Outdoor Recreation in Swedish Forests – Implications for Society and Forestry

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Abstract

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Swedes are often said to have a strong relationship with nature, and nature for Swedes can be regarded as being represented by forests. Like most relationships, also the relationship with nature is likely to transform over time. This thesis describes changes in the relationship with the forest of adult Swedes during a 20-year period. It also describes how the relationship, described as visiting frequencies, is affected by physical planning, and what is considered to be the ideal situation among the adult public regarding the distance between their residence and the closest forest. The thesis also presents ideas on how woodland in urban areas can be planned to be more attractive than at present, providing a diversity of recreation opportunities, by developing a planning concept adopted for Swedish outdoor recreation. For the planning concept, theories were tested on a case area in the vicinity of Stockholm. All other data in this thesis were collected as part of a larger nationwide survey studying forest recreation among the adult population using mailed questionnaires.

In the thesis it is concluded that the relationship with the forest is still close, but public use is changing from harvesting towards the purely recreational. This can be observed in results showing small changes between 1977 and 1997 in the pattern of forest recreation, and for the preferences of different forest environments. Observed differences during the same 20-year period, include a large drop in the inclination to pick wild berries, and an increased popularity for virgin forest as a recreational environment but still, for most people, an unpopular environment to visit. To provide opportunities for frequent forest visits, it should be possible to get to the forest on foot. This implies that residential areas should be planned to have the closest forest preferably within one kilometre, and definitely not exceeding two kilometres. However, according to the respondents' own preferences, the forest should be located within one kilometre. For planning for recreation in urban forests, three theories, all focusing on experiences but originating from different research fields, have been tested and found useful. For the plans, other data input than traditional forest inventories are needed, and also other land use classes than woodland should be included.

Keywords: Forest recreation, postal inquiry, distance, management, urban planning, forest planning, recreational planning,

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Contents

Introduction **7**
The Swede's relationship with nature 7
Outdoor recreation in Sweden 8
Forest and nature in Swedish society 9
Research into outdoor recreation - the international perspective 10
Motives for of outdoor recreation *10*
Forest environment preferences *11*
Planning forests for outdoor recreation *12*
Objectives 13

Materials and Methods **14**
Mailed inquiry 14
Planning recreational forests 15

Results **16**
Distance to forests 16
Changes in forest recreation 18
Changes in preferences for forest types 18
Planning recreational forests 19

Discussion **20**
What is meant by a forest 20
Forest and nature in society 20
Changes in forest recreation 21
Preferences for forest types 22
Planning recreational forests 23

Conclusions **24**

References **25**

Acknowledgements **29**

Appendix

Papers I-V

The present thesis is based on the following papers, which will be referred to by their Roman numerals.

I. Hörnsten, L. & Lindhagen, A. Methodology for a nation-wide quantitative study of forest recreation in Sweden 1997-1998. Manuscript.

II. Hörnsten, L. Frequency of recreational forest visits in Sweden. Manuscript.

III. Hörnsten, L. & Fredman, P. 2000. On the distance to recreational forests in Sweden. *Landscape and Urban Planning 51*, 1-10.

IV. Lindhagen, A. & Hörnsten, L. 2000. Forest recreation in 1977 and 1997 in Sweden: changes in public preferences and behaviour. *Forestry, 73*, (2), 143-153.

V. Hörnsten, L. and Dahlin, B. Managing urban forests in Sweden – from silvicultural recommendations towards a planning concept. Manuscript.

Introduction

The Swede's relationship with nature

Swedes are often said to have a strong relationship with nature. One key to understanding this relationship is that Sweden is peripheral in Europe, and remained undeveloped for a very long time. The first cities in the world emerged between eight and ten thousand years ago in the Euphrates, Tigris and Indus areas. The first cities in Europe were located to the best areas, around the Mediterranean sea, while for many centuries the remaining population was spread out, dominated by a nomadic life, and dependent on hunting, fishing and primitive agriculture. The areas where nomadic life was most long-lived was in the Nordic countries, where it is probably less than 3000 years since population become dominated by permanent settlers. The agrarian culture, however, never became as dominant as in the south of Europe, and the primary resources such as hunting, fishing and forestry remained important. Non-agrarian societies, like those dealing with trading and handicraft, have only existed for about a thousand years in the Nordic countries, which is four to eight thousand years later than in the south of Europe. The existence of a Nordic urban culture is still fairly young, and today still remaining undeveloped and marginal (cf. Wiklund 1995).

Around the turn of the twentieth century, the dominating part of Swedish society was still agricultural and rural, but a rapid transformation to an industrialised and urban-living nation had started. The changes in society caused tensions that were stabilised by the creation of a myth, initially bourgeois, but later turned to a unifying national identity (Gaunt & Löfgren 1984). The myth included a love of nature and the simple life, and was expressed as a longing for the good old days in the farming village. This view of nature became rather romantic and differed radically from the traditional perspectives in farming societies, which was feasible since nature no longer represented the daily income. It is then likely that the valuation of nature changes as well (Frykman & Löfgren 1979). This relatively recent myth is a second, and maybe most important key, to understanding the Swedish relationship with nature. The relationship with nature has persisted due to the late development of society leading to the lack of a strong urban culture. The myth probably became easier to create since nature was a well-known environment.

