, based on voluntary participation and flexibility, may increase the acceptability of conservation. This in turn reduces the probability of conflicts and improves the chances of success in forest and environmental policy in the long run.

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