

The role of internet in knowledge-building among private forest owners in Sweden

Mats Hannerz, Lis Boje and Magnus Löf

The major part of the temperate broadleaved forests in Sweden is owned by non-industrial private forest owners. The daily decisions on management of these forests therefore rely on a diverse owner population with various experience, age, education and attitudes. This study investigated how the forest owners obtain their information needed for their decisions. The use of internet as an information channel was specifically focused. Analyses were made of a postal questionnaire with responses from 327 private forest owners in southern Sweden. The respondents were sorted into groups of different age, education, gender, property size and residency (living on or off the property). For all groups, personal advisory was the most important channel for knowledge-building, followed by forest magazines and newsletters from forest organizations. Meetings and courses were also considered important, while internet had a lower rank. Still, 29% of all respondents considered internet as an important channel for knowledge-building in silviculture. Three-quarters of the respondents had internet access in their homes, and 40% used internet daily. Internet was used for forestry purposes at least monthly by 30% of the respondents. Age and education had a significant influence on the scored importance of internet as a communication channel for forest information, with younger forest owners (≤ 50 yr) and owners with a university degree being the most devoted internet users. Owners >65 yr and owners with only primary school education were much less inclined to rely on internet for their information needs.

M. Hannerz (mats.hannerz@silvinformation.se), Skogforsk, Uppsala Science Park, SE-751 83 Uppsala, Sweden, present address: Silvinformation AB, Kolonivägen 6B, SE-741 44 Knivsta, Sweden. – L. Boje, The school of technology and design, Växjö Univ., SE-351 95 Växjö, Sweden. – M. Löf, Southern Swedish Forest Research Centre, SLU, P.O. Box 49, SE-230 53 Alnarp, Sweden.

Temperate broadleaved tree species (*Quercus* spp., *Fagus sylvatica*, *Fraxinus excelsior*, *Acer* spp., *Tilia* spp., *Ulmus* spp., *Carpinus betulus* and *Prunus avium*) constitute $< 2\%$ of the total standing volume in the Swedish forests, but is still an important element of the southern-most region (Swedish Forest Agency 2007). The temperate broadleaved species have a special status in the Swedish forest legislation, with 13 species being classified as “noble” (a historical term). The aim of the legislation is to preserve at least the currently existing stands dominated by these species.

The southern counties Skåne and Halland have a share of respectively 25% and 10% temperate broadleaved trees on a volume basis, with oak and beech being the dominating broad-leaved species. Most of the forest in these counties (79% in Skåne and 84% in Halland) are owned and managed by non-industrial private forest owners (Swedish Forest Agency 2007). Although professional advisors are available, it implies that the final decisions on silviculture and management on most of the forest land are made by

the diverse population of forest owners, described by e.g. Ingemarson et al. (2006). Temperate broadleaved forest management is usually considered more complex than the stream-lined management of conifer forests in Sweden. Besides commercial timber production, the temperate broadleaved forests have important functions for biological diversity and recreation. The variety of tree species necessitates a management adapted to a range of ecological demands and growth strategies.

Competent decisions in broadleaved forestry require experience and knowledge, or access to qualified advisors. There is a wide range of options and media for knowledge-building in the private forestry. A study by Mattsson et al. (2003) showed that the most important sources for forest information were personal contacts with professional advisors, newsletters and magazines from forest organizations, and courses and excursions. The results are confirmed also in a case-study from southern Sweden, describing how forest owners retrieved information after the large storm-

fellings in 2005 (Linde 2007). In Finland, contact with trusted professional advisors was also the main source of forest information (Hujala and Tikkanen 2008), although the information needs vary widely among owners with different preferences (Hujala et al. 2009). Educational campaigns have also proved successful to change attitudes and stimulate activity among the forest owners (Uliczka et al. 2004, Götmark et al. 2009).

