



FOREST CONSERVATION AND ECONOMIC UTILIZATION: PUBLIC ATTITUDES IN FINLAND

HEIMO KARPPINEN AND HARRI HÄNNINEN*

ABSTRACT

Attitudes of the Finnish public towards the economic utilization of forests and forest conservation are examined using interview data collected in 1994. Principal component and cluster analyses are used to discern between persons with flexible and inflexible attitudes towards these issues. Four attitude groups are identified; citizens who support either increased forest utilization or increased forest conservation, and reject the alternative, citizens who support both increased conservation and economic utilization of forests and citizens who oppose both. The groups are further described by socio-demographic characteristics, including ownership of forest land, and their proportion strengths are estimated.

Keywords: environmental attitudes, forestry, knowledge level, multivariate methods, private forest owners, public opinion.



INTRODUCTION

In most western countries, forestry has recently been subject to public criticism. Until the late 1980's, these criticisms mainly focused on forest management practices¹. Since then, the main theme in the ongoing debate has been the question of biodiversity. In particular, the conservation of old-growth forests and endangered biotopes and species have been given considerable attention (Hellström, 1994; Hellström & Reunala, 1995). For instance, in the US Northwest, the spotted owl debate has caused a clear reduction in cuttings of old-growth forests (Yaffee, 1994; Sedjo, 1995). Criticisms are also reflected in international environmental agreements, such as the Rio declaration, which emphasize multiple-use principle and sustainability (Report ...,

¹ Forest management practices can be executed for many purposes in multifunctional forestry: timber production, recreation, erosion control etc. In this article, the purpose of forest management and forestry as a whole is mainly considered to be timber production.

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1992; Second Ministerial ..., 1993). On the global scale, the pressure to conserve forests will almost certainly increase in the future, but the demand for wood and wood products is also expected to rise (Solberg, 1996; FAO, 1997).

Active groups involved in forestry conflicts, such as the forest industries, environmental groups and landowners, have easy access to the mass media. For the general public, opinion polls offer an important participatory channel. The public's attitudes and opinions concerning forestry have been studied in several countries (e.g., Hoen & Winther, 1993; Shindler *et al.*, 1993; Bliss *et al.*, 1994; Bourke & Luloff, 1994; Public ... , 1995; Kangas & Niemeläinen, 1996; Zimmermann, 1996; Schmithüsen *et al.*, 1997). However, as a whole, public opinion concerning these apparently contradictory tendencies to conserve forest and intensify the utilization of forests is insufficiently understood.

Previous studies have mainly presented only responses to single statements, which always involves a danger of misinterpretation. The one-item measures are not proportioned to each other, which may result in an exaggerated impression of inconsistency in the attitudes of the public. Public attitudes concerning "abstract" environmental issues are invariably inconsistent to some extent (Uusitalo, 1990). The construction of summated and cumulative scales of attitudes (Tull & Albaum, 1973; deVaus, 1996) will probably yield more reliable and more consistent results. On the other hand, multivariate methods enable simultaneous analysis of several statements, making it possible to cluster persons with flexible and inflexible attitudes.

The main contribution of this study is to demonstrate a procedure for overcoming the danger of misinterpretation present in separate analyses of single attitude statements. In this study, multivariate methods are employed to discern between persons with distinct and more flexible attitudes towards forest conservation and economic utilization. Principal component analysis is used to condense a number of statements into a few interpretable attitude dimensions, and two of these dimensions are employed as criteria for clustering the citizens into four attitude groups.

The procedure allows the assessment of the proportion of the Finnish public which is singularly pro forest conservation at the expense of economic utilization, and vice

versa. Besides the analysis of these extreme groups, the study also enables the evaluation of the extent to which Finns are more flexible towards these issues. The supporters of forest conservation, economic utilization and the two other groups are further identified by readily observable socio-demographic characteristics. The study results are useful in planning and implementing national environmental and forest policies.

The attitudinal differences between Finnish non-industrial private forest owners and non-owners are particularly interesting. The American studies suggest that there are minor differences between forest attitudes of the forest owners and the public (Bliss *et al.*, 1994; 1997; Bourke & Luloff, 1994), whereas evidence from Finland suggests that non-owners are more pro-environmentally oriented than forest owners (Kangas & Niemeläinen, 1996).

Another controversial issue concerns the role of forestry knowledge in attitude formation. Finnish opinion polls have revealed that the public's knowledge of forestry is poor. Forestry professionals have therefore often pointed out that negative attitudes towards forestry are due to lack of relevant information (Hellström & Reunala, 1995).

This paper is organized as follows. A review of the literature on socio-demographic differences in environmental attitudes is presented first, and hypotheses are introduced. Personal interview data on 970 Finnish citizens is outlined in the next section, which also includes a short description of the methods used in the analysis. The empirical results are then presented, and finally conclusions are drawn.

