Dissertationes Forestales 98

Forestscapes – A Forest Landscape Typology as an Integrated Planning Process Tool

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Academic dissertation

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ABSTRACT

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The purpose of the study was to find forest landscape qualities, which are essential to landscape development and its critical success factors. Are there special landscape character types, with such unifying qualities, as to be considered similar types, and distinguishable from other types? What are the qualities, preferred management alternatives and visual problems caused by forestry?

The study was based on eight case studies of nationally valuable landscape areas in different landscape regions in Finland. The case study areas were Ruissalo, Koli, Melalahti, Häntälä, Peränne, Naapurinvaara, Vuokatti and Tipasoja. The preference studies related to the planning processes showed the differences in perception of landscape types, namely in their sensitivity to change and visual appearances depending on the location of operations in the landscape. Thus the characteristics of the forest spatial structure were described and classified into various forest landscape types.

The assessment of case study areas distinguished eleven forest landscape types to consider in forest planning and landscape management practices. The highest parts of the landscape were often summit forests, followed by slope forests and edges. The edge often presented a high variation in forms of cultural landscape edges, pasturelands, road edges and swamps. It was a zone of extensive and versatile cultural and natural activity. The lowest level of the landscape included the types of valley with small woods and tree groups and shores, divided into cultural, natural shores and islands.

In the comparison of location of types between the case study areas, some forest landscape types were found to exist in one particular location (stable types), while some types varied in their location (variable types). The stable types were summit forest, slope forest, edge, valley and shores, while the location of variable types of pasturelands and swamps seemed to largely depend on the regional landscape structure and land use. In order to find management alternatives, the professional analysis of case study areas was combined with preference studies and the landscape management recommendations suggested for each forest landscape type.

The applied landscape structure theory was useful in distinguishing structural and spatial differences in forest landscape. The results from the eight case study areas show that the differences in landscape types can be identified and observed with an applied planning method and how forest management could be adjusted to comply with their special characteristics. The examined typology could be an instrument for developing sustainable management strategies and a framework for planning cultural forest landscapes, in order to identify their sensitivity, character, and sustainable actions for each landscape type.

Keywords: landscape structure, landscape types, landscape provinces, landscape planning, landscape management, landscape preferences, forest landscape

ABSTRACT IN FINNISH

Komulainen, Minna. 2010. Forestscapes – Metsämaisematyypit integroivan suunnitteluprosessin työvälineenä. Aalto yliopisto. Dissertationes Forestales 98. 196 p. Saatavissa: http://www.metla.fi/dissertationes/df98.htm

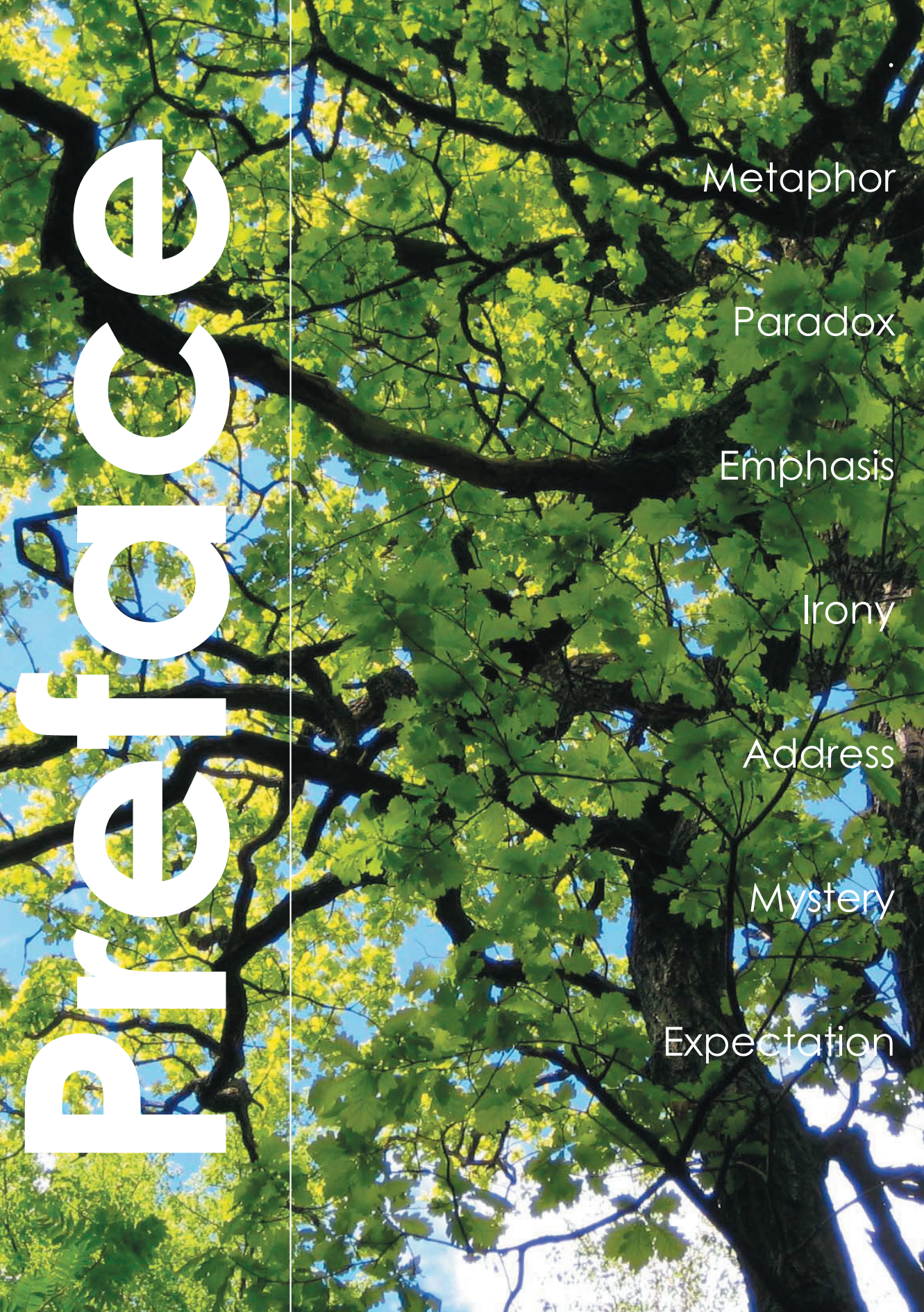
Tutkimuksen tavoitteena oli kartoittaa metsämaiseman ominaispiirteitä, jotka ovat merkityksellisiä metsien käsittelyn ja maatalouden aikaansaamissa maiseman muutosprosesseissa. Löytyykö erityisiä maiseman ominaispiirteitä, joilla on sisäisesti yhtenäisiä laatutekijöitä, niin että ne voidaan yhdistää samoiksi metsämaisematyypeiksi ja erottaa ao. tekijöiden perusteella muista maisematyypeistä? Mitkä ovat maiseman ominaispiirteiden tekijät, arvostetut maisemanhoitovaihtoehdot sekä visuaaliset ongelmat eri metsämaisematyypeissä?

Tutkimus perustui kahdeksaan tapaustutkimukseen eri maisemamaakunnissa Suomessa. Tutkittavat maisemallisesti arvokkaat alueet olivat Ruissalo, Koli, Melalahti, Häntälä, Peränne, Naapurinvaara, Vuokatti ja Tipasoja. Suunnitteluprosessiin liittyneet maisema-arvostustutkimukset toivat esiin eroavuuksia eri maisematyyppien havaitsemisessa, erityisesti niiden visuaalisessa herkkyydessä muutosprosesseille. Muutoksen havaittu voimakkuusaste oli suhteessa toimenpiteen sijaintiin maisemarakenteessa.

Tapaustutkimusalueilla kartoitettiin metsän spatiaalisen rakenteen ominaispiirteet, visuaaliset ongelmat ja luokiteltiin ne 11 erilaiseksi metsämaisematyypiksi sijaintinsa ja maankäytön mukaan. Maisemarakenteen korkeimmat alueet olivat lakimetsiä, joita seurasivat horisontaalisesti rinne- ja reunametsät. Reunametsien ominaispiirteissä ja maankäytössä esiintyi usein eniten vaihtelua, ne jakaantuivat vielä kulttuurivaikutteisesta reunametsästä hakamaihin, tienvarsimetsiin ja soihin. Maisemarakenteen alavimmat alueet olivat laaksometsät metsäsaarekkeineen ja mosaiikkimaisine puuryhmineen sekä rantametsät (kulttuurivaikutteinen, luonnonvarainen sekä saaret). Kun metsämaisematyyppien sijaintia verrattiin eri tapaustutkimusalueiden välillä, osa tyypeistä sijaitsi pääsääntöisesti tietyillä maisemarakenteen kohdilla (pysyvät tyypit), kun taas osan tyyppien sijainti vaihteli (muuttuvat tyypit). Pysyviä tyyppejä olivat lakimetsät, rinnemetsät, reunametsät, laaksot ja rantametsät. Muuttuvien tyyppien kuten hakamaiden ja soiden sijainti maisemarakenteessa oli laajalti riippuvainen alueellisen maisemarakenteen ominaispiirteistä ja paikallisesti maankäytöstä. Maisemahoitomallien kartoittamiseksi esimerkkialueiden maisema-analyysien tietoa verrattiin maisema-arvostustutkimusten tuloksiin. Tutkimuksen tuloksena esitetään metsämaisematyyppien luokitus, tyyppien kuvaus, visuaaliset ongelmat sekä maisemanhoitosuosituksia.

Tutkimuksessa sovellettu maisemarakenneteoria oli käyttökelpoinen eroteltaessa metsämaiseman ekologista, kulttuurihistoriallista ja spatiaalista kerroksellisuutta. Kahdeksan tapaustutkimuksen tulokset osoittavat, että metsämaisematyyppien eroavuuksia voidaan identifioida käytetyllä suunnittelumenetelmällä, sekä löytää keinoja kuinka metsien käsittelyä voidaan sovittaa ao. tyyppien maisemallisiin ominaispiirteisiin. Huomioimalla metsäalueen erilaiset maisematyypit metsien käsittelyllä voidaan korostaa maiseman alueellisia piirteitä ja vähentää maankäytön konflikteja muiden käyttömuotojen kuten matkailun kanssa. Metsämaisematypologia voi toimia työvälineenä kestävien kehitysstrategioiden sekä maisemanhoitomallien laatimiseksi maisemallisesti arvokkaiden metsäalueiden suunnitteluun.

Asiasanat: maisematyyppi, maisemarakenne, maaseutumaisema, maisemasuunnittelu, maisemanhoito, maisemallisesti arvokkaat alueet


Preface
Metaphor
Paradox
Emphasis
Irony
Address
Mystery
Expectation

PREFACE AND ACKNOWLEDGEMENTS

Many authors suggest that Beauty is an essential ingredient of a satisfactory human habitat (e.g. Appleton 1975, Bourassa 1991). This study was a voyage in search of Beauty utilising modern scientific disciplines. The writing of this doctoral thesis started from questions that have been waiting to be answered for 20 years. The idea that a landscape only has one past yet many potential futures, took me through the Finnish landscape, with its people and forests, to search for knowledge on the constitution of landscapes. The crucial turning point came when I became acquainted with Finnish landscape structure theory and the visual design principles of the British Forestry Commission.

Besides my work as an executive director of the Rural Women's Advisory Centre of Kainuu and caring for my family, the writing of this doctoral thesis has been a challenge. Discussions and training requests from forestry organisations created an obvious need to develop a concrete tool for integrating landscape planning into forest management. So I returned to my roots and studied forest landscape and had the good luck to receive grants from the Ministry of Agriculture and Forestry's Rural Policy Committee, the Metsämiesten Säätiö and the municipality of Sotkamo. Without these scholarships it would not have been possible to write this doctoral thesis. The material for the doctoral thesis was collected from case study areas of landscape plans made by the author during the period 1989-2008. In 1992-1996 the study was a part of the "Multiple-use of Forestry"-research programme in the Finnish Forest Research Institute.

As a landscape researcher I received great support and a widening of research perspective from international co-operation with the Swedish Agricultural University, Danish Landscape and Forest Research Institute, Forestry Commission of Scotland, Trondheim University in Norway and Private Forestry Boards in Finland.

I am grateful to my tutoring professor Maija Rautamäki at Helsinki University of Technology for her long-term guidance since 1989 in the Ruissalo landscape plan. She taught me in practice how landscape structure can be found in an environment and her licentiate study of landscape provinces was a source of inspiration in my own work. Furthermore I am grateful to the landscape architect Simon Bell who invited me to become acquainted with British forest design principles. This helped me to find my way forward and I adopted their principles as part of the planning method.

I am grateful to my employers and to fellow workers at the Finnish Forest Research Institute, the Forestry Centre Kainuu, ProAgria Kainuu and the Rural Women's Advisory Centre Kainuu. Dr. Aarne Reunala and professor Matti Leikola at Helsinki University instructed me in the philosophy of the multiple-use of forests and supported me in finding the appropriate landscape research path. Tuija Sievänen patiently guided me through the theoretical world of the research, and with Eeva Karjalainen I conducted the landscape preference studies related to the case studies. Irja Löfström and Risto Savolainen and many others helped me on my way.

The pilot projects of the forest landscape plan were activated in nationally valuable landscapes nationwide, by Airi Matila of the Forestry Development Centre, Tapio. One of the first projects started in Melalahti at the initiative of the Kainuu Forestry Centre, whose directors

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[1] *Author's note: Some of the publications referred to in the study by the name of Antikainen, were written using my maiden name. Therefore all 20 of my publications with the name of Antikainen, M. or Komulainen, M. are listed separately in chapter 8. References.*

Eila Valtanen and Jorma Tolonen challenged me to find suitable landscape models for forestry practices. I wish to thank all the co-planners, foresters, landscape planners, biologists, geographers and other persons involved in the planning process for their fruitful comments for further developing the integrated planning process; Tapio Heikkilä and Minna Perähuhta, from the Ministry of Environment for their advice on terminology, national landscape strategies and the structure of the thesis; Sirpa Törrönen and Marja Suihkonen for finalizing the structural maps and profiles by computer; and the assistants for their help in drawing the figures and in the layout of this thesis. Kaisa Enticknap-Seppänen proofread the text to check the English language. All photographs were taken by the author, if not mentioned otherwise.

Last, but not least, I am grateful to my family for their support during all the stages of this work. My most creative ideas came with one eye on my writing and the other following the children playing on our island in Lake Nuasjärvi with a panoramic view to the blue-ridge line of Vuokatti. My husband deserves special thanks for his support and discussions on finding one's own path of research. Sometimes when writing was difficult, I recalled the memory of my grandmother, an evacuee from Lake Ladoga, in the mysterious landscape of Karelia, and how she sewed on an old Singer machine, patiently unpicking and sewing up faulty stitches, reminding me of my process of rewriting this thesis once again. I owe a lot to my mother, a biologist, who taught me to appreciate the processes of nature, and the equal right of women to education and a career. These thoughts gave me much strength, (the so-called Finnish Sisu) to go forward in life and not to give up. Thanks also to my sisters, father and friends for their support during this challenging task.

With joy I state that this work has been brought to an end. In some slow moments I promised myself that this doctoral thesis will be my conclusions on the subject when it is completed, but like the nature of writing, you never know what ideas will again arise, like the wild flowers that appear unexpectedly in a garden.

On Little Rowan Island, Sotkamo, Finland, July 30th, 2009

Minna Komulainen

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Chapter 1

Introduction

1 INTRODUCTION

1.1 Changing the cultural forest landscape – An accepted fact or problem?

The Nordic rural landscape is changing in appearance due to the continued removal of un occupied areas for field afforestation and forest felling. The cultural landscape is surrounded by forest edges and any changes to their appearance are generally perceived by the inhabitants (Bell 1993, Lucas 1991). Changes in the landscape have a direct, immediate visual effect on people's surroundings. They raise public concern and interest in other environmental changes, e.g. in the problem of decreasing biodiversity (Landscape and Visual Impact Assessment 1995).

The landscape is a creation of natural and human forces. It is a complex set of phenomena with its natural and cultural forces shaping the region, varying in scale from a single forest site to the broad landscape and on the other hand, its widely aesthetic value of sublime beauty reflected in the arts and by human perception.

Landscapes and biodiversity in rural areas have been shaped by centuries of human activity. Agriculture has created open agricultural and traditional landscapes and shaped marginal zones by forest as well as patches of trees and bushes. Traditional land use, such as grazing and mowing, has created the diverse plant and animal species characteristic of these areas. Traditional landscapes, meadows, cutover pastures and forest pastures enrich the cultural landscape of rural areas and are among the richest natural habitats in Finland, in terms of the diversity of their flora and fauna. In the Rural Development Programme, active farming has been considered as a basic prerequisite for preserving open and managed rural landscapes (Ministry of Agriculture and Forestry 2007).