New technology has opened for new media for knowledge-building. Internet has the option to provide updated, custom-tailored information on demand. Forest owner's access to internet has increased during the 2000s, and the internet usage has recently climbed also in the upper age-classes (over 65 yr). The annual enquiry to forest owners (Skogsbarometern 2007) showed that 76% of the forest owners in Sweden had access to internet, and that 53% used it at least occasionally for forestry purposes. Although printed media play a much more important role in the knowledge transfer to forest owners, internet has also a role, which can be expected to increase (Mattsson et al. 2003, Linde 2007, Hujala and Tikkanen 2008). In USA, internet is considered an important channel to engage forest owners who are not involved in traditional consulting with professionals (Kirilenko et al. 2007).

Internet could be used as a direct link from researchers to the final users in the forest. The research program "Sustainable management in hardwood forests", led by the Swedish Univ. of Agricultural Sciences, produces excessive information that eventually is aimed to be used in practical forest management (Löf 2001). The program has used several channels to disseminate its results, such as seminars, courses and articles in forestry magazines. As a complement, a decision-support tool on the internet was produced by the research program with the main aim to help forest owners with their decisions in practical management of their hardwood forests (Hannerz et al. 2005, 2007). Still, we do not know if the dissemination strategy is successful, and an evaluation of it would need a thorough analysis of how the specific information reaches its target groups and eventually changes the knowledge and behavior among the forest owners. A first step is however to evaluate how various forest owner groups retrieve information needed for their decisions. Despite that other recent reports have characterized the forest owners with respect to information strategy (see Hujala et al. 2009 and references therein), there is a lack of results showing the magnitude of internet as a channel for forest information.

The aim of this study was therefore to characterize the non-industrial forest owners with respect to their channels used for knowledge-building and communication needs, and particularly their use of internet. An increased knowledge about the information habits and experience of internet could be used to define target groups who are more open to internet-based information. The information habits were therefore analyzed with respect to factors such as gender, education, age, residency and property size.

The study was based on a questionnaire to a sample of forest owners in two communities in southern Sweden, where temperate broadleaved forests are common.

Materials and methods

The study was based on a postal questionnaire sent to 600 forest owners, 300 in the community Laholm in the southern part of the county Halland, and 300 in Östra Göinge, in the northern part of the county Skåne (Fig. 1). These two communities are characterized by a mix of broadleaved forests and conifers, particularly Norway spruce (*Picea abies*), and a high share of private forest ownership (Table 1).

The questionnaires were sent to a random sample of private forest owners with at least 10 ha forest provided by the Swedish Forest Agency. The questionnaires were addressed to the contact person of the property, but in the case of dual ownership, it was not required that this person had to be the one who answered the questionnaire.

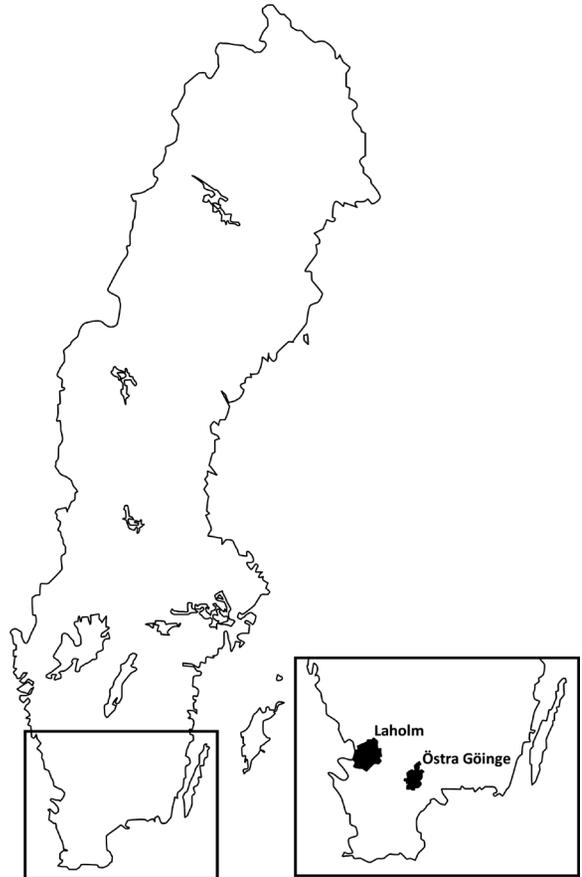


Figure 1. The communities Laholm and Östra Göinge, with Laholm in the southernmost part of the county Halland, and Östra Göinge in the north of the county Skåne in southern Sweden.