SOCIO-DEMOGRAPHIC DIFFERENCES IN ENVIRONMENTAL ATTITUDES

The public's environmental attitudes are often assumed to be associated with socio-demographic characteristics. For instance, age or generation (age cohort) is considered to be important. Younger persons seem to be more concerned about environmental issues than older people (Van Liere & Dunlap, 1980; Steel *et al.*, 1990; 1994; Kangas & Niemeläinen, 1996). This hypothesis can be based on the assumption that young people are less integrated into the

dominant social order and economic system, which is often considered to be threatened by pro-environmental ideologies (Van Liere & Dunlap, 1980). Also Inglehart's (1977) well-known, although heavily criticized, materialism – postmaterialism hypothesis suggests that younger generations “born in prosperity” express more pro-environmental attitudes than older generations who emphasize material needs (see also Van Liere & Dunlap, 1980).

Women are also considered to be more concerned about the condition of the environment than men. This assumption regarding differences between the attitudes of the sexes is based on the argument that women are socialized from childhood to raise and care for their families, and this “motherhood mentality” is reinforced by the roles women occupy during their adulthood in the family as homemakers and mothers. Nurturing attitudes have been translated into the environmental domain. On the contrary, men are socialized to be family breadwinners and economic providers, and this “marketplace mentality” is again reinforced in their workplace roles (Mohai, 1992; Steel *et al.*, 1994). This is close to the assumption that males are more probably than females concerned about jobs and economic growth, and therefore less concerned about the quality of environment (Van Liere & Dunlap, 1980). Still another hypothesis suggests that males are more concerned about environmental issues because they are more likely to be politically active, more involved with community issues and have higher levels of education than females (Van Liere & Dunlap, 1980). Consequently, there is no clear conclusion concerning the relationship between gender and environmental attitudes.

Formal education is often associated with environmental concerns. Persons with higher levels of education are more likely to show concern for environmental problems than those with lower levels of education. The rationale behind this kind of reasoning is that education makes it easier to understand complex environmental issues (Steel *et al.*, 1994). According to Van Liere and Dunlap (1980), environmental concern is positively connected to social class, as indicated by education, income and occupational prestige. This assumption is based on either Maslow's hierarchy of needs or the idea of relative deprivation. The latter means that the middle and upper classes have more

probably experienced pleasant residential, work and recreational environments, and are therefore more sensitive to the deterioration of environment than the lower class.

It has also been argued that education may not matter because environmental concern depends more on values than knowledge (Steel *et al.*, 1990). Furthermore, Bliss *et al.* (1997) claim that formal education contributes to an increased approval of certain forest management methods, such as clearcutting and the use of herbicides. In conclusion, it is reasonable to assume that education and environmental concern are positively associated.

Previous studies suggest that urban residents are more likely to support pro-environmental attitudes than rural residents (Van Liere & Dunlap, 1980; Lowe & Pinhey, 1982; Steel *et al.*, 1994; Kangas & Niemeläinen, 1996). Urban people have better access to environmental knowledge and educational opportunities, and they also may have more experience from the environmental deterioration in their neighborhoods than rural residents. The interest in forest conservation can be considered to have its roots in urban culture (Steel *et al.*, 1994). On the other hand, rural residents are often more involved with nature exploitative occupations, e.g., the utilization of forests, and therefore express less concern for the preservation of pristine nature (Van Liere & Dunlap, 1980).

In Finland, this urban – rural difference could also be interpreted regionally. As suggested by Kangas and Niemeläinen (1996), pro-environmental attitudes may be associated with the residence in the more developed and more densely populated southern part of the country than in northern Finland.

The American studies suggest that there are only minor differences between forest attitudes of the forest owners and the public (Bliss *et al.*, 1994; 1997; Bourke & Luloff, 1994). Taking into account the economic importance of wood production in Finnish private forestry, it is reasonable to expect, as suggested by Kangas and Niemeläinen (1996), that private forest owners are not as pro-environmentally oriented as other citizens.

To sum up, the socio-demographic characteristics hypothesized to be *in connection with pro-environmental attitudes are: young age, high level of education, urban residence,*

residence in southern Finland and non-ownership of forests. However, the relationship between sex and pro-environmental attitudes remains ambiguous.

DATA AND METHODS

The countrywide survey data were collected by personal interviews in 1994 by a commercial enterprise specialized in opinion polls (Taloustutkimus Inc.). The population consisted of all Finnish citizens between 15 and 74 years. The sample size was 982, but the number used in the analysis was 970 due to non-response to the question on forest ownership. The sampling procedure was quota sampling (Bailey, 1994), which was based on the proportions of the age classes, sex and place of residence (urban/rural) of the population in the particular province. Case weights were therefore applied in the analysis.

The data were originally collected for another purpose, and the effect of non-response bias could not be investigated in this study. The rate of non-response has usually been rather small (5-8%) in opinion polls executed by Taloustutkimus (personal communication, Hannu Ilkas). Furthermore, differences were not detected in the comparison of the sample demographics and population census statistics. The sample is therefore considered to be statistically representative of the Finnish population.

