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Landscape approach to implement sustainability policies? – value profiles of forest owner groups in the Helgeå river basin, South Sweden

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**Institutionen för skogens produkter
och Skogsmästarskolan i Skinnskatteberg**

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Abstract

Southern Sweden's forest and cultural woodland landscapes provide natural resources in terms of goods, services and values to a wide range of actors and stakeholders. In this survey value profiles among different forest owner categories in the Helgeå river basin in southern Sweden were explored. The study area encompassed 14 different municipalities and a total area of 11 336 sq. km. Products derived from the forest land were divided into use values and non-use values. Direct use values included (1) consumptive (e.g., timber and non-timber forest products) as well as (2) non-consumptive use values (e.g., landscape quality or recreation). Indirect use values included ecosystem services such as soil and watershed protection. Non-use values were closely linked to environmental and cultural conservation interests. A total of 89 telephone interviews were conducted in late 2007 with non-industrial private forest owners and forest managers or representatives of fourteen municipalities, the Swedish environmental protection agency, the Church of Sweden and the state owned forest company Sveaskog Co. The value profiles of small-scale private land owners and municipalities were very broad. The primary objective of the Church of Sweden and Sveaskog Co. was centred on wood production, while the Swedish environmental protection agency focused on environmental protection issues. Finally, the ambitions of current sustainable forest landscape policies were compared with the observed state and trends of the economic, ecological, social and cultural aspects of the sustainability concept. While the economic dimension appears to be satisfactory fulfilled, there seems to be a need for landscape and regional level approaches for governance and management to satisfy ecological, social and cultural aspects. Landscape approaches such as Model Forest and Biosphere Reserve thus appear to be relevant tools.

Keywords: Forest owners; Sustainable forest management; Total forest value; Landscape governance; Attitudes; Forest owners' objectives; NIPF; Model Forest; Partnerships; River basin planning

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Introduction

As previously stated in Angelstam and Richnau (2008), a wide range of international and national policies related to the ecologically, economically, socially and culturally sustainable use of renewable natural resources have been formulated since the appearance of the sustainability discourse during the 1980s (e.g., Kennedy et al. 2001, Campbell and Sayer 2003, Innes and Hoen 2005, Saastamoinen 2005). Three examples are the Pan-European forest policy process (MCPFE 1993), the European Landscape Convention (ELC) (Anon. 2000a), and the EC Water Framework Directive (WFD) (Anon. 2000b). Implementing these ambitions requires that users of landscape goods, services and values collaborate among sectors and levels of organisation at the landscape and even regional scale (e.g., Falkenmark 2003).

At present, there are several types of gaps between the desire to develop landscape approaches on the one hand, and what is practised in actual management units on the other (e.g., Eriksson and Hammer 2006). The range of gaps can be divided into two groups. The first is related to the key challenge of incorporating multifaceted values into governance and management (e.g., Szaro et al. 2005). There are for example significant gaps between the way we describe and monitor landscapes in practice in forest management units (e.g., focus on timber forest products at the stand scale) and what ought to be the case if based on the current definition of policies on sustainable natural resource use (e.g., integration of non-timber forest products and ecological, social and cultural dimensions at multiple scales within landscapes) (Angelstam et al. 2004, Innes and Hoen 2005). The second is related to the limited understanding of how to develop regionally adapted functional systems for governance and decision-making in different types of landscapes (Olsson et al. 2004, Berkes et al. 2003). For example, while the composition and structure of forests are often ecologically homogenous within a landscape or region, the patterns of ownership and systems for management may be very different (Angelstam and Pettersson 1997).

As mentioned in Angelstam and Richnau (2008), the WFD (Anon. 2000b) explicitly and implicitly stresses the need to move from sectoral towards territorial approaches to implement sustainable development based on renewable natural resources. This involves many challenges to multiple actors, stakeholders and other levels of society in terms of adaptive capacity to deal with opportunities, uncertainties and risks (e.g., Campbell and Sayer 2003). Two concrete examples are to define good ecological status and other types of performance targets for ecological sustainability (e.g., Angelstam et al. 2004) and how to successfully achieve public participation in the process (e.g., Tippett et al. 2007). Realising these ambitions requires that users of forests goods and services collaborate at the landscape and even regional scale such as entire catchments (e.g., Falkenmark 2003).

One example of an attempt to create a resilient social-ecological system and implement sustainable development policies is the Kristianstad Vattenrike Biosphere Reserve (KVBR) located in the lower parts of the Helgeå river basin (Olsson et al. 2007, Hahn et al. 2006). The KVBR is a semi-urban area of approximately 1100 square kilometres with high biological and cultural values. The primary focus is a 35 km long stretch of wetlands along the Helgå river that was declared as a Ramsar Convention Site in 1975 (Walker and Salt 2006). To protect the unique natural and cultural values an ecosystem approach was necessary and a collaborative governance system that includes a wide range of stakeholders has been developed (Olsson et al. 2004, Hahn et al. 2006). Although much has been accomplished on a local level, several important challenges that require a landscape approach remain to be resolved. For example a vital issue is to improve the upstream water quality in order to

mitigate the declining bird populations (Walker and Salt 2006, S-E. Magnusson, pers. comm. 2007). In addition, the Swedish Forest Agency has identified parts of the Helgeå river basin as a potential future Model Forest candidate where the KVBR would represent an excellent complement and a major partner (Jougda et al. 2008). This process is still at an early stage of development. To focus on the actors and the ongoing processes in the Helgeå river basin and the surrounding landscape as a case study is therefore interesting for the development of landscape governance strategies.

In order to develop a functioning landscape approach based on a multi-stakeholder partnership, understanding the underlying motives and attitudes among stakeholders is essential to enhance collaboration (e.g., Poncelet 2001). An obvious starting point is to map land owners and actors and their use of different kinds of natural resources including the full range of landscape values. As a starting point I use Merlo and Croitoru's (2005) approach to classify forest resources into use and non-use values. A combination of human and natural sciences methods are then used to describe the value profiles of the forest owners groups. Based on a numerical classification approach of the interviewees' answers together with individual's own comments, the value profiles are presented for each main forest owner category. Finally, the need for a landscape approach to satisfy policies about sustainable forest landscapes is discussed by classifying the value categories into economic, ecological, social and cultural aspects.

Study area

This study focuses on the entire river basin of the Helgeå River which covers 4 725 km² (Carlsson 2005). The river runs across the border between the boreal forest ecoregion found in south-central Sweden, via the lowlands with temperate lowland and sandy Scots Pine (*Pinus sylvestris*) forests to the Baltic Sea coast (Snogerup 2003). While the average forest cover is about 64% (Table 1), there is a clear gradient in forest land cover from north to south (Figure 1). The outer border of all municipalities located within the Helgeå river basin including a 5 km buffer zone was selected as the delimit of the total case study area (Figure 2). The study area encompasses the territory of 14 different municipalities in two historical provinces and three county administrative regions and covers 11 336 km² (Table 2).

Table 1. Land cover proportions in the study area

Land cover category	Area (ha)	Proportion (%)
Urban area	21 831	1.9
Forest	730 128	64.8
Open land	248 207	21.9
Wetland	44 532	3.9
Open water	83 897	7.4
Total	1 133 594	100



Figure 1. Map showing the main land cover types of the study area and the Helgeå river basin.

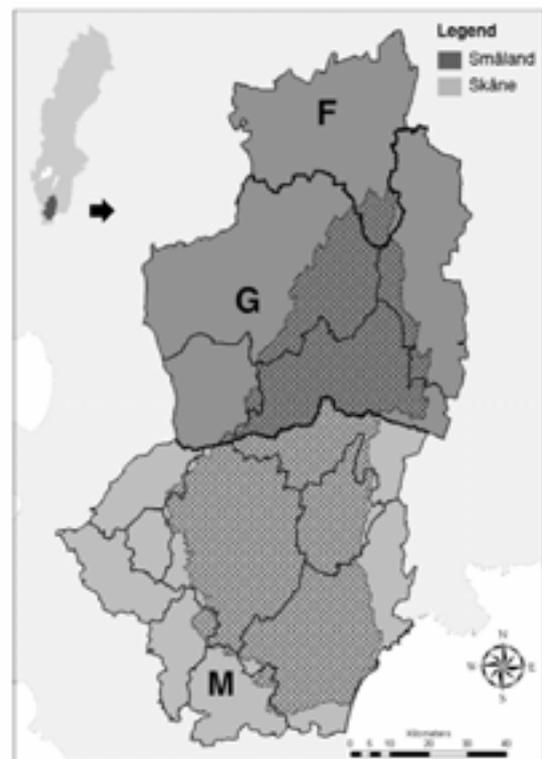


Figure 2. Map showing the 14 municipalities, the 3 county administrative regions (F=Jönköping, G=Kronoberg, M=Skåne) and the two historical provinces (Skåne and Småland) within the study area and the Helgeå river basin.

Table 2. Characteristics of the 14 municipalities located within the study area

Municipality	Total Area (ha)	Area within the Helgeå River basin (ha)
Ljungby	200 099	56 299
Osby	60 260	40 618
Värnamo	139 267	9 985
Markaryd	53 610	3 268
Hörby	43 381	3 371
Höör	32 177	3 796
Örkelljunga	33 348	1 214
Perstorp	16 285	90
Östra Göinge	45 292	41 660
Hässleholm	131 511	121 365
Alvesta	107 502	16 472
Älmhult	98 116	87 545
Kristianstad	183 495	89 198
Klippan	38 023	0
Sum	1 133 594	474 881

Theoretical background and methods

Landscape and landscape approach

The word “landscape” is a complex term that has appeared in the scientific literature in a wide range of meanings. This topic has been treated by several authors. An overview of the landscape term is presented by Saltzman (2001) who concludes that the notion of the landscape has changed and evolved both over time as well as between different disciplines. For example, natural scientists may often focus on the landscape as a biophysical environment related to ongoing natural processes or interactions between species, while other disciplines have different approaches. Landscape architects tend to see the landscape as a planning instrument, archaeologists are primarily interested in the temporal aspects and the memory of the landscape, and artists first of all use an aesthetical approach. Among ethnologists, anthropologists, in literature or among other disciplines the term landscape may still serve other purposes (Saltzman 2001).