Table 1. Data about the forests in Laholm and Östra Göinge, Sweden.

	Laholm	Östra Göinge
Total productive forest area, ha	42.800	28.200
Non-industrial private forest owned land	78%	87%
Average holding, ha	40	33
Percent of standing volume *:		
Norway spruce	51	59
Scots pine	15	14
Birches, aspen, alder	17	15
Temperate broadleaved trees	17	12

* approximate data from *kNN* Sweden provided by Mikael Egberth, Swedish Univ. of Agricultural Sciences. *kNN*-Sweden (*k*-Nearest Neighbor) is a project which has mapped forest parameters in Sweden using satellite and inventory data.

The questionnaire included 28 questions covering: 1) general information about the property and the owner, used for grouping the respondents; 2) attitudes to the forest and motives for the ownership; 3) information strategy, i.e. whom to turn to for advices on forestry issues, and which channels are used to obtain information; 4) internet use in general and for forestry purposes. The questions are described more in detail in Appendix.

Most of the questions had 3–5 alternative answers on a scale from “not important at all” to “very important”, “never” to “often”, “have no knowledge of” to “have used several times”.

The questionnaires were sent by post in August 2008. After two postal reminders, the last in early October, 327 answers were returned (54.5%). Most of the forms were completely filled in, but for some questions (mainly those on information habits and internet use), boxes were left without checking in 5–16% of the replies. The number of answers therefore varied somewhat between the questions. The returned questionnaires were analyzed and grouped with respect to community, gender, education, age, size of the property and residency (living on property, defined as maximum 3 km from the forest, or living off property).

Data analysis

The responses from the two communities did not differ significantly, and were therefore pooled into one dataset. Separate analyses were made for the following groups (number of responses in brackets):

Age: ≤ 50 yr (77), 51–65 yr (148), >65 yr (93).

Highest level of education: primary school (103), upper secondary school (121), university (91).

Gender: men (257), women (62).

Property size, forest area: ≤ 50 ha (164), >50 ha (155).

Residency, distance from home to forest property: ≤ 3 km (193), >3 km (134)

Answers were missing from 9 (age), 12 (education), 8 (gender), and 8 (property size) respondents. All had answered the distance question.

The categorical variables (never – often, not important – very important, etc.) were treated as continuous variables in the statistical analysis, with mean and 95% confidence intervals used for statistical comparisons. Overlapping confidence intervals were considered not significant. Questions which were not checked by the respondents were treated as missing values.

Results

The property and the owner

Table 2 shows the average data about the properties and respondents. The average property had 85.0 ha forested land. This area is higher than the average among all forest owners in the communities (compare Table 1), and also exceeds the registered areas in the samples who received the enquires (53 ha in Laholm and 58 ha in Östra Göinge). This indicates that owners with smaller properties tended to answer less frequently. The average age (59 yr) is close to the figure 60 yr obtained by the national enquiry *Skogsbarometern* (2005). The proportion of men in the responses was higher than the average in Sweden, where 37% of the forest owners are women (Swedish Forest Agency 2007).

Attitudes to forestry

The importance of the forest with respect to various objectives is shown in Table 3. All groups considered commercial timber harvesting as most important, with 89% answering that this objective was very or rather important. The only significant difference for this objective was the property

Table 2. Main data and averages of the responses.