The valuation of nature today is still high among Swedes. A postal inquiry to adult Swedes showed that a large majority, 94 percent, of the respondents agreed with the statement "spending time in woods and fields, by a lake or by the sea makes me feel relaxed and harmonious" (Uddenberg 1995, p. 177-178). When asked the reason why, the respondent said he/she enjoyed picking berries and mushrooms, fishing or hunting, 75 percent stated the main reason was that they liked to be out in nature. Most parts of Sweden today are dominated by forests. The total land area of Sweden is covered by forest to about 60 percent. The

northern and central parts, outside the mountain region, have forest cover to up to 80 percent, while the landscape in the south is a mixture of forests and open agricultural land. In the most southwesterly region, forest cover is only 18 percent (National Board of Forestry 1997); all of which illustrates that the nature in which Swedes have been living is characterised by forests (Sörlin 1992), and when Swedes expresses a high valuation of nature, it may be regarded as being represented by forests (Uddenberg 1995, p. 145). Forest visits are frequent during leisure time, with a median frequency of one to two visits every two weeks (Lindhagen 1996a, Hultman 1983b).

Outdoor recreation in Sweden

According to Tordsson (cited in Sandell 1991), the Nordic tradition of outdoor recreation is characterised by simplicity and popularity, emphasising its difference from the more commercialised and specialised outdoor life activities of North America and Continental Europe. Since the 1960s and according to repeated interview surveys, the dominating leisure activities among the Swedish public are linked with nature, like walks, picking berries, bicycle trips, hunting, fishing and other outdoor recreations. The dominating activities during summer includes bathing and walks in the forest while winter activities are dominated by walks and skiing (Statistics Sweden 1993a, 1997b, SOU 1964). The most frequently visited facilities are nature areas; outdoor recreation areas and places for bathing. Clearly, it is the inexpensive facilities like nature- and recreational areas, tracks and paths, that commuters prefer and use most frequently (SOU 1964). During recent decades, the number of outdoor recreation activities has multiplied, where new activities have been added: mountainbiking, windsurfing, snowboarding, etc. For large groups of the population, however, the traditional and simple outdoor recreation still plays an important role (Ahlström 1999).

Regarding recreation in the forest environment, the dominating use in Sweden is concentrated to urban forests, where visitor frequency is estimated to be 250 times higher than in other forested areas (National Board of Forestry 1991). Approximately one percent of the total forest area in Sweden is classified as urban forest[1]. Rydberg & Falck (2000) give a detailed description of urban forests in Sweden including historical origin and development of the forests, their main functions and urban silviculture in the past and present.

The outdoor recreation described above includes a wide spectrum of activities that are not limited to the forest environmnt. The Swedes of today can, however, be assumed to have a more indirect relationship with the forest than some decades ago, since the link between forest products and daily income is less obvious. At

[1] Urban forests are defined by the National Board of Forestry as forest land primarily used for recreation in the relative proximity of urban areas or other recreational facilities.

national level, only one study focusing on forest recreation among the public has been made in Sweden, i.e. Hultman (1983b). By repeating this survey after 20 years, changes over time in forest recreation could be observed.

Forest and nature in Swedish society

In all modern societies land is a limited resource (Westerlund 1987). Physical planning is of a complex nature, including a great number of factors, but satisfactory planning of society modifies different interests to a good total solution. A working team appointed by the Swedish government states that access to good nature areas close to built-up areas, is just as important in a good urban environment as functional traffic systems and good dwellings, etc. It is further stated that the urban commonplace nature, that needs neither to be rich in species, nor unique or magnificent, is worth preservation due to its easy access and possibility for children and the young people to get a sense of, and interest in, nature. It also provides a better environment of living (cf. Kulturdepartementet 2000, p. 40).

A Nordic study of criteria and norms for planning public areas (Nordisk Ministerråd 1996, p. 32) claims that 250 meters is a critical walking distance to recreational areas during weekdays, while areas used during weekends and holidays are located further away. For those who live even further away from forested areas, distance can work as a barrier and hinder visits. The strength of the barrier effect varies among user groups, where for instance children are an exposed group (Norling 1985). When norms are in use for planning purposes, the range is between two to five kilometres (Nordisk Ministerråd 1996, p. 76). However, in actual physical planning situations at the local level, outdoor recreation is often inferior in competing with other activities (Almstedt 1998, p. 205). A 1.4 percent decrease in the accessible woodland, other green spaces not included, has been observed in urban settlements of over a 10,000 inhabitants during the period 1980 to 1990 (Statistics Sweden 1993b & 1997a). According to Almstedt (above) the low priority is explained as competition between commercial and non-commercial activities, where the non-commercial outdoor recreation is inferior in competing with other, economic ones. The same author concludes that it is in terms of tourism that outdoor recreation is given status on the local level. The low priority can also be explained by a complex of not being urban enough and in the right way, identified among a large number of those dealing with city planning in the Nordic countries (Wiklund 1995, p. 145). In line with this, Berglund (1996, pp. 164-165) states that physical planners have a main concern with the central parts of the city, where good architecture, streets, history, water and city trees are of interest, while the green structure of the town - the parks, paths natural settings, wildlife and other ecological questions – does not seem to have the same priority. Hence, the concern of the planners contrasts with that of the city residents.

Assumably it will be easier for policy-makers and physical planners to include forest recreation into planning if provided with quantitative data of a quality aspect in physical planning, i.e. regarding the distance between the residence and the closest recreational forest. Here it is important both how distance actually affects the forest visiting frequencies, but also what the public consider to be the preferred (ideal) distance.