Rural landscapes have recently faced drastic changes and the key question has been how to adapt such changes to the landscape. For example changes in livelihood structures, a decreasing rural population and ignorance of traditional housing styles have led to the reduction of many characteristic elements in the rural landscape. Measures permanently altering land use, such as afforestation, new construction and the construction of roads, have and continue to have the greatest impact on rural landscapes.

Furthermore, nature changes the cultural landscape permanently when fields are left fallow and overgrow. Humans cause permanent landscape change by new building or demolishing traditional settlements, or by changing land use, e.g. transferring from cattle-raising to crop cultivation or building golf courses on meadows (Heikkilä 2007).

The reduction in agricultural activity and production volume has led to a large number of uncultivated traditional landscapes, natural pastures, meadows and forest pastures, some becoming overgrown by forest. Many fields are withdrawn permanently from agriculture under different afforestation programs. Since the 1980's, a range of policies has been designed to increase the area of forest and woodland across Europe. Such afforestation programmes are a response to the expected marginalisation of arable land because of agricultural overproduction (Kankaanpää & Carter 2004). Almost 242,000 hectares of agricultural land have been afforested partly by means of State support between 1969 and 1999 (Ministry of Agriculture and Forestry 2007).

Due to drastic changes in farming and forestry practices, semi-natural habitats have disappeared so rapidly that their numbers are thought to have declined by more than 99% over the last century (Ministry of Agriculture and Forestry 2007, Pykälä 2001). An inventory of semi-natural habitats across Finland during the period 1992-1998 recorded valuable tradi-

tional rural biotopes, with a total area of approx. 19,000 hectares, of which only about half is currently managed (Vainio et al 2001). The decline in biodiversity especially concerns species in groves, traditionally farmed and grazed habitats, old-growth forests, nutrient-rich types of peat-land and small watercourses in their natural state. 37.5% of endangered species live in forests and 28% in traditional rural biotopes according to the Evaluation of Threatened Species in Finland (Rassi et al 2001).

Conservation of the cultural landscape requires more active landscape management measures since only natural landscapes and certain antiquities can be conserved by leaving them in their natural state. In the countryside, villages and towns, landscape conservation requires a variety of measures. Maintaining open fields and meadows, the basis of the cultural landscape, requires work year after year (Heikkilä 2007). Hence the agri-environmental scheme in Finland has significantly supported the continuation of traditional management methods – Schulman et al (2006) stated that they were the best way to advance agricultural biodiversity. Over 2500 semi-natural habitats were managed by Finnish agri-environmental programme (Kuussaari et al 2004).

The changing landscape dilemma is complicated, as rural areas not only depend on agricultural activity and policies, but also on forestry measures and other land-use. Forests are the most characteristic element of the Finnish landscape. Forests, together with arable land, watercourses, islands and peat-lands, create a distinctive combination of cultural and natural landscapes in each region. Forests have an important role as natural ecosystems and habitats for wild organisms and as recreational areas. Forests are a significant part of the Finnish rural landscape and are an important resource for tourism and recreational services (Parviainen et al 2007).

In addition to agricultural land and building heritage, cultural landscapes include wood edges, solitary trees and forests that are modified by forestry activities such as felling, thinning, pruning and field afforestation. Various forestry practices create new shapes in the landscape. The main visual problems seem to occur in regeneration felling. The period after clear-cutting has particularly been perceived as a form of landscape decay within the Finnish forest (Karjalainen & Komulainen 1999). Clear felling suddenly creates open spaces in the closed forest canopy and the growth of planted saplings is a slow process, not easily noticed by the layman. The negative attention and criticism generated by clear felling primarily includes the issue of landscape decay, which is more easily noticed than ecological matters and biodiversity. In general, problems have not arisen with thinning in the landscape, unless access has been hindered by shrubbery in the forest.

Summit and slope forests are more sensitive to forestry practices in the broad landscape, thus natural methods of regeneration, shelterwood felling and seeding felling, were favoured in aesthetically important places (Savolainen 1990). However such visual sensitivity also concerns forest edges, woods in the midsts of cultural landscapes and shore forests. Broken skylines, even-spaced thinning of forest edges, abrupt changes in the canopy of small woods in fields or felling areas stretching down to a riverside or lake shore may arouse concern. Such concern raises a significant question in forest landscape management in terms of how to integrate forestry operations into the landscape within an aesthetical, economical and ecological context.

While nature produces various benefits accessible to people via ecosystems, the Millenium Ecosystem Assessment (2005) stressed that among ecosystem services, landscape and amenity values are important, but seem of less value in practice. Despite various government landscape policies, landscape issues have been left far behind ecological issues such as watershed-management in forestry management, research and guidelines.

Meanwhile, there is a growing trend in respecting the cultural heritage of one's home region within the development of year-round tourism and aesthetic values. Cultural and amenity services represent a considerable economic resource. For example tourism generates approximately 11% of global GDP and employs over 200 million people. Approximately 30% of such revenue comes from cultural and nature-based tourism. The importance of cultural services and values has not yet been recognized in spatial planning and management (Millenium Ecosystem Assessment 2005).

Since there is no common language to share ideas when discussing forest landscape, agreed principles and planning tools, it has been difficult to consider or develop landscape in the context of forest management. Thus, the next issue to be discussed is the need for developing forest landscape planning principles and practical management models.

The need for an integrated planning approach in rural areas

Is changing the rural landscape acceptable or problematic? How do local inhabitants and society value the landscape and perceive such changes? This chapter summarises the need for integrated landscape planning and forms the background to the research questions and objectives of the dissertation. It also provides the purpose of the study by answering the question: why was it important to focus on studying the forest landscape.

Rural landscape management became a more widely accepted practice during the 1990's, whereas before landscape issues mainly concerned the preservation of marginal areas subject to controversy in academic societies (Komulainen 1995a). This trend was to a large extent due to the following reasons: Scandinavian countries entered the EU, which lead to a reformulation of agricultural policies, an increase in Northern nature tourism destinations, and a growing environmental consciousness that gave rise to new forestry and agricultural requirements. The problem formulation of this study started during this period and the first case studies were implemented in 1989.

Due to drastic landscape changes a social need to protect landscape values was created. Historically, landscapes were moulded by traditional agricultural practices, but to achieve the same degree of management later, support by society was required. The concern that landscape management subsidies could only be directed towards a small proportion of the whole landscape, suggested it would be more cost effective to support rural livelihoods in a way enabling landscapes to be managed extensively, rather than intensively in limited areas (Helaakoski 1997). Wilkin (1996) suggests landscape-planning application should also develop systems for monitoring human ecosystem productivity to determine progress toward sustainability as well as its costs.

The above-mentioned viewpoints direct the way by which landscape practices could be better and more widely supported. Furthermore the viewpoints put forward the development challenge for this research as to how to integrate wider landscape planning approaches into livelihood-based agricultural and forestry planning in order to create a more solid basis for implementation. Obviously, this would mean integrating landscape management practices into ordinary agricultural and forestry practices.

From the viewpoint of the landscape planner and manager, landscape is a paradigm of challenges. Landscape analyses and recommendations can be made for different parts of the landscape, but in order to put them into practice the planner will probably have to work with hundreds of landowners with a variety of values and land-use needs. The village areas covered in this study were often owned by one hundred to two hundred land-owners, whose land was often divided vertically against the landscape structure due to ancient land division

provisions, where land was divided equally to include a share of good agricultural land and poorer forest land. However, this traditional land-division method still leads to felling coupes designed according to land-ownership borders, shaping them as vertical strips against the horizontal landscape.

Statistics show that Finland has 26.3 million hectares of forest, i.e. 86% of the land area, of which 20 million hectares is forest well suited to timber production. Of the forested area, 60% is privately owned, companies own 9%, and the State owns 24% and others, such as municipalities and parishes, own 5%. The number of private forest owners in Finland is 440,000, and the average area of a forest holding is 20–30 ha. 22% of forest owners are farmers and they own 33% of the private forest area (Karppinen et al 2002).

The significance of land-ownership and the change of agricultural and forestry methods can distinctly be seen in the broad landscape. They are significant factors in the visual appearance of the landscape, which is distinguished e.g. in the structure of fields and the borderlines of forest operations. Felled forest may open unexpected views either to lake sceneries or to ridges with another series of geometrically shaped, vertical clear felling coupes, distinct in the broad landscape (Figure 1.1.1). The borders of private ownership and the versatile needs of landowners can create unexpected geometrical shapes revealed in the landscape through forestry practices.

In Nordic countries landscapes are often fragmented due to the small size of private forest properties. Most farmers own small-scale forest lots where the areal co-ordination of forest management is often weak. However forest owners have shown an increasing interest in the multiple values of forests. Recent studies e.g. von Boehm (2008) have shown a distinct need for "greener" forestry planning, where the multiple values of forests are integrated. In fear of destroying the value of the landscape, and the recreation value and biodiversity of their forest lots, some forest-owners prefer not to implement felling at all. This trend suggests that the development of better tools to integrate landscape and biodiversity in forestry planning may form a crucial means of obtaining timber from private forests to paper mills, which have suffered from a shortage of raw material.

The recent discussion on revised forest and landscape policies also demonstrates the need for integrating landscape-planning tools into other forms of rural planning, such as forestry planning (Figure 1.1.2). Various landscape conservation measures in Finland have been applied, whose maintenance on a larger scale and in the long term may not have been on a permanent economic basis. Therefore a new awareness and tools are needed for integrating spatial planning in agricultural and forestry planning systems to prevent conflicting land use in landscapes of cultural importance. In order to achieve this goal, a new holistic methodology for understanding the forest landscape as a whole must be explored. A more comprehensive knowledge of landscape sub-factors and their interaction mechanisms are required for the process of planning and guiding landscape change (Landscape Character Assessment 2002).

Uniform forest guidelines have a tendency to produce uniform landscapes. Forestry guidelines are based on forest type classification, which reflect ground vegetation cover and soil fertility potential (Kuusipalo 1996). They are therefore bound to ecological factors. Bell & Apostol (2008) state that silviculture is not forest design, as it is practiced at site level, rather than at landscape scale, from "inside out" rather than "outside in" from forest to landscape, and is purely aimed at maximizing wood production.

However, a planning approach taking into account location has so far been missing in forestry planning. A planning method, which considers the location of the forest in the broad landscape, its ecological and visual factors, and furthermore that recognizes different forest

Figure 1.1.1 Seed tree felling on the skyline catches the eye in the cultural landscape of Tipasoja, Sotkamo, one of the case study areas. According to a survey on the village landscape, forestry operations caused the second biggest reduction in the amenity value of the cultural landscape of Tipasoja (27 % of the answers), while the unkempt roadside was the most important depreciative factor (36%), (Komulainen et al 2008).

Figure 1.1.2 New awareness and tools are needed for integrating spatial planning in agricultural and forestry planning systems to prevent conflicting land use in cultural forest landscapes. The various shapes of felling coupes on the slopes of Vuokatti in one case study area.

characteristics and unifies them as forest landscape types and finds appropriate management solutions, is needed.

On the other hand, a single inventory of viewpoints is not aesthetically and ecologically sustainable in landscape planning. Such an inventory is restricted to the analysis of views from only one or two directions and trusts in the shelterbelts of neighbouring forest in the design of felling coupes in the broad landscape. If another landowner independently felled forest on the other side of the lot border a clear cut would then stand out in the landscape.

Thus a developmental model, which concerns landscape ownership and integrates a multiple-use aspect in planning, would be an important step forward. The forest landscape typology considers ecological and visual factors to produce more ecologically, economically and socially accepted landscapes.

In reference to the discussion above on the limited economic resources of landscape management and the fragmentation of private forest lots, an examination of how to integrate a landscape planning approach into forestry practices at a farm-based level was chosen as the core issue in this research. The applied approach aimed to examine forestry planning practices tools, which could be utilised at farm level and in addition to create an understanding of broad landscape factors and natural landscape structure. Thus the theoretical landscape structure approach was combined with forestry planning practices. Such a reformulation of planning models is crucial in order to help us understand the variation that exists in different parts of the broad landscape.

The key question in this research was how to understand variations of the broad landscape and work in the practical context of fragmented private forests. Gustavsson & Ingelög (1994) discovered differences and variations in the broad landscape, meaning that problems, possibilities and optimal solutions can differ in different parts of the landscape. Uniform management activities create uniform landscapes, and may also be in conflict with ecological factors. Every landscape has specific features that call for an individual approach.

This leads on to the research question in this study; how to assess and understand variation between different landscape types, their character and sensitivity, and how to consider such characteristics within forest practices. The aims and research methodology were chosen on the basis of this practical core question, and they are further explained in the next the next chapter.

1.2 Aims of the study

The aim of the study was to examine a planning framework, which could guide forestry practices in a visually acceptable way in the broad landscape. The objective was to create a general framework to support practical planning activities and to identify the sensitivity, character and sustainable actions for specific forest landscape types. The choice of thesis subject was prompted by practical needs that arose in the discussion on landscape conservation and forestry, as referred to in section 1.1 of this chapter and Komulainen's (1995a) literature review on forest landscape management in Nordic countries.

The general research question above formulated a more specific research strategy *to explore the typology of Finnish forest landscapes by studying the case areas from different landscape provinces*. According to Meeus (1995) the typology is an attempt to generalise landscape characteristics and to formulate a basic framework for assessing how natural and anthropogenic factors affect the development of the environment. The typology could be an

instrument for developing sustainable management strategies and priorities in forestry planning and a guide to the sustainable development of nature resources.

In the study, the typology of Finnish forest landscapes was examined by studying the classifications of landscape types in eight case study areas. The classification methodology was chosen as the applied method based on the literature survey, which showed that landscape classifications have been used in shaping strategies for sustainable development (Meeus 1995) and integrating landscape considerations into environmental planning (Beer 1993).

Objectives of the study

The study focused on the following questions in the case studies: Are there differences in the characteristics of Finnish forest landscapes, which should be considered in forest management? Are there special landscape character types, which hold such unifying qualities as to be considered similar types, and distinguished from other types? What are these qualities, the visual problems caused by forestry and what are the preferred management alternatives?

With these research questions it was possible to formulate three main objectives for the study. Table 1.2.1 illustrates the objectives of this dissertation, the background to the study and their research approaches.

Objective	Background	Approaches and references in chapters
1. To examine and describe Finnish forest landscape types	To study the practical context of planning To develop a landscape type classification model for forestry	Literature survey (Chapter 2, 3) 8 landscape analyses in case areas in Finland (Chapter 5)
2. To evaluate the perception of forest landscape types and their preferred management alternatives	To evaluate the sensitivity and visual problems of landscape types	To compare the findings to preference studies related to case study areas (Chapter 4, 6)
3. To identify management models for landscape types	To formulate management models for forest landscape types based on the evaluation of qualities and visual problems in case study areas	Comparison of the findings of case areas (chapters 6 and 7)

Table 1.2.1 illustrates the objectives of this dissertation, the background and approaches to the study.

Objective 1 was **to examine and describe Finnish forest landscape types**. The aim was based on the practical need for finding a method to guide forestry practices to make them visually acceptable in the broad landscape (Komulainen 1995a). In order to classify the forest landscape types, Objective 1 was examined by analysing the differences and unities of types in eight case areas of various landscape provinces from Southwest to Northern Finland. The case study areas mainly represent nationally valuable landscapes or other cultural forest landscapes.

Objective 2 was **to evaluate the perception and management alternatives of forest landscape types** by comparing the results of site studies to preference studies. The two preference studies were made in relation to the planning process, and they examined the perception, sensitivity and preferred management alternatives of forest landscape types from the viewpoint of local inhabitants and foresters. The above-mentioned preference studies are separately published as articles of "Karjalainen, E. & Komulainen, M. 1998: Field afforestation preferences: A case study in North-eastern Finland"; and "Karjalainen, E. & Komulainen, M. 1999: The visual effect of felling on small-and medium-scale landscapes in North-eastern Finland".

The Objective 3 was **to identify management models for forest landscape types** in cultural forest landscapes by comparing the analyses of case areas. The goal of Objective 3 was to discover whether common interaction between the areas existed and to create a forest landscape typology as a framework for considering the broad landscape in forestry planning. Finally, the results were discussed in the context of landscape planning research and the practical environment of forest landscape management.

The research objectives were based on the following assumptions:

1. The structural and spatial differences of forest landscapes can be classified according to the landscape structure theory.
2. Classification can introduce different characteristic landscape types in forest areas.
3. Common forest landscape type interaction between the case study areas can be identified.

Objective 1 the "description of Finnish forest landscape types" is based on the assumption that the structural and spatial differences of forest landscape types can be classified with the help of the *landscape structural theory* and the variety of characteristics in the forest landscape can be examined. The hypothesis is based on the theory of landscape structure zones, which can be distinguished according to topographical-geological, hydrological, microclimatic and biotic factors (Veisterä 1988, Rautamäki 1990, Panu 1994).