	All	Laholm	Östra Göinge
Number of respondents	327	160	167
Forested land, ha	85.0	88.0	80.8
Percent temperate broadleaved trees (volume)	9.1	9.8	8.6
Percent living on the property (≤ 3 km)	59.0	57.2	60.7
Average age, yr	59	59	59
Percent men	81	79	82
Education, percent with highest education:			
Primary school	32.5	27.2	38.8
Upper secondary school	38.6	40.1	37.5
University	28.8	34.0	23.7

group >50 ha, that considered timber harvesting more important than the smaller property group did. There were also tendencies, although not significant, that men were more timber oriented than women, and that owners living on the property considered timber harvesting more important than owners living off the property did.

Education level affected the view on the objectives recreation and biological diversity, where owners with a university degree considered them significantly more important than owners with only primary school education. Women also considered recreation significantly more important than men did.

Channels for knowledge-building

The results for knowledge-building in silviculture are presented in Table 4. The scores for information channels with respect to market information, forestry in general and laws and regulations were similar and are not shown. Personal advisory, forestry magazines and newsletters from the Forest Membership Association and timber buyers, and excursions, meetings and courses were considered the most important sources for forest information for all groups. Internet, TV and radio were less important.

A significant difference was found for personal advisory, where women scored this channel as more important than the men did. Significant differences were also found for internet among respondents of different ages and education. Respondents up to age 50 yr considered internet as significantly more important than those 51–65 yr, who also considered it more important than those above 65 yr. Respondents with a university degree had a higher score for internet than those with an upper secondary exam, and the least importance of internet was scored by those with primary school as their highest education.

There was a tendency, although not significant, that off-property residents scored both personal advisory and internet higher than the on-property residents.

The detailed answers for the question on the importance of internet are shown for age and education, the factors that turned out as significant (Fig. 2). Of the respondents up to age 50 yr, 44% considered internet as a rather or very important information channel, while the corresponding figure for those above 65 yr was 12%. A corresponding difference is found between those with only primary school education (16%) and those with a university degree (45%).

Age and education were correlated in the study, in the sense that the oldest age class more often had a lower education. A split of the responses showed that as many as 70% of the youngest with a university degree considered internet as rather or very important for information on silviculture. On the contrary, only 3% of the oldest age group with primary school education considered internet important (Table 5).

Internet use

On average, 75% of the respondents had access to internet in their homes; 61% had a broad-band connection and 14% were bound to the slower telephone modem (Table 6). Forty percent used internet daily and 62% at least weekly. However, only 1% used it daily for forestry purposes and 11% weekly. Of all respondents, 30% used internet for forestry purposes at least once a month.

The access and usage rates reflect the questions about the importance of internet in the previous section. Among the retired (>65 yr), only 44% had access to internet, compared to 92% of those up to 50 yr. In the oldest age class, 52% never used internet at all, and very few used it for for-

Table 3. Attitudes to various objectives of the forest ownership. The question was worded "How important has your forest been so far with respect to the following objectives?": Average scores on a scale from 1=not important at all, 2=not particularly important, 3=rather important, 4=very important. 95% confidence interval in parentheses.