Research into outdoor recreation - the international perspective

Manning (1999) gives an overview of the research field of outdoor recreation: Research into outdoor recreation on an international scale emerged after the World War II when the participation in recreational activities largely and sustainably increased in developed Western countries, as an effect of the economic upswing, ease of transportation, increasing leisure time, and other social forces. Originally it focused on management of wilderness areas and national parks. Hence, most of the earliest studies were ecologically oriented, dealing with environmental side-effects of recreation such as carrying capacity. However, social problems such as crowding supplemented the traditional concerns and attention to socio-economic characteristics, attitudes and preferences of participants in outdoor recreation activities were also studied. Today, international research field into outdoor recreation is of a multidisciplinary nature and includes several social science disciplines, such as sociology, economics, psychology, economics and geography. More recently, research has paid greater attention to the motives for outdoor recreation, which is a shift from the earlier focus on the activities performed.

Research into outdoor recreation has regularly been criticised for lacking a theoretical base and coordination, having overemphasis on applied problem-solving, , and that studies in outdoor recreation have few broad implications (e.g. Knopf 1983, Riddick et al. 1984, Witt 1984).

Motives for of outdoor recreation

Participation in outdoor recreation not only affects the individual but also, on a larger scale, the society to which the individual belongs. Motives for participation can hence be divided into two categories: personal and societal.

Several theories concern the motives why people participate in outdoor recreation. It is hypothesied that multiple motives must be involved in outdoor recreation (Bultena & Taves 1961). Two conventional theories, but little supported in studies, are the compensatory theory, suggesting that leisure activities are selected to contrast with, and give relief from, routine activities, and the familiarity theory, suggesting that leisure activities are selected to be in conformance with routine activities to avoid feelings of uncertainty (cf. Manning 1999, p. 157). Today, a dominating theory is the behavioural approach, whereby people select and participate in recreation activities to meet certain needs. Activities meeting the same needs can, accordingly, replace each other. Hence, focus on the activities

themselves, as was done in much of the early research, would be misleading (ibid.).

As regards society, a number of motives to support outdoor recreation can be mentioned, such as social, ideological, educational and public health. The ideological motives, not strongly emphasised today, served as a unifying national identity in Sweden during late 19th - early 20th century. Educational motives include the expectation that concern for nature includes knowledge of nature, which can be emphasised in outdoor recreation. At present mainly health reasons are stressed. At national level, it has been observed that physical inactivity is one of the most important factors behind ill-health and premature death among adults and the elderly in Sweden (National Institute of Public Health 1999, pp. 66-67). Among different types of exercises, by far the largest potential to increase physical activity is stated to be in walking (ibid., p. 27). The natural environment itself, as expressed in green areas, parks and forests, etc., in comparison with indoor and urban environments, gives a better contribution to recovery of mental capacity (Ulrich et al. 1991). For children too, nature is an environment with high qualities. Grahn (1997) showed that kindergartens where children are able to play in a natural environment, have less illness and better physical ability among children than kindergartens where children play in an ordinary playground. Several studies have shown significant effects of childhood influences on outdoor recreation in later life (Bixler & Morris 1998, p. 18, Burch & Wenger 1967, Sofranko & Nolan 1972).

Forest environment preferences

A large number of preference studies have been made comparing scenic qualities among different forest types (reviewed by Ribe 1989), where scenic values in certain forest characteristics are identified, at least for residents in developed Western countries, for example: big trees are attractive, moderately stocked more open stands are preferred, ground slash and other evidence of harvests are disliked, ground vegetation enhances forest scenes, evidence of fire detracts from beauty, whereas species variety can enhance impressions of beauty. A general sense of aesthetics would help explain why preference studies of changes over time, show small, if any, differences (Jensen 1999).

However, different types of people have been found to perceive forests in different ways. Differences have been found between groups of forest users (McCool et al. 1986), between professionals, especially foresters, and the public (Hultman 1983b, Jensen 1999), as well as between immigrants with different generational tenure (Carr & Williams 1993). Some of these findings appear easy to explain, according to Ribe (1989), like professional biases where one would expect certain attributes to be liked, such as foresters favouring tall straight trees. The same author reports that other observed intersubjective differences seem more arbitrary, like the ones between social groups. However, a change in attitudes among forestry students in Sweden has been noted. Only one study has

been made at national level in Sweden regarding suitability of forest sites for outdoor recreation, i.e. Hultman (1983b). If repeated after a suitable period of time, trends in preferences among the public could possible be observed, and recommendations in forest management could consequently be adjusted.

On a larger scale, like landscape level, little preference research has been made. Jensen (1999) considers that the mean of the population's desires does not provide a completely satisfactory basis on which to make decisions in forest and landscape management. If managers attempt to satisfy the average person only relatively few people become satisfied, whereas a variegated range of alternatives, which is in harmony with the surroundings and the differing desires of the visitors, can satisfy far more people. Also Lindhagen (1996b) mentions the importance for research on a larger scale than in-stand studies, by stating that the perception of a whole area need does not need to be based on the the sum of the stands within it. The variation in the forest environment, often identified as important, is difficult to survey, but Axelsson-Lindgren and Sorte (1987) in a pilot study showed that in a varied forest environment hikers made better descriptions of time spent and distance covered. So, there is probably more gain in recreational-aesthetic value from a varied set of stands than if all stands were uniformly maximised in their singular perceived beauty.