Why should landscape classification theory be of such importance in the planning of forest landscapes that it has become the cornerstone of this study? Forest areas are not uniform in their characteristics, in fact they comprise of a variety of locations, ecological factors, tree species, scale of visual sensitivity, and not least of varied cultural contexts such as local land-use history and landowners' values. Therefore similar landscape management practices are not necessarily applicable from place to place. For example, attempts at creating highly-valued landscape types such as semi-open pasture woodland or mature mixed pine-birch forests cannot succeed everywhere, although such landscape types are highly valued by Finnish people (Kellomäki 1975, Karjalainen 2006). The problems, opportunities and optimal solutions can differ according to landscape type (Gustavsson & Fransson 1991, Rihtniemi 1995). Landscape recreation studies show that people value a variation of landscape types in the environment (Axelsson-Lindgren 1991, Karjalainen 2006). In consequence, creating a gradual change of landscape types or tree species may enhance the vividness of the cultural forest landscape.

Thus the description and classification of forest landscape types based on landscape structure was assumed to provide an applicable planning framework for the cultural forest landscape. The visual and ecological assessments of the case study areas provided a basis for identifying the landscape types and formulating landscape management alternatives. *The aim was to create a typology within the categorized types, whose internal qualities were as uniform as possible inside the type group, but whose external characteristics differed from other landscape types* (Figure 1.2.1). For example summit forests may have common qualities in various landscape provinces, which differ from the qualities of edge forest, thus resulting in different management objectives for the type in question.

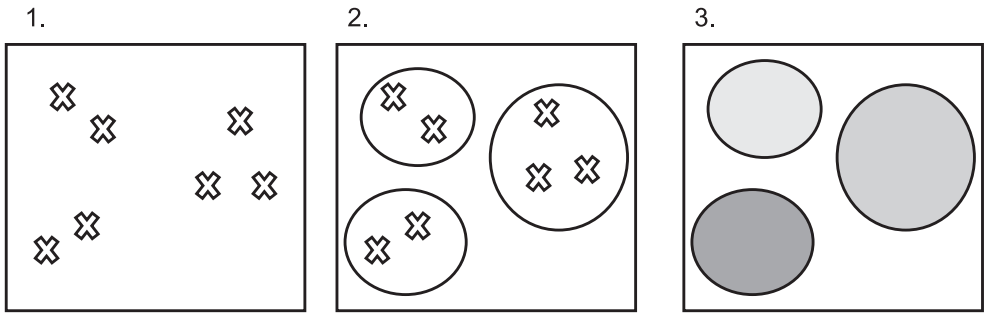


Figure 1.2.1 presents the hypothesis and factors of the studied phenomena. Objective 1 refers to the hypothesis of "finding the variety of characteristics in the forest landscape". Objective 2 examines the "unifying visual characteristics classified into similar types"; and finally Objective 3 summarises the "description of the qualities, visual problems and management alternatives of perceived types".

The results of typology depend upon the used criteria (which in this study is the landscape structure theory) and the qualities of the classified areas in general. Laurila (1994) mentions in relation to the construction of typologies that certain areal characteristics have to be generalised for the total area or class, although there might be a certain variation within types (sub-type). Typologies can still be considered as a useful research tool for examining rural areas (Katajamäki-Rajakallio 1993).

Objective 2, "evaluating the perception and management alternatives of forest landscape types" is based on the hypothesis that "classification can introduce different character types in the forest areas". It examines and deepens Objective 1's hypothesis by assuming that there are differences in the broad landscape, particularly in their sensitivity to change and visual appearance. Objective 2 focused on *evaluating possible differences between landscape types, and how to take into account such qualities within forestry practices.* This information formed the background data to formulating landscape types still further. Hence the distinguished types could be combined with similar types.

Objective 3, "to identify management models for landscape types" was based on the assumption that it is possible to find a common interaction of types between the case study areas and to create a forest landscape typology as a framework for considering the broad landscape in forestry planning. An assessment of forest landscape types would integrate structural features and visual characteristics forming a practical planning method for producing the information needed in forestry planning. By means of the case study descriptions the qualities,

visual problems and management alternatives of perceived types can be summarized. The method was also used to produce information about the morphology and spatial structure of the landscape, and to determine the location of each stand in the broad landscape, thus deriving the potential characteristics, visual problems and management alternatives from the case areas. The validity of the third hypothesis was evaluated by comparing the site studies.

The studies of Karjalainen & Komulainen (1998, 1999), Karjalainen (2006), and Komulainen (1995a) suggest that in versatile and attractive environments, e.g. the cultural forest landscapes of the case study areas, the way forest felling is implemented, is more significant than in less attractive, ordinary environments. Thus forestry practices based on a forest landscape typological model may be more socially acceptable and ecologically sustainable in cultural forest areas.

1.3 The structure of the dissertation

The study followed action research strategies and utilised case study as its epistemological base. The applied methods of this study were qualitative and hermeneutic in character involving a literature survey, map and site survey of case areas, and the classification and description of types. Various methodological approaches have been used to gather the data of this multi-disciplinary research, aiming to integrate the versatile approaches of the forestry and landscape architectural planning sciences. The importance of an integrative approach has been discussed where one theory is not capable of explaining an entity, but several parallel theories of various disciplines are needed, which are guided by a common holistic approach based on reality (Stenros 1992).

Furthermore, Karjalainen (2006) suggests that different scientific approaches can be combined into a theoretical framework, as landscape perception and preferences are complex, multidimensional phenomena. For this reason, these phenomena should not only be studied from an interdisciplinary point of view based on common theories but also through different disciplines, methods and assumptions to gather the various threads of appropriate knowledge. However, the same research objectives can also be studied by applying various approaches. The integration of all the knowledge produced by a variety of approaches is essential to gain a more thorough comprehension of landscape preferences and planning.

The purpose of this work was to study the above phenomenon by assessing the practical planning tools suitable to adjust the impact of changing rural livelihoods in the landscape. In order to achieve this goal, it was first necessary to examine what types of operations stakeholders considered acceptable. After the preference studies the study aimed to clarify the relationship between the forest landscape types of the actual planning cases and preferences.

Thus the research strategy of the dissertation is described in figure 1.3.1. The Borg & Gall's (1989) action research development strategy was applied to provide the process model in the research and development process of the case studies.

Chapter 1 evaluated the background of the research topic, the factors that alter the cultural forest landscape and its development challenges in the forms of biodiversity, the rural economy and land-ownership. Consequently, this led to a needs-analysis determining the themes to be developed for the landscape to be considered in forest planning and management systems. Furthermore chapter 1 set the framework and objectives of the study and described the applied research approaches.

Secondly, Chapter 2 examines the context of nature resource integrated planning. As a literature survey it reviews the historical patterns of forest landscape, forest aesthetics, the

multiple-use of forests and the participatory approach in rural development. It studies the framework of landscape policies, legislation and subsidy programmes launched to support landscape conservation and management in general.

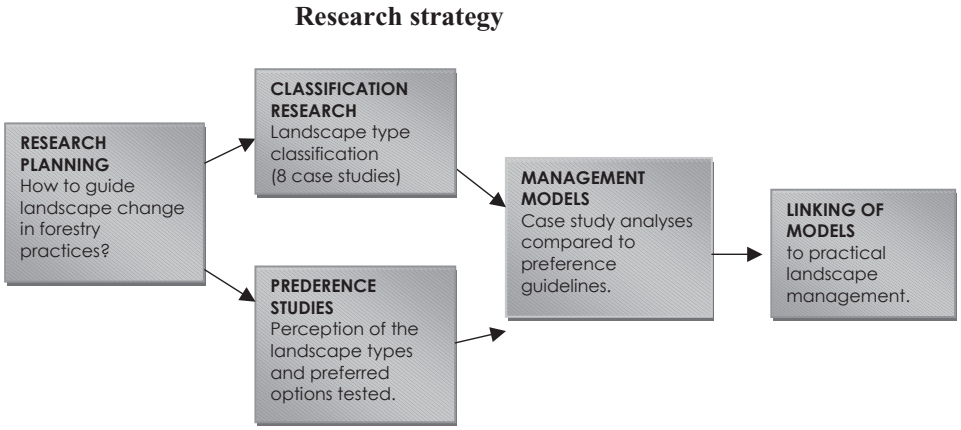


Figure 1.3.1 The Research strategy of this study followed the action research development strategy, which consists of the following phases: data gathering and its formulation, developing the hypothetical model, its on-site testing and adjustment according to feedback.

Chapter 3 discusses the concepts of landscape, sets the foundation of the philosophy of science approaches of the study. Planning methodology and landscape classification research is reviewed from the scientific literature. Based on the above overview, an assessment of the foundation of the applied landscape structure theory is discussed from the viewpoint of cultural forest landscape planning.

Chapter 4 presents the research materials and methods and discusses related empirical preference studies on the perception of forest landscape types and preferred management alternatives (Karjalainen & Komulainen 1998, 1999), with which the preliminary classification is compared the case study areas. The fact that the studies indicated differences in landscape types, particularly in their sensitivity to change and visual appearances, was the basis for further developing the classification.

The forest landscape types were then examined in the case study areas. Chapter 5 provides the summary of the eight case studies of various landscape provinces from Southwest to Northern Finland. Different forest landscape types in the landscape structure were described based on location and their characteristics were classified according to typical qualities.

Chapter 6 evaluates the classification by comparing the similarities found in the landscape types of the case study areas. The case study analyses were then compared to the related preference studies. Combining the two approaches of planning science and preference research, a forest landscape typology was formulated as a framework for considering the broad landscape in forestry planning.

Finally chapter 7 summarises the results and discusses them within the framework of landscape research. Furthermore it evaluates the validity and reliability of the study, and suggests future research perspectives based on the results.

Defining the study

This study focused on *cultural forest landscapes*. The case study areas were mainly nationally valuable landscapes (Ruissalo, Melalahti, Vuokatti, Naapurinvaara, Häntälä, Peränne), other cultural landscapes (Tipasoja) or natural heritage areas (Koli). The case study areas were selected as a result of applied landscape projects carried out by the researcher Minna Komulainen as a landscape planner during 1989-2008.

The case areas consisted of villages, which actively initiated the planning process and received external funding for integrated planning, often for their nationally valuable landscape areas or other important cultural landscapes. Thus the selection of case study areas does not equally cover different landscape provinces in Finland, nor commercial forests. Commercial forest areas generally lack external financial resources and are generally planned with ordinary forest planning tools. Since the examined areas focused on cultural forest landscapes, the direct application of the results of the research to commercial forest areas may be restricted. The applicability of the results is further discussed in chapter 7.

Secondly, the study mainly focuses *on the impacts of forestry and agricultural activity*, which are often the main livelihoods influencing the rural landscape. In addition the landscape's composition is also appreciably affected by other forms of land-use such as the location of roads, power and water lines, and construction sites. Land-use such as the above is not evaluated in the study, as they are planned and regulated by other systems. Furthermore the effects of construction and land use planning on landscape have been studied, e.g. Rautamäki (1990) by examining the landscape types of Southwest Finland for land use purposes. Aarrevaara and Kukkonen (1993) classified traditional building styles in Häme, in Central Finland. Antikainen (1996) examined the consideration of landscape in land consolidation processes in Central Bothnia.

Land use planning approach for landscape management is not covered in this study, since the Finnish countryside is not included in detailed regional plans. Moreover spatial planning does not include a detailed landscape management tool for natural elements like forests, in spite of setting some restrictions.

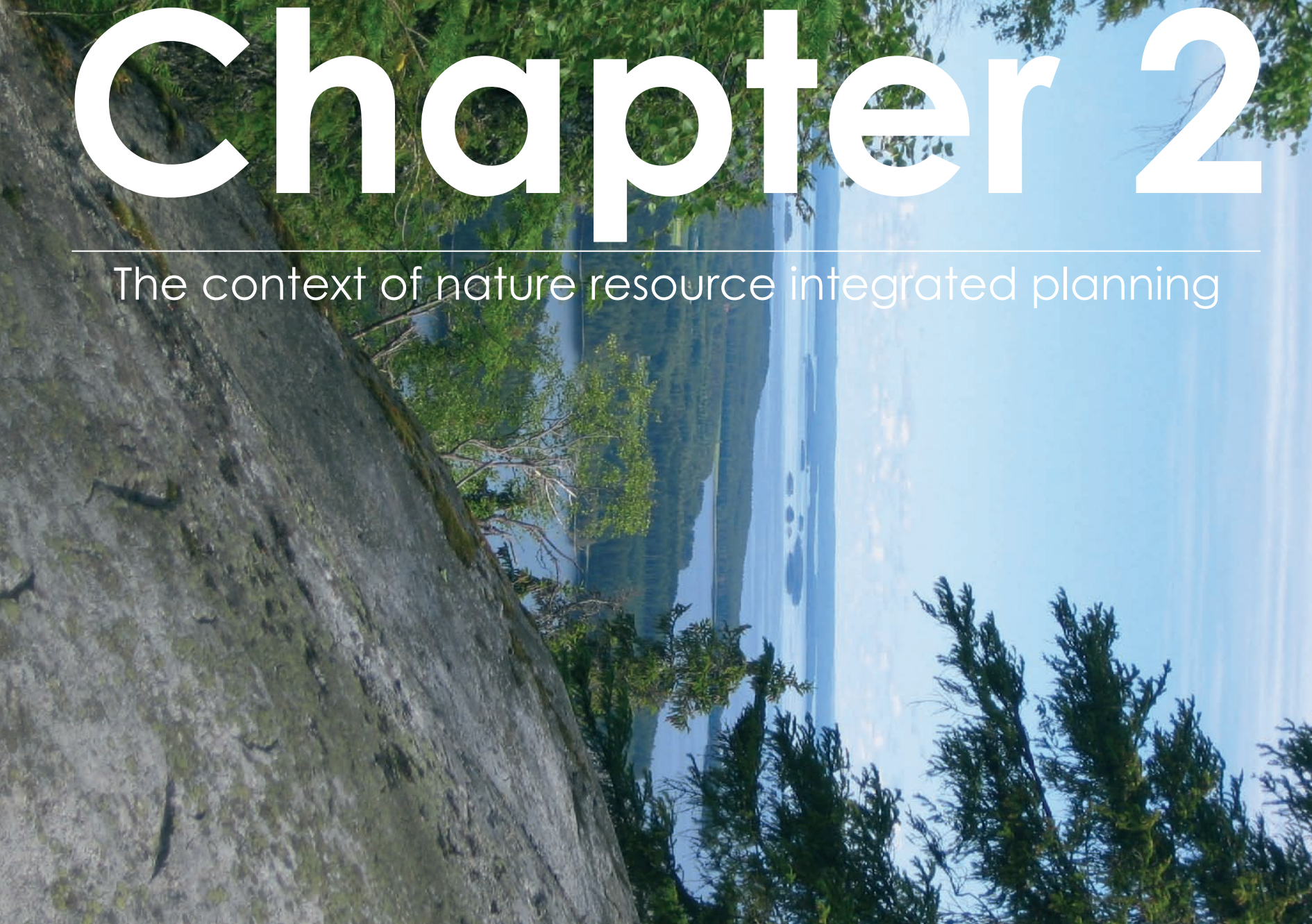
Participatory planning and dialogue between experts, authorities and landowners is an important process in the planning of rural landscapes. This process was examined in my licentiate study, "Living Landscape! – Participatory Planning as a tool for Rural Development" (Komulainen 1998), where the methods of raising awareness of landscape issues in villages and the land-owners' objectives and engagement in landscape management were studied using follow-up questionnaires. Several of the studied villages (Melalahti, Peränne, Häntälä and Naapurinvaara) were the same as in this study.

In order to avoid repetition, the methods of participatory planning are not reviewed in depth in this study, although the gathering of the many different objectives of landscape management formed a part of the planning process in the villages. The summaries of the case studies reflect this particular dialogue in Chapter 5. To define this work, it has been necessary to focus on an expert methodology so as to find and describe the forest landscape types within the case areas.

In general, the study seeks to produce knowledge about rural landscape planning. The results of the study can be used for defining a landscape's local value for planning and agri-environmental support systems in the forestry sector, and for the agricultural and environmental authorities. The context of nature resource integrated planning is discussed in the following chapter.

Chapter 2

The context of nature resource integrated planning



2 THE CONTEXT OF NATURE RESOURCE INTEGRATED PLANNING

2.1 Historical patterns for forest landscape in Finland

Forest Aesthetics

Since ancient times, the forest landscape has been a part of the everyday Scandinavian living environment. Aesthetic experiences are perceived when moving through the landscape and when viewing the landscape from a distance. Human beings have a need for beauty, security and variation in the landscape where they live (Landskapsplanering... 1992). The forest landscape is perceived as elements (colours, smells, sounds), visual qualities (space, shapes) and qualities like unity, contrasts and scale (Sepänmaa 1987, Horelli 1982). While observing the environment, one also judges its aesthetic quality (Sepänmaa 1986).