Objective: "How important has your forest been with respect to..."	All respondents		Age, yr		Education		Gender		Property size (forested land)		Residency		
	≤50	>50	51–65	>65	Primary school	Upper secondary school	University	Men	Women	≤ 50 ha	> 50 ha	On property (≤3 km)	Off property (>3 km)
... timber	3.39 (0.08)	3.34 (0.17)	3.35 (0.11)	3.45 (0.15)	3.43 (0.13)	3.36 (0.13)	3.35 (0.13)	3.42 (0.08)	3.25 (0.22)	3.18 (0.12)	3.61 (0.09)	3.47 (0.10)	3.27 (0.12)
... hunting, berry- and mushroom picking	2.64 (0.09)	2.83 (0.18)	2.59 (0.14)	2.56 (0.17)	2.53 (0.17)	2.71 (0.14)	2.69 (0.20)	2.59 (0.10)	2.88 (0.23)	2.61 (0.13)	2.67 (0.14)	2.65 (0.12)	2.63 (0.15)
... recreation	2.81 (0.10)	2.99 (0.21)	2.73 (0.15)	2.77 (0.19)	2.59 (0.19)	2.83 (0.15)	3.06 (0.20)	2.72 (0.11)	3.18 (0.24)	2.94 (0.14)	2.66 (0.14)	2.82 (0.13)	2.79 (0.16)
... biological diversity	2.56 (0.10)	2.73 (0.21)	2.48 (0.14)	2.47 (0.18)	2.35 (0.17)	2.57 (0.16)	2.76 (0.20)	2.50 (0.11)	2.81 (0.28)	2.55 (0.15)	2.54 (0.14)	2.55 (0.13)	2.56 (0.15)
... part of a long-term family tradition	2.68 (0.12)	2.82 (0.24)	2.62 (0.18)	2.66 (0.25)	2.58 (0.24)	2.89 (0.18)	2.46 (0.25)	2.62 (0.14)	2.96 (0.30)	2.63 (0.17)	2.77 (0.18)	2.72 (0.16)	2.62 (0.19)

Table 4. Importance of information channels for knowledge-building in silviculture. The question was phrased "How important are the different information channels when you search information on regeneration, pre-commercial thinning, thinning and harvesting?". Average scores on a scale from 1=not important at all, 2=not particularly important, 3=rather important, 4=very important. 95% confidence intervals in parentheses. Scores with overlapping confidence interval were considered non-significant.

	All respondents			Age, yr		Education		Gender		Property size (forested land)		Residency	
		≤50	51–65	>65	Primary school	Upper secondary school	University	Men	Women	≤50 ha	>50 ha	On property (≤3 km)	Off property (>3 km)
Personal advisors	3.02 (0.11)	2.96 (0.21)	3.03 (0.16)	3.05 (0.23)	2.80 (0.22)	3.12 (0.16)	3.10 (0.19)	2.95 (0.12)	3.31 (0.23)	2.94 (0.15)	3.09 (0.16)	2.91 (0.14)	3.18 (0.16)
Forest excursions and courses	2.54 (0.10)	2.39 (0.20)	2.57 (0.14)	2.61 (0.22)	2.53 (0.20)	2.55 (0.15)	2.55 (0.20)	2.53 (0.12)	2.65 (0.23)	2.48 (0.15)	2.59 (0.14)	2.61 (0.13)	2.45 (0.16)
Forestry magazines	2.79 (0.09)	2.60 (0.22)	2.81 (0.12)	2.90 (0.17)	2.69 (0.18)	2.73 (0.15)	2.93 (0.15)	2.76 (0.10)	2.91 (0.23)	2.74 (0.13)	2.84 (0.13)	2.78 (0.11)	2.80 (0.15)
Newsletters from forest membership associations and timber buyers	2.86 (0.09)	2.69 (0.19)	2.86 (0.13)	3.02 (0.17)	2.92 (0.17)	2.90 (0.14)	2.70 (0.16)	2.88 (0.10)	2.84 (0.22)	2.91 (0.12)	2.83 (0.13)	2.95 (0.11)	2.75 (0.15)
TV or radio	1.80 (0.09)	1.76 (0.15)	1.78 (0.12)	1.90 (0.19)	1.74 (0.16)	1.85 (0.13)	1.75 (0.16)	1.77 (0.09)	1.90 (0.22)	1.79 (0.13)	1.81 (0.12)	1.86 (0.11)	1.72 (0.13)
Internet	1.89 (0.11)	2.31 (0.21)	1.88 (0.15)	1.47 (0.18)	1.47 (0.16)	1.95 (0.16)	2.27 (0.21)	1.86 (0.12)	2.04 (0.24)	1.82 (0.15)	1.94 (0.15)	1.80 (0.14)	2.03 (0.17)