In this study, I use the same approach to the landscape concept as Elbakidze and Angelstam (2007), which in many ways correspond to the definition of the landscape term often used in cultural geography where interaction between the biophysical landscape and the human society is a central idea (Saltzman 2001). In the European Landscape Convention a landscape is defined as “*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*” (Anon. 2000b). Elbakidze and Angelstam (2007), conclude that a landscape forms a social-ecological system that includes both natural and cultural components that are intermingled with each other. The character of a landscape has evolved over time and has been shaped by both natural and cultural factors. In this sense, landscapes can be regarded as geographical units that offer a sense of place to inhabitants and stakeholders (Elbakidze and Angelstam 2007). These aspects of the landscape must also be considered in addition to the biophysical environment. Therefore, to fully describe a landscape the authors therefore propose that various variables that represent all dimensions of sustainability should be used (Forman 1995, Berkes et al. 2003, Andersson et al. 2005).

As stated in a previous study (Angelstam and Richnau 2008) approaches to address the challenges of implementing sustainable landscape policies have led to proposals and arguments in favour of a landscape approach (e.g., Sayer and Maginnis 2005). According to the WWF the aims of the landscape approach is to improve the planning processes regarding management practices in larger territories or regions and to facilitate negotiations between stakeholders (Anon 2002). One of the central ideas is to combine a top-down planning perspective with a bottom-up participatory approach. According to Elbakidze and Angelstam (2007) there is a need for expanding the spatial role of management and also to handle management issues on a regional scale instead of the present focus on smaller units such as forests stands. In addition all social organisational scales should be integrated in the process, including for example individuals, households and local communities as well as regional administrative boards or national or global institutions (Elbakidze and Angelstam 2007).

However, it is obvious that implementing such a landscape approach in reality implies several challenges. One is to include different sectors with different perspectives. For example, as previously mentioned in Angelstam and Richnau (2008), while forest and landscape planners and managers try to accommodate commodity and non-commodity values in the same management unit, conservationists often define functional conservation landscapes, and other stakeholders such as farming communities or district officials may refer to their cultural or livelihood landscapes (e.g., Innes and Hoen 2005). An important step to resolve this would be

to improve communication and collaboration between stakeholders in order to develop their understanding of each other's attitudes and positions.

The total economic value (TEV) concept

The wide range of benefits that forest and woodland landscapes provide implies a major analytic and methodological challenge. Merlo and Croitoru (2005) straightforwardly classified real and potential benefits into direct and indirect use values, option values and non-use values. As explained in Angelstam and Richnau (2008) direct use values include (1) consumptive (e.g., timber and non-timber forest products (TFP/NTFP, respectively)) as well as (2) non-consumptive direct use values in terms of landscape quality or recreation. Indirect use values include ecosystem services such as watershed protection, water purification and carbon sequestration. Non-use values are not linked to the actual use of forests but rather to conservation interests of the landscape. Two examples are (1) bequest values arising from placing a value on the conservation of natural or cultural elements of the landscape for the benefit of future generations, and (2) existence values derived from the knowledge of conserved ecosystems, habitats or species.

The individual value variables used in this survey were selected in an attempt to encompass the most obvious kinds of values of the forest landscapes in the study area, and to correspond as closely as possible to the theoretical framework of Merlo and Croitoru (2005). However, there are several additional value variables mentioned in the TEV concept that have not been considered in this survey (e.g. forest grazing, carbon sequestration, educational or scientific values etc.). Another dilemma is that individual value variables may belong to multiple value categories. For example, biodiversity may be seen both as an existence, bequest or direct use value in terms of the recreational value of observing plants or animals. The radar diagrams represent an attempt to account for this. In addition, in order to simplify the study, option values were assigned to belong to the direct use values and were not treated as an individual value category. Finally, negative outputs of various value variables were not accounted for.

Mapping actors and their use of landscape values

To get an overview of the study area the main types of land covers (forest, open land, wetlands and open water) and land owner categories were mapped using the Corine landcover database (Engberg 2002) and GIS software. Ten groups of land owners were identified based on the analyses of the coarse land ownership maps (Table 3). The ownership landscape was dominated by non-industrial private forest (NIPF) owners who were in possession of 88,6 % of the land. Forest owner groups owning less than 0,5 % of the land were considered to be of minor importance and were excluded from further investigation. The opinions of the land owner categories incorporate companies and other landowners (i.e. trading companies, foundations, associations etc.) were considered to be represented by the remaining landowner categories and were also excluded. For the remaining five groups of landowners, 105 telephone interviewees were selected to identify the value profile of each category in terms of use of forest landscape goods, services and values.

Table 3. Land owner categories with more than 1000 ha in the Helgeå river basin study area (11 336 km²)

Land owner category	Interviews	Land cover area (ha)	Area proportion of study area (%)	Estimated number of individual owners
Other landowners	No	16 334	1,4	-
Incorporate companies	No	18 934	1,7	-
Bergvik Skog AB	No	1 897	<0,5	-
The National Fortifications Administration	No	5 188	<0,5	-
The National Property Board	No	2 195	<0,5	-
Municipalities	Yes	20 433	1,8	14
Church of Sweden	Yes	17 714	1,6	1
Swedish Environmental Protection Agency	Yes	8 860	0,8	1
Sveaskog Co.	Yes	37 482	3,3	1
Non-industrial private forest owners	Yes	1 006 789	88,6	Many

To identify the value profiles of the forest owner groups telephone interviews were conducted with a sample of interviewees representing the main land owner categories. These included (1) NIPF owners, (2) municipalities, (3) the Swedish environmental protection agency (SEPA), (4) the Church of Sweden and (5) the state owned forest company Sveaskog Co. NIPF owners and municipalities were both divided into two groups based on the historical provincial units Skåne and Småland. Sveaskog Co. and the Church of Sweden were assigned to the same group as both of them had similar objectives belonging to a kind of *industrial forest owner* group. All forest properties with a forest cover ranging between 19 and 100 ha belonging to NIPF owners were identified. This represents the average size of a forest property in Southern Sweden (N-G. Cato, pers. comm. 2007). A total of 75 forest properties evenly distributed between the Forest Agency's three districts (two in Skåne and one in Småland) within the study area were selected randomly and the owners were asked to participate in a telephone interview. For all fourteen municipalities, the responsible officer for forest management at the municipal level was contacted. In most cases, a second person responsible for environmental issues was also contacted for supplementary comments mainly about nature conservation strategies and recreation. The state owned land set aside for conservation and recreation is technically owned by the SEPA. However, interviews were conducted with staff at the three County Administrative Boards (CAB) within the study area (i.e. the counties of Skåne, Kronoberg and Jönköping), who were assumed to possess deeper knowledge about local conditions. The CABs' main responsibility is to coordinate the development of the county in line with goals set in national politics, and are in most cases responsible for the operational management of the state owned land. In addition, one executive at Sveaskog Co. and two managers in charge of the forest management at each of the Church of Sweden's two districts were also interviewed.

All telephone interviews were semi-structured (Kvale, 1997) and based on four themes: (1) economic focus, (2) social activities, (3) biodiversity and nature conservation and (4) historical/cultural aspects. A semi-structured interview is a flexible interview method that allows for new questions to be brought up during the conversations depending on the comments from the interviewees. The interview manual framework can be found in Appendix 1. The interviews were recorded digitally and summarized briefly afterwards, but were not transcribed word by word.

Based on the conversation with the interviewees, the importance of various value variables were rated on a three-graded scale ranging from 0 to 2, where the rank numbers represent the interviewers perception of the interviewees interest in a particular kind of forest use as being unimportant (0), of lesser importance (1) and of greater importance (2), respectively. The value variables investigated were *wood production, fuel wood, berries, mushroom, hunting, investment, recreation, landscape quality, soil protection, water protection, inheritance, cultural elements, habitat conservation* and *biodiversity*. The evaluation was made by the interviewer (and not by the interviewee him/herself) and was based first of all on the opinions of interviewee, but also based on his/her description of how the forest was actually managed.

Results

General results

A total number of 89 persons were interviewed consisting of 58 NIPF owners, 25 municipal representatives, 3 CAB representatives, 1 executive of Sveaskog Co. and 2 managers responsible for the forest management of the Church of Sweden. 17 NIPF owners were excluded for various reasons (for example because of recent shifts in property ownership, insufficient knowledge, not found or unwillingness to participate) and the response rate of NIPF owners was thus 77%. The NIPF owners were between 35 and 83 years old, the average age was 58. 14 were women (24 %) and 44 were men (76 %).

Landscape values

The interviewees' answers showed that there was a broad range of use and non-use values in the Helgeå river basin. A brief summary of the use and non-use value variables grouped per value category and assigned to different dimensions of sustainability (Table 4) is presented below.

Table 4. Use and non-use value variables grouped in different value categories and assigned to the four aspects of sustainable forest management

	Use Values			Non-use Values		
	Direct Use Values			Indirect Use Values	Bequest values	Existence values
	Consumptive		Non consumptive	Ecosystem services		
	TFP	NTPF				
Economy	Wood production	Berries	Landscape quality	Inheritance		
	Fuel wood	Mushroom				
		Hunting				
		Investment				
Ecology	Wood production			Soil protection	Biodiversity	
				Water protection	Habitat conservation	
Social	Wood production	Berries	Recreation	Soil protection	Cultural elements	
		Mushroom	Landscape quality		Habitat conservation	
		Hunting	Cultural elements			
			Biodiversity			
Cultural	Wood production		Landscape quality	Inheritance		
			Cultural elements	Cultural elements		
				Habitat conservation		

Direct use values – consumptive timber forest products

Consumptive timber forest products were reported as one of the major direct use values, which provided land owners with an economic income from production of timber, pulpwood and wood chips. The interviewees also mentioned other values connected to forest management. The opinion that silviculture is important to create habitats for biodiversity was expressed among the interviewees. Silvicultural practices such as planting and pre-commercial thinning also served as a social purpose, for example as a recreational activity or as an emotional enjoyment of creating something. Silviculture was also perceived as an integrated activity of the cultural landscape.