Planning forests for outdoor recreation

In Sweden, multiple-use planning is widely used in forestry. When different interests use the same resource, conflicts may occur if one use affects another negatively. In a multiple-use plan the different uses are regulated to reach an optimal solution for all uses. For the forest resource, this procedure generally results in adaptations of economic forestry to other uses, like biodiversity or outdoor recreation (cf. Aasetre 1992, p. 39). In Swedish forest areas that are frequently used for recreation, adaptations are made for recreation following recommendations of the 1970s and 1980s (Kardell 1980), with a basis for recommendations in preference studies of forest types (Hultman 1983b). In traditional multiple-use planning, specific recreational needs are not elaborated. When ecological aspects of forests came into focus in the early 1990s, it successively led to parts of urban forests being given conservation status (Rydberg & Falck 2000). Hence, recommendations for management in those areas focus on biodiversity, which is often believed to be a good solution also for recreational needs, but which is not always the case (Hultman 1983b).

Aasetre (1992, p. 40) points out the need for specific tools to plan for outdoor recreation in forests. Manning (1999) describes a number of conceptual frameworks designed to encourage diversity in outdoor recreation opportunities. The described planning strategies maximise user satisfaction by, for example, taking environmental impacts and crowding effects into consideration. This usually means conservation of existing values. Important elements for these frameworks are a systematic approach to provide a diversity of satisfactions at

regional level, and the use of a classification or zoning system to ensure diversity. Manning (1999) also mentions the recent focus on the relatively highly developed recreation classification system called the Recreation Opportunity System (ROS) which was developed by two groups of researchers simultaneously (Clark & Stankey 1979, Brown et al. 1978, Driver and Brown 1978).

Whereas the discussion in the paragraph above largely refers to the North American situation, it must be remembered that Swedish and Nordic outdoor recreation differs from the North American by its non-dramatic everyday character, often performed in areas affected by human activities. The presently used Swedish management recommendations need to be developed towards a planning concept, where international research findings are interpreted with consideration to Swedish conditions.

Objectives

The objectives of this thesis are to address some of the problems involved in outdoor recreation research and to present knowledge of use to policymakers and people more practically involved in physical planning issues, both within society and forestry:

1) Distance to forest:
   a) Map public preferences of how residence areas should be physically planned according to access to recreational forests.
   b) Map how the distance to a recreational forest affects visiting frequencies.

2) Outdoor recreation:
   a) Map trends in forest recreation. Describe how the public use of forests for recreational purposes has changed from the 1970s to the 1990s.
   b) Map preferences for forest types. Are the forest environment preferences the same among the public today as they were twenty years ago?

3) Planning recreational forests:
   a) Describe the present status in planning for outdoor recreation.
   b) By using the knowledge aquired, contribute to practical recommendations in planning.

Objectives 1 and 2 were studied through data collected in a nation-wide survey using mailed questionnaires. Objective 3 was studied by using a case where three theories for planning and inventory were tested on an outdoor recreation area.

Materials and Methods

Mailed inquiry

A quantitative mailed inquiry studying forest recreation in Sweden serves as the data source for papers II, III and IV. Methodology used for the survey is described in paper I. The population used is the public in Sweden aged between 16 and 75 years, from which a sample of 3,000 individuals has been extracted. In the survey, a number of issues were studied. The design of the survey was based on the mapping of visiting patterns during the year. The sample was, hence, divided into six sub-samples, (sub-sample A to F) of each 500 individuals, Table 1. Each sub-sample was used in one of the mail-outs sent every second month during a year.

To some extent all six questionnaires were identical, *i.e.* the introductory questions and some questions concerning forest visits, like the time span since the last recreational visit. The introductory questions included the demographic variables age, gender and number of inhabitants in the home municipality. Other questions concerned membership in environmental organisations, any physical handicap, and experience of, or education in, forestry.

To some extent questions were exchanged between the six questionnaires. Depending on expected variance in the answers, in combination with space limitations, questions were repeated in one or more mail-outs, provided that they were not believed to be affected by the season of the year. All questions used are presented in Appendix 1, (in Swedish), along with the total number of answers and answering rate for each question. Table 1 gives an overview of sub-samples used in papers I-IV.

Table 1. Use of sub-samples in papers I, II, III and IV

Sub-sample	Size of sub-sample (n)	Date for mailout	Sub-samples used in			
			Paper I	Paper II	Paper III	Paper IV
A	500	1997-10-01	X			X
B	500	1997-12-10	X	X		
C	500	1998-02-27	X	X	X	
D	500	1998-04-28	X	X		
E	500	1998-06-17	X	X	X	
F	500	1998-08-21	X	X		

Papers II and III deal with issues concerning distance to the recreational forest and visiting frequencies. An open-ended question format was used: Questions were posed on the present and preferred (ideal) distance to the closest recreational forest. Frequency of forest visits was mapped by asking for the number of days since the respondent's most recent forest visit. Attitudes to an increase in the present distance were measured also including a willingness-to-pay (WTP)

measure. Whereas paper II is based on five mail-outs with a total sample of 2,500 randomly chosen Swedes, paper III is based on two mail-outs including a sample of 1,000 individuals (Table 1).

Paper IV analyses changes over time in forest recreation and preferences by repeating a survey after 20 years. Questions in both surveys were identical, but in 1997 the questions were included as a part of a larger questionnaire. Predominantly multiple-choice questions were used. The questionnaire included a set of 28 black and white photos of forest sites, identical to those used 1977. Respondents were asked to sort the photos according to their suitability for outdoor recreation. The 1977 study used a sample of 1026 individuals in Sweden aged between 15 and 74 years, whereas the study in paper IV used a sample of 500 individuals (Table 1).