The objectives of the primary study have determined the contents of the questions. This may cause validity problems in attitude and knowledge measurement and restricts the adoption of a theoretical framework. It was not possible to adopt tripartite conception of attitude, i.e., to measure separately cognitive, affective and conative components of attitude (e.g., Maloney & Ward, 1973; Lutz, 1991). Only cognitive component - questions concerning forestry knowledge - was measured, in principle, separately. Also unidimensionalistic view of attitude as presented by Ajzen and Fishbein (1980) was beyond the scope of this study. Attitudes were measured in this investigation by single attitude scales. The wording of certain attitude and knowledge statements can also be assessed to be somewhat value-laden and perhaps biased in favor of economic utilization of forests. The data were, however, considered to be suitable for meeting the objectives of the present study.

The questionnaire included 15 statements concerning attitudes towards forestry measured by a five-point Likert scale (Strongly agree, Agree, Cannot tell, Disagree, Strongly disagree). Also three questions concerning knowledge were measured by Likert scale. Furthermore, respondents' socio-demographic characteristics were inquired.

In order to group persons with flexible and inflexible attitudes towards forest conservation and economic utilization of forests, the attitude statements were first condensed into a few interpretable combined variables by means of principal component analysis (e.g., Lewis-Beck, 1994). The principal component scores describing support for the forest conservation and the economic utilization of forests were then used as grouping variables in cluster analysis. Grouping the citizens allowed different combinations of the two dimensions of attitudes among the public, and the groups could be identified by socio-demographic characteristics. Orthogonal in construction, principal component scores provided a convenient way to avoid the problem of multicollinearity which could distort clustering (Engelman, 1980). K-means clustering, based on Euclidean distances, was employed. It is a combination of a hierarchical stem-to-leaf algorithm and iterative partitioning (Anderberg, 1973; Hartigan, 1975).

The groups based on attitudes were identified by demographics using logit models (Hosmer & Lemeshow, 1989). The dependent variable in the models was dichotomous: assignment to the specific group versus other citizens. Multinomial models were also technically possible, but binary models were preferred because they permitted the identification of a specific group of citizens from other citizens instead of comparing all groups with each other simultaneously. The attitude groups were further used in the analysis of knowledge of forestry and in the comparisons between forest owners and non-owners.

RESULTS AND DISCUSSION

Attitude Groups

Fifteen statements describing the attitudes of the public concerning forestry were condensed into four attitude dimensions using principal component analysis (Table 1). KMO measure was 0.745 indicating the existence of suffi-

TABLE 1. PUBLIC'S ATTITUDES TOWARDS FORESTRY.
Principal component analysis. Varimax rotation. (Loadings below 0.250 denoted by asterisk).

	I	II	III	IV	h ²
Cuttings and forest management should be reduced to maintain virgin nature.	0.758	*	*	*	0.591
The majority of forests should be maintained as untouched virgin nature.	0.711	*	*	*	0.567
Forest management and cuttings in our forests form a menace to the profusion of flora and animal species.	0.680	*	*	*	0.515
More tax funds should be used for the conservation of old-growth forests.	0.597	*	*	*	0.360
Timber cuttings are necessary for the health of forests.	*	0.642	*	*	0.480
The welfare of our country will be based on forests also in the future.	*	0.638	0.333	*	0.533
The utilization of forests should be intensified to improve our standard of living.*		0.614	*	0.274	0.453
A well-managed forest is suitable for berry- and mushroom-picking as well as for hiking.	*	0.583	*	*	0.375
Our forests have roundwood in abundance as a raw material for industry.	-0.267	0.524	*	*	0.373
The forest industries cope well with the requirements of international competition.	*	*	0.800	*	0.654
The forest industries are the most important foundation and maintainer of welfare in our country.	*	*	0.747	*	0.562
The forest industries are an old-fashioned and stagnant branch of industry.	*	*	-0.582	*	0.373
Mechanized site preparation to ensure the development of plants is acceptable in principle.	*	*	*	0.785	0.625
Clearcutting and planting or sowing seeds is acceptable in principle.	*	*	*	0.763	0.588
Modern methods enable roundwood harvesting from the forest without damaging nature.	-0.250	*	*	0.505	0.339
Eigenvalue	2.117	1.923	1.689	1.656	
Proportion explained	14 %	13 %	11 %	11 %	
n	970				
Interpretation of the principal components:					
I "Support for forest conservation"					
II "Support for economic utilization of forests"					
III "Positive image of the forest industries"					
IV "Acceptance of present forest management methods"					

cient correlations between the statements for the analysis (deVaus, 1996). The reliability of the solution was satisfactory (Carmines' theta = 0.69)². The explained proportion of the total variation of the original variables was 49%.