Direct use values – consumptive non-timber forest products

Non-wood products were recognised by interviewees as values derived from forests. The non-wood values were related to both economic and social dimensions. One example is hunting, which was reported to generate meat to the actual landowner or income in form of leasing the right for hunting to other interested persons. In addition, hunting also represented a popular social event. A similar type of value was associated with collecting berries and mushroom. While this does not generate any important economic income, it was reported as an important recreational value. Other consumptive non-wood values had a strict economical focus. Exploitation of forestland for establishment of residential or industrial areas by municipalities was one example. Some landowners also saw forest ownership as an economic investment for various reasons, for example because the expected increase in value of forest properties.

Direct use values – non consumptive values

The non-consumptive direct use values included a wide range of values such as landscape quality, recreation, cultural elements and biodiversity. All these values were connected to social aspects in some way. In addition, the cultural elements and the landscape quality were part of the inhabitants' cultural identity and sense of place. Some landowners also reflected upon the economical aspect of the landscape quality in terms of increasing the attractiveness of the property by improving the aesthetical qualities. On a regional level, landscape quality often played an important part for the municipalities to improve their attractiveness for in migration.

Indirect use values – ecosystem services

With the exception of soil and water protection, few indirect values were identified by the interviewees. Some of the interviewees expressed a wish to care for streams by leaving buffer zones and others expressed an ambition to minimise the soil damage from forest harvesting machinery. These values were clearly connected to the ecological dimension of SFM but also in some way to the social dimension, for example in terms of a desire to avoid reducing the quality of important recreation areas.

Non-use bequest values

Several forest owners considered conservation of cultural elements or particular forest habitats to be important. This ambition included both a wish for future generations to be able to experience these natural and cultural landscape components, and also in a wish to conserve the cultural tradition. Inheritance was another bequest value recognised by forest owners. This value was also linked to the cultural and sense of place contexts, but there was also an economic dimension to it, i.e. a wish to contribute to the financial situation of interviewees' heirs.

Non-use existence values

Many interviewees also recognised the existence values of the forest landscape, which were linked to the intrinsic values of conservation of biodiversity and specific forest and woodland habitats.

Value profiles

The perception of the importance of the various value variables to the forest owner groups are summarised in Figure 3 a-d, and the value profiles of the forest owner groups visualised as radar diagrams following Bossel (2003) using the point system described in Appendix 2 are presented in Figure 4 a-d. To the non-industrial forest owner groups, the most important use values were wood production, recreation, and landscape quality (Figure 3a). The remaining use categories were all perceived as important as well except soil and water protection. The value profiles (Figure 4a) point to important consumptive wood and non-wood values as well as non-consumptive, bequest and existence values. The ecosystem services values were, however, perceived as relatively unimportant. The use values perceived as most important for the municipality owner groups were wood production, recreation, investment, landscape quality, cultural elements, biodiversity and habitat conservation (Figure 3b). The importance of hunting, mushroom and berries were perceived as less important, and soil and water protection as fairly unimportant. The municipalities' value profiles indicate that all value categories except the ecosystem services values were perceived as important (Figure 4b). To Sveaskog Co. and the Church of Sweden, the use categories perceived as most important were wood production, habitat conservation and cultural elements (Figure 3c). The importance of biodiversity was also high. Soil and water protection, energy wood, investment and hunting received intermediate scores and the importance of the remaining value variables was low. The value profiles indicate that the value categories of importance were the consumptive wood, existence, bequest and ecosystem services values (Figure 4c). The SEPA owner group (Figure 3d) rated the value variables recreation, cultural elements, biodiversity, habitat conservation, as well as soil and water protection to be most important. Investment was of some importance while the remaining categories were of no importance. The value profile indicates that only existence and ecosystem services values were highly important (Figure 4d). Bequest values and non-consumptive values displayed intermediate scores, and the consumptive wood and non-wood values were very low.

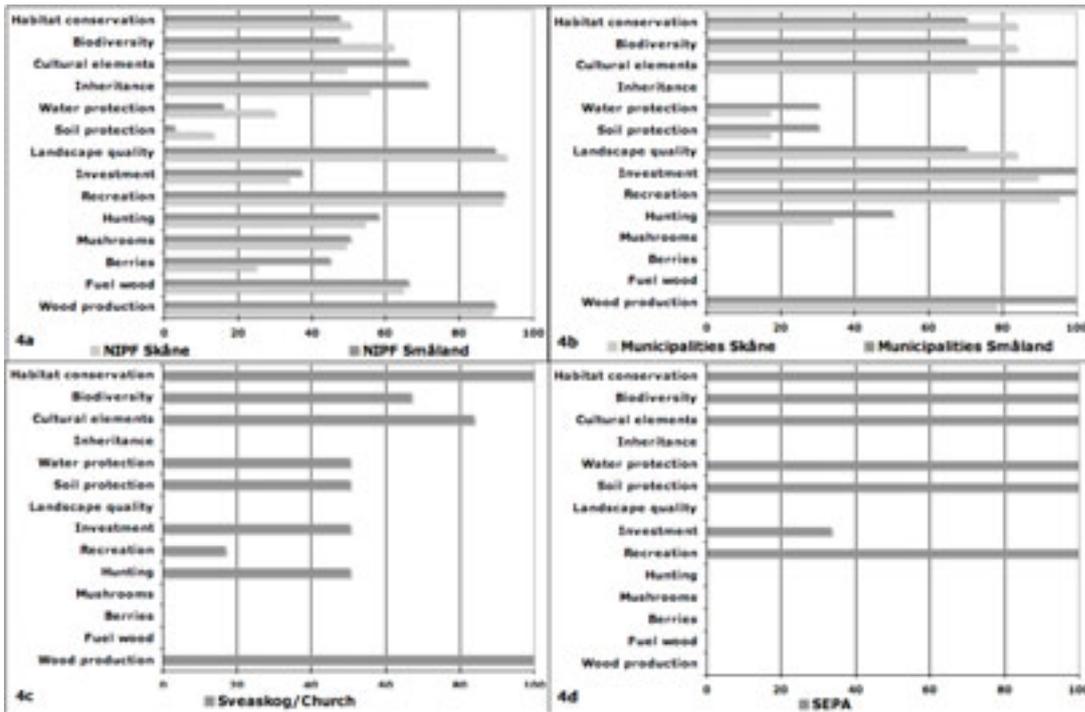


Figure 3a-d. Profiles of use of forest landscape goods, services and values among (a) NIPF owners in Skåne and Småland, (b) municipalities in Skåne and Småland, (c) Sveaskog and the Church of Sweden, and (d) the Swedish Environmental Protection Agency.

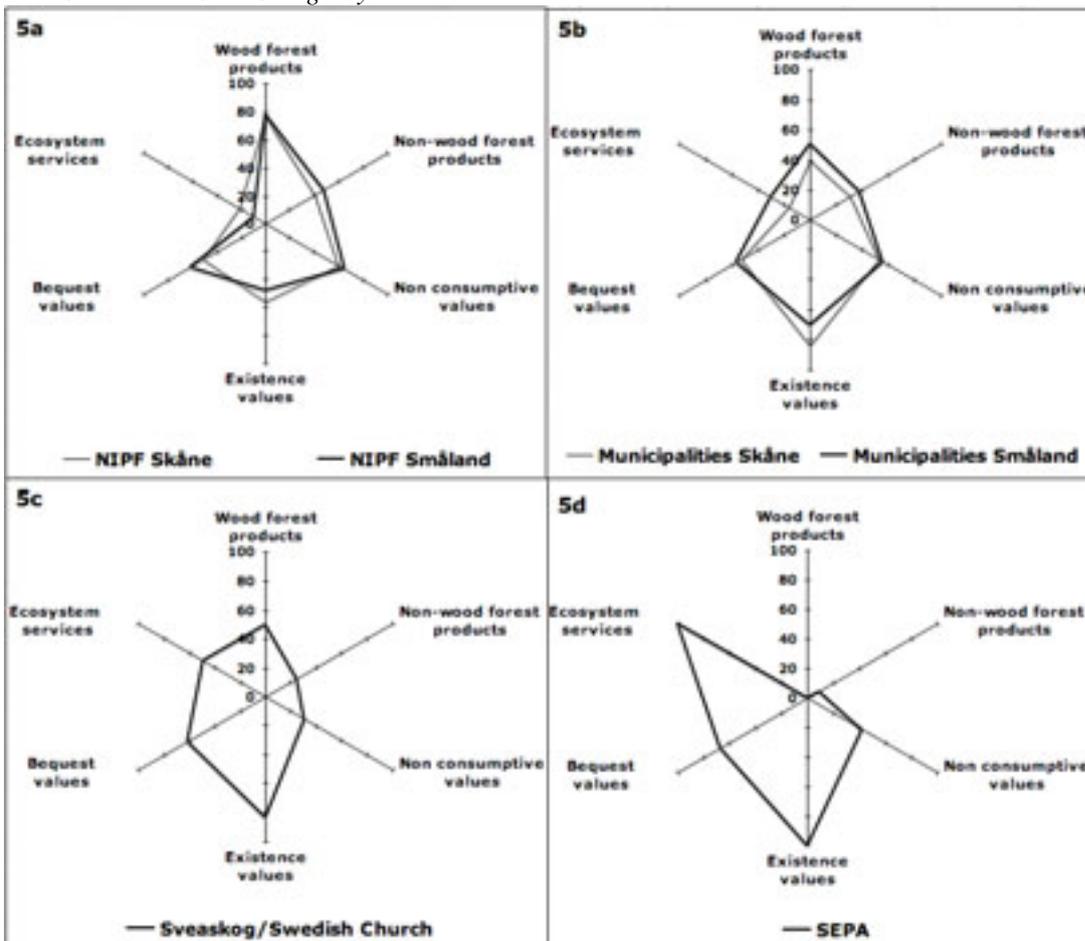


Figure 4a-d. Radar diagrams showing the profiles of (a) NIPF owners in Skåne and Småland, (b) municipalities in Skåne and Småland, (c) Sveaskog and the Church of Sweden, and (d) the land owned by the Swedish Environmental Protection Agency.