Aesthetic qualities have been studied by assessing the beauty of forests, regarding them as aesthetic objects (Sepänmaa 1986, Borup 1991). Forest aesthetics describe the aesthetic experience as a result of different senses in a cultural context. According to Sepänmaa (1987), the Forstästhetik can also mean principles of aesthetic forest management. This concept was first presented by a German, Heinrich von Salisch (1885).

Forest landscape contains many immaterial values, which vary according to cultural history, traditional land use and architectural style (Linkola 1983). Landscape values seem to reflect the cultural heritage of the country. The character of the northern Scandinavian landscape is wild, natural and closed, due to forests. It differs from general landscape aesthetics in Germany and England, where the cultivated landscape is more common in terms of the everyday landscape.

The aesthetics of Nordic forests has been studied from landscape paintings, literary descriptions and folklore (Schulin 1949, Sepänmaa 1978). Perception studies measure the landscape values of modern people, but the roots of these values have been affected by cultural history. In a study of landscape heritage, forest aesthetics may explain why certain landscape types are respected. Some landscape values remind us of archetypes in people`s minds, and some come from works of art (Reunala 1987).

The Finnish landscape is a typically small-scale forest landscape, where lakes, fields and cutting, create a fragmented variation. Forests also surround cultural landscapes. Forest management has a great impact on landscape, and the abrupt changes due to geometrical felling has provoked strong criticism against the forest industry, especially agaist clearcutting. Such changes also gave rise to debate in the Finnish media between the 1980's to the end of the 1990's. Thus it became more important in forest management to adjust the needs of the economic use of forests to other forest values. Experience of the landscape is related to perception. Human perceptions, in turn, are the product of the knowledge system of which the individual or community is a part. All knowledge systems, whether traditional or formal reflect the history of ideas as much as an objective body of scientific facts (Millenium Ecosystem Assessment (2005).

Chapter 2 reviews the different trends in forestry, environmental policies and guidelines in different time periods and discusses the context of nature resource planning. Both the landscape experience and Nordic forestry have changed in the course of time (Geelmuyden 1989). According to Miettinen (1993), the consideration of beauty in silviculture in Finland can be divided into three time periods:

1) Time before the First World War (before 1917):

Forest aesthetics was developed according to central European models. Beauty was presented as part of an idealistic education; the beauty of forests occurred in managed forests.

2) Time from World Wars to 1965:

Silviculture has developed into an independent sector. Vividness of forest views was created through ordinary timber management, and through the management of park forests, sceneries, forest edges, and also through protecting forest for nature conservation purposes.

3) Time from 1965:

Beauty was included in the new concept of multiple-use forestry. Landscape research started.

History of Forest Aesthetics

In the 19th century, farmers and traditional land use shaped the forest landscape. The forest was a setting for their everyday life; it was used for grazing and shifting cultivation (Linkola 1983). The natural landscape was increasingly transformed into fields and meadows. In the past, landscape experience was limited to the use of the forest landscape; collecting wood, grazing and hunting, whereas nowadays aesthetic feelings aroused by forests are more connected with recreation or the scenery of surrounding areas (Geelmuyden 1989, Keisteri 1990a).

At the end of the 19th century, untouched landscapes were seen from a romantic point of view (Borup 1991). This was related to the nations' birth, identity and development. For example, in Norway and Finland, where economic development went hand in hand with strong cultural identity, natural resources, including forests, were respected (Geelmuyden 1989).

In Finland, the myth of landscape heritage generally applies to areas where the natural elements of landscape are in powerful contrast (e. g. narrow eskers surrounded by water) and where human activity has had only a slight influence (Antikainen 1993a). The earliest idea of nature and landscape can be found in the national epos, Kalevala, collected by Elias Lönnrot in 1835. Its landscape aesthetics reflect the Finnish natural landscape, with forests and lakes, and also the use of forests for shifting cultivation (Sihvo 1984). Ancient people and traditional land-use seemed to recognize and follow the natural structure of landscape, as the hymn of Kalevala below (Lönnrot 1835, translated by Schoolfield et al 1988), describes how the Spirit of Arable Sampsa, sowed trees during the Creation.

The Spirit of Arable, Sampsa sowed the hills with pine,
sowed the knolls with stands of fir,
the heaths with growth of heather,
the dells with young undergrowth.
He sowed birches in swales, alders on light-soiled lands,
chokecherries he sowed on moist spots,
sallows in wet lands,
rowans in holy places, willows on flooded lands,
junipers on barren lands, oaks by the sides of a stream."

Appreciation of natural landscapes arose in the 19th century. The expansion of shifting cultivation moved the border of wilderness landscape to eastern Karelia and North Finland. Wild natural landscapes were appreciated in Finnish painting and literature. Scenes with lakes and forest-growing eskers from the Finnish Lake District were represented as an ideal landscape. An ideal northern panoramic landscape was presented by the poet, J.L. Runeberg

(Laitinen 1984). His descriptions of summer time scenery, the small-scale variation of woods, lakes and fields became the archetypal landscape for Finns. Even nowadays, the most appreciated landscapes are areas where many landscape types meet.

Later this symbolic and ethical landscape became more recognised and located in a certain area (Klinge 1984). A Finnish writer, Zacharias Topelius, described the character of different landscape areas in his poems and writing. He appreciated the mild, cultivated landscape, but also described the wild forest landscape. Topelius named the three main elements of the Finnish landscape: granite rocks, coniferous woods and lakes (Suutala 1986). Also the contrasts in topography and the verdure of the shifting cultivated birch forests were important in his descriptions. Many landscapes presented in *"Our Country"*, a famous book on Finnish geography, history and folklore, written by Topelius in 1887, are nowadays appreciated by Finns as landscape heritage. For example, the Punkaharju eskers and the Puijo hill offer famous views over blue lakes, seen from a high hilltop, and through crooked pines.

At the end of the last century, national landscapes started to reflect the people's image of their home country. Artists like Axel Gallen-Kallela, Jean Sibelius, and other "Karelianists" travelled to areas of Kalevala`s birthplace. In their works, the panoramic landscapes, for example, from the Koli ridge or from esker areas, represented the genuine Finland. Coniferous forests became symbols of wild, free and untouched nature, located in the hinterland or the border zones of culture. Groves and broadleaved trees symbolized the expansion of culture and civilization (Julkunen & Kuusamo 1987). For example the writer, Juhani Aho (1893) divided the landscape of Koli, one of the most famous national landscapes, into the wild, heathen eastern panoramic landscape and into the Christian, shifting cultivated landscapes dominated by deciduous trees.

Figure 2.1.1 Traditional shifting cultivation in Koli in 1893 by I. K. Inha.

Landscape experiences are related to cultural context. Appreciation of landscape types has become more diversified. In the beginning of the l9th century, only cultivated landscape was highly appreciated - virgin nature meant chaos and a threat. Romanticism brought appreciation of the wilderness landscape: cliffs, wind-broken trees and a stormy sea. But it was not until the beginning of the 20th century, with the rise of nature conservation, that a monotonous natural landscape, like a plain bog, and the outer archipelago, also started to represent the beauty of virgin, barren nature (Sepänmaa 1978).

Foresters as managers of nature and landscape 1880-1950

As the first foresters learned methods of silviculture from Germany in the 19th century, they were also influenced by the cultural era of National Romanticism (Geelmuyden 1989). In Scandinavia, discussion of forest aesthetics started in the late 19th century when the Dane Opperman (1897) wrote of a Romantic point of view on nature in his book "Skoven, Skovbruget og Det Skönne" ("Forest, Forestry and Beauty"). He was inspired by von Salisch's book "Forstästhetik" (1885), where aesthetics was connected to silvicultural methods. Opperman points out that the beauty of forest is born from contrasts in environment, and the forest should give an impression of nature, not culture. These principles of forest aesthetics were carried further by the director of State Forests, Lorenzen (1918), who said that it was the forester's duty to conserve and create beauty (Borup 1991). This same thought was also emphasized by the Finnish silviculturist, P.W. Hannikainen, who wrote already one hundred years ago of how foresters awoke negative feelings in the public when forest practices were carried out against naturalness and a sense of beauty. According to him, economic benefits and aesthetics exist side by side in forestry (Hannikainen 1893).

With knowledge of natural sciences and wide experience of the state of forest nature during the intensive shifting cultivation period, foresters also were active in the newly founded organizations for nature conservation (Reunala & Heikinheimo 1987). The idea of protecting the most sensitive and beautiful areas was suggested by the first Norwegian foresters, P. Chr. Asbjörnsen and J.B. Barth, in 1864 (Geelmuyden 1989). In Finland, A.E. Nordenskiöld was the first to present the idea of establishing state-owned nature parks in 1881. Due to his famous suggestion, intensive discussion started in scientific societies. The Forest Research Association suggested the establishment of national and nature parks in Finland in 1906. In 1910, the National Forest Board started to protect valuable areas in state-owned forests, based on Cajander's report (1909).

In eastern Finland, an intensive shifting cultivation culture developed in connection with the settlement of wilderness areas. By the end of the 19th century, it was estimated that there were around 4 million hectares of shifting cultivated areas, 20 % of which were without forest cover. The large burnt areas and signs of tar production in the Ostrobothnian region, in western Finland, provoked a fear of deforestation. Due to intensive shifting cultivation and selection cuttings by measure, the first forest law was issued to protect forests in 1886. It was emphasized that the "forests should not be devastated". This also formed the main principle of later forest laws (Reunala & Heikinheimo 1987).

In writings about the Finnish landscape, intensive human acts against the landscape were considered to cause destruction of aesthetic values (Inha 1925, Kalliola 1949, Sepänmaa 1978). A hundred years later, traditional land use and natural succession have made the shifting cultivated landscapes more harmonious and appreciable, due to the fact that these areas are now covered by beautiful birch forests.

The concepts of scenic beauty and ecological values were not especially emphasized in

forestry at the beginning of this century, but they were included in silvicultural methods (Geelmuyden 1989), when farmers were taught how to regenerate forests spoilt by shifting cultivation, tar production and by selection cuttings by measure. In Finland, the theory of natural forestry was developed by Erkki K. Kalela in the 1940's (Kalela 1949). According to Kalela, all management of forests should be done in such a way that man follows the natural processes.

In Finland, ideas of landscape aesthetics in forestry were promoted by Torsten Rancken and Reino Kalliola. They emphasized naturalness in landscape management, using biological laws as guiding principles of beauty. This differs from von Salich's Forstästhetik, where aesthetic management varies according to the styles being applied (Kalliola 1949). Yrjö Sepänmaa (1978) has classified Kalliola's aesthetic criteria with the following concepts: harmony, contrast, richness, economy, simplicity, wildness, elaborateness, purposefulness, changeableness, general opinion and knowledge.

Torsten Rancken developed the basis for modern urban forestry. He wrote about how forests should be managed aesthetically when located near towns, villages and recreation areas. He described how to manage trees to develop a well-shaped crown, how to open views and how to enhance views with solitary trees (Rancken 1956, 1964). In Norway, the concept of a park forest was created between garden parks and national parks, in 1945, to classify aesthetically important forests, which were managed by applying silvicultural methods (Geelmuyden 1989).

Landscape aesthetics and forestry were not in conflict until the Second World War. In this period, silviculture symbolized responsible management of natural resources and national values. Forestry and aesthetics had parallel management goals (Geelmuyden 1989, Reunala & Heikinheimo 1987).

Functional aesthetics and efficient forest management 1950-1970

A modern, rational forestry developed after the Second World War. It emphasized economic interests and technical skills, whereas ecological and aesthetic considerations became less important.

In the 1950's and 1960's, after an expansion of clearances even to the hinterlands, efficient timber management began in Finland. Soon after the guidelines of natural silviculture had been presented by Erkki K. Kalela (1949b), new technical skills made it possible to move from natural regeneration to cultivation-based forestry. Clearcutting and planting spread from Lapland to southern Finland. Other new forestry practices were also introduced: site treatment, ploughing, fertilization, and chemical weed and sprout control. Also, technology became more artificial, as machines started to replace man and horse in felling and in other forest work (Reunala & Heikinheimo 1987).

Clearcutting became a symbol of intensive forestry, alongside ploughing (Reunala & Heikinheimo 1987). Until the end of the 1960's, the size of clearcutting in Lapland could be thousands of hectares. When problems occurred in the reforestation of large open areas, strip felling became a common method of regenerating old spruce forests. The resulting rectangular shapes did not suit the landscape. Geometrical clearcutting and strips had already been used in the 1920's and 1930's on a small scale. When these methods were used in large areas, fellings were criticized.

During the same time period in Sweden and Norway, forestry was also rationalized and forest owners concentrated on maximizing their economic benefits from forests in the 1960's with a tendency to develop pure conifer forests while reducing the number of mixed forests

(Reunala & Heikinheimo 1987). Criticism of clearcutting started in the 1960's and led to revised forest legislation (Kardell 1991, Falk 1991).

Aesthetic considerations were featured in the Swedish forest law in 1993. It contained, for example, regulations on the size of clearcutting and the shape of the cutting area. However Kardell (1991) made the criticism that there was not much landscape management action in practice. In the period 1965-1980, the dominant type of landscape management involved opening forests along shores and leaving evenly spaced birches and alders.

2.2 The rise of multiple-use in forestry

The increase in manual labour costs and changes in values forced forestry to use more natural methods in felling and other operations. In the 1980's forest owners became more urbanized and for many of them, timber production was no longer the most important management objective. For more than 30 % of forest owners the main uses of their own forest were connected with recreation, i.e. free time use, or to affection for their home region (Ihalainen 1992).

In the 1980's, aesthetic trends showed a more ecological approach than before (Sepänmaa 1986, Geelmuyden 1989, Bramsnaes 1991). Functional and visual aesthetics adopted impacts generated by the rise in landscape ecological research (e. g. Forman & Gordon 1986). Sepänmaa (1986, 1987) pointed out the importance of ecological aesthetics, where the beauty of nature is not only the beauty of forms of visual appearance, but also the beauty of natural processes. In such processes forest aesthetics is based on a nature- and culture-ecological approach, where the appropriateness of nature is the criterion for beauty.

The basis for multiple-use forestry was clarified in Germany in the 1950's. Viktor Dietrich stressed knowledge of the complex interrelationships between forests and people as well as an understanding of the importance of forests to the economy and welfare in 1953 (Hytönen 1995). The main functions of forests have been grouped as utilization (Nutz), recreation (Erholung) and protection (Schutz) (Hasel 1971) and the social dimension of perception was added later (Fernand 1995).

The philosophy of multiple-use forestry started to evolve in the USA at the beginning of the 19th century, and became an official concept in 1960, when the Multiple Use Sustained Yield Act was passed. Later, professor Eino Saari brought the concept into Finnish forest discussion by considering the most important forest products, in addition to timber, to be water, outdoor recreation and wildlife (Saari 1962, Hytönen 1995). In the 1960's and 1970's Peitsa Mikola elaborated multiple use principles for forestry planning and silvicultural criteria for improving the amenity of forests (Mikola 1969, Hytönen 1995). In the 1970's and 1980's Saastamoinen and Kellomäki further classified forest uses as material goods, indirect impacts, recreation, scientific services, landscape and cultural functions of forests and nature conservation (Jaatinen & Saastamoinen 1976, Kellomäki 1984).

In the last few decades the multiple-use concept has gained a permanent place in forestry vocabulary. Its importance has been stressed at the UN Conference on Environment and Development, at conferences of European forest ministers and in other international forums. According to the Forest 2000 Programme, "multiple-use forestry means planned utilization of forest resources in such a way, that the various needs of people are satisfied sustainably and the total of material and non-material benefits, provided by the forests to the society, is as large as possible". Forests offer many non-wood benefits, such as recreation, biodiversity or landscape. These benefits are usually outside the markets and bring no economic benefits to the forest-owners. There is a need, therefore, for direct public financing to ensure the delivery of these public benefits (Kankaanpää & Carter 2004).

The significance of the multiple use of forests

In Finland all forest areas are available for recreation according to the doctrine of "everyman's right's". There are also a large number of designated recreation areas owned by government and municipalities. Areas most used for recreation are forests close to urban centres, lake and seashore forests, and forested islands in the archipelago as well as national parks and wilderness areas in Northern Finland (Sievänen 2001).

According to the Finnish "National Outdoor Recreational Demand Survey" (Sievänen 2001), outdoor recreation is an important component of the Finnish way of life, as 97% of Finns take part in some such activity during the course of the year, and two-thirds engage in outdoor recreation every week. The most popular outdoor pursuits are walking, swimming in natural waters, staying in summer cottages, berry picking, cycling, fishing, boating, skiing, mushrooming, and sunbathing on the shore. Three out of four Finns walk in the countryside exercising the Finnish public right of access to land, two out of five use municipal recreation areas, and one in five uses state recreation areas.