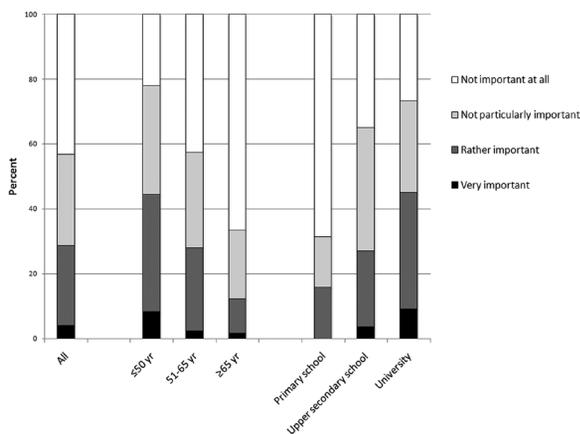


Figure 2. Importance of internet as a channel for information in silviculture, percent who considered it not important at all to very important. Values for all respondents and separated for the age and education groups.

estry purposes. Among the respondents with a university degree, 94% had access to internet, and 84% used internet at least weekly. Corresponding figures for those with a primary school education were 51 and 36%. There was also a large proportion of the primary school group that never used internet (50%), compared to 6% among those with a university degree.

Access to internet and internet use was also higher among those living off the property, and slightly higher among those with larger properties. The differences between men and women were minor.

The most important forestry-related task to be performed on the internet was to pay bills (Table 7). Of all respondents who answered the question, 48% did it “often” or “sometimes”. The second most important was searching contacts and prize-information (29% answered “often” or “sometimes”). Twenty-seven percent used internet often or sometimes to search information on silviculture and forestry, while 13% used it for information on nature conservation and protection. The missing answers to the questions on internet tasks in the forestry were rather high, 12–16% for the various topics.

Table 5. Percent who considered internet as important for information on silviculture divided on age groups and education.

	Age		
	≤50	51–65	>65
Education			
Primary school	45.0	17.0	3.3
Upper secondary school	32.5	28.0	15.0
University	70.0	38.0	25.0

Of all respondents, 20% expected internet to become “much more important” for their forest information needs in 2 yr from now, and another 34% consider it to be “somewhat more important than today”.

The most important hindrance for internet use in the forestry was lack of computer knowledge, which was mentioned by 95 of all the 327 respondents. Lack of forestry competence and insufficient usability of the forest websites were also important obstacles (63 and 64 answers respectively). Lack of internet access was also a hindrance, but less so (48 answers of the total respondent population).

The different groups highlighted different obstacles. Men more often mentioned lack of computer knowledge, while women mentioned lack of forestry knowledge. Those who were more comfortable with internet (younger and those with a university degree), mentioned insufficient usability of the forest websites as the most important obstacle.

Discussion

The study confirmed previous results showing that the internet still has a less important function in knowledge-building among forest owners compared to traditional channels. Personal advisory was considered most important, followed by forestry magazines and newsletters. The group “Forestry excursions, meetings and courses” was considered fourth most important. The same ranking was found by Mattsson et al. (2003).

Although less important, still 29% of all respondents considered internet as very or rather important for their knowledge-building in silviculture, 75% had access to internet at home, and 40% used it daily. The use of internet for forestry purposes was less frequent, but still 30% used it for forestry purposes at least once a month. Since 54% of all respondents expected internet to become more important for their forestry information within the next 2 yr, we conclude that internet need to be considered as an important element in forthcoming strategies for knowledge-building.

However, it must be considered that information over the internet is excluding a large portion of the forest owners who do not have access to internet or the skills to use it. Twenty six percent of all respondents never used internet. Hujala and Tikkanen (2008) concluded from their study on Finnish forest owners, that attitudes towards the internet were strongly dichotomized: “some are enthusiastic or interested; others are reserved, suspicious or rejective”. The “digital divide” is by many expected to remain and possibly increase, since well-educated, young and adapted users raise higher demands on advanced internet functions, while the older generation and standard users only can use part of the information (Nordfors et al. 2006). Our results showed that people over 65 yr were less frequent internet users, as well as people with a lower education level.