The first principal component was considered to describe *support for forest conservation* because of the high loadings for the statements "Cuttings and forest management should be reduced to maintain virgin nature", "The majority of forests should be maintained as untouched virgin nature", "Forest management and cuttings in our forests form a menace to the profusion of flora and animal species", and "More tax funds should be used for the conservation of old-growth forests".

The following statements received high loadings on the second principal component: "Timber cuttings are necessary for the health of forests", "The welfare of our country will be based on forests also in the future", "The utilization of forests should be intensified to improve our standard of living", "A well-managed forest is suitable for berry- and mushroom- picking as well as for hiking", and "Our forests have roundwood in abundance as a raw material for industry". The component was therefore considered to describe *support for economic utilization of forests*.

The third attitude dimension could be interpreted to represent *positive image of the forest industries* as a competitive, modern branch of industry that forms a foundation of economic well-being. Finally, the fourth component was considered to describe *acceptance of present forest management methods* (e.g., clearcutting, mechanized site preparation).

Two of these attitude dimensions, support for forest conservation and economic utilization of forests describe attitudes that are often viewed as contrary to each other. They were therefore chosen for further analysis. Moreover, the differences between the attitudes of the forest owners and

² Carmines' theta is computed for the unrotated solution as follows:

$$\Theta = \frac{N}{N-1} \left(1 - \frac{1}{\lambda_1} \right)$$

where N is the number of items in the total principal component analysis and λ_1 is the largest (the first) eigenvalue. Theta can be regarded as a maximized Cronbach's alpha coefficient (Carmines & Zeller, 1979; BMDP..., 1992).

other citizens were manifested only with respect to these two dimensions. In order to evaluate the reliability of these two principal components separately, Cronbach's α s were calculated (BMDP..., 1992). They were 0.66 for support for forest conservation and 0.53 for support for economic utilization of forests, indicating only moderate reliability.

The objective of the cluster analysis was to discern between those persons with strong attitudes towards forest conservation and economic utilization of forests, and those persons with more flexible attitudes towards these attributes. A four-group solution proved to be interpretatively straightforward and satisfactory as to the group size (Table 2). F-ratios suggest that the components discriminate rather well.

In the first group, the mean of the principal component score describing support for forest conservation was positive and that of support for utilization negative. In other words, the interviewees belonging to this group emphasized forest conservation and did not support economic utilization. Consequently, such persons can be characterized as *supporters of forest conservation*. In the second group, the signs of the means of the principal component scores

TABLE 2. GROUPING OF THE PUBLIC BY THEIR ATTITUDES TOWARDS FORESTRY.

K-means clustering.

ATTITUDE GROUP	N	MEAN OF PRINCIPAL COMPONENT SCORE (STANDARD DEVIATION)	
		I Support for forest conservation	II Support for economic utilization of forests
I Supporters of forest conservation	233	0.893 (0.581)	-0.393 (0.481)
II Supporters of forest utilization	334	-0.934 (0.546)	0.414 (0.516)
III Multifunctionalists	229	0.708 (0.606)	0.942 (0.398)
IV The indifferent	174	-0.334 (0.748)	-1.508 (0.755)
	Σ 970		
F-ratio		549.889	804.646
P-value <		0.000	0.000

were the opposite: economic utilization of forests was emphasized at the expense of nature conservation. Thus, the group can be labeled *supporters of forest utilization*. In both groups, the coefficient of variation of the principal component score representing support for forest conservation was distinctively smaller than that of support for utilization. This suggests that attitudes concerning forest conservation were more consistent than attitudes towards economic utilization.

In the third group, the means of both support for forest conservation and economic utilization of forests were high and positive. The persons belonging to this group considered that forest conservation and economic utilization could be increased at the same time. The group was therefore labeled *multifunctionalists*. The respondents of the fourth group took a negative attitude towards both forest conservation and economic utilization. They did not want to increase forest conservation or economic utilization. The group was labeled *the indifferent*. The analysis of the coefficients of variation in these two groups suggested that the attitudes related to the economic utilization of forests were clearly more consistent than the attitudes towards conservation.

More than one third of the respondents belonged to the supporters of forest utilization and close to one fourth to the supporters of forest conservation (Fig.1). This implies that every third person would be ready to increase utilization of forests at the expense of forest conservation, and one in four citizens would be ready to increase forest conservation at the expense of wood production. Thus, about sixty percent of the population seem to have a distinct (either - or) attitude towards these issues.

One fourth of the Finns in the investigation were multifunctionalists who simultaneously supported the increased conservation and economic utilization of forests. This kind of attitude is in line with the international environmental agreements emphasizing multiple-use of forests (Report ..., 1992; Second Ministerial ..., 1993) and with the commonly assessed abundance of forest resources in Finland, which is regarded to enable a simultaneous increase in the forest conservation and utilization of forests to meet the roundwood demand of the forest industries.