The simulation approach can only provide a small proportion of the stimuli perceived when actually visiting a forest. To give reliable results, the simulated environment has to be well known by the respondents so they are able to sense intuitively some of the other stimuli, for instance smells and sounds, when looking at pictures, etc. (Kaplan & Kaplan, 1989). The use of photos to validly represent in-the-field perceptions have been questioned, but confirmed for forest landscapes (Hultman 1983a, Kellomäki & Savolainen 1984, Axelsson-Lindgren 1990).

Planning recreational forests

A lack of useful planning methods for forest recreation areas in Sweden was identified in paper V. To develop a useful method, three theories, originating from different research fields, are tested for planning of a case area. One theory is a concept used for planning recreation areas, i.e. the Recreation Opportunity Spectrum, ROS (Driver & Brown 1978), originating from wilderness management. The other two are inventory models focusing on experiences, i.e. firstly, the characteristics for urban parks and green areas by Grahn (1991) where also the motives behind activities in different environments are described, and secondly, the Lynch theories of way-finding (Lynch 1998) developed in the built-up city environment.

The ROS concept is a tool to define recreation opportunities, and to ensure that a spectrum of opportunities is provided for. This means that instead of providing environments suitable for different activities, environments should provide opportunities to fulfil different motives, like risk-taking or in-group affiliation. The rationale for ROS is that the potential for an area to provide certain opportunities is dependent on management in combination with the physical and social setting. By using a normative approach, areas are classified into opportunity classes. There are six opportunity classes, ranging from Primitive, where opportunities for isolations should be provided for, to Modern urbanised, where opportunities to experience affiliation with individuals and groups are

prevalent, as is the convenience of sites and opportunities. By using ROS, inconsistencies are easily identified when comparing the desired recreation opportunities to be provided with the defined recreation opportunity class.

According to Grahn, urban green areas consist of eight different characteristics; "wilderness, rich variety of species, forest, play-inspiring, sports-orientated, peaceful, festive and ornamental", that can be ranked on a scale where wilderness is the most natural environment and the ornamental is the most man-made. Each park character evokes inspiration to perform certain activities. Grahn proposes that a good urban environment provides all eight park categories. Hence, the categories can be used as a starting point for evaluating and planning of a community's supply of urban parks and green areas.

Lynch's theory focuses on the structure and identity of an area, which is described in a map of the experience. Here, the presence, visibility, and the interrelations among the features, landmarks, nodes, paths, edges, and districts, as well as image strength and weakness of these elements, are noted. Consequently, an abstraction is being mapped, not physical reality itself. If the Lynch theories are valid also in a forest environment, they might be used for improving the imageability of urban forests resulting in visitors being better oriented and able to move more easily. Also the sense of security could be improved in this way, especially for visitors unfamiliar with the forest environment.

The case area, Northern Djurgården, is situated 2.6 km from the city centre of Stockholm. The area, totalling 320 hectares, is a mixture of open land and woodland. The public use of the area includes 305,000 recreational visits per year, where 37 percent were walking, 24 percent exercising/jogging, 18 percent nursery school children, and where both cyclists and sunbathers each made up to 8 percent. The average visiting time was 55 minutes (Kardell 1998). The areas was used by different groups, i.e. kindergartens, schools and associations or societies with open-air interest, where activities for children made up 75 percent of the visits (Ullskog 2000).

Results

Distance to forests

Much research regarding forest recreation has focused on the relationship between forest characteristics and recreational benefits. However, a shorter distance was considered as a more important factor to increase the frequency of forest visits than changing forest characteristics (paper III). Two papers in this thesis addresses the issue of distances to recreational forests, where paper II shows how distance to the closest recreational forest affects visiting frequencies,

and paper III illustrates what respondents considered to be the preferred (ideal) distance between their residence and the closest recreational forest. Both studies are based on mail-outs distributed as a part of the nation wide survey studying forest recreation in Sweden (paper I).

Paper II demonstrates that the distance to the closest recreational forest does affect visiting frequencies. The longer the distance to the forest, the larger the time span since the respondent's last recreational forest visit, which is especially pronounced when distance (residence to forest) exceeds two kilometres. The same pattern, with decreasing visiting frequencies at longer distances, was observed for all studied sub-groups[2] of the respondents, except for those between 16 and 30 years. Taking the respondent's distance to the closest forest into consideration, the most frequent forest visits were observed among those being members in environmental organisations and those living in a rural context. The lowest visiting frequencies were observed among respondents aged between 16 and 30 years and those living in an urban context. In comparison with other nationalities, however, urban-living respondents visit forests frequently. If the rather weak urban culture in Sweden today continues to strengthen, it will probably result in further decreases in visiting frequencies in urban areas.

When asking respondents for their own preferences regarding the distance to the closest forest (paper III), about half of the respondents stated that they were satisfied with their present distance. On average, they lived at a distance of 0.7 kilometre, with a median of 0.3 kilometre (southwest of Sweden excluded). Those 40 percent who wanted to live closer to a recreational forest (all respondents except in the southwest of Sweden) lived, on in average, 2.7 kilometres away, with a median of 2.0 kilometres. Given a free choice, these respondents stated they preferred to live at a distance of 0.7 kilometre on average, and a median of 0.3 kilometre, i.e. similar to circumstances for those that were satisfied today.