Discussion

Diverse owner group value profiles

The results point to important differences as well as similarities among the forest owner groups in the Helgeå river basin. The direct use values were very important for all groups, but the types of values varied. In this aspect, the SEPA forest ownership had a clear focus solely on the recreational values, while by contrast Sveaskog Co. and the Church of Sweden's had a profile that concentrated primarily on biomass production for the region's forest industry. Nevertheless, existence values were perceived as important for both of these owner groups, as well as bequest values. The value profiles of NIPF owners and municipalities were more complex. The direct values incorporated a broader range of values than for the other groups, including non-timber forest products, hunting and landscape quality. Bequest and existence values were also recognised, while the indirect use values seemed to be neglected.

Non Industrial Private Forest Owners

The NIPF owner group was very heterogeneous with a very diverse profile of use of their forest ownership. Their value profile was quite complex, but as a group all value categories (consumptive TFP and NTFP, non-consumptive use, bequest and existence values) were recognised, except for the indirect use values. What mainly distinguishes this owner group from the others is the strong personal and emotional connection to the forest property, which also has been observed in other studies (e.g., Stenseke 2001, 1997). It can be argued that these sort of *emotional values* correspond to what Merlo and Croitoru (2005) refer to as sensibility values, identity values and aesthetical values, which are not really quantifiable in monetary terms according to the authors. In this study, these values can be considered to be integrated in several categories, for example habitat conservation, cultural remains or landscape quality, but also within the production of timber products. Stenseke (1997) concluded that NIPF owners generally try to manage their properties for several different values, and that a forest property can be perceived both as an economical asset, as well as an heritage and a place for living, and thus an integrated part of everyday life. This view was also confirmed by several interviewees who used practically the same words to describe their opinion about the forest ownership, for example:

“It is a way of life. You feel good, being independent, to go there and do things, see everything evolving. To tend for it simply.” (NIPF 47)

NIPF owners generally have good knowledge about the timber production aspect of forest management (Mattsson et al. 2004), which was clearly confirmed by the interviews. However, while some forest owners explicitly stated that the purpose of their forest ownership was to generate income, the majority seemed to have other a more complex approach where the economic factor plays a minor or complementary role:

“I work as a civil engineer at Saab in Linköping.../ I see it [the forest ownership] as a nice hobby. Today, it hardly contributes anything to my financial situation.” (NIPF 16)

However, all of the interviewees used the forest resource for production purposes to various degrees of intensity. Some relied on fuel wood for domestic heating while others utilised just a small amount of wood for a pleasant moment in front of the tile stove. Consumption of non-timber products was also something that clearly distinguishes the NIPF from the other owner groups. Berries and mushrooms were often referred to as an appreciated resource even though

the explicit economic value was negligible. Some of the interviewees were enthusiastic hunters with a great interest in wildlife management but the majority leased the right for hunting on their territory to others. The recreational benefits were generally perceived as very important, both for the owners themselves but also to other users such as sport or riding clubs, dog clubs, tourists, or the general public. The recreational activities include everything from strolling to hunting, horseback riding or collecting mushroom and berries among many other things. Working in the forest was also often regarded as a recreational activity and as a way to stay in good health:

“During my spare time, I enjoy working as a forester. It’s incredibly good exercise, I like that.” (NIPF 51)

This joy of managing the land and shaping the environment in a personal way is also an interesting theme. Several interviewees reflect on the aesthetical qualities of the surrounding nature. To many people the aesthetical qualities are important. It is not uncommon that people transfer conifer forest into broadleaf stands to improve the atmosphere around their domestic house. Removing trees to improve the scenery was another example or the creation of ponds or small wetlands. One interviewee also reflected on the economic dimension of aesthetical qualities:

“I think the value of the property will increase if you have some variation and if you make it look beautiful. And also take care of everything, plantations, thinnings, forest roads, ditches and all that... / Also I have made seven or eight water holes or fishponds with crayfish and trout, and the birdlife has changed as well. And those sorts of things, it increases the value of the property.” (NIPF 40)

The importance of indirect use values was difficult to quantify and there is a considerable uncertainty factor about these values. Altogether, it is difficult to assess to which degree people are aware about water and soil protection. Some interviewees reported that they took special measurements, for example by leaving buffer zones next to creeks or tried avoiding soil damage caused by heavy machinery. One farmer pointed out that he participated in a project to reduce the nutrient leakage run by the farmers association (LRF). Other studies have shown that people perceive it as almost impossible for them to influence the water quality all by themselves (Lindström, 2003). In general the utilitarian perspective has been shown to be very important for forest owners’ objectives (Tikkanen et al. 2006), and one possible way to explain the ignorance of indirect values could be due to their somewhat passive character. Instead other objectives such as aesthetical qualities seem to be more important:

“Both my neighbours and me have used the forest for wood production all the way down to the shore. So we haven’t considered that really [water quality], it’s almost the contrary, that I have been cutting a little bit more intensively to clean the area and get a nicer view on the lake.” (NIPF 33)

Regarding bequest values, many interviewees placed an emotional value on keeping up the family tradition of the forest ownership. A couple of farms had been owned by the same family for several hundreds of years and these interviewees often expressed a clear wish for their children to continue the legacy. On the other many interviewees considered it to be completely their children’s choice:

“My son is very interested in the forest and everything else, but as it seems today I don’t think any of them will continue. That’s just the way it is, and you have to accept that. It would have been nice but it can not be a purpose of its own.” (NIPF 4)

Concerning the cultural heritage of the region, it was clear that there were a lot of historical and cultural remains. Some people are very interested in conservation of these and may for example be involved in the local history societies, while others seemed much less enthusiastic. People first and foremost recognised cultural remains such as stone fences, old cottage foundations or tar pits, but also living elements were mentioned such as orchards:

“In addition there are of course a lot of cultural remains, and I am very interested in that part, and I’ve found a lot of traces both in the forest and in the former agropastoral landscape. I think there must be about one hundred old apple trees that used to stand along the fields. And I take care of them, I definitely don’t want them to disappear. Then there are stone fences in the forest, which sometimes at some places can seem to be very odd for them to be there, and then you find old cairns in the forest as well.” (NIPF 18)

Conservation of biodiversity and forest habitats were also considered as bequest values, but were also assigned an existence value. In general, the impression was that interviewees were quite willing to set aside land for other purposes than timber production. Several were interested in creating nice habitats for birds or game, others referred to certification policy standards. The quality of the conserved forest habitat varied. Humid sites with low productivity were frequently reported to be used for nature conservation. However, this type of forest is very common and has low potential to host red listed species (Niklasson and Nilsson 2005). In order to draw any conclusion about the quantity and quality of these habitats for biodiversity conservation further research will be required. Aesthetical and emotional appreciation of an area may also represent an important objective for habitat conservation, which was observed in a study by Lindström et al. (2006). For example, one interviewee clearly expressed a wish to secure the nature for future generations to experience:

“It’s a fantastic ridge where there used to grow both conifers and broadleaves. And we have removed all the conifers. And there are a lot of old trees with mosses and lichens, and it’s so great to walk there, a very nice biotope that’s what it is... / It was really an idea that we had one day. We wanted this place to be conserved for posterity.../ It such an incredibly beautiful place nowadays.” (NIPF 33)

Previous studies have shown that a majority of NIPF owners dislike the idea of establishments of nature reserves on their own properties (Götmark et al. 2000), which was suggested also by the interviewees. One interviewee admitted that he could see the need for this even though he disliked the idea, while other interviewees had a negative view on confiscation of private land in general by the state:

“In my opinion it’s completely foolish because, I mean there is an explanation for why there are high biological values, and that’s thanks to us forest owners who have been managing the forest in different ways. And it’s sort of a punishment in the end, that they [the authorities] confiscate the land, and buy it by force.” (NIPF 34)

In addition, to several land owners forest conservation was also linked to silviculture. It was seen as important to continue to manage the forest and to take care of the “forest’s health”. This attitude has been observed in other studies as well, for example among NIPF owners in northern Sweden (e.g., Lisberg Jensen 2002). Among these interviewees, conserving the forest’s health often meant removing dead or dying trees and avoid other signs of degradation:

“I want to conserve it like it is, conserve the forest. And plant seedlings and make sure there is a good regeneration so that the forest stand will still exist in the future. Some people don’t care, they just let it grow wild.” (NIPF 45)

The desire to conserve biodiversity was a complex affair. Some forest owners were very interested while others did not care very much at all. However, most interviewees expressed a wish to manage their forests in what they considered to be an environmentally friendly way, in one way or another. However, the knowledge about biodiversity conservation seemed to be quite poor, which is in line with previous studies (e.g. Lindström et al. 2006):

“And I take care of the creek and make sure it’s kept clean, so there is nothing left. If we’ve been cutting along the edge, I always clean up so that there is nothing lying in the stream.” (NIPF 12)

The conversations on biodiversity involved only the diversity of individual species, and never genetic, ecosystem or process diversity (e.g., Noss 1990). Some interviewees seemed to equal the definition of biodiversity to the diversity of tree species, while others related solely to wildlife management and sustainable game populations. The species that people were interested in were primarily limited to different bird species (e.g., grouse, owls, raven etc.) and large mammals. Additionally, some of the interviewees occasionally acknowledged vascular plants, fish (e.g., trout) and crayfish. Organisms such as insects, reptiles, fungi, lichens, bryophytes or other organisms were mentioned very rarely. Attitudes towards conservation of species have been discussed in several other studies. For example Kellert (1996) concluded that people have a more positive attitude towards well-known charismatic species such as birds or vertebrates compared to other species, and Lindström et al. (2006) who found that familiarity is an important factor for prioritisation of biodiversity conservation. This can be typically illustrated by one interviewees’ reflection about the freshwater pearl mussel, a red-listed species classified as vulnerable:

“We have the freshwater pearl mussel on our property yes.../ Well, it’s sort of nice, but I mean, it’s something that you never see.” (NIPF 5)

Municipalities

The value profiles of the municipalities (Fig. 3b) indicate high importance for option, bequest and existence values as well as some direct use values, whereas indirect use values and some direct use values seem to be of lesser importance.