Forests provide the most important recreational environment for about 4 million Finns engaged in outdoor activities. About 56 % Finns pick wild berries and 38% forest mushrooms. There are 300,000 hunters and 2 million people engaged in recreational fishing. A considerable part of Finland's cultural heritage is tied to the forest in one way or another. The forests are of enormous material, recreational, spiritual and cultural value to Finland (National Forest Programme 2007).

The value of game and recreation is approx. EUR 75 million per year. Forestry has an effect on wildlife food, shelter and welfare. In general, environmental prerequisites aimed at preserving wildlife can be taken into account in forest management. Variation of small forest stands will often provide the majority of wildlife species with a favourable mixture of varied tree species, old and young forests, clearings and shrubs. Reindeer husbandry is a characteristic source of livelihood in northern Finland, with an obvious economic and cultural influence (National Forest Programme 2007).

In addition to cultural landscapes, forests themselves are cultural environments in the sense that Man's influence can even be seen in the most remote forests. In addition to forestry history such as logging areas and camps, floating huts and other constructions, the forests hide traces of early Finnish settlements, cultivation and war history. Mechanical timber harvesting, soil preparation and forest road construction can easily destroy prehistoric remains and other sites of cultural and historical value. On the other hand, reforestation and afforestation obscure all such sites. Therefore forestry should pay more attention to sites with cultural and historical value by intensifying co-operation with the antiquities authorities guided by Regional Forest Programmes (National Forest Programme 2007).

The multiple-use of forests provides opportunities for expanding and diversifying business activities and employment connected with the forests. Multiple use entrepreneurship, such as the gathering of natural products and their processing, tourism and various forms of recreational and trekking services provide new opportunities for business ventures which can help to preserve rural society (National Forest Programme 2007).

The future demand on forests for recreation and nature-based tourism is expected to become one of the major and increasing uses of European forest resources in the future (Kankaanpää & Carter 2004). In addition to national parks and other protected areas, commercial forests provide a good tourist attraction. For tourism it is vital that the forests are managed according to the principles of sustainability and that outdoor recreation services are managed with proper public funding. Forest roads also play a significant role in outdoor rec-

reation and tourism. There are development needs in the processes of creating nature tourism services linked with nature tours, including product-development and marketing (National Forest Programme 2007).

2.3 Towards Participatory Planning Approach in Rural Development

The landscape is an important part of the quality of the environment. Moreover a well-managed landscape reflects the activity of various livelihoods. The landscape is the central resource of rural economic operations such as nature tourism and farm tourism where the attractiveness of the environment, especially of the landscape, is crucial in addition to the quality of service (Ministry of Agriculture and Forestry 2007). A pleasant environment, natural landscapes and well-managed cultural landscapes are factors that can be used to tempt new inhabitants, people with second homes, entrepreneurs and employees to rural areas and also to reduce the desire to move away from rural areas (Ministry of Agriculture and Forestry 2007).

Unmanaged, overgrown landscapes are a sign of decreasing agriculture and other village business activities. According to the Selby & Petäjistö study (1995), field afforestation has a negative effect on business activity in the countryside. Rural landscapes and nature biodiversity are closely integrated with agriculture, forestry and other forms of livelihood, such as small enterprises (Vierula 1995).

Actual landscape alteration measures are not only in the hands of landowners or planners, but are also deeply affected by rural policies. What opportunities do policies and planning create on a large scale for landscape management? Friedmann (1973) emphasises the meaning of planning as a guide to change. Local landscape planning can attempt to guide landscape change, although independent factors e.g. the climate, changes in livelihoods also play their part. Landscape planning is especially needed not only in newly founded landscape conservation areas and nationally valuable landscapes, but also in every-day human landscapes.

Landscape management goal formulation is a complex process. The aims of landscape conservation are not clearly formulated, as they reflect the ideologies and policies of various interest groups (Rønningen 1993). Thus a communicative approach is needed to involve the stakeholders in the planning process dialogue. According to Michael Jones (1988) various groups see the landscape differently; the landscape has different meanings to people, depending on ethnicity, economy, class and academic training. In Denmark an investigation of preferences of various social groups for recreational landscapes was carried out. Significant differences were found, as the group of academics and upper class people preferred landscapes that seemed untouched and desolate, while workers seemed to prefer more cultural landscapes (Jörgensen & Framke 1986). Also different professionals, environmentalists, landscape architects, sociologist have different approaches to landscape. The cultural landscape has become an academic battlefield (Jones 1991), as various groups try to justify their influence.

Rønningen (1993) asks: For whom are we actually planning, conserving and maintaining cultural landscapes? And who is to decide what should be conserved? These clients could be:

- The users of landscape for recreation and experience - the public
- Landowners: people living on and off the land
- Professionals
- The landscape itself, eco-centric way

Rønningen (1993) doubts that only landscape managers could manage large areas. It is unlikely that society would be willing to pay for the large-scale imitation of traditional farming methods. Furthermore, these would be artificial landscapes, not based on production. How to conserve the traditional landscape, when the methods of agriculture are changing and the number of people and grazing animals in the countryside is decreasing? How to integrate aesthetic values into present agricultural production, rural services and everyday actions? Implementation of landscape management on a wide scale requires more cooperation and participatory planning between the interest groups of land use planners, rural authorities and inhabitants. However, according to Rønningen (1993), the important factor shaping future landscapes is rural and agricultural policy and economic development.

According to Primdahl & Brandt (1997) the CAP (Common Agricultural Policy) had a strong influence on rural land use and growing interest in nature conservation. In the 90's, there was a change of payments from production-based towards land-based subsidies. To understand rural changes and landscape dynamics, public regulations are an important framework incorporating the relationships between agricultural land use, landscape structures and landscape values. Most regulations affect farmers'/owners' behaviour, rather than the landscape directly therefore, we also need data on farmers' decisions concerning landscape changes.

Farmers' decisions are not only affected by public regulations. Technology, socio-economic, cultural values and the natural environment are all important factors. Public regulations of agricultural decision-making are the oldest parts of public regulations, e.g. "Landscape Acts" common in Nordic Countries in Medieval times. In the post-productivist process of the 1990's, there was more emphasis on non-agricultural aspects of landscape use. To study the processes in their total context, which is clearly necessary, a case-study approach is required. Landscape management is a complex problem, e.g. some farmers do not even apply for environmental subsidies. The CAP also had strict regulations, e.g. only active farmers could receive the subsidies, causing 'white areas', i.e. unmanaged pieces of land within the landscape (Primdahl & Brandt 1997).

There is a growing awareness that agriculture also produces environmental values that are not covered by subsidies, as they are the external effects of agricultural production. Such environmental values have been regarded as a collective good, which is difficult to price. Through the agri-environmental scheme, society had shown willingness to pay for landscapes possessing certain environmental qualities. There is little doubt that the conservation and management of the rural landscape serve at the same time as a legitimisation for agricultural policies and as a survival strategy for the agricultural sector (Rønningen 1998).

According to the European Spatial Development Perspective (ESDP 1997) agriculture, landscape, natural environment and tourism are interrelated and interdependent. ESDP (1997) also states that landscape development is inextricably linked to other land uses; it cannot be isolated from other land-use.

Thus it is evident that most regions depend on a set of combined economic activities, to which farming and forestry provide the basis. Forestry, agriculture, tourism and reindeer husbandry comprise other land use interests that are to a certain extent interdependent and also in conflict. The development of better landscape planning in connection with physical and traditional economically based planning systems may therefore be crucial to future rural development (Rønningen 1998).

In table 2.3.1 the main challenges of rural landscape planning and management are evaluated. As outlined in the literature reviews above, the decline of cultural landscapes and species could pose a major threat to landscape variety. Such a decline could lead to the visual

and ecological impoverishment of landscape characteristics, if diversity and shapes are not taken into account e.g. in afforestation and in the design of felling coupes. Komulainen's (1998) licentiate study on rural landscape planning pointed out that there are, however, many advantages to landscape management in rural areas.

The results of the preference studies related to the case study areas (Karjalainen & Komulainen 1998, Karjalainen & Komulainen 1999) suggest that in landscape heritage areas or in areas of high amenity value, there may be more local interest in or appreciation of landscape management than in more ordinary forest areas, as afforestation might be more distinguishable in valuable landscapes. On the other hand, less attractive environments are often areas where landscape management could increase the value of the landscape. In general there is often local interest in improving the landscape which is also an important asset in the implementation of landscape management, activated at village level through participatory planning with residents.

STRENGTHS	**WEAKNESSES**
Attractive nature attracts local interest	Problems in implementing plan
Participatory planning	Lack of occupational guidance
Positive attitude towards landscape planning	Little knowledge of methods
	Restricted funds
	How to support forest -owners to implement plans?
	Visualisation techniques to be developed
OPPORTUNITIES	**THREATS**
Improves living environment and attracts tourism	Visual and ecological impoverishment,
Development of local training in landscape management	Destruction of cultural landscapes
Attracts new inhabitants	Destruction of cultural species leads to monocultures
Employment opportunities	Afforestation of agricultural land
	Uncoordinated felling

Table 2.3.1 The SWOT-analysis presenting the main problems and challenges of forest and agricultural-related land-use and landscape management in the Finnish countryside (Komulainen 1998).

Weaknesses may arise when landscape management plans are put into practice because of restrictions in funding and the engagement of landowners. However the revised EU agri-environmental support system has widened funding possibilities to include associations. To overcome the weaknesses in landscape management new organizational and implementation models are needed. To solve the problems of implementation coordination, a number of measures and conditions would be crucial such as the training of residents in villages, knowledge of methods, more participatory planning with land-owners, new visualization methods, flexible funding systems and better quality management.

Different forms of agricultural production and farming methods and environmental management techniques can be distinguished in rural landscapes. In addition to agricultural production, agricultural landscapes are valuable as providers of intangible benefits, such as outdoor and recreational services. As the price obtained by farmers for their products drops, many agricultural policy forecasts expect the public good valuation of rural landscapes to rise even further. There have been several experiments with e.g. landscape agreements between landowner and tourism entrepreneurs concerning the conservation of the landscape for public benefit (Matila et al 2008).

Since the 1990's landscape, forestry and spatial planning have encompassed a more communicative approach. Instead of using a normative top-down process to implement plans, a rise in participatory planning methods in rural planning has become apparent. The planning cases, Leader-programmes and other financial agri-environmental programmes supported this growing trend.

Landscape approaches in forestry planning have varied depending on the tools available and the level of interest of planning groups. Local rural authorities and forestry centres have taken part in landscape development and multiple-use projects around Finland e.g. from Koli National Park in Northern Karelia (Antikainen 1993a, 1993b), from Melalahti village by Lake Oulujärvi (Antikainen & Tolonen 1994), from Ruissalo, Southwest Finland (Antikainen 1991, 1992) and from Peränne village in Central Finland (Matila et al 1995).

In the above landscape areas, planning has been widened to embrace total resource planning, into which the diversification of rural livelihoods has been integrated. After landscape planning and the defining of values had taken place, development work focused on the development of village products and entrepreneurship. In addition to village level development, agri-environmental and multiple-use forestry plans were made for the farms. Furthermore methods for surveying public appreciation of landscape values and the indicators to measure change in rural landscapes have been developed (Tyrväinen & Silvennoinen 2005, Tyrväinen et al 2007, Tyrväinen & Uusitalo 2005).

Civic activity and a community spirit involving cooperation between rural associations are the strengths of Finnish rural areas. Village activity and action group work, for example, are an indication of this, e.g. the Finnish Rural Women's Advisory Organisation has arranged yearly "Village Walks" with local village associations to study landscape values together. Revised agri-environmental funds include village association financing for landscape management purposes (Ministry of Agriculture and Forestry 2007). Furthermore Partanen et al (2008), Partanen (2006) and Rutanen et al (2008) put forward landscape entrepreneurship as a new operational model to conserve rural landscapes and natural diversity. An appreciation of landscape management increases with landscape management entrepreneurship and at the same time it also promotes agriculture and the landscape in a positive way.

The Rural Development Programme (Ministry of Agriculture and Forestry 2007) suggests that rural culture not only strengthens local identity but also creates opportunities for distinctive entrepreneurial activities and product development. Marginal areas could benefit from the increasing demand for quality agricultural products and green tourism, due to their well-preserved natural and cultural heritage, their local products and tourism potential (ESDP 1997). This is especially apparent in tourism and arts and crafts, which have become important sources of income in rural areas. Special area trademarks have been developed to benefit the integration of cultural heritage and regional traditions, e.g. Marchi D'Area (Parco Nazionale del Cilento e Vallo di Diano 2007).

2.4 Policies guiding landscape change

Agriculture and forestry are the two livelihoods, which most shape the rural landscape and come under the jurisdiction of European and national policies. Agricultural measures are supported by European regulations and financing programmes; while timber-management is mainly covered by national acts and grants. A number of national environmental policies related to landscape have been set up to guide landscape change processes in Europe, which also impact forestry.

According to Dramstad et al (2001) landscape changes depend on national and international agricultural policies. Their political, administrational and economic control, like various environmental schemes directly affect landscape state. Thus various landscape and environmental programmes have been applied in the EU and beyond (Heikkilä 2000).

Rapid internationalisation, the crucial importance of forests to rural livelihoods and to global environmental processes, as well as concern for the loss of biodiversity, have all led to international negotiations and treaties on the environment and forests during the last 20 years (Parviainen et al 2007).

Two major trends in the function and composition of forests are apparent in Europe. First, there has been a shift towards the multi-functionality of forests and a shift in emphasis of forests being seen as primarily sources of wood, to forests that fulfil a wide range of ecological and societal needs and uses. Second, forests have become substantially, but not exclusively, providers of environment and amenity related goods (Kankaanpää & Carter 2004). Therefore forestry guidelines and related environmental legislation in many European countries have been reformed a number of times.

The globalisation of the forest industry and Finland's European Union membership has increased the importance of international cooperation an international approach. Forest certification may also, when fully realised, affect the forest policies of Finland and many other countries.

The Framework convention on Climate Change and the Convention on Biological Diversity were concluded in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, which also adopted principles for the management, use and sustainable development of forests, the so-called Forest Principles (UNCED 1992). It was followed by the Ministerial Conference on the Protection of Forests in Europe in 1993 in Helsinki and other cities in Europe in 1993-2007 (Ministry of Agriculture and Forestry 2007). The UNCED process established a strong international background for the development of national forest policies. In all these connections the importance of national forest programmes has been stressed as a prerequisite for sustainable forestry. By now, almost every European country has developed its legislation, organisations and regulations to conform to the new expanded principle of sustainability (Kankaanpää & Carter 2004).

The sustainable management of natural resources and the preservation of cultural and landscape values are also included in the aims of the Pan-European Biological and Landscape Diversity Strategy (1994) and the European Landscape Convention (2000). The convention concerning the protection of world cultural and natural heritage (World Heritage Convention) is an international convention adopted by UNESCO in 1972. Seven sites in Finland are inscribed on the World Heritage list.

The importance of landscape has also been emphasised in the European Spatial Development Perspectives (ESDP 1997), which points out the importance of landscape planning as a tool for guiding landscape change. According to the policy report, the change and destruction of cultural heritage has occurred gradually, and it has been difficult to develop a specific

protection policy for landscapes, because the whole landscape composition provides value, not the separate elements of the landscape.

Later, the European Landscape Convention (2000) states the measures to be taken at a national and international level. It defines landscape as an essential consideration in striking the balance between preserving natural and cultural heritage as a reflection of European identity and diversity, and using it as an economic resource capable of generating employment through the increase in sustainable tourism. The Convention encourages the public and inhabitants to take an active part in landscape management and planning, and to take responsibility for what happens to the landscape. It defines the term "landscape policy" as a reflection of public authorities' awareness of the need to formulate an official landscape policy. Such policy sets out the focus, general principles and strategic choices by which decisions on landscape protection, management and planning are to be guided.

In order to organise landscape management, the Finnish Ministry of Environment has defined nationally valuable landscape areas, which are samples of the most typical and best preserved cultural landscapes in the Finnish countryside (Haapanen & Heikkilä 1993a, b). In this case, policy underlay the financial grants for the management of traditional cultural and natural landscapes programme. The recommendations of the nationally valuable landscape areas working group include that landscape management should be a focus for agricultural subsidies and livelihoods and the conservation of the cultural landscape should be an objective of decision-making concerning the countryside.

In the selection of nationally valuable landscape areas the Ministry of Environment strove for geographical equality and to find valuable areas that were representative of the regional landscape. In this way the national landscape province map was created on the basis of the selection (Haapanen & Heikkilä 1993a).

In the report, 156 of the landscape areas were identified as being important nationally. These areas represent the livelihood landscapes of primary production, mainly cultivation landscapes with arable land, building stock and wooded edge zones. The surface area of important landscape areas is 730 000 ha in total, of which about 300 000 ha are fields. The areas represent the most valuable and typical features of each landscape province. Furthermore, 27 landscape areas were designated as national landscapes (Putkonen et al 1993b), of which e.g. Koli national park was nominated as a national landscape. A national inventory of traditional rural biotopes was conducted in 1992–1998 (Vainio et al 2001). The inventory identified 3,700 semi-natural habitats, which had developed as a result of traditional agricultural practices.