Means of transportation to the forest depended on the distance travelled, where a large majority of transports within one kilometre were made by foot or on skis, and distances over two kilometres by car (paper III). The decreased visiting frequencies with increasing distances observed in paper II, is explained as a barrier effect, which is especially strong when the distance to the forest exceeds two kilometres. A partial explanation might be a cultural pattern where cars are considered improper for transports to the forest, since a forest visit should be simple and uncomplicated.

Paper II concludes that if opportunities are to be provided for frequent forest visits, they should include the possibility to reach the forest on foot. This implies

[2] Analysed sub-groups includes males, females, 16-30 years, 31-55 years, 56-75 years, members in environmental organisations, and people living in urban/rural environments.

that residential areas should be planned to have the closest forest area preferably within one kilometre, and definitely not exceeding two kilometres. According to respondents' own preferences (paper III), the forest should be located within one kilometre. The norms used for planning purposes, presently in the range between two to five kilometres should hence be amended as the range of distance is too long.

Changes in forest recreation

Changes in recreational use of forests were studied in paper IV by repeating a postal survey after 20 years. The study is based on one of the mail-outs, distributed as part of the nationwide survey studying forest recreation in Sweden (paper I), where a sample of 500 randomly chosen Swedes serves as the basis for the results.

The main result is that changes observed in recreational use were small. The visiting frequency remains unaltered. Very frequent visits, more than three times a week during winter, have more than doubled between 1977 and 1997. It is entirely explained by increased visiting frequencies among people aged more than 45 years. Distance covered during a forest visit, usually 3-4 kilometres, remains unaltered. There is a tendency that the proportion of very short (<1 km) and very long (>7 km) distances covered during the forest visit have increased between 1977 and 1997. The most commonly picked berries both in 1977 and 1997 are bilberries *(Vaccinium myrtillus)* and cowberries (*Vaccinium vitis-idaea*). A large drop was observed for the inclination to pick wild berries in general, with a total decrease in 1997 to about one-third of the volume picked in 1977. Also the proportion of respondents who picked wild berries has decreased significantly for respondents aged between 25 and 65 years. The proportion of respondents picking wild mushrooms remains unaltered. It is concluded that the relationship with the forest is still close, but that public use is changing from harvesting towards the purely recreational.

Changes in preferences for forest types

Paper IV deals with how different forest sites are preferred for forest recreation. This was done by repeating a postal survey after 20 years, where respondents were asked to rank a set of photos according to their suitability for recreation. The study is based on one of the mail-outs, distributed as part of the nationwide survey studying forest recreation in Sweden (paper I). A sample of 500 randomly chosen Swedes serves as the basis for the results.

The ranking of the photos showed small differences between 1977 and 1997. In both surveys the highest ranking was given to four photos showing open mature stands with easy access by foot (Appendix, paper IV). The lowest ranking in both studies was given to three sites containing lying trees or logging residuals obstructing accessibility. Significant differences, however, were observed for some photos. The largest change was observed for a photo of virgin forest, which

had become considered as more suitable image for recreation in 1997. All five photos significantly considered more suitable for recreation included lying trees, logging residues or dead standing trees. Of the photos considered less suitable, the largest change was observed for a shelterwood of Scots pine (*Pinus sylvestris*). Three out of the four photos considered less suitable for recreation were dominated by young coniferous stands.

Planning recreational forests

Three theories on how to develop a useful method for planning of urban forest areas, all originating from different research fields, are tested in paper V, i.e. the Recreation Opportunity Spectrum, ROS (Driver & Brown 1978), the characteristics for urban parks and green areas by Grahn (1991), and the Lynch theories of way-finding (Lynch 1998).

Results show that all theories are useful, and that they can be used together. For example, planning should be expanded from urban forests to the whole nature area, where also the value of other land use classes such as open land should be taken into consideration. Initially, the spectrum of opportunities that should be provided within the area is defined, regarding the motives for using different park characteristics. As a second step, the opportunity class in which the area is capable of producing opportunities is defined, which clarifies which facilities should be provided in the area, i.e. the scope of action. Lynch and Grahn are then used to describe the experience of the area, identifying its weaknesses and strengths. With Lynch-mapped abstraction as a basis, and by using the identified park and nature categories present in the area, management operations are made to strengthen the image and to fulfil goals set. The methods suggested methods enable a shift to be made from traditional focus on stands, stand age and species composition, towards one where the total experience and system of paths seem crucial.

Paper V also proposes that multiple use planning should be based on separate plans, first optimising each integral use, and then, as a second step, merging the plans into one. This would clarify conflicting goals and effects of other uses. In plans optimising recreational needs, other input than traditional forest inventory data are needed, like inventories using Grahn's characteristics and Lynch-mapping.

Discussion

What is meant by a forest

In the survey forming the source of data for papers II-IV, the term recreational forest is rather widely defined. In the questionnaire (paper I), the respondents are asked to think of recreational forest areas as follows: "a forest area (not park) that can be used as an outdoor recreation area (for example, walking, picking berries and mushrooms, skiing)". The interpretation of the question is somewhat unclear. The specific forest in the respondent's mind may either be the one he/she normally uses, regardless of activities performed, or the forest where exemplified activities can be performed. One respondent commented that he excluded his closest, normally used, forest due to the exemplified activities. I believe, however, that the large majority had been thinking of a forest suitable for their own use. Depending on a respondent's different uses, a variation in the definition can be assumed between respondents. It is likely that some respondents include also environments other than pure forests, but still having forest or woodland features. Since forests dominate Swedish nature, the forest is a feature present in almost all nature areas, as discussed in paper V. It can, hence, be assumed that many respondents have been thinking of natural environments in general when asnwering the questionnnaires being the base for paper II, III, and IV. Actually, many Swedish studies in outdoor recreation have been using a relatively wide phrase "in woods and fields", together with the general term "outdoor recreation" in questionnaires (e.g. Lindhagen 1996a, Statistics Sweden, e.g. 1993a) instead of the more forest-focused terms "forest" and "forest recreation".