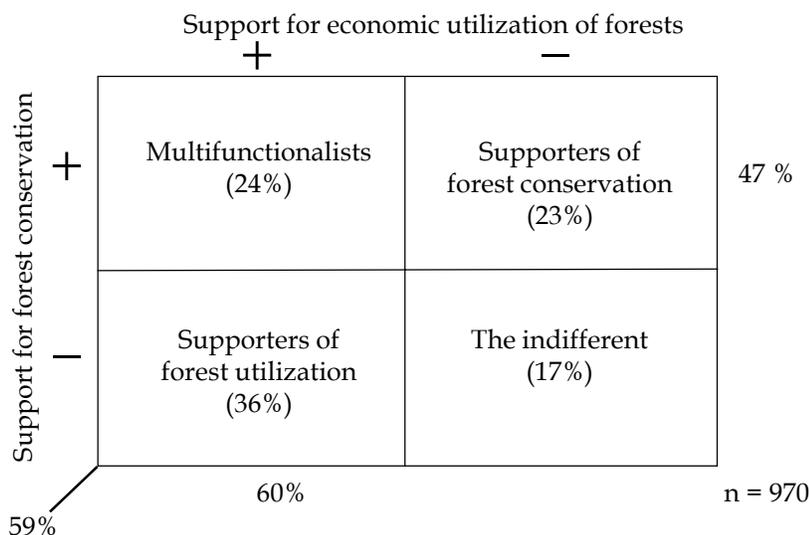


FIGURE 1. GROUPING OF THE PUBLIC BY THEIR ATTITUDES TOWARDS FORESTRY (+ POSITIVE ATTITUDE, - NEGATIVE ATTITUDE).

One sixth of the Finns had a negative attitude towards both the increased forest conservation and economic utilization of forests. Such indifferent citizens obviously accept the present situation or are disinterested in the whole issue.

The results also reveal that forty-seven percent of the population supported the increased forest conservation and sixty percent the increased economic utilization of forests, when multifunctionalists were included. This proportion of the supporters for conservation is close to the estimate given by Kangas & Niemeläinen (1996) based on responses to a single statement.

Demographics of the Attitude Groups

The socio-demographic characteristics of the supporters of forest utilization and conservation were identified using separate logit models for both groups. The objective was to identify the persons belonging to the specific group from other people (three other groups). According to the results, a person was more likely to belong to the *supporters of forest utilization* if he was male, and more than 30 years old, had a college or academic degree, lived in the southern part

of the country (to the south of Oulu province), and was a forest owner (Table 3). Given these attributes, the probability of belonging to the group was 68% (Appendix 1).

The *supporters of forest conservation* could not be as clearly distinguished from other citizens by standard demographics.³ However, the probability of belonging to the supporters of conservation increased to some extent if the person was less than 30 years old, female, and lived in northern Finland (Table 3). Given these attributes, the probability of belonging to the group was 53% (Appendix 1). The model identifying the supporters of conservation does not give a distinct picture of what type of Finns are so much in favor of forest conservation that they are willing to compromise on the economic utilization of forests.

The hypotheses on the connection between socio-demographic characteristics and attitudes were only partly confirmed. As expected (Van Liere & Dunlap, 1980; Steel *et al.*, 1990; 1994; Kangas & Niemeläinen, 1996), the support for forest conservation was linked with youth. Women showed more pro-environmental attitudes than men, which is also in accordance with some previous studies (Mohai, 1992; Steel *et al.*, 1994).

Contrary to the hypothesis, the results suggest that a higher level of education tends to increase support for the economic utilization of forests. The result is similar to that of Bliss *et al.* (1997) who noted that formal education contributes to an increased approval of clearcutting and the use of herbicides. It is possible that education deepens the insight of the economic importance of forests in Finland, or leads to a more favorable attitude towards dominant economic thinking in general. It may also be that environmental concerns depend more on values than knowledge (Steel *et al.*, 1990).

According to the previous studies, urban residents are more likely to support pro-environmental attitudes than rural residents (Van Liere & Dunlap, 1980; Lowe & Pinhey,

³ The socio-demographic characteristics of the supporters of forest conservation were also compared with those of supporters of forest utilization but the analysis did not reveal any additional information to that presented in Table 3.

TABLE 3. IDENTIFICATION OF THE ATTITUDE GROUPS BY SOCIO-DEMOGRAPHIC CHARACTERISTICS.