The National Board of Antiquities surveyed and classified built heritage of Finland from an architectural, historical and environmental point of view in a nation-wide report on nationally valuable built cultural environments (Putkonen et al 1993a). A survey of built heritage completed in 1993 covered 1,772 valuable sites and areas whose value stems from an architectural heritage. The environments of these areas also include trees and edge forests. Built heritage has been transformed over a long period of time in the development of the multidimensional and layered environments that currently exist.

There are several guidebooks and recommendation papers, e.g. the Guide on Biodiversity in Agricultural Areas, which provide practical instructions on and examples of agricultural environmental management and encourage landowners to seek environmental subsidies (Maatalousalueiden lumoava luonto 2006). Practical handbooks, based on landscape planning research were also published, among others, the Urban Forest Management Guide Book (Komulainen 1995b) and in the articles of the Tapio Forestry Development Centre Silvicultural Handbook (e.g. Komulainen 1994).

Finland drew up a national action plan for biodiversity for 1997–2005 to promote the protection and sustainable use of biodiversity. On 21 December 2006, the government adopted a resolution on a strategy for the protection and sustainable use of biodiversity in Finland 2006–2016. Biodiversity in the agricultural environment is enhanced by the continual development and maintenance of the protection of semi-natural habitats and their species by also drawing attention to the maintaining and protection of everyday agricultural biodiversity (Ministry of Agriculture and Forestry 2007).

Forest programmes have played an important role in Finland both as an instrument of forest policy and in the provision of funding for forestry since 1961. The latest forest programmes have been The Forest 2000 Programme (Metsä 2000... 1985), the Environmental Programme for Forests in Finland (Metsätalouden ympäristöohjelma 1994), and the National Forest Programme 2010 (Ministry of Agriculture and Forestry 1999). Its aim is to secure employment and livelihoods based on the use of forests, the biological diversity and vitality of forests, as well as their recreational benefits.

The increase in environmental concern began as the consequence of changes in the international environmental policy of the 1990's (among others, the Conference of Rio 1992), which later led to the revision of Finland's forestry legislation. In the Forest 2000 Programme the multiple-use and, among others, landscape management of forests were mentioned for the first time. The Forestry Environmental Programme (Metsätalous ja ympäristö 1994) had been specifically directed to meet international environment challenges and landscape management was also briefly mentioned in this programme.

At the same time, there was an increase in landscape research caused partly by an increase in environmental policies and European ministries became interested in financing landscape research. Landscape research has sought to meet current challenges, under discussion within practical forestry. When forest legislation was reformed in the 1990's, the following research themes were raised for use as concrete planning indicators: the inclusion of landscaping in forest management, the design of felling coupes, and the location of afforestation in the cultural landscape, the determination of the most sensitive forest areas and the definition of visual problems associated with different landscape types.

Environmental principles were ratified in 1994 with the Environmental Programme for Forestry jointly produced by the Ministry of Agriculture and Forestry and the Ministry of the Environment (Metsätalouden ympäristöohjelma 1994). Based on this programme, various forestry organisations and forest industry companies have reformed their forest management instructions and recommendations.

The Forest and Park Service (Metsähallitus) produced guidelines on landscape and nature management in 1970 but only since the 1990's, has landscape management received more attention in instructions concerning State-owned forest. The environment handbooks of the Forest and Park Service appeared in 1997 and it also contained short instructions on landscape management (Korhonen 1997). The consequent environment handbooks appeared in 1997 and 2004 and included planning guidelines on how to consider the forest landscape (Metsätalouden ympäristöopas 1997 & 2004). In 2006, Metsähallitus prepared a Cultural Heritage Strategy for the management of state lands.

For private forests, the Tapio Forestry Development Centre published environmental guidelines and included landscape management in their silvicultural guidelines (Metsänhoitosuositukset 1989, Luonnonläheinen metsänhoito 1994, Hyvän metsänhoidon suositukset 2001 & 2006). However, these instructions were limited. Hence in 1997 Tapio and Metsäteho published a special Forest Landscape Management Guidelines edition (Hänninen et al 1997).

Ecological approaches to silviculture were also presented in a Swedish project called "Ståndortsanpassat skogsbruk", which can be translated "forestry following natural site variation" (Lundmark 1988), and in a campaign called "Rikare skog" (Richer forest) (Rikare skog 1990). Furthermore, the education program, "Det nya landskapet" (New Landscape) was launched to better adjust forest afforestation to the landscape (Gustavsson & Ingelög 1994).

Similar trends also occurred in other Scandinavian countries. In Norway, forest landscape and nature guidelines highlighted the importance of landscape in forestry due to increasing recreation (Landskapsvern… 1978). In 1989, the strategical guidelines of "Multiple-use forestry" (Flersidig skogbruk 1989) suggested that multiple-use be one condition for the receipt of state support for forestry planning.

In Denmark, the Forest Policy Committee established by the government in 1987 stressed that the multiple use of forests should be supported and enhanced, with special consideration of immaterial values, such as aesthetics and recreation. Later, in the 1989 Forestry Act, landscape aesthetics were mentioned to be one of the five aspects to be taken into account in forestry in addition to timber production (Koch & Kristiansen 1991).

In these multiple-use strategies, forestry organizations were revising their ethical responsibility in the light of ecological and landscape values. Because of critical arguments against the impacts of forestry operations on the landscape and nature, and threat campaigns in paper buying European countries, the interests of the forest industry and environmental activists started to find common ground (Geelmuyden 1989).

The importance of aesthetics in forestry increased because of tourism, urbanization and recreation. During the era of internationalization, it became more important to preserve the identity and local character of landscape (Algreen-Ussing 1992). Additionally, the increasing amount of threatened species also forced the forestry industry to consider non-material values more than before.

The National Forest Programme 2010 (1999), which was approved by the government as a part of direct national forestry policy, was drawn up on the basis of these programmes and it implements the objectives set out in the EU Forestry Strategy. The programme promotes environmental sustainability by reducing the harmful effects of forestry measures on the natural environment and by promoting the preservation of biodiversity of forest nature in commercial forests. It also takes into account traditional ways of using and managing forests, their cultural history and landscapes. It emphasises that multiple use of forest and diversity should be more widely financed under the Act on the Financing of Sustainable Forestry (e.g. forest landscape management).

Furthermore in its "Future Review for the Forest Sector" (2006), the Forest Council saw growing economic potential in nature tourism. The Council also stressed the importance of defining the non-marketable values of forests and assessing their value. The cultural and landscape functions of forests are also covered in the Natural Resources Strategy of the Ministry of Agriculture and Forestry, in agricultural policy programmes and sector programmes for agriculture, as well as in various regional and local development and environmental programmes (Parviainen et al 2007).

In addition to forestry and regional policy programmes, the main strategic instruments governing the management of forest landscapes and land use changes are the government resolution on national land use guidelines (VAT 2000) and the government resolution on nationally valuable landscape areas and the development of landscape management (VAT 1995).

However the report on Sustainable Forest Management (Parviainen et al 2007) pointed

out that the areas important for multiple-use are being treated as if they were commercial, timber-production forests. For example, clear felling takes place in hiking areas and municipal recreational areas, without real wood-production targets. This occurs, although the Forest Act would allow the use of versatile forestry methods in such forests e.g. group selection felling or light selection felling.

Therefore the challenge is to find the tools to sustain recreational values, while simultaneously obtaining income from forest felling. Another problem is the cost of diversified forest management planning, which is often higher than in traditional planning. At the moment there is no financial support available for additional planning work (Parviainen et al 2007).

The interim evaluation of the National Forest Programme (Pihlajamäki et al 2005) states that nature tourism is growing in importance, as a commercial means of exploiting the forest, having a major future impact on local economy and employment. Environmental values will continue to be immensely important, which will keep the pressure up to improve the conservation of forests. The evaluation suggested that there is need for the diversification of silvicultural methods and guidance, an improved allocation of subsidies for forestry for landscape purposes, for forest conservation development and the co-ordination of land-use aims and targets.

The National Forest Programme's special publication, "Multiple Use of Forests", promotes nature management in commercial forests, as a means of including ecological and social aims in silviculture, forest management planning and forestry operations. It states that nature management operations are decisive in increasing the amount of decayed wood valuable to endangered species, maintaining valuable habitats for biodiversity, protecting waterways and enhancing landscape management as well as recreational use (Seppälä 2007).

Forestry, environmental and agricultural policies have recently been reformulated and developed. The next section of this chapter examines how such policies and strategies have brought about the revision of legislation and new subsidy programmes to ensure their implementation in practice.

2.5 Legislation for landscape conservation

Landscapes, unlike other works of art, are subject to constant change as a result of natural processes and shifts in land use - they cannot be embalmed like museum pieces (Firth 1980). What then is to be preserved? Can the process of ageing, regeneration, and adaptation be accepted? The feasibility of preservation or restoration strategy depends on available historical information and an ability to recover and maintain past characteristics (Firth 1988). Where it is unfeasible to preserve or restore a biotic cultural resource, alternative ways of managing a landscape must be found, e.g. replacing it with an equivalent community, such as grassland, and releasing it to allow the return of native vegetation and wildlife.

In Finland, forest legislation and the Nature Conservation Act were both reformed in the 1990's due to Finland's process of entering the EU, increasing nature tourism activity and constantly growing environmental awareness, which set new standards for commercial forests.

According to the Nature Conservation Act of 1996, biodiversity will be protected by means of conservation programmes, the creation of protected areas and protection schemes for special types of nature and living organisms. The Nature Conservation Act of 1996 assumed that landscape areas could be protected as a specific type of preserved area. The law states, that "a landscape conservation area can be established in order to preserve and manage

a natural and cultural landscape of outstanding beauty, historical interest or special value" (Nature Conservation Act 1996). The revised Nature Conservation Act brought a new viewpoint to protected areas, by stressing cultural landscapes formed as a result of past land-use. The conservation of such cultural landscape areas would require different aims and tools to traditional nature conservation areas, where the environment is left in its natural state. In that sense, the Finnish practice of preserving cultural landscapes started to approach the general European norm where traditional land-use and farming in designated areas is allowed.

The Act also set the conditions for the protection of natural monuments as a "single tree, group of trees, natural formation worthy of special conservation because of its beauty, rarity, scenic value, can be designated a protected natural monument". Furthermore the Nature Conservation Act lists 9 specific types of natural habitat to be protected such as wild woods rich in broad-leafed deciduous species, common alder woods, juniper meadows, prominent single trees or groups of trees in an open landscape.

The Forest Act reform took place at the same time as the revision of the Nature Conservation Act, at the end of the 1990's. The Forest Act reform aimed to broaden the goals of forestry from the simply economic and silvicultural towards caring for biodiversity and forest landscapes. Since the 1880s, the main purpose of private forest legislation had been to prevent both the destruction and inappropriate use of forests. In the reformed act, cultural heritage, landscapes and associated values are extensively recognised in Finnish legislation as functions that need to be taken into consideration (Parviainen et al 2007). The new act can be viewed as a response to "green" values in Finnish society, as well as a signal of compliance to the forestry principles laid out at the Rio UNCED in 1992 (Kankaanpää & Carter 2004).

Figure 2.5.1 A felling coupe with some retained trees in an examined case area.

According to the Forest Act, forests must be managed in an economically, ecologically and socially sustainable way. The Act provides the opportunity to manage forests taking into account the special characteristics of sites in terms of landscape, multiple use and research. Since 1998, the regional objective programmes for forestry drawn up by each forestry centre have been the foundation for the economically, socially and environmentally sustainable use of forests. The law requires regional forestry strategy plans, where timber-management and multiple-uses are integrated, e.g. the Regional Forest Programme of Kainuu 2006-2010 (Tolonen et al 2006).

The Forest Act of 1997 regulates felling and obliges owners to carry out reforestation after final felling. The Forest Act addresses particularly important habitats, such as the immediate banks of brooks and small lakes and certain nutrient-rich mires, which have to be preserved in order to protect rare species.

At present, 11.2 % of the land area of Finland is protected. 7.6% of the forest area is highly protected, and in addition to this forestry use is restricted in about 4.5% of the forest area (Ministry of Agriculture and Forestry 2007). In order to maintain biodiversity in commercial forests, habitats of special importance in terms of biodiversity in commercial forests are specified in the Forest Act. Likewise, the Nature Conservation Act safeguards forest biotopes and endangered species in forest habitats.

The current Forest Act (1996) lays down the provisions concerning regeneration obligation and safeguarding diversity. In order to preserve the diversity of forest nature and to promote nature management in commercial forests, the Forest Act defines habitats of special importance in commercial forests that must be safeguarded. According to the survey of habitats specified in the Forest Act, which was completed in 2004, there are 75,000 hectares of habitats of special importance in private forests, which corresponds to approx. 0.5% of the surface area of private forests. In addition to safeguarding habitats of special importance, commercial forest owners have invested in voluntary conservation methods in accordance with the Forest Biodiversity Programme for Southern Finland (METSO), such as natural values trading, competitive tendering and cooperation networks. Different nature management projects have been implemented to promote regional diversity (Pihlajamäki et al 2005).

As the Nature Conservation and Forest Acts were launched, financing support and legislation were revised to finance landscape management by land-owners. The Act on the Financing of Sustainable Forestry (1996) can be applied to finance nature management plans for several private holdings, which take landscape values into consideration. Financial support is provided for private forest owners for forest management work, where the financial returns would otherwise be low, and for the maintenance of biodiversity. Under the Rural Development Programme farmers are eligible for special support to offset the cost of managing wooded heritage landscapes or loss of income caused by such management (Ministry of Agriculture and Forestry 2006).

Nature management projects are forest nature and environmental management development projects financed by the State according to the Act on the Financing of Sustainable Forestry (1996). Since 1997 it has been possible for forestry centres to finance, plan and implement nature management projects in order to preserve the biodiversity of forest nature, protect waters in commercial forests and to preserve or enhance other natural forest values. In total € 6.2m were used for nature management projects in 1997– 2005 (Parviainen et al 2007). Nature management projects according to the Act on the Financing of Sustainable Forestry (1996) are: maintenance and restoration of habitats of special importance covering several estates; realisation of landscape planning and landscape management operations;

other regionally significant projects promoting multiple-use, landscape, cultural and recreational values of the forests.

Furthermore, the forests located in heritage landscapes may be rich in pre-historic relicts. Under the Antiquities Act (1963), antiquities are automatically protected. Prehistoric and historic relicts must be taken into account in all land use. This requirement is also incorporated in forest certification. The National Board of Antiquities has produced guidelines for forest management in areas containing antiquities. Guidelines concerning private forests covered forest planning and ancient relicts (Matila at al 1994).

Zoning based on the Land Use and Building Act (1999) can be used to issue instructions for planning, protection and construction that take cultural, historical and landscape values into account. In land use planning, the cultural and environmental impacts of the plan must be assessed. According to the Land Use and Building Act, actions altering the landscape may not be taken without a permit. Trees in areas covered by a detailed land use plan may not be felled without a permit. A landscape work permit may be required in master plans instead of the Forest Use Declaration set down in the Forest Act.

Other statutes linked to cultural and landscape values of forests are: the Act on Wilderness Reserves (1991), the Land Extraction Act, the Act on Environmental Impact Assessment Procedure (1994), and the Assessment of the Impacts of Authorities' Plans Act, and environmental programmes and policies.

2.6 Policy instruments: subsidy programmes

Agri-environmental schemes were set up to finance environmental measures, such as practical landscape management. Changes in Western European agricultural policies have already reflected a "post-production" era within agriculture, where production subsidies have been transformed into various area payments as well as for landscape management. Management of the rural landscape has become a part of a new legitimisation for agriculture and agricultural subsidies (Rønningen 1998).

Finland's Rural Development Strategy for 2007-2013 (Ministry of Agriculture and Forestry 2006) states that the decline in open and managed farming landscapes threatens to dramatically change the rural landscape. The agri-environmental support scheme covers the whole Finland. The strategy stresses maintaining valuable, cultivated agricultural landscapes as well as meadows and pastures; and preserving biodiversity in agricultural and forest environments.

The EU's agri-environmental programme includes the landscape management of farms, farmer environmental training, guidance, and development projects. The Structural European Funds for Agriculture suggests several measures for landscape management during the programme period of 2007–2013 (Ministry of Forestry and Agriculture 2007). The conservation and upgrading of rural heritage measure is used to implement projects that utilise cultural heritage sites and valuable buildings as well as natural heritage sites and high natural value sites in rural areas and promotes their conservation, maintenance and development. Such measures include: the renovation of buildings with a high landscape value and managing the cultural environment; drafting and implementing landscape management plans; landscape projects; and the management of architectural heritage and the built environment. These funds are applicable using the Leader approach. The Leader approach provides a registered association with the opportunity to manage valuable areas that farmers are not able to manage.