The direct use values were primarily connected to recreation, timber production and landscape quality. Most municipalities used forested land for production purposes with different degrees of intensity. Some municipalities had decided on a determined revenue target from forest management. In contrast, other municipalities seemed to have different priorities:

“So we don’t have that much forest left. We have been selling off land through the years... / It’s not very profitable for such a small municipality like ours to own forest. There are other fields that we’d rather invest in.” (Municipal officer 24)

The recreational value of the municipal owned forests was considered to be very important for all but one of the municipalities. Managing the forests for recreation by creating running tracks or walking paths was thus one of the main objectives. Several of the interviewees pointed to the connection between recreational activity and health benefits for the citizens, and thus implicitly reduced costs for public health service. Non-timber products (berries and mushrooms) were considered to likely represent an appreciated resource for the common citizens but were otherwise of no importance for the municipalities as organisations. Hunting on the other hand generated some income from the lease of hunting rights to interested persons or groups.

A unique feature of the municipal forest value profile was the landscape quality value as a direct use value. For municipalities, an appealing environment is important to attract tourism but above all else new citizens, which in turn will generate important tax revenues:

“Environmental and recreational values are also part of the marketing of our municipality, to have a positive in-migration. So it is something very important.” (Municipal officer 7)

As for the NIPF owner group, there is a significant uncertainty factor to the acknowledgment of the indirect use values by the municipalities. The management of the forest was leased to different entrepreneurs who are entrusted to pay satisfactory attention to soil and water protection. Water protection in general was recognised as an important issue for many municipalities:

“Yes, with specific focus on the water quality of the lake Möckeln. In that case there is a clear political consensus. There has even been collaboration with [the municipalities] Ljungy, and even Markaryd participated, in a project together with the county administrative board.” (Municipal officer 14)

However, this attitude is rarely reflected in the management of their own properties. There did not seem to be any direct guidelines or any wish that entrepreneurs would fulfil anything beyond the minimum requirements, probably due to the limited benefits of such precautions seen from a regional perspective. Some of the interviewees also recognised that it was important to avoid soil damage in forests with high recreational values.

Exploitation for residential, commercial or industrial purposes was another primary objective. Properties can either be exploited directly or be traded for privately owned properties that are more suitable for exploitation. Several of the interviewees admitted that there was often a question of prioritising between exploitation and conservation of forest land as green structures for recreation purpose. Often, exploitation seemed to be more important:

“Yes, I guess you could say that because they took the best recreation area for housing... / And then there’s this place called Forsskogen that you thought would always be left untouched, there are old trees and such things. But now they intend to build family houses there... / Then there is Apladalen, which is

known in the whole country, 22 hectares, and they take small pieces all the time. At the moment, they're discussing building a new bridge and a new road along the edge. Just a few years ago, an ice hockey arena was built there as well." (Municipal officer 5)

Conservation of the cultural heritage of the region was recognised as important and must also be considered to be part of the landscape quality. Forestry entrepreneurs were entrusted to respect the legislation and pay general attention to stone fences and other remains. Particular cultural elements on the municipal owned properties were often cared for.

Conservation of biodiversity was generally considered to be quite important among the interviewees. Most municipalities have had their forests certified according to PEFC, and declared that they have a high nature conservation ambition:

"Well, we've been certified since 1995, and at that time we were in the frontline. And maybe that made others to follow our example." (Municipal officer 5)

The forest habitats set aside for conservation purposes may serve several purposes at the same time, recreation and conservation of biodiversity:

"...So the point with this whole reasoning is that higher biodiversity will generate more recreation, thus improved health condition, more tourism and better national economy. So if you consider forest from a national economic perspective, biodiversity and forest continuity should have higher priorities than what's the case in today's production landscape." (Municipal officer 6)

To combine management for recreation and biodiversity was not always without complications. As other studies have shown, the public often has a negative attitude towards leaving dead wood (e.g., Lindhagen and Hörnsten 2000, Hysing et al. 2005):

"Yes, it's very obvious in some cases where I want to make sure there's enough amounts of dead wood while many people perceive this as messy... / I argue that it is definitely possible to combine the two [recreation and leaving dead wood], one thing does not exclude the other". (Municipal officer 14)

Finally, the knowledge about the present ecological situation seemed to be poor. Only a couple of municipalities had an employed municipal ecologist. One of these ecologists pointed out also that there is an extensive lack of monitoring programs:

"Let me put it like this: As far as I know, everything is functioning well. However, we do not have enough resources for monitoring whether nature conservation practices are functioning well in reality or not. That's how I see it." (Municipal officer 21)

Swedish Environmental Protection Agency (SEPA)

The value profile of the SEPA (Fig. 4c) has a very distinct character that clearly differentiates it from the other owner group profiles. The objective of forest ownership by the SEPA is focused solely on conservation interests. Existence and bequest values were therefore the most

important ones. As a consequence, indirect use values (soil and water protection) were also highly ranked.

Another major objective was to promote and encourage the recreational activities. Occasionally, this objective could be stronger than the focus on conservation of species. Besides recreation, no other direct use values were recognised. However, two of the county administrative boards also acquired land to be used to compensate private landowners whose forest ownerships are affected by the establishment of nature reserves.

Nature reserve is the predominant type of reserve but there also exist a few cultural reserves. During the last decade, the budget for establishment of reserves has increased as a result of an increased political focus on environmental issues. Monitoring though seem to face the same financial problems as the municipalities did:

“... I don't know about the situation in other counties but monitoring of the management programs of the reserves has not worked that well... / As soon as you are dealing with inventoring of biodiversity there's a lot of expenditures. It's both a question of staff and other resources.” (CAB 1)

In addition the county administrative boards has encountered another financial challenge recently. For a long time much of the actual forest management work in the reserves has been carried out by unemployed people. This used to be financed by unemployment service programs that were abandoned recently:

“We had these green-work-teams until the first of July this year [2007]. And after that point, it has disappeared. So now we are down on a basic level again where we have a couple of people from the Forest Agency who just go round and look after our reserves so to say.” (CAB 1)

Sveaskog Co. and Church of Sweden

The primary objective of the Church of Sweden's forest ownership was to earn money from forest management. Sveaskog Co. shared this goal but had explicit other important objectives as well. The value profile for these two owner types (Fig. 5d) was characterised by both high and low approval of different direct use values, depending on value variables. Existence values and bequest values were ranked high while indirect use values were rather low.

In order to generate income, the main focus of the forest management was production of biomass. The largest part of the income is derived from timber and pulpwood production. Besides, biomass residues from timber harvesting are turned into wood chips that are sold as bio-energy fuel. In addition, the leasing of hunting rights also generated some profit.

Non-timber forest products were of no direct interest for these two forest owner groups. The recreational values were of some importance to Sveaskog Co., which recently has founded a subsidiary company (Sveaskog Naturturism AB) that deals primarily with wildlife tourism. Concerning the indirect use values, these may perhaps not be of utter importance for this owner group but the interviewees pointed out that the necessary precautions to consider close to watercourses or regarding soil protection are stipulated by the national legislation, which they follow by all means.

Investment in forest properties was of little importance but all three interviewees agree that it may sometimes be advantageous to trade a forest property for another to improve for example logistics or other things.

The importance to conserve the cultural heritage of the region (bequest values) is acknowledged by all three interviewees. Once again, the requirements stipulated by the legislation were being respected and the representatives of the Church of Sweden pointed out that they have decided to indicate valuable cultural remains with signs in the field.

Conservation of biodiversity (existence values) was claimed to be very important by all three interviewees. All forests are certified according to either the FSC or the PEFC system. Conservation of biodiversity represented one of the core management objectives of Sveaskog Co., and for the Church of Sweden's it is important to appear as a responsible forest manager. Conservation of habitats was first and foremost related to conservation of biodiversity. All the three interviewees pointed to the fact that they have set aside more land than necessary for nature conservation purposes compared to what is necessary to fulfil the minimum requirements of the certification standards.

Methodological comments

Some methodological complications have been encountered given the kind of interdisciplinary approach in this study. It is important to point out that all results from the interview material are qualitative and not quantitative. The visualisation based on numerical analyses of rank values represent a major simplification of the reality and was impossible to do without ignoring the complexity of each aspect. Rating the interviewees' attitude numerically towards different value variables based on the conversations was a delicate task and there is a major uncertainty factor at least to some of the value variables. In future studies it could be advisable to let the interviewees rate their own opinion themselves. Another possible solution would have been a written survey. On the other hand, such approaches would probably have failed to identify the complex diversity of the forest owners' opinions.

Need for landscape approach - a SWOT analysis

Several initiatives have been taken to encourage the implementation of sustainable landscape development policies in the study area. Two regional examples are "Hållbar Utveckling Skåne" (<http://www.hutskane.se/>) in the Skåne region and "Miljöresurs Linné" (<http://www.miljoresurslinne.se/>) in Småland. Another local example is the KVBR (Hahn, et al. 2006, Olsson et al. 2004). In an attempt to evaluate the need for such landscape approaches a SWOT analysis was made to reflect upon different dimensions of sustainability in relation to policies aiming at sustainable landscapes (Table 5). What are the strengths, opportunities, threats and weaknesses when it comes to the land owners' ability as a group to implement SFM in the Helgeå river basin? Are the current policy instruments in relation to the ownership constellation sufficient to accomplish SFM or is there a need for a landscape approach? Much focus is laid on the NIPF owners since they represent such a large proportion (88,6 %) of the total land ownership.

Table 5. Summary of SWOT analyses concerning actors' amalgamated efforts to implement policies about sustainable forest management

SWOT	Economic	Ecological	Social	Cultural
Strengths	Demand for wood forest products, profitability, effectiveness, infrastructure, knowledge, responsibility	Many NIPF: ambitions, regional responsibility, cultural/natural heritage	Municipal focus, job opportunities, right to access, clubs/organisations	Strong emotional acceptance
Weaknesses	Homogenous group of actors, dependence on imported round wood, negative effects on natural ecosystem	Plantations, lack of knowledge, monitoring, no landscape approach, coordination, lack of interest for non charismatic species	Rural population: longer transport, few social events	Functionality of cultural elements
Opportunities	Entrepreneurship, tourism, new businesses, bioenergy, climate change	"New" forest owners (foreigners, leisure), growing concern for environment (climate), managing for flagship species?, new directives (e.g., WFD, ELC)	New focus on social dimensions, proximity to Oresund, new approach (e.g., Biosphere reserve)	Strong identity, awareness, ambition to preserve past legacy
Threats	Price for forest properties, international competition, age distribution, interest, climate change	Cultural landscape disappears (grazing), forest industry	Smaller towns/villages are being abandoned, lack of time	Loss of knowledge, financial resources, less grazing

Economic dimensions

When referring to economic sustainability, I primarily relate this to the use of the forest resource to generate commodities or incomes without degrading the economic potential of the forest resource for future generations. The economic dimension of forest ownership has several strengths in the study area. The forest owners seem to have a strong tradition of independence and entrepreneurship and the level of knowledge about silviculture practices among the forest owners is good. People also seem to have a great trust in the major industrial forestry actors in the area. The legislative framework and the industrial sector are well developed, as well as the transport infrastructure. Finally, the demand for fibre and energy products is high and might increase even more in the future according to some of the interviewees. Compared to conifers, the market demand for broadleaf timber is quite low at the moment, but this might change in the future.