Logit analysis. Maximum likelihood estimates.ⁱ

CHARACTERISTIC	SUPPORTERS OF FOREST CONSERVATION	SUPPORTERS OF FOREST UTILIZATION	MULTIFUNC- TIONALISTS	THE INDIFFERENT
	C o e f f i c i e n t (Wald statistics)			
Constant	0.105 (0.443)	-2.342 (8.57)	-1.361 (7.44)	-1.064 (7.53)
Sex, male	-0.722 (4.50)	0.775 (5.43)	-0.445 (2.81)	-
Age, older than 30 yrs	-0.905 (5.65)	0.629 (3.82)	0.904 (4.71)	-0.669 (3.74)
Forest owner	-	0.491 (3.01)	-	-0.424 (1.91)
Education, college and/or academic	-	0.521 (3.30)	-1.095 (5.21)	-
Occupation, manager or private entrepreneur	-	-	-	0.633 (2.44)
Location of permanent residence in urban or rural center	-	-	0.470 (1.90)	-
Location of permanent residence in Southern Finland	-0.422 (1.94)	0.674 (2.91)	-	-
Log-likelihood	-503.464	-583.868	-499.521	-445.424
R_L^2 (likelihood ratio index)	0.05	0.06	0.06	0.02
n	967	967	967	970

ⁱInitial models were estimated by a stepwise procedure. The models presented in the table contain only statistically significant (or almost significant) variables at the 5% level. Other variables included in the analysis were occupational status (e.g., farmer, worker, clerk, private entrepreneur, manager, housewife, student, retired) and family income.

1982; Steel *et al.*, 1994; Kangas & Niemeläinen, 1996). However, no difference was detected in the forest attitudes of rural and urban residents in this study. This may be because there is obviously no distinct cleavage between urban and rural culture in Finland. Furthermore, environmen-

tal deterioration is rather limited even in urban surroundings. The results of this study are in accordance with the American study by Bliss *et al.* (1997).

Forest conservation was more strongly supported in sparsely populated northern Finland than in more developed and densely populated southern Finland. The result contradicts previous studies (Kangas & Niemeläinen, 1996). The majority of the conservation forests are located in northern Finland. It is therefore possible that northern inhabitants consider that the restrictions on timber cuttings maintain or improve the preconditions for tourism.

Similar models were estimated for both multifunctionalists and the indifferent (Table 3 and Appendix 1). Multifunctionalists could not be distinctly identified from other citizens by socio-demographic characteristics. The probability of belonging to the this group increased somewhat if the person was female, and more than 30 years old, did not have college or academic degree, and lived in urban or rural center. In this "favorable" case, the probability of belonging to multifunctionalists was 50%. On the other hand, the assignment to the indifferent was more probable if the person was less than 30 years old, was a manager/private entrepreneur, and did not own forest. The explanatory power of the model was poor.

Attitudes and Knowledge of Forestry

The supporters of forest utilization were better acquainted with forestry than the supporters of forest conservation (Table 4). They knew more often than the supporters of conservation that "Our forests produce more wood than is being cut from them", "The wood reserve of our forests has increased during this century", and "The measures for environmental conservation of forest industries have resulted in improved condition of the water systems in our country".

One half of the Finns believed that the state owns the majority of the forests and only one fourth knew that non-industrial private forest owners are the largest owner group in terms of forest area. One third of the supporters of forest utilization knew that private families were the major owner group. On the other hand, only fifteen percent of

TABLE 4. KNOWLEDGE OF FORESTRY AMONG SUPPORTERS OF FOREST UTILIZATION AND FOREST CONSERVATION.

The proportion of respondents who agreed or strongly agreed is given under the first three questions (the proportion of answers no opinion in brackets).

	PERCENT OF		
	SUPPORTERS OF FOREST UTILIZATION	SUPPORTERS OF FOREST CONSERVATION	ALL CITIZENS
Our forests produce more wood than is being cut from them.	77 (3) ⁱ	46 (9)	62 (7)
The wood reserve of our forests has increased during this century.	64 (12)*	38 (11)	51 (12)
The measures for environmental protection of forest industries have resulted in improved condition of the water systems in our country.	70 (6)*	54 (7)	61 (6)
Which of the forest owner groups below owns most forests in Finland?			
- private families	36*	15	25
- the state	44	52	49
- the forest industries	14	16	15
- others ⁱⁱ	4*	13	9
- no opinion	2	4	2
n	334	233	970

ⁱ difference significant at the 5 % level (2-way test)

ⁱⁱ communes, congregations, and banks

the supporters of forest conservation knew the right answer. Multifunctionalists had, in general, somewhat poorer knowledge concerning forestry than supporters of forest utilization, but they were better acquainted with the issue than supporters of conservation and the indifferent.

It may be that knowledge of forestry pre-determines favorable attitudes towards the utilization of forests. On the other hand, favorable attitudes may encourage people to actively seek more information on forestry. However, the validity of the questions measuring forestry knowledge in this study can be questioned. The questions are obviously one-sided, ignoring, for example, ecological aspects of forestry. They are also too few to give a comprehensive view of the forestry knowledge of the public.

TABLE 5. KNOWLEDGE OF FORESTRY AMONG FOREST OWNERS AND NON-OWNERS.

The proportion of respondents who agreed or strongly agreed is given under the first three questions (the proportion of answers no opinion in brackets).