Table 6. Access to internet at home, frequency of internet usage and percentage of respondents who use internet “often” or “sometimes” for various tasks in their forestry.

	All respondents		Age, yr		Education		Gender		Property size (forested land)		Residency	
	≤50	51–65	>65	Primary school	Upper secondary school	University	Men	Women	≤ 50 ha	> 50 ha	On property (≤3 km)	Off property (>3 km)
Access to internet at home, %	74.7	84.9	44.0	51.5	81.0	94.4	74.2	75.8	71.6	77.6	66.8	85.7
Use internet daily, %	40.2	46.2	19.0	17.9	38.7	68.2	41.0	36.1	39.2	41.5	35.0	47.3
Use internet at least weekly, %	62.1	69.0	38.0	35.8	68.1	84.1	62.3	59.1	59.5	65.3	53.3	74.0
Never use internet, %	25.7	17.2	52.4	50.5	18.5	5.7	25.8	26.2	29.7	21.8	32.8	16.0
Use internet for forestry purposes at least weekly, %	11.0	13.2	4.8	2.1	8.6	25.3	11.4	10.6	9.0	12.8	8.7	14.3
Use internet for forestry purposes at least monthly, %	29.5	37.8	11.9	15.6	30.8	44.8	31.0	26.4	23.8	35.1	26.3	34.1

Table 7. Percent who uses internet sometimes or often for various tasks related to the forestry ownership, average for all respondents.

Task	Percent
Searching contacts and price information	28.7
Searching information on silviculture and forestry	27.1
Searching information on nature conservation and protection	13.3
Internet courses	4.0
Payments	48.4
Book-keeping on internet	10.3
Forest management plan on internet	3.9
Purchasing products	21.3
Sales and marketing	8.8

The results are confirmed by official statistics from the overall population in Sweden, where use of internet is related to age (younger uses internet more often) and education (higher use with higher education) (Statistical yearbook of Sweden 2008).

The results indicate that knowledge-building over the internet should in the first hand be targeted to those groups who are more comfortable with modern technology. Based on the results of this study, the most enthusiastic internet user is a forest owner who is up to 50 yr, has a higher education, lives off the property and has a larger forest area. However, to satisfy the needs also for this group, the websites need to be packaged user-friendly enough to include as many users as possible. Kirilenko et al. (2007) concluded that existing decision-support tools in USA are too advanced for the family-forest owner. Tools for this group need to be provided in particularly user-friendly versions (Kirilenko et al. 2007). The usability can be further improved if the content is personalized, i.e. adapted to the individual user. Arianit (2009) advocated that personalization increases learner's engagement and could lead to better learning results.

The attitudes towards their objectives of the forest ownership differed somewhat between the groups. All groups considered timber harvesting as most important but other motives such as recreation and biological diversity were important for many forest owners. The web information need to account for such different objectives, not to exclude those who are not only "timber-oriented". The difference between the objectives corroborates the results from a similar study by Kindstrand et al. (2008), who found that 35% of forest owners in southern Sweden considered "timber" as a very important objective, while 25% and 16% gave the same value to "recreation" and "biodiversity", respectively.

The results from our study support the idea of using internet as a channel for research information directly to the

forest owner through internet. Also Kirilenko et al. (2007) concluded from North American experience that internet can "bridge the gap between a new generation of family forest owners and natural resources professionals".

In conclusion, we found that forest owners rely most on personal advisors and printed information in forest magazines and newsletters, but internet is an important channel for knowledge-building for some groups. Internet is an attractive channel for the new generation of forest owners with a higher education and more often living off the property, and its importance can be expected to rise. The new forest owners can also be expected to have higher computer skills. However, research results must still be disseminated in traditional channels, such as courses, excursions and magazines, in order to include all categories of forest owners. Not the least, personal advisory will probably remain the most important channel for information and advice.