Regarding the weaknesses, there is an ongoing debate about forest health and climate change (Sonesson 2006). The role of tree species composition and silvicultural systems related to storm sensitivity is an issue that forest owners must consider (e.g., Blennow and Sallnäs 2002). Other issues perceived as problematic are browsing damage by game species, damage caused by insects or rot fungi and falling timber prices (Blennow and Sallnäs 2002).

An opportunity is the ambition by several of the interviewees to shift towards a more varied mix of tree species to reduce the financial risk sensitivity (Knoke et al. 2008). Some opportunities can be found in the possibilities to develop new businesses. The Oresund region is growing fast and the positive economic effects are spreading to the more rural areas of the region. There might be a good potential for development of the tourism sector especially considering the proximity to Denmark and the Central European countries.

As to the threats, several interviewees were concerned about climate change. Storm damage is believed to become a greater problem as well as damage from insects and rot fungi. Increasing international competition could lead to lower profitability.

Ecological dimensions

When discussing ecological sustainability I refer to the utilisation of the forest resources without endangering the long-term existence of all naturally occurring species and ecosystems and their interactions. One strength is that the study region covers both the nemoral and the hemiboreal vegetation zones, and land cover types that represent both natural and cultural biodiversity values (e.g., Angelstam 2006). The importance of conserving biodiversity in terms of species, ecosystem and processes is well recognised by the existing international and national policy documents, and the nature values are greatly appreciated by local people. The land owners seem to host a great feeling of responsibility to the regional natural and cultural heritage and a great desire to care about the nature.

Weaknesses include that there are many threatened species and habitats. The industrialisation of the landscape use during the last century has resulted in a more homogenous and less biodiversity rich environment (Niklasson and Nilsson 2005). Many species are threatened because of habitat loss, both those that are adapted to the traditional agricultural and pastoral landscapes (Stenseke 2006) and also those that depend on old growth forest and untouched wilderness (Niklasson and Nilsson 2005). The problem of habitat fragmentation is severe, and the functionality of habitat networks is poor (Blomberg and Burman 2001). Insufficient knowledge and lack of monitoring programs for biodiversity is another weakness. Concerning the fragmented ownership structure, it is questionable whether the ownership constellation is capable of managing for dealing with the ecological issues at appropriate spatial (landscape and region) and temporal (long-term) scales. Among small scale forest owners, the knowledge and understanding of the dynamics of the ecosystem seem to be quite poor as well as the interest in non charismatic species.

Opportunities: The enthusiasm for nature values among small scale forest owners might make it possible to manage for certain flagship or umbrella species (see Roberge and Angelstam 2004). Information can be used to increase the understanding and acceptance of various management actions, for example to combine environmental and recreational functions of forests (Jensen 2000). It may also be possible to find mutual benefits in combining environmental and social functions of forests. Education can increase the understanding and interest for nature conservation among forest owners. Development of alternative silviculture methods (e.g., Larsen 2005, Hagner 1998) might combine economic and ecological dimensions more successfully than the present dominating silviculture systems. Overall, there seem to be a growing environmental concern (especially concerning the effects of climate change) on all levels of society.

Climate change is an uncertain factor, which may represent an important additional threat to biodiversity conservation (Lennartsson and Simonsson 2007). The ongoing disappearance of the traditional agricultural landscape and the focus on spruce plantations impose a threat to biodiversity conservation. Also, people tend to focus solely on charismatic species like birds or mammals, while other groups of species are being neglected. As to the riverine landscape aspect, increasing levels of dissolved organic material in the Helgeå river are affecting the water colour (Holmberg 2002), which is believed to be the cause of the declining bird populations at the Kristianstad Water Realm biosphere reserve (H. Cronert, pers. comm. 2007).

Social dimensions

When referring to the social dimension of sustainability I primarily relate to the social functions of the landscape such as participation, recreation and other interactive processes between the landscape and the social sphere. The social dimension particularly related to the forest landscape includes several important strengths of which the legislative right of public access is among the most important. Other strengths are the well-developed regional infrastructures like roads and hiking trails covering the whole region. Also, municipalities are often well aware of the benefits of recreational value and the landscape quality value of forests.

Weaknesses related to the social dimension include negative aspects of everyday life for the rural population. Cars are often indispensable for transportation between home and the place of work. Others aspects are fewer possibilities for consumption of social and cultural activities. Also, reduced competition and low customer base lead to increasing prices for food and other merchandise.

One opportunity is that the social dimension of the forest landscape is given increasing attention, not the least because of health benefits (Rydberg 2001). Municipalities and other actors (e.g. the Forest Agency) seem to focus more on the recreational aspects of forests. By providing an attractive physical environment, the region should have a good a potential to attract tourism or new inhabitants especially from the Oresund region in both the Sweden and Denmark.

Increasing costs for living may result in an increasing migration of the rural population who leave to settle in urban areas. One such example is the increasing price for petroleum fuel, which affects the costs for transport. Municipal development strategies of urban areas can impose a threat when planners are forced to prioritise between exploitation and conservation of forest land with recreational values. During recent years, the legal protection against exploitation close to water shores has been somewhat undermined. A few interviewees had experienced irresponsible behaviour from visitors and tourists on their land, which could lead to conflicts in case of increased occurrences.

Cultural dimensions

The cultural dimension of sustainability is perhaps the most difficult dimension to define but in this reasoning, I primarily refer to identity values connected to the landscape and the development and conservation of the local culture, which involves both the physical elements as well as tacit knowledge. The landscapes in the study area has been shaped by people for several thousands of years and the presence from human culture influence can be seen everywhere in the landscape. All these different elements from architecture, infrastructure, management practices, living organisms etc. form a cultural capital that constitutes a unique resource and a regional identity. Another type of cultural capital is that people seem to have a strong emotional acceptance and willingness for conservation of this landscape identity. A strong sense of place can also affect economic development positively (Johannisson 2005).

A weakness is that the rural development during the last century has changed the conditions of the landscape. Today it seems that the landscape is loosing its former heterogeneity. One reason might be that the former functions of certain cultural elements have disappeared, which reduces the incentive to conserve them. Lack of financial resources for conservation programmes may represent another weakness. It can also be argued that there is a need for a landscape perspective for a successful conservation strategy of cultural elements. Different

specific historical elements may seem insignificant by themselves but could represent something unique on a local or regional level, and it is uncertain if small scale private landowners have the ability to deal with these issues on their own.

The local involvement in conservation of the cultural heritage is an opportunity. It seems that the ambition to preserve elements linked to the landscape is very strong among people, at least on their own properties or in their immediate surroundings. The sustainability development movement may represent an opportunity in the context of striving for more locally produced goods and services.

One of the major threats is that people are moving to more urban areas where there are more job opportunities. This implies that houses are being abandoned or used as summer houses, which is of concern to remaining villagers. One of the reasons behind the trend is the diminishing profitability of small scale farms, which in turn has resulted in a fewer number of cattle, less grazing and thus a less open and more homogenous landscape. Traditional knowledge and craftsmanship is inevitably disappearing. The remaining cultural remains that once served a clear function are also threatened by the development of modern society. For example, planning authorities may not pay enough attention to these values and give priority to other objectives instead when planning urban development or new infrastructure. Biodiversity represents another dimension of the cultural heritage and the loss of endangered species is therefore another threat.

Model Forest and Biosphere Reserve – tools for SFM?

The results from this study suggest that NIPF owners have limited capacity to deal with forest management issues at a landscape level. To satisfy the ecological dimension of SFM it appears that there is a need for a landscape approach (e.g., Sayer and Maginnis 2005, Singer 2007). It is likely that the cultural and social aspects also would benefit from such an approach. For example, developing the local involvement and a participatory approach is likely to have a positive effect on the cultural dimension and strengthen the local communities' identities and feelings of responsibility over the landscape. Concerning the economic aspect it can be argued whether there is a new approach that is really indispensable. For example, it seems today that the forestry sector (i.e. wood production) is closely connected to both local, national as well as global market processes. However, as previously mentioned it is impossible to separate the four sustainability dimensions since the integration of the economical, ecological, social and cultural aspects is a prerequisite for implementing sustainable development. Consequently this study does not contradict the need to focus on multi-level partnerships of actors and stakeholders from different sectors working towards sustainable development in an entire landscape or region. The river basin perspective, which is advocated in the WFD seems to be an appropriate management approach.

In Sweden there are several initiatives towards the creation of local and regional approaches in support of landscape scale partnership for sustainable development. EU Leader, Biosphere Reserve and Model Forest are three examples (Ray 2000, Axelsson and Angelstam 2006). The first Biosphere Reserve (BR) that was created in Sweden according to the Sevilla principles, which declare the role of BRs as regional models for sustainable development (Price 2002), was the KVBR located in the southern part of the study area (Hahn et al. 2006). With an increased interest in this geographic area of encompassing forest issues, also the Model Forest concept has been explored (Besseau et al. 2002, Jougda et al. 2008). Taken together local and regional initiatives inspired by Leader, Model Forest and Biosphere Reserve concepts represent a suite of multiple social-ecological systems that cover Sweden's variation in

biophysical conditions, environmental history and systems of governance (e.g., Jougda et al. 2008, Angelstam et al. 2006, 2007). Using a sample of such initiatives for systematic transdisciplinary research is an important approach to support the process of implementing policies about sustainable landscape development.