	PERCENT OF		
	FOREST OWNERS	NON-OWNERS	ALL CITIZENS
Our forests produce more wood than is being cut from them.	72 (4) ⁱ	58 (7)	62 (7)
The wood reserve of our forests has increased during this century.	63 (10)*	47(13)	50(12)
The measures for environmental protection of forest industries have resulted in improved condition of the water systems in our country.	64 (7)*	61 (5)	61 (6)
Which of the forest owner groups below owns most forests in Finland?			
– private families	39*	20	25
– the state	38*	53	49
– the forest industries	12	16	15
– others ⁱⁱ	4*	13	9
– no opinion	3	2	2
n	223	747	970

ⁱ difference significant at the 5 % level (2-way test).
ⁱⁱ communes, congregations, and banks.

Forest Owners and Other Citizens

There are about 440 000 non-industrial private forest holdings in Finland (Sevola, 1998). However, there are considerably more persons who own forest.⁴ The data of this study suggests that about 850 000 persons own forest, which means that every sixth Finn is a forest owner. This is close to the estimate given by Ripatti (1994).

Forest owners' attitudes towards forestry differed from those of other Finns (Fig. 2, see also Table 3). About half of the forest owners belonged to the supporters of economic utilization of forests while only every third of the non-owners shared this attitude. One fifth of the forest owners supported conservation, whereas conservation supporters amounted to one fourth of the non-owners. Forest owners supported conservation almost as often as other citizens.

⁴ Forest can be owned either alone, together with the spouse and/or children, or as a member of heirs or family concern.

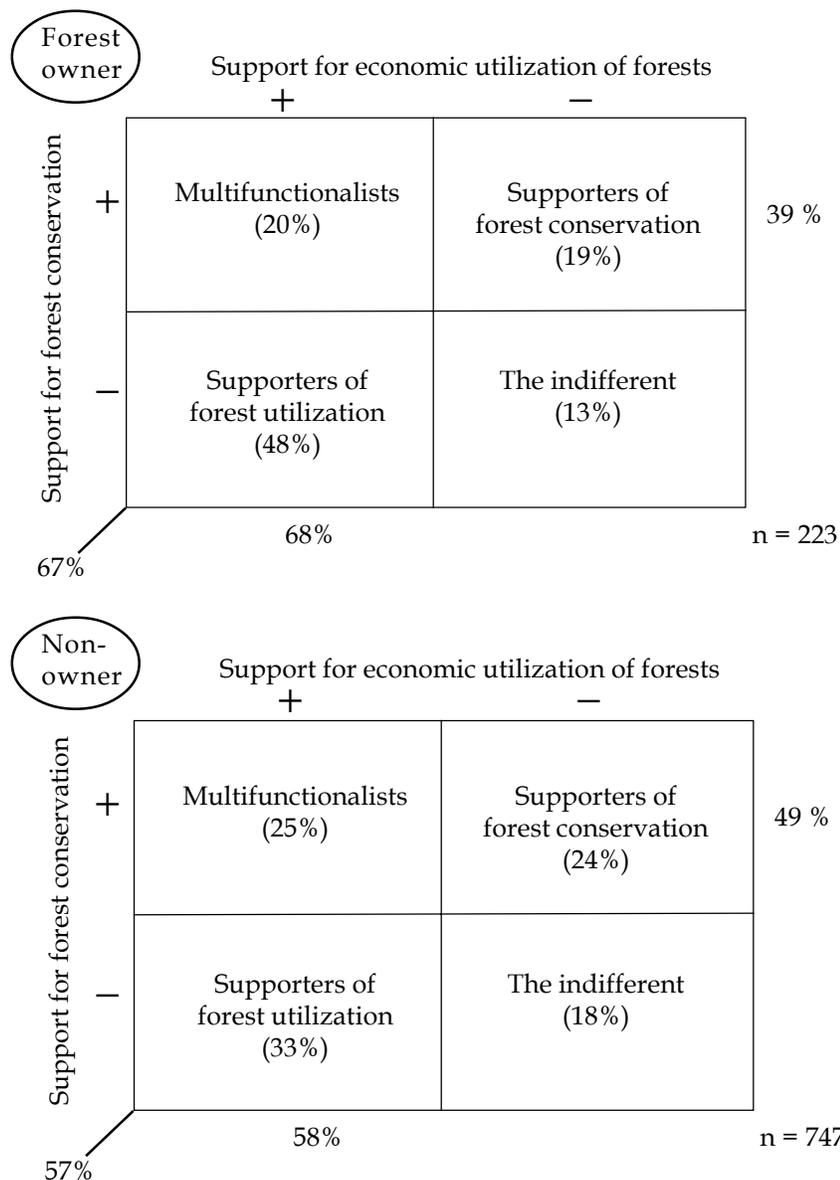


FIGURE 2. GROUPING OF FOREST OWNERS AND NON-OWNERS BY THEIR ATTITUDES TOWARDS FORESTRY (+ POSITIVE ATTITUDE, - NEGATIVE ATTITUDE).

Differences were also detected in the knowledge of forestry between the forest owners and other citizens. Forest owners were generally better acquainted with forestry than non-owners (Table 5). The differences were, nevertheless,

not as clear as those between the supporters of forest utilization and forest conservation.