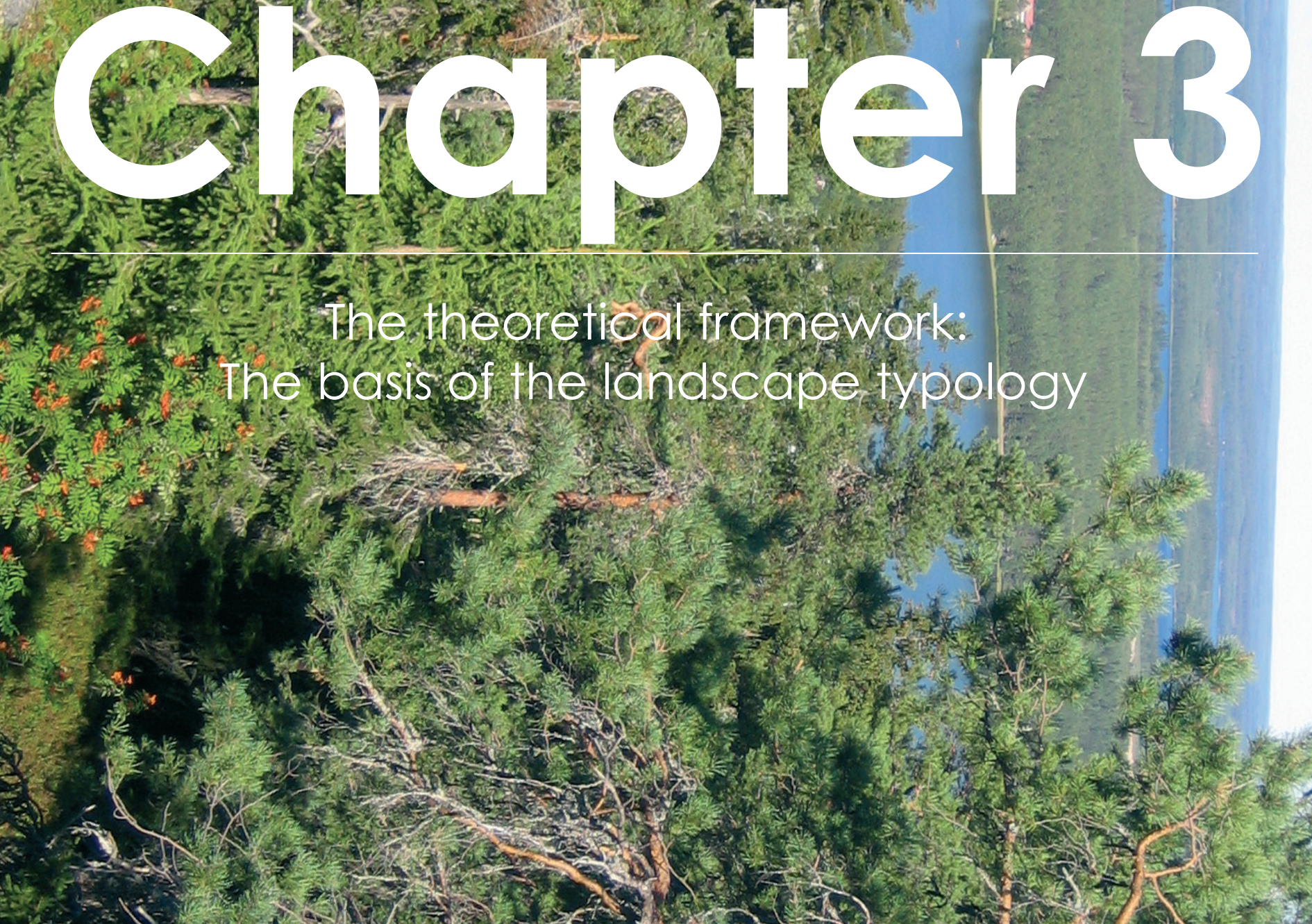
There are also special measures related to agri-environment payments, like the management of traditional biotopes for preserving rural cultural heritage and landscape values; and to encourage the management of small-scale valuable sites, such as meadows. Examples of management measures include mowing, grazing, collecting leaf fodder from deciduous trees and the grubbing-up of shrubs and trees, maintenance and repair of traditional construction, as well as fencing the area and other measures related to grazing. After restoration, a contract for their management is made for 5 years (Ministry of Forestry and Agriculture 2007).

Furthermore, the management plans for national parks, wilderness reserves and nature conservation areas have been made to promote, not only nature conservation, but also the management of landscapes and cultural heritage in these areas. Many nationally valuable landscape conservation areas are covered by management plans. Regional, implemented management plans and guidelines for traditional landscapes have been made e.g. in Southern Savo (Lahdenvesi-Korhonen 2002), the Landscape Plan of Porvoo River Basin (Porvoonjokilaakson… 2001), the Kerkkoo-Henttala Landscape Plan (Kerkko-Henttala… 2001), the Manamansalo Landscape Plan (Manamasalon… 1998), the Paltaniemi Landscape plan (Lassila & Helo 2006) and monitoring surveys have already been initiated (Heikkilä 2002, Schulman et al 2006, Vainio et al 2001, Vainio & Kekäläinen 1997).

Regional programmes on the cultural environment basically govern the planning, protection and management of the built environment and landscape, but they can also include aims that involve forests. Agricultural and forest areas of special environmental value are designated as such in land use plans such as the Nature Resource Plan of Ostrobothnia (Pohjois-Pohjanmaan luonnonvarasuunnitelma 2007) and Regional Plan of Kainuu (2006). Nationally and regionally valuable cultural landscape areas and sites are also marked in land use plans. Only recommendations on forest management may be given in the plans.

Chapter 3

The theoretical framework: The basis of the landscape typology



3 THE THEORETICAL FRAMEWORK: THE BASIS OF THE LANDSCAPE TYPOLOGY

3.1 Definitions of landscape

The concept of landscape involves versatile dimensions and definitions based on research disciplines. The understanding of the physical processes of a site can be connected to the appreciation of beauty (e.g. Bourassa 1991). Beauty indeed has been largely discussed in philosophy and such discussion constitutes the basis of landscape aesthetics. By going beyond an aesthetic interpretation, moreover, it is possible to consider the relationship between landscape, place, culture and society (Makhzoumi & Pungetti 1999).

This chapter discusses the definitions of landscape, providing explanations to the applied terminology of the study. Hence it sets the theoretical framework for the study and reviews the methodology in planning. Chapter 3.4: "Methods of landscape classification research" evaluates previous classification research in order to identify potential indicators for the classification of forest landscape types. Later, in chapter 3.5 the development of landscape structure theory and its approaches in planning is examined. In addition, the theory's strengths and weaknesses in applied forestry planning were evaluated from the viewpoint of a hypothetical planning model.

The definition of landscape has varied during different periods and in different research disciplines. At the end of 1830 the Finnish word "*maisema*" (landscape) described land, soil, shape, area, place or region, following the German word '*Landschaft*' and the Swedish word '*landskap*'. In many European languages the meanings of the landscape word can be traced to Latin words such as *pagus* (inhabitant of a certain area), *scaena* (natural scenery) and *regio, loca, terra*, which describe the surface of the earth, fertility, the spirit of the place, *genius loci* and character (Keisteri 1990a). As early as the beginning of the 18th century landscape was meant to be an area, seen from a higher place (Hommeyer 1805, cit. Aartolahti 1982).

In comparison, the English word landscape is borrowed from the Middle Dutch word *lantscap*, Modern Dutch *landschap*, which in turn derives from the common Germanic *land* and the suffix *–schap* meaning "constitution, condition" while both the Old English *landscape* and the Old High German *lantscaf* had the connotation of "region", "tract". Specifically the Old High German *lantscaf* became *Landschaft* in Modern German; the Old English *landscipe* became *landskip* in the sixteenth century, in the seventeenth century *lantskip* and now *landscape*. Its meaning has varied from "a picture representing natural inland scenery" of the sixteenth century to the modern "a tract of land with its distinguishing characteristics and features, especially considered as a product of modifying or shaping processes and agents" of the nineteenth century (Makhzoumi & Pungetti 1999).

The word of *Landschaft* is related to the continental European school of *Landschaftgeographie*, originating in Germany a century ago. The subject of landscape science mainly concerned the physical and geographical, such as the form of the landscape of specific regions (Makhzoumi & Pungetti 1999). For example Sauer (1963) and landscape geographist Olavi Granö (1930), in Finland, used the concept of landscape as geographical place in their pioneering research.

Landscape as an expression of culture is the next usage of the word to consider. Landscape, in fact, also means how people have modified the environment. On a regional scale, landscape can be defined as "an area made up of a distinct association of forms, both physi-

cal and cultural (Sauer 1963). Thus *environment* and *area* have recently replaced the word landscape for conveying the meaning of "place of people". Landscape accordingly can be considered a "place which humans inhabit" and organise as a system of functional forms and spaces (Makhzoumi & Pungetti 1999).

The anthropocentric approach has been reflected by the landscape art of painting and cultural geography. There, landscape has been considered more as a human-centred assessment of visual shapes, reflecting the accepted values and tastes of the beholder. In human sciences landscape is assessed as an aesthetic experience of an individual (e.g. Keisteri 1990a, Sepänmaa 1987, Horelli 1982). This is also reflected by the definition in the Oxford English Dictionary of landscape as "a prospect of inland scenery such as can be taken in at a glance from one point of view." Scenery is defined as "the general appearance of a place and its natural features from a picturesque point of view". So landscape can be defined in terms of natural components, human attributes, and aesthetic qualities (Lucas 1991).

Often the concept of the landscape applies to our whole physical environment or to the whole human experience. Likewise, the European Landscape Convention (2000) defines Landscape as a zone or area as perceived by local people or visitors, whose visual features and character are the result of the action of natural and/or cultural factors. This definition reflects the idea that landscapes evolve through time, as a result of being acted upon by natural forces and human beings. It also underlines that a landscape forms a whole, with natural and cultural components that are taken together, not separately.

For example in *landscape ecology*, the landscape not only contains ecological and biological processes but also the impact of man (Forman & Godron 1986). In the 1980's and 1990's, the landscape planning school integrated land-use planning using the theories of geomorphology and ecology, and thus extended the landscape concept from a mere visual perception to a multi-layered ecological complex system (Bell 1999, Rautamäki 1983, 1997, Panu 1998, Makhzoumi & Pungetti 1999). E.g. the British Landscape Character Assessment (2002) emphasised the relationship between the different components of our environment – both natural (geology, soils, climate, flora and fauna) and cultural (land-use, settlement and human interventions). The landscape character, which is the pattern that arises from particular combinations of different components, can provide a sense of place to our surroundings. The definition, outlining the *genius loci*, spirit of place in the landscape, also implies that significant modifications to landscape are not possible without major changes in social attitudes (Makhzoumi & Pungetti 1999).

Therefore in this study, the concept of *landscape* is defined as a certain place, with its geomorphologic, ecological and cultural/historical qualities and their interaction under continuously changing processes (Rautamäki 1983, Holt-Jensen 1988, Aartolahti 1982). Landscape serves at the same time as a concrete geomorphologic place '*Landschaft*' and an immaterial, aesthetic perception (Hustich 1982). Rautamäki (1997) presumed that landscape could be considered as physical structure, scenery, and mental perception as follows:

1) Landscape determined by natural sciences, physical existing landscape (areal entity) with a certain structure, including natural and cultural factors and their processes = structure of landscape.

2) Objectively measurable (with camera or surveying methods), easily documented optical perception of the landscape, scenery, which does not include value judgements. Scenery consists of various layers of light reflection, which can change rapidly after illumination and under certain weather conditions or slowly with changes of the landscape's essential qualities = visual image of landscape.

3) Landscape as an abstract, culturally perceived image, perceived by senses of physical

space based on previous knowledge, evaluations and feelings (Tuovinen 1992, Allas 1993) = perception of landscape.

Theoretically two types of landscape can be identified: the *"natural" landscape*, formed by the forces of nature (tectonics, climate, erosion, sedimentation etc.) and the *"cultural" landscape*, being the result of an interaction between man and nature. In the European context, there are hardly any landscapes that can be considered natural in the sense that there has been no human influence at all and few where there has been no human presence. Most landscapes are directly affected by human activity, such as forestry, pasturing or agriculture (Meeus 1995).

It is not without human activity, that natural landscapes change and are transformed into cultural landscapes that are in turn undergoing a constant modification process (Aartolahti 1982). One can reveal traces of human impact on the cultural landscape which has resulted in its reshaping (Keisteri 1989). The concept of cultural landscape (*kulturlandskap*) has been used in Nordic countries as a synonym of a cultivated agricultural landscape, shaped by human activity (Jones 1988). The cultural landscape is linked to the values, ideologies and sustaining culture of a certain time period (Keisteri 1990b). In the Mediterranean context cultural landscape has been defined as the product of the natural and anthropic shaping of the land, which has often developed over a very long period of time (Makhzoumi & Pungetti 1999).

Landscapes formed by natural and cultural processes, are under a continuous process of change. Human impact has caused rapid changes to the landscape, both creating new and

Figure 3.1.1 Landscapes formed by natural and cultural processes, are under a continuous process of change. The shapes of the terrain have been formed by fluvial forces, ancient volcanoes and agriculture in Scotland.

destroying the traditional landscape's aesthetics, and its cultural, historical and recreational values. The preservation of landscape aims to help retain a harmonious environment and aesthetic values (Alapassi, Häyrinen & Linkola 1984).

Considerations on the natural and cultural landscape have led to the concept of landscape as a *holistic entity* (Makhzoumi & Pungetti 1999). In planning research, landscape has been presented as the integrated study of the natural environment, comprising all the ecological factors involved not only in natural science, but also in land use, urbanisation and society. Uniting different disciplines in landscape research is necessary to reach a certain depth of understanding of the whole process, e.g. as in the integration of the landscape planning approach into forestry sciences in this study. Hence, landscape is a concept, which implies a certain way of seeing the land and at the same time, its layers have been modified by the history of economic and social processes.

In the holistic approach, Makhzoumi & Pungetti (1999) divide landscape dimensions as follows: natural, cultural, analytical, political and interventional. The dimensions are grouped in the following Table 3.1.1 according to their approach.

Aspect	Dimensions
Natural aspect	landscape science
Cultural aspect	landscape art
	landscape philosophy
	landscape psychology
	landscape history
Analytical aspect	landscape classification
	landscape description
	landscape evaluation
	landscape computer analysis
Political aspect	landscape legislation, landscape strategy
Interventional aspect	landscape planning
	landscape design
	landscape management

Table 3.1.1 Landscape dimensions according to Makhzoumi & Pungetti (1999).

Definition of landscape planning

Landscape planning is the process that can guide landscape change within a social and ecological context. It is an open-ended procedure for the co-ordination of man's actions in physical space (Skage 1993, Friedmann 1973). According to Skage (1993), landscape planning is not the beautification of the environment, but an arena for life and life sustaining activities. "The Design of Forest Landscape" in Britain defines landscape design as the organisation of a place in a way which reconciles the conflicting requirements of use, e.g. forestry, wildlife, and recreation, while ensuring an attractive appearance (Lucas 1991).

Beer (1993) analyses interpretations of landscape planning in the English language. Firstly, when defining *landscape* as scenery, the term *Landscape planning* means the planning of

the visual aspects of land use. This definition is commonly used in Britain. The second interpretation of landscape planning has served as the basis for the development of the subject area in the rest of the English-speaking world. They consider landscape as places (definable, relatively homogeneous zones), each with different quantifiable environmental characteristics, which are in part a result of natural processes and in part induced by the actions of man. They describe landscapes not just as visually homogenous units, but as ever-changing environmental units reflecting the interaction between people and nature. They admit that a people's past and present cultural, social and economic activities play a key role in determining landscape characteristics.

In the early 1960's Ian McHarg in USA (1969) defined landscape planning as the planning of the human habitat and its social and economic support systems within parameters set by the local abiotic (air, water, geology) and biotic (plants and wildlife) factors. His work had a strong influence on the development of landscape planning in the USA and Europe. His sieve map method laid foundations for the development of a computer-based approach to environmental planning through the use of GIS.

Various landscape-planning methods have been developed to analyse the visual factors of forest and the impact of felling on the landscape. The most common forest landscape planning methods have been developed in North America (U.S. Forest Service: Visual Management System 1972, 1973, 1974) and in Great Britain (Forestry Commission 1989, Crowe 1978, Lucas 1991). According to Crowe (1978) the visual character of landscape is affected by the shapes of topography, variation in scale; vegetation types and pattern texture and colour. All landscapes have their own character and patterns, scale and variation. Long-term geological and climate processes have modified the character of landscape, and it has developed through human land-use into its current shape. The planning method used by the Forestry Commission zooms in on habitat and vegetation patterns, and it has been further developed in Britain and the USA (Bell 1999, Bell & Apostol 2008).