Concluding remarks

While the economic dimension of SFM appears to be satisfied by today's governance and management approaches, there seem to be a need for new innovative landscape and regional level approaches for governance and management to satisfy ecological, social and cultural aspects. Landscape approaches such as Model Forest, Leader and Biosphere Reserve thus appear to be relevant.

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References

- Andersson, F., Angelstam, P., Feger, K.-H., Hasenauer, H., Kräuchi, N., Mårell, A., Matteucci, G., Schneider, U. and Tabbush, P. 2005. A research strategy for sustainable forest management in Europe. Technical Report 5. COST Action E25, ECOFOR, Paris. 166 pp.
- Angelstam, P. 2006. Maintaining cultural and natural biodiversity in Europe's economic centre and periphery. In: Agnoletti, M. (Ed.), *The Conservation of cultural landscapes*. CAB International, 125-143.
- Angelstam, P., Elbakidze, M., Axelsson, R., Lopatin, E., Sandström, C., Törnblom, J., Dixelius, M., Gorchakov, V. and Kovriga, L. 2007. Learning for sustainable forest management: Europe's East and West as a landscape laboratory. *Forest Facts 1*. Forest Research at the Swedish University of Agricultural Sciences. 4 pp. (also available in Russian).
- Angelstam, P., Pettersson, B. 1997. Principles of present Swedish forest biodiversity management. *Ecological Bulletins* 46: 191-203.
- Angelstam, P. and Richnau, G. 2008. Use dynamics of landscape goods, services and values in Southern Lapland, Sweden: local, regional and global perspectives. WP-5 Forest-sector actors, Baltic Forest Project.
- Angelstam, P., Roberge, J.-M., Dönn-Breuss, M., Burfield, I. and Ståhl, G. 2004. Monitoring forest biodiversity – from the policy level to the management unit. *Ecological Bulletins* 51: 295-304.
- Angelstam, P. and Törnblom, J. 2004. Maintaining forest biodiversity in actual landscapes – European gradients in history and governance systems as a “landscape lab”. In: Marchetti, M. (Ed.), *Monitoring and indicators of forest biodiversity in Europe – from ideas to operationality*. EFI symposium 51, pp. 299-313.
- Angelstam, P., Törnblom J., Degerman, E., Henrikson, L., Jougda, L., Lazdinis, M., Malmgren, J. C. and Myhrman. L. 2006. From forest patches to functional habitat networks – the need for holistic understanding of ecological systems at the landscape scale. In: Davison, R., Galbraith, C.A. (eds.), *The natural heritage of Scotland series, 14. Farming, forestry and the natural heritage: Towards a more integrated approach*, pp. 193-209. Edinburgh: Scottish Natural Heritage.
- Anon., 2000a. European Landscape Convention. European Treaty Series No. 176, Council of Europe.
- Anon., 2000b. Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.
- Anon., 2002. The Landscape Approach. Position Paper February 2002. [Retrieved from <http://www.panda.org> Jan. 21, 2008 at 3.00 pm.]
- Axelsson, R., Angelstam, P., 2006. Biosphere Reserve and Model Forest: a study of two concepts for integrated natural resource management. In: *Science for Sustainable Development - Starting Points and Critical Reflections*, Proceedings from the 1st VHU Conference on Science for Sustainable Development, Västerås, Sweden 12-14 April, 2005, pp. 31-39.
- Berkes, F., Colding, J. and Folke, C. 2003. *Navigating social-ecological systems*. Cambridge University Press, Cambridge.
- Besseau, P., Dansou, K. and Johnson, F. 2002. The international model forest network (IMFN): elements of success. *The Forestry Chronicle* 78: 648-654.
- Blennow, K. and Sallnäs, O. 2002. Risk perception among non-industrial private forest owners. *Scandinavian journal of forest research* 17: 472–479.
- Blomberg, A and Burman, A (red.) 2001. *Mångfaldskonferensen 2000: Biodiversitet I odlingslandskapet*. CBMs Skriftserie 4, Centrum för biologisk mångfald, Uppsala.

- Bossel, H. 2003. Assessing viability and sustainability: a system-based approach for deriving comprehensive indicator sets. In: Campbell, B.M., Sayer, J.A. (eds.) 2003. Integrated natural resource management: linking productivity, the environment and development. CABI Publishing, pp. 247–266.
- Cambell, B.M. and Sayer, J.A. 2003. Research to integrate productivity enhancement, environmental protection and human development. Bossel, H. 2003. Assessing viability and sustainability: a system-based approach for deriving comprehensive indicator sets. In: Campbell, B.M., Sayer, J.A. (eds.) 2003. Integrated natural resource management: linking productivity, the environment and development. CABI Publishing, pp. 247–266.
- Carlsson, N. 2005. Bevarandeplan för Natura 2000-område Helge å. Länsstyrelsen i Skåne Län.
- Elbakidze, M. and Angelstam, P. 2007. Implementing sustainable forest management in Ukraine's Carpathian Mountains: The role of traditional village systems. *Forest Ecology and Management* 249: 28–38.
- Engberg, A. 2002. Produktionsspecifikation av Svenska CORINE Marktäckedata. Lantmäteriet – dokumentnummer SCMD-0001.
- Eriksson, S. and Hammer, M. 2006. The challenge of combining timber production and biodiversity conservation for long-term ecosystem functioning – a case study of Swedish boreal forestry. *Forest ecology and management* 273: 208–217.
- Falkenmark, M. 2003. Freshwater as shared between society and ecosystems: from divided approaches to integrated challenges. *Philosophical transaction of the royal society of London series b-biological sciences* 358(1440): 2037–2049.
- Forman, R.T.T., 1995. Land mosaics. The ecology of landscapes and regions. Cambridge university press.
- Götmark, F., Söderlundh, H. and Thorell, M. 2000. Buffer zones for forest reserves: opinions of land owners and conservation value of their forest around nature reserves in southern Sweden. *Biodiversity and conservation* 9: 1377–1390.
- Hagner, M. 1998. Lieberich: liberation thinning combined with enrichment planting – guide for practical application of a management system. Working papers 113. Swedish University of Agricultural Sciences.
- Hahn, T., Olsson, P., Folke, C. and Johansson, K. 2006. Trust-building, knowledge generation and organizational innovations: the role of a bridging organization for adaptive comanagement of a wetland landscape around Kristianstad, Sweden. *Human Ecology* 34(4): 573–592.
- Holmberg, F. 2002. Helgeån 2002 – en kortversion av årsrapporten 2002 med långtidsutvärdering. Kommitén för samordnad kontroll av Helgeån. ALcontrol AB. 12 pp.
- Hysing, E., Olsson, J., Angelstam, P. Törnblom, J. 2005. Mer död ved i skogen - är skogsbrukets attityder och beteende ett problem? I: de Jong, J., Almstedt, M. (red). Död ved i levande skogar. Hur mycket behövs och hur kan målet nås? - Naturvårdsverket Rapport 5413: 87-110.
- Innes, J.L., Hoen, H.F. 2005. The changing context of forestry. In: Innes, J.L., Hickey, G.M., Hoen, H.F. 2005. Forestry and environmental change: socioeconomic and political dimensions. CABI Publishing, pp. 1-14
- Jensen, F.S. 2000. The effects of information on Danish forest visitors' acceptance of various management actions. *Forestry* 73(2): 165–172.
- Johannisson, B. 2005. Entrepreneurship in Scandinavia: bridging individualism and collectivism. In: Corbetta, G., Huse, M. and Ravasi, D. (eds). 2005. Crossroads of entrepreneurship. Springer US, pp. 225–241.

- Jougda, L., Svensson, J., Angelstam, P., Axelsson, R., Liedholm, H., Ederlöf, E., Myhrman, L., Sandström, P., Törnblom, J. 2008. Arenas for sustainable use of all values in the landscape – the Model Forest concept as an example. Rapport 1. Skogsstyrelsen.
- Kellert, S.R. 1996. The value of life: biological diversity and human society. Island Press.
- Kennedy, J.J., Ward, T.J., Glueck, P. 2001. Evolving forestry and rural development: beliefs at midpoint and close of the 20th century. *Forest Policy and Economics* 3: 81–95.
- Knoke, T., Ammer, C., Stimm, B., & Mosandl, R. 2008. Admixing broadleaved to coniferous tree species: a review on yield, ecological stability and economics. *European Journal of Forest Research*, 127(2): 89-101.
- Kvale, S. 1997. Den kvalitativa forskningsintervjun. Studentlitteratur.
- Larsen, J.B. 2005. Naturnær skovdrift. Dansk Skovforening, København.
- Lennartsson, T. and Simonsson, L. 2007. Biologisk mångfald och klimatförändringar. Centrum för biologisk mångfald, SLU.
- Lindhagen, M. and Hörnsten, L. 2000. Forest recreation in 1977 and 1997 in Sweden: changes in public preferences and behaviour. *Forestry* 73(2): 143–153.
- Lindström, M., Johansson, M., Herrman, J. and Johnsson, O. 2006. Attitudes towards the conservation of biodiversity – a case study in Kristianstad municipality, Sweden. *Journal of environmental planning and management* 49(4): 495–513.
- Lindström, M. 2003. The Lyckeby river – an investigation about water issues, study 1. Seagull report 2-2003. Departement of Biology and Environmental Science, University of Kalmar.
- Lisberg Jensen, E. 2002. Som man ropar i skogen: modernitet, makt och mångfald i kampen om Njakafjäll och i den svenska skogsbruksdebatten 1970-2000. *Lund Studies in Human Ecology* 3.
- Mattsson, L., Boman, M. & Kindstrand, C. 2004. Privatägd skog: Värderna, visioner och forskningsbehov. SUFOR/Brattåsstiftelsen, SUFOR Rapporter. Alnarp: SUFOR, s. 1-68.
- MCPFE, 1993. MCPFE, 1993. General declaration and resolutions adopted. In: Proceedings of the Second Ministerial Conference on the Protection of Forests in Europe, Helsinki, 1993. Report. Liason Unit, Vienna.
- Merlo, M., Croitoru, L. 2005. Concepts and methodology: a first attempt towards quantification. In: Merlo, M., Croitoru, L. (eds.) *Valuing Mediterranean forests. Towards total economic value*. CABI Publishing. pp. 17-36.
- Niklasson, M. and Nilsson, S.G. 2005. Skogsdynamik och arters bevarande. Studentlitteratur.
- Noss, R. F. 1990. Indicators for monitoring biodiversity: a hierarchical approach. – *Conserv. Biol.* 4: 355–364.
- Olsson, P., Folke, C. and Hahn, T. 2004. Social-ecological transformation for ecosystem management: the development of adaptive co-management of a wetland landscape in southern Sweden. *Ecology and Society* 9(4):2.
- Olsson, P., Folke, C., Galaz, V., Hahn, T. and Schultz, L. 2007. Enhancing the Fit through Adaptive Co-management: Creating and Maintaining Bridging Functions for Matching Scales in the Kristianstads Vattenrike Biosphere Reserve, Sweden. *Ecology and Society* 12(1): 28.
- Poncelet, E.C. 2001. Personal transformation in multistakeholder environmental partnerships. *Policy Sciences* 34(3-4): 273–301.
- Price, M.F. 2002. The periodic review of biosphere reserves: a mechanism to foster sites of excellence for conservation and sustainable development. *Environmental Science & Policy* 5(1): 13–18.
- Ray, C. 2000. The EU LEADER programme: Rural development laboratory. *Sociologica ruralis* 40(2): 163–171.
- Roberge, J.-M., Angelstam, P. 2004. Usefulness of the umbrella species concept as a conservation tool. *Conservation Biology* 18(1): 76-85.