Forest owners supported the utilization of forests clearly more often than other Finns. Many forest owners also considered forest conservation important. The hypothesis suggesting that non-owners are more pro-environmentally oriented than forest owners (Kangas & Niemeläinen, 1996) was therefore only partly confirmed.

American studies have not reported significant differences between the attitudes of forest owners and other citizens (Bliss *et al.*, 1994; 1997; Bourke & Luloff, 1994). Nonetheless, Bliss *et al.* (1997) found attitudinal differences among forest owners. Differences were detected between timber sellers who used professional forestry assistance, and non-sellers.

The different results for Finland and the USA could be explained by the relatively high frequency of timber sales and the intensity of contacts to forestry extension organizations among Finnish forest owners. It is obvious that the majority of the Finnish forest owners resemble American timber sellers. The average sales interval is only three years in Finland (Karppinen, 1998b), and according to Hänninen (1993), extension organizations reach more than 80 percent of the forest owners during a five-year period. Nevertheless, the primary reason for these behavioral discrepancies rest in landowner objectives. Finnish owners use their forest land clearly more often for timber production than their American counterparts (e.g., Birch, 1996; Karppinen, 1998a).

CONCLUSION

Attitudes and opinions of the public are taken into account in policy-making by inquiries and opinion polls, using various attitude statements in questionnaires. Opinion polls have, nevertheless, been criticized (e.g., Bourdieu, 1979) and the relevance of knowledge concerning specific environmental attitudes has been questioned. Especially, attitude-behavior inconsistency has been considered a major problem in environmental studies (e.g., Uusitalo, 1990; Ungar, 1994). Opinion polls are, however, a channel through which the knowledge of the opinions and attitudes of the citizens can be provided to the decision-makers at a relatively low cost.

This study demonstrates one procedure for overcoming the danger of misinterpretation present in separate analyses of single attitude statements. Multivariate methods were employed to enable the simultaneous analysis of several statements, in order to group persons with distinct and more flexible attitudes towards forest conservation and economic utilization of forests. The procedure also allowed the identification of different attitude groups by readily observable socio-demographic characteristics, which increases the utility of the results in environmental decision-making.

Some reservations must be kept in mind when interpreting the results. First, the validity of the attitude and knowledge statements can be questioned, because only data designed for a different study were available. The wording of certain statements can be assessed to be biased in favor of economic utilization of forests. The attitude statements should also have been designed to take into account the owner category of forests in question. For instance, Bliss *et al.* (1997) found differences in the willingness to accept clearcutting in private and public lands. Second, the classification of respondents into attitude groups would be more valid if there had been some external criteria – other questions measuring the same phenomenon – with which the groups could have been compared.

One step further from opinion polls is direct participation. For instance, in the formulation of Finland's National Forest Programme 2010 (Finland's ..., 1999), the public was, for the first time, given the opportunity for direct participation in policy formulation through public forums and via an internet discussion group. This procedure is well in accordance with the forestry principles agreed in UN Conference on Environment and Development in Rio de Janeiro which emphasize opportunities to participate in the planning and implementation of national forest policies (Report..., 1992).

One of the pre-requisites of the effective and useful participation in a public debate is relevant knowledge. The public knowledge of forestry issues is obviously insufficient, as indicated also in this study, and more information should be distributed to the general public. Forestry extension organizations, which have traditionally concentrated on forest owners, should also serve the public at

large. Interaction between professionals and the public should be encouraged. Forestry professionals should extend their expertise to cover not only ecological and economic knowledge but also social and psychological skills.

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APPENDIX 1.

Probability of assignment (π) to attitude groups by socio-demographic characteristics. The most “favorable” and “unfavorable” combinations of the variables.

Sex, male	Age, older than 30 yrs	Forest owner	Education, college and/or academic	Occupation, manager or private entrepreneur	Location of permanent residence in urban or rural center	Location of permanent residence in Southern Finland	Probability of assignment to the group (π), %
Supporters of forest conservation							
0	0	-	-	-	-	0	53
1	1	-	-	-	-	1	13
Supporters of forest utilization							
1	1	1	1	-	-	1	68
0	0	0	0	-	-	0	9
Multifunctionalists							
0	1	-	0	-	1	-	50
1	0	-	1	-	0	-	5
The indifferent							
-	0	0	-	1	-	-	39
-	1	1	-	0	-	-	10

Instead of calculating the odds ratios or marginal effects (Hosmer & Lemeshow, 1989; Demaris, 1992) the direct probabilities of the group assignment were calculated. This was carried out by using different value combinations of the socio-demographic variables, as suggested by Roncek (1991). The table indicates, for instance, that the probability of a respondent to belong to the supporters of forest utilization was 68% in the most “favorable” case, i.e., the value combination with the highest probability, and 53% considering supporters of forest conservation, respectively.