We cannot rule out the possibility that results presented here, that were collected through the questionnaire (papers II, III, IV), have a wide definition of forest, including all sorts of natural environments where forest features are present. However, no study has been made of how either the respondents or the public in general define recreational forests. Increased knowledge of preferred mixes of land-use classes (lancscape types) would support design and planning of outdoor recreational areas.

Forest and nature in society

The distance to the closest recreational forest affects visiting frequencies (paper II). Physical inactivity is one if the most important factors behind ill health and premature death among adults and elderly in Sweden (National Institute of Public Health 1999), and walks have by far the largest potential to increase physical activities, according to National Institute of Public Health (1999). Paper IV shows forests to be frequently used for walks. Out of the total number of walks, walks in "woods and fields" represent a large part (Statistics Sweden in Kulturdepartementet 2000).

The finding in paper III suggesting that the public would like to live close to a forest (i.e. within 1 km) was also shown by Berglund (1996, p. 163), where residents surveyed stated that living close to a park or close to nature was just as important as having services within walking distance from home. Paper II suggests that a close relation to nature is a part of Swedish culture. Since culture transforms over time, the Swedish relationship with nature is hence probably going to change. Barriers hindering visits are probably speeding up the process. To maintain a close relationship with the forest, which inclines frequent visits, it seems crucial to provide recreational forest close to housing areas.

People in urban areas visit the forest less frequently than residents in rural areas (paper II). This supports the theory that the late urbanisation in Sweden explains the close relationship with nature (Wiklund 1995), who also maintain that a continued strengthened urban culture developing in the same direction as the south-European ones, would probably imply decreased visiting frequencies.

Physical planners, having strong impact on the physical planning, are identified as suffering from a complex of not being urban enough or in the right way (Wiklund 1995). Accordingly, physical planners focus on the central, built-up parts of the city, giving the green structure of the town lower priority (Berglund 1996, p. 164-165). This helps to explain why outdoor recreation and green areas are inferior in competing with other activities in actual physical planning situations at the local level, as concluded by Almstedt (1998, p. 205). The contrasting relationship with the public and physical planners is highlighted here, and it is suggested that accessibility to forests and nature in general will be given higher priority in planning situations. Analysis of how forest and nature areas are prioritised in planning situations, and if optimal solutions for society's needs are chosen, is proposed for further research.

Changes in forest recreation

In both 1977 and 1997 about 80 percent of respondents stated they visited the forest during the summer once a fortnight or more frequently, and during winter about 60 percent stated they visited the forest once a fortnight or more. The absolute figures, however, are uncertain, since there is a great risk of idealisation, where habits perceived as good are overestimated (Koch 1978, pp. 308-313, 390-391). The size of the exaggeration when answering questionnaires concerning forest visits in Sweden has been estimated to 2 (Lindhagen 1996a) and 5-10 times (Kardell & Pehrson 1978, p. 5). Even though absolute figures may be assessed with caution, results can be valuable for purposes of comparisons over time (Jensen 1999).

Traditional outdoor recreation has been fairly constant during the last 20-25 years according to Danish surveys (Jensen 1999). Results in paper IV suggest an opposite trend, with a drastic drop in berry picking, a pattern also observed in Norwegian studies (Aas & Aasetre 1994). Paper IV discusses several explanations

for the decline in berry picking, where a change in lifestyle is considered as important. Since paper IV was produced, research has shown that browsing of large herbivores effect the berry production of *Vaccinium myrtillus* negatively (Bergquist 1998). During the studied 20-year period the number of roe deers has increased in the south of Sweden, and, hence, the berry production is likely to have decreased, which helps explaining the observed decline in berry picking. However, in a comparison between forest recreation in the Nordic countries, Jensen (1995) discusses that there might be a decline in "traditional" Nordic forest recreation activities (such as walking in the forest, berry and mushroom picking, and cross-country skiing). Jensen means, "earlier generations who were taught to appreciate activities will be replaced by generations with a different or at least a more diversified basic attitude". For the picker, however, the berry picking might not even have been experienced as recreation, but an important support to the household economy. Anyhow, along other possible explanations discussed in paper IV, Jensen stresses that an increasing urbanisation might influence participation in traditional "harvesting" activities negatively.

International research has shifted focus from activities to a behavioural approach emphasising motivations and benefits. The rationale is that people select and participate in recreation activities to meet certain goals or satisfy certain needs. The drop in picking of berries, paper IV, is a drop in a single activity that, according to theory, would be exchanged with other activities meeting the same goals or needs, or, alternatively, the needs have changed during the studied twenty-year period.

Preferences for forest types

Information is known to be able to influence aesthetic perceptions of scenes containing evidence of that information, if respondents are made aware of the benefits of management practises (Jensen 2000, Simpson et al. 1976), which may be a possible explanation of differences in preferences. One way to explain above observed differences in preferences, and the overall general unity, is to assume that preferences consist of two parts, where the general pattern is uniform but where also a more varied one is present that is affected by learning or experiences. The changed valuation of virgin forests during a 20-year-period, being one of the findings in paper IV, would hence be the result of the influence/learning of the idea-historical phenomenon expressing concern for nature for nature's own good that occurred during recent decades (Uddenberg 1993, p. 291).