Acknowledgement – The study was financed by Skogforsk (MH), the research programme "Sustainable management in hardwood forests" (MH and ML), and faculty financing from Växjö University (LB). The Swedish Forest Agency is acknowledged for providing addresses to forest owners in the two communities.

References

- Arianit, K. 2009. Exploring the multiple dimensions of context: implications for the design and development of innovative technology-enhanced learning environments. – Ph.D. thesis, Acta Wexionensia 180/2009, Växjö Univ. Press.
- Götmark, F. et al. 2009. Education and advice contribute to increased density of conservation trees, but not saplings, in young forest in Sweden. – *J. Environ. Manage.* 90: 1081–1088.
- Hannerz, M. et al. 2005. Knowledge direct – an internet-based guide for foresters. – Results from Skogforsk 2, 2005.
- Hannerz, M. et al. 2007. Knowledge direct – high-value hardwoods. – Resultat från Skogforsk 4, 2007, in Swedish with English summary.
- Hujala, T. and Tikkanen, J. 2008. Boosters of and barriers to smooth communication in family forest owner's decision making. – *Scand. J. For. Res.* 23: 466–477.
- Hujala, T. et al. 2009. Family forest owner's perception towards decision support. – *Scand. J. For. Res.* 24: 448–460.
- Ingemarson, F. et al. 2006. A typology of small-scale private forest owners in Sweden. – *Scand. J. For. Res.* 21: 249–259.
- Kindstrand, C. et al. 2008. Attitudes towards various forest functions: a comparison between private forest owners and forest officers. – *Scand. J. For. Res.* 23: 133–136.
- Kirilenko, A. et al. 2007. An internet-based decision support tool for non-industrial private forest landowners. – *Environ. Model. Software* 22: 1498–1508.
- Linde, V. 2007. How different categories of forest owners made their decisions after the storm named Gudrun. – Swedish Univ. of Agricultural Sciences, Work report 190, in Swedish with English summary.
- Löf, M. 2001. Sustainable management in hardwood forests: proposal for research and development. – Faculty of Forest

Sciences, Swedish Univ. of Agricultural Sciences, Report 19, Uppsala, in Swedish with English summary.
Mattsson, L. et al. 2003. Privatägd skog: värden, visioner och forskningsbehov. (Privately owned forests: values, visions and research needs.) – Rapport från Sufor/Brattåsstiftelsen, in Swedish.
Nordfors, L. et al. 2006. The future of eGovernment. – Vinnova Rapport VR 2006:04, in Swedish with English summary.

Skogsbarometern 2005. – LRF Konsult, in Swedish.
Skogsbarometern 2007. – LRF Konsult, in Swedish.
Statistical Yearbook of Sweden 2008. – Statistics Sweden.
Swedish Forest Agency 2007. Statistics on forest and forest owners. – www.skogsstyrelsen.se, 2009-02-19.
Uliczka, H. et al. 2004. Non-industrial private forest owner's knowledge of and attitudes towards nature conservation. – *Scand. J. For. Res.* 19: 274–288.

Appendix

Questions in the postal enquiry:

General information about the property and the owner: community of the forest; residence of the forest owner; distance from residence to the forest; total and forested area; standing volume share of all broadleaves and temperate broadleaved trees; area of land protected for conservation; ownership; responsibility of decisions; respondents age, gender and education; access to a forest management plan.

Attitudes: how important the forest has been to the owner with respect to the objectives commercial timber production; hunting, berry- and mushroom picking; recreation; biological diversity; and maintaining a long-term family tradition.

Information habits: whom to turn to for advice on management of the forest; importance of different channels (personal advisory, excursions and courses, forestry magazines, newsletters from the private owners association or timber buyers, TV and radio, internet) on knowledge-building in silviculture, market information and timber sales, general forestry, and laws and regulations.

Internet use: access to internet at home; frequency of internet use in general and related to forestry; for which topics internet is used in the forestry; knowledge and use of common forestry websites; expected change in internet use; and hindrance for use of internet.