- Rydberg, D. 2001. Skogens sociala värden. Rapport 8J, Skogsstyrelsen.
- Saastamoinen, O. 2005. Multiple ethics for multidimensional sustainability on forestry? *Silva Carelica* 49: 37-53.
- Saltzman, K. 2001. No landscape is an island – dialectics and practice in landscapes of Öland. Department of European Ethnology, Lund University.
- Sayer, J., Maginnis, S. and Laurie, M. 2005. Forests in landscapes, ecosystem approaches to sustainability. Earthscan Publications.
- Singer, B. 2007. How useful is the landscape approach? In: Patry, M., Ripley, S. 2007. World Heritage forests. Leveraging conservation and the landscape level. Proceedings of the 2nd World Heritage forests meeting, March 9-11, 2005, Nancy, France. UNESCO World Heritage Centre, Paris, pp. 49-55.
- Snogerup, S. 2003. Skånska vegetationstyper. In: Olsson, K.-A., Gustafsson, M., Johansson, H., Snogerup, S., Tyler, T. *Floran i Skåne – vegetation och utflyktsmål*. Lunds Botaniska Förening, pp. 53–76.
- Sonesson, J. (ed.) 2006. Klimatet och skogen – underlag för nationell forskning. *Kungl. Skog- och Lantbruksakademiens tidskrift* nr. 9.
- Stenseke, M. 1997. Bonden och landskapet – ägares och brukars relationer till markerna och förutsättningar för en utållig markanvändning. Avhandling nr 131. Studentlitteratur 1997.
- Stenseke, M. 2001. Landskapets värden – lokala perspektiv och centrala utgångspunkter. Vägar till ökad lokal delaktighet I bevarandeplaneringen. *Choros* 2001:1. Kulturgeografiska institutionen, Handelshögskolan Göteborgs Universitet.
- Stenseke, M. 2006. Biodiversity and the local context: linking seminatural grassland and their use to social aspects. *Environmental Science and Policy* 9: 350–359.
- Szaro, R., Angelstam, P., Sheil, D. 2005. Information needs for ecosystem forestry. In: Sayer, J.A., Maginnis, S. (eds) *Forests in landscapes. Ecosystem approaches to sustainability*. Earthscan, pp. 31-46.
- Tikkanen, J., Isokääntä, T., Pykäläinen, J. and Leskinen, P. 2006. Applying cognitive mapping approach to explore objective-structures of forest owners in a Northern Finnish case area. *Forest Policy and Economics* 9: 139–152.
- Tippett, J., Handley, J.F. and Ravetz, J. 2007. Meeting the challenges of sustainable development - A conceptual appraisal of a new methodology for participatory ecological planning. *Progress in planning* 67: 9–98.
- Walker, B. and Salt, D. 2006. Building resilience in the wetlands: the Kristianstad Vattenrike, Sweden. In: Walker, B. and Salt, D. *Resilience thinking: sustaining ecosystem and people in a changing world*. Island press, pp. 125–138.

Appendix 1. Telephone interview manual

Introduction

1. Presentation of project
2. Background information
 - age
 - occupation

The forest property

3. Description of forest owners forest property
 - physical elements
 - reason for acquisition

Motives & Management, discussion about:

4. Production/economic values
5. Recreational values
6. Biological values / Habitat conservation
7. Cultural values
8. Other values

Other information

9. Thoughts about the future
10. Entrusted forest managers and organisations

Appendix 2

To visualise the value profiles of the forest owner groups, an index based on the rank numbers was calculated. As a starting point, the different value variables were assigned to different value categories (Table 4). The sum of the rank numbers for each value variable was calculated for each forest owner group. A total sum for every value category was then calculated based on the sums of all value variables represented in each value category. In order to visualise the comparison between the different owner groups, an index based on a scale from 0-100 was calculated as the sums of value categories divided by the maximum possible score, i.e. number of interviewees times 2 (Table 6). The index values were never based on a total sum of less than 12.

Table 6. Index scores of the value categories among forest owners groups in the Helgeå river basin

Ownership Group	Use Values			Non-use Values		
	Direct Use Values		Indirect Use Values	Bequest	Existence	
	Consumptive TFP	Non consumptive NTFP				Ecosystem services
NIPF owners Skåne	76	40	60	21	51	56
NIPF owners Småland	78	47	64	9	61	47
Municipalities Skåne	39	31	52	17	52	83
Municipalities Småland	50	38	56	30	57	70
SEPA	0	8	43	100	67	100
Sveaskog Co. and Church of Sweden	50	25	31	50	61	83

Publikationer från Institutionen för skogens produkter, Sveriges lantbruksuniversitet (SLU)

Rapporter

1. Ingemarson, F. 2007. De skogliga tjänstemännens syn på arbetet i Gudruns spår. Institutionen för skogens produkter, SLU, Uppsala
2. Lönnstedt, L. 2007. *Financial analysis of the U.S. based forest industry*. Department of Forest Products, SLU, Uppsala
4. Stendahl, M. 2007. *Product development in the Swedish and Finnish wood industry*. Department of Forest Products, SLU, Uppsala
5. Nylund, J-E. & Ingemarson, F. 2007. *Forest tenure in Sweden – a historical perspective*. Department of Forest Products, SLU, Uppsala
6. Lönnstedt, L. 2008. *Forest industrial product companies – A comparison between Japan, Sweden and the U.S.* Department of Forest Products, SLU, Uppsala

Examensarbeten

1. Stangebye, J. 2007. Inventering och klassificering av kvarlämnad virkesvolym vid slutavverkning. *Inventory and classification of non-cut volumes at final cut operations*. Institutionen för skogens produkter, SLU, Uppsala
2. Rosenquist, B. 2007. Bidragsanalys av dimensioner och postningar – En studie vid Vida Alvesta. *Financial analysis of economic contribution from dimensions and sawing patterns – A study at Vida Alvesta*. Institutionen för skogens produkter, SLU, Uppsala
3. Ericsson, M. 2007. En lyckad affärsrelation? – Två fallstudier. *A successful business relation? – Two case studies*. Institutionen för skogens produkter, SLU, Uppsala
4. Ståhl, G. 2007. Distribution och försäljning av kvalitetsfuru – En fallstudie. *Distribution and sales of high quality pine lumber – A case study*. Institutionen för skogens produkter, SLU, Uppsala
5. Ekholm, A. 2007. Aspekter på flyttkostnader, fastighetsbildning och fastighetstorlekar. *Aspects on fixed harvest costs and the size and dividing up of forest estates*. Institutionen för skogens produkter, SLU, Uppsala
6. Gustafsson, F. 2007. Postningsoptimering vid sönderdelning av furu vid Säters Ångsåg. *Saw pattern optimising for sawing Scots pine at Säters Ångsåg*. Institutionen för skogens produkter, SLU, Uppsala
7. Götherström, M. 2007. Följdeffekter av olika användningssätt för vedråvara – en ekonomisk studie. *Consequences of different ways to utilize raw wood – an economic study*. Institutionen för skogens produkter, SLU, Uppsala
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9. Högsborn, G. 2007. Sveriges producenter och leverantörer av limträ – En studie om deras marknader och kundrelationer. *Swedish producers and suppliers of glulam – A study about their markets and customer relations*. Institutionen för skogens produkter, SLU, Uppsala
10. Andersson, H. 2007. *Establishment of pulp and paper production in Russia – Assessment of obstacles*. Etablering av pappers- och massaproduktion i Ryssland – bedömning av möjliga hinder. Department of Forest Products, SLU, Uppsala
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14. Höglund, J. 2008. *The Swedish fuel pellets industry: Production, market and standardization*. Den Svenska bränslepelletsindustrin: Produktion, marknad och standardisering. Department of Forest Products, SLU, Uppsala
15. Trulson, M. 2008. Värmebehandlat trä – att inhämta synpunkter i produktutvecklingens tidiga fas. *Heat-treated wood – to obtain opinions in the early phase of product development*. Institutionen för skogens produkter, SLU, Uppsala

16. Nordlund, J. 2008. Beräkning av optimal batchstorlek på gavelspikningslinjer hos Vida Packaging i Hestra. *Calculation of optimal batch size on cable drum flanges lines at Vida Packaging in Hestra*. Institutionen för skogens produkter, SLU, Uppsala
17. Norberg, D. & Gustafsson, E. 2008. *Organizational exposure to risk of unethical behaviour – In Eastern European timber purchasing organizations*. Department of Forest Products, SLU, Uppsala
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19. Richnau, G. 2008. *Landscape approach to implement sustainability policies? - value profiles of forest owner groups in the Helgeå river basin, South Sweden*. Department of Forest Products, SLU, Uppsala