Despite small changes over time in preferences, it may be of interest to make follow-ups, since small changes may be the result of changes in the learning or experience part of preferences described above. Since almost all preference studies have been made during 1970s –1990s, the relatively uniform scenic values for forest characteristics, might possibly also be explained by a slower change in preferences than could be detected during studied periods.

The photos used in paper IV were identical to those used in 1977. They represent common Swedish forest environments resulting from the standard silvicultural methods used during the 1970s. A few photos show unmanaged forest environments. Since forest recreation can be assumed to prefer other forest types than the standard silvicultural method used in the seventies, also other forest types were included in the survey presented in paper I. Results regarding changes in preferences presented in paper IV can be generalised only for the adult public. A task for further research is to study whether there is a pattern of changes over time in preferences for those in the population younger than 16 years of age.

Planning recreational forests

Paper V calls attention to the lack of planning concepts for forest recreation areas in Sweden. It is also an attempt to meet the criticism of the research field that it lacks in theoretical foundation and that studies have few broad implications.

The ROS needs to be developed before it is capable of becoming fully adopted in the Nordic countries, as stressed by Kalternborn and Emmelin (1993), and Wallsten (1984). For the urban end of the spectrum, adaptations to Nordic conditions likely include higher acceptance for sights and sounds of man, while, in contrast, fewer facilities should be provided than proposed according to description of physical, social and managerial settings. Perhaps the most important is to adjust the experience opportunities to be provided. In the ROS description, the physical environment is of minor importance in the most man-made opportunity class, but according to Grahn (1991), the setting of the physical environment in Sweden is important also in the most man-made environments.

As an adaptation to Swedish conditions with a non-dramatic outdoor recreation, where closeness is important (paper III), it is proposed that areas adjacent to residential areas should be managed for the majority of the public whereby, for example, excessive emphasis on only biodiversity would be avoided (paper IV). In areas close to residence areas, children's needs must be given high priority, since distance for children is likely to have a larger barrier effect and will hinder visits more than for adults (Norling 1985). At regional level, more extreme or specified environments should be provided, but these can be located in areas where the closeness to residences is not the major quality. At regional level, a spectrum of opportunities would be provided, thereby limiting the risk stressed by Jensen (1999) that satisfying the average person, probably satisfies only relatively few people.

As proposed in paper V, following the theories of ROS, each recreation area should be evaluated as a part of a larger system of areas, each contributing as best it can to the diverse needs of the public. Much of Swedish outdoor recreation takes place in landscapes largely influenced by human use. As a consequence of an implementation of ROS, in line with the park characterisation, future

recommendations for planning and management should include all land-use classes and not only forest.

Due to the right of common access in Sweden also privately owned land is used for recreation. The private landowners must tolerate this use, as long as land-use in progress not is obstructed to any particular extent. On the other hand, there are minor legal ways to force a landowner to make special considerations for recreation. This complicates the intentions in ROS, where each recreation area is evaluated as part of a larger system. The most satisfactory solution for outdoor recreation would be to make the plans irrespective of ownership. To some extent outdoor recreation is already included in physical planning today, but with few practical implications (Almstedt 1998, p. 44). So, if any special considerations are needed when planning for recreation on a larger, regional scale, as proposed in ROS, they must either concern only publicly owned land, or there must be special agreements with the private landowners.

Data used for planning for recreation in paper V differs from traditional forest inventory data used in economic forestry. To map experiences, both Grahn's park characteristics and Lynch's way-finding have been shown to be useful. This focus on experiences requires a goal definition capable of expressing the desired experiences, as in ROS, but not in traditional multiple use planning in Sweden. As a consequence for the forest manager, such goal definition implies altered management inputs, being less stereotype, and more skill-demanding than at present.

The motives defined by Grahn for visiting different park characteristics was practicable as input for the ROS planning in the case area, even though terminology is not directly transferable. The validity for the motives, however, needs to be tested among the public, since they originate from a survey of different associations' use of urban forest and green areas. Grahn's park characteristics are suggested to be used in the most extreme urban opportunity classes for describing environment and the motives. For opportunity classes in the middle and towards the other extreme of the scale, however, other tools are needed.

Conclusions

When providing opportunities for frequent forest visits, it is important that the journey to the forest can be made on foot. This implies that residential areas should be planned to have the closest forest preferably within one kilometre, and definitely not exceeding two kilometres. According to respondents' own preferences, the forest should be located within one kilometre.

The relationship with the forest is still close, but public use is changing from harvesting towards the purely recreational. This can be observed in results showing small changes between 1977 and 1997 in the pattern of forest recreation and the preferences for different forest environments. Observed differences during the same 20-year period, include a large drop in the inclination to pick wild berries, and increased popularity for virgin forest as a recreational environment, but still, for most people an unpopular environment to visit.

Three theories originating from different research fields have been tested and found useful for planning of urban forests, i.e. the Recreation Opportunity Spectrum, ROS (Driver & Brown 1978), the characteristics for urban parks and green areas by Grahn (1991) and the Lynch theories of way-finding (Lynch 1998). For the planning, other data input than traditional forest inventories are needed, like the result of inventories using Grahn's and Lynch's theories. Also other land-use classes should be included in plans for outdoor recreation.

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