In the study, the criteria of visual assessment apply the principles developed in Britain (Lucas 1991), where the character and identity of landscape are identified by means of the following visual factors: shape, scale, visual force, diversity, unity and spirit of the place, *genius loci.*

Landscape assessment has been defined as landscape character assessment for land use planning, landscape conservation and enhancement serving management purposes (Landscape Character Assessment 2002). There the concept of landscape character zones (comprising landscape types) was determined as describing landscapes as places containing given visual characteristics (such as pattern, texture and colour) derived from an interaction between the way people have used the landscape over time and the naturally occurring features of that landscape.

The European Landscape Convention (2000) defines *landscape planning* as the formal process of study, design and construction by which new landscapes are created to meet the aspirations of the people concerned. It emphasises the reshaping of areas affected by change and badly damaged areas (for example suburbs, periurban and industrial areas, coastal areas).

The European Landscape Convention (2000) also adds protection and management to important intervention tools, as most landscapes need a combination of the three modes of action. Hence *landscape protection* is determined as consisting of measures to preserve the present character and quality of a landscape which is greatly valued due to a distinctive natural or cultural configuration. Such protection must be active and involve upkeep measures to preserve the significant features of a landscape. Likewise *landscape management* is any measure introduced, in accordance with the principle of sustainable development, to steer

changes brought about by economic, social or environmental necessity (European Landscape Convention 2000). The management approach must be a dynamic one and seek to improve landscape quality on the basis of the population's expectations.

The European Landscape Convention (2000) states that in seeking the right balance between protection, management and planning of a landscape, it should be remembered that the aim is not the preservation or "freezing" of the landscape at a particular point in its lengthy evolution. Landscapes have always changed and will continue to change, both through natural processes and through human action. In fact, the aim should be to manage future changes in a way, which recognises the great diversity and quality of the landscapes that we inherit and seeks to preserve, or even enhance diversity and quality instead of allowing them to decline.

Besides landscape planning, the approach of landscape structure is widely applied in the assessment of landscape ecology and biodiversity, by which biodiversity can be explained. In this case landscape structure is an examined area composed of various habitat patches, corridors and matrixes (Forman & Godron 1986). In this discipline landscape structure and its relationship to the distribution of species are assessed by landscape structural analysis, and a habitat map of the examined area is made measure the biodiversity of the landscape's ecosystem and its areal distribution (Luoto et al 2004).

Concept of landscape management

Landscape management is the active maintenance of a landscape's potential and structure; its development and utilisation in various operations (Rautamäki 1997). The concept has generally been used as a tool for integrating multiple values at a regional level and guiding land-use. Landscape management can also be defined as the organising and controlling of biotic or cultural resources (Firth 1988).

Reino Kalliola (1949), one of the first Finnish forest aesthetes, separates landscape management from nature conservation by the differences in the objectives, as similarly stated by Kardell (1991). The aim of nature conservation is to save a site in its original state, which is directly related to the ethical issue of preserving flora and fauna. In contrast, landscape management was considered as the aesthetic-social conservation of nature with the purpose of preserving its natural beauty, recreation potential and cultural values (Kalliola 1949). Luostarinen (1951) combines both the aesthetic and economic in landscape planning and management, determining landscape as a result of natural and human activity. In her pioneering "Garden and Landscape" (Luostarinen 1951), she also described the concepts of landscape regions and touched upon landscape types.

Nowadays landscape management is commonly used as to integrate and control areal land-use. Landscape management does not exclude the economic use of an area, but aims to guide it in such a way that human operations are harmoniously integrated into the landscape. In practice, the borders of nature and landscape management definitions often shift and they may support each other.

In my previous study of Koli National Park, *forest landscape management* has been defined as the integration of forest management into the areal landscape structure (Antikainen 1993a). The objectives of management integrate the aesthetic, ecological and economic needs of the forest site, in a manner, which enables the reinforcement of the landscape structure and its ecological and productive qualities. Forest landscape management reduces the impact of intensive timber-management on a site's nature and scenery. It imitates areal nature characteristic by tree selection, the design of felling coupes in the terrain and conserving the most sensitive areas. Besides, management could also aim to enhance the local character and unique

qualities of the landscape by guiding forest structure development e.g. by removing spruce seedlings from oak groves or maintaining sceneries on eskers as semi-open by thinning.

Landscape type expresses how to sort the landscape of a certain region into classes. This ordering is the result of local landscape characters reflecting vegetation, pattern of fields, landform and land use (Countryside Commission 1991, Makhzoumi & Pungetti 1999).

Generally landscape types can be understood to be classified according to their spatial structure, e.g. open, semi-open or closed space. In this study, concerning forest landscape planning, *forest landscape type* is the concept used to describe "landscape structural zones which lay horizontally in a summit to valley order". They are general types, which can occur differently in different landscape character regions, like summit forest in East Bothnia or the South coast landscape region. The concept of *landscape types* is used instead of the term of landscape zones, which could also be similar in content, but zones may also present wider areas in the planning scale. Therefore the concept of describing small-scale parts of the various locations in landscape structure is used in this study in reference to forest areas.

Another reason to apply the concept of landscape types is that in Finnish forest planning, forests are classified as forest types to describe the vegetation potential of the site, e.g. Myrtillus (MT) and Vaccinium (VT). A.K. Cajander developed the forest site type classification in the early 20th century (Cajander 1926). The forest type is an abstraction, which cannot be seen in wood, instead it is perceived by forest vegetation structure. Thus forest types can be classified using various means (Lindholm 1994). In that sense, the concepts of landscape type and forest type are in correlation with each other. The concept of landscape type includes visual characteristics in addition to ecological factors. This study examines, using eight case study areas, if there are unifying factors and characters between various landscape types in terms of location in landscape structure, qualities, visual problems and management alternatives.

The Landscape Character Assessment (2002) makes a distinction between *landscape character types* and *landscape character areas*. The former is a generic term; distinct types of landscape that are relatively homogeneous in character, in theory a particular landscape type can occur anywhere in the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage, vegetation and historical land use and settlement patterns. The latter term is geographically specific and suggests an area's regional and recognisable identity. They are single, unique areas and are the discrete geographical areas of a particular landscape type. E.g. in regional character areas, like the Lake-District, the possible landscape types might include forest on shores.

In this study applied concepts are based on landscape architecture, aesthetics, environmental and forestry disciplines. The applied concepts are summarised in Table 3.1.2 below.

Summary of the definitions used in this study:

(*Italics in Finnish*)

Aesthetics (*estetiikka*) – The science or study of beauty. The theory or understanding of the perception of the environment by all the senses (Lucas 1991).

Background (*kaukomaisema*) - The part of landscape composition furthest from the viewer. Usually it is from five to eight kilometres away. Details are lost; colours and textures are the main determinants (Bell 1993).

Beauty (*kauneus*) – The harmonious relationship of seen parts which, brought together in a composition, give great pleasure to the senses (Lucas 1991).

Built heritage (*rakennusperintö*) – Culturally and historically valuable buildings (Putkonen 1993a).

Character (*maiseman luonne*) - The distinguishing aspects of an element, a design or a landscape. No value or judgement on a given character need be applied (Lucas 1991, Bell 1993). A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from other, rather than better or worse (Landscape Character Assessment 2002).

Characteristics (*ominaispiirre*) – Elements, combinations of elements, which make a particular contribution to distinctive character (Landscape Character Assessment 2002).

Characterisation – The process of indentifying areas of similar character, classifying and mapping them and describing their character (Landscape Character Assessment 2002).

Contrast (*kontrasti*) - The visible differences between two parts placed close together. The greater the visual differences and the closer they are placed, the greater is the degree of contrast (Lucas 1991).

Edge forest (*reunametsä*) - Transition zones, where two landscape types meets e.g. a slope passes into a valley. These are often sediment soil areas, mildest of all, rich in vegetation. The structure might be dense, from semi-open to open, depending on the soil, tree species, former land-use pattern and cultural impact, for example road edges or pasture lands. The effects of forest edges on vegetation, soil microbial biomass and activity penetrate from 20 to 50 meters in community forests (Malmivaara-Lämsä 2008). The structure and tolerance of the forest depends on fragmentation, trampling, fertility, shape and width of the forest edge.

Element (*maisemaelementti*) - An identifiable part of composition, e.g. basic element, point, line, plane, volume (Lucas 1991). Individual components which make up the landscape, such as trees and hedges (Landscape Character Assessment 2002).

Features (*ominaispiirre*) – Particularly prominent or eye-catching elements, like tree clumps, church towers or wooded skylines (Landscape Character Assessment 2002).

Forest aesthetics (*metsäestetiikka*) – Principles of aesthetic forest management (Sepänmaa 1987).

Landscape (*maisema*) - A certain area, its geomorphologic, ecological and cultural/ historical qualities and their interaction under continuously changing processes (Rautamäki 1990).

Landscape conservation area (*luonnonsuojelulain mukainen maisema-alue*) – Landscape conservation area designed by the Nature Conservation Act of 1996. A landscape conservation area can be established in order to preserve and manage a natural and cultural landscape of outstanding beauty, historical interest or special value.

Landscape capacity (*maiseman kapasiteetti*) – Refers to the degree to which a particular landscape character type or area is able to accommodate change without significant effects on its character, or overall change to the landscape character type (Landscape Character Assessment 2002).

Landscape province (*maisemamaakunta*) - They are single unique areas and the discrete geographical areas of a particular landscape type, like Ridge-Kainuu. They are geographically specific and suggest an area's regional and recognisable identity (Landscape Character Assessment 2002).

Nationally valuable landscape area (*arvokas maisema-alue*) – 156 nationally valuable landscape areas, with a total area of 730,000 hectares, were defined by the working group of Nationally Valuable Landscape Areas (Haapanen & Heikkilä 1993b) and designated by the Finnish Government in 1995 as nationally valuable landscapes (VAT 1995).

Landscape image (*maisemakuva*) – Optical appearance of landscape structure (Rautamäki 1983).

Landscape value (*maisema-arvo*) – The total worth placed by the public as a whole on a specific landscape; impossible to calculate, but it can be assessed in qualitative emotional and comparative terms (Lucas 1991). It is concerned with the relative value that is attached to different landscapes (Landscape Character Assessment 2002).

Landscape sensitivity (*maiseman herkkyys*) – The tolerance of landscape to change, to which affects visibility, recreation and ecological sustainability (Komulainen 1998, Lucas 1991).

Landscape structure (*maisemarakenne*) – The dynamic entity formed by natural and cultural processes (Rautamäki 1983).

Landscape type (*maisematyyppi*) - Landscape structural zones which lay horizontally in a summit to valley order; unite area, which is defined by shape, soil, water and vegetation potential. A generic term; distinct types of landscape that are relatively homogeneous in character, in theory a particular landscape type can occur anywhere in the country, in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement patterns (Landscape Character Assessment 2002). E.g. summit or shore forest.

Landscape quality (*maiseman laatu*) – Based on judgements on the physical state of the landscape and about its intactness, from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place (Landscape Character Assessment 2002).

National landscape (*kansallismaisema*) - The term national landscape is often used to describe famous landscapes of a high symbolic value and widely recognised significance in cultural and historical terms, or in the popular image of Finland's natural landscapes. Areas considered national landscapes are nationally valuable landscape areas and/or nationally significant constructed cultural environments. In 1992, 27 national landscapes were designated around Finland, in areas that particularly represent the special natural and cultural features of different regions (Putkonen et al 1993b).

Nationally valuable built cultural environment (*Valtakunnallisesti merkittävä kulttuurihistoriallinen rakennettu ympäristö*) - 1,772 nationally valuable built cultural environments have been designated around Finland. These environments, selected by the Ministry of the Environment and the National Board of Antiquities, range from individual buildings to extensive cultural landscapes (Putkonen et al 1993a).

Natural monument (*luonnonmuistomerkki*) - Under the Nature Conservation Act, trees, groups of trees, boulders or other natural formations can be protected as natural monuments. Natural formations can be protected because of their beauty, rarity, scenic importance or scientific value.

Node point (*solmukohta*) – Site of crossing landscape factors, dominating a point of space (Lynch 1960, Rautamäki 1983).

Space (*maisematila*) - Three-dimensional volume defined by surrounding elements, e.g. by the ground plane, water surface, steep slopes, forest edges or the canopy overhead. A space can be open, semi-open or closed (Komulainen 1998, Lucas 1991).

Scale (*mittakaava*) – Size in comparison with the human figure, landscape, the proportions of the whole composition (Lucas 1991).

Shape (*muoto*) – The attribute of a plane in the way its edges are varied by terrain or vegetation. Shapes can be geometric or irregular. The most important variable (Lucas 1991).

Skyline (*siluetti*) – The line where the land and sky appear to meet: it is usually dominated by landform, line where forest canopy, buildings etc. are drawn against the sky, e.g. on the summit areas of hills (Lucas 1991, Komulainen 1998).

Slope forest (*rinnemetsä*) - The forest area between summit and lower edge zones.

Summit forest (*lakimetsä*) – A landscape type, located on the highest level in the topography, formed by bedrock and moraine, gravel or sand. Summit forests appear on rocky, moraine, supra-aquatic northern hills or sandy eskers.

Traditional rural biotope, semi-natural habitat (*perinnebiotooppi*) - These are areas or sites moulded by traditional livelihoods and land use patterns where historical traces are preserved. Traditional rural biotopes include meadows, pastures and wooded meadows with a rich mix of species, structures and methods of utilisation associated with them (Parviainen et al 2007, Ministry of Agriculture and Forestry 2007). Such areas include various types of meadowland, moorland, wooded pastures, and areas of woodland cleared for shifting cultivation.

Traditional rural landscape (*perinnemaisema*) - Cultural heritage landscapes with

ancient buildings and settlements, surrounded for example by meadows and pastures (Parviainen et al 2007, Ministry of Agriculture and Forestry 2007).

Valley forests (*laaksometsä*) – Landscape type on the lowest level of topography. e.g. plains, varying from broad to narrow, from large to small, often levelled by fine sediments, occupied early for agricultural use. Traditional structure often leaves small hillocks for housing and small-scale woods and tree groups.

View (*näkymä*) – An area of landscape seen from a specific point; viewpoint. The precise place from which a specific view is seen (Lucas 1991).

Visual (*visuaalinen*) – Describing an image perceived by the sense of sight (Lucas 1991).

Table 3.1.2 Summary of applied concepts and their definitions used in this study.

3.2 Theoretical framework of the study

This chapter addresses the theoretical framework of this dissertation with an ontological approach and theory's representation in landscape architecture. What is theory? According to Corner (1990) theory provides a foundation, a responsible structure, with attendant principles and axioms from which prescriptions for action may be drawn. Alternatively, theory might act as a sort of catalyst, maintaining heterogeneity and promoting change. Before the age of Enlightenment *theoria* remained very much a unifying concept of cosmic order. This cultural sharing of theoretical knowledge through idealised mimesis, iconographic embodiment, and the use of primordial archetypes continued through the late Renaissance and Baroque eras. In 1750 Alexander Baumgarten published *Aesthetica*, the first reasoned discourse on the philosophy and theory of art, especially regarding beauty and taste. Taste was to aesthetics, what reason was to science.

The nature of theory during the late 18th century was largely centred on the debate about landscape aesthetics and taste. There emerged a striking and radical importance attached to purely visual criteria leading to the defining of an aestheticized landscape, where form and picture became the primary content or meaning. Today, a technological school exists, whose theory is based either on positivism or ecological management. Likewise an equally aesthetic school also exists. Theory today has been functionalized into a set of operational rules and procedures of primarily technological character: design methodologies, typologies, linguistic rules of formalism and behaviourism (Corner 1990).

Corner (1991) presents the framework for a hermeneutic landscape architecture, which is based on situated experience, placed both within space and time as well as in tradition, and is equally about resurgence or renewal as it is about invention. Landscape is not only a physical phenomenon, but also cultural schema, a conceptual filter through which our relations to wilderness and nature can be understood.

Corner (1991) has three assumptions - situational interpretation, the primacy of perception, and the happening of tradition, which form the basis of hermeneutics: the theory of understanding and interpretation.

1. Situation. Landscape architecture has provided humankind with the sense of meaningful belonging and orientation while transcending earthly limitations.

2. Corner defines landscape not only as physical materials and natural processes, but suggests codes and languages, which enable cultural understanding of the landscape.

3. Tradition is a dynamic artefact, a result of human work and the accumulation of ideas.

The call for a reconnecting of modern culture to its vital heritage's demands, a remapping of our history and tradition.

Thus hermeneutics differs from positivistic approaches in that it is primarily a contemplative and meditative practice, as opposed to an analytical and calculative system. It is also ontological and circumstantial rather than methodological and universal (paradigms). And it unfolds within a process of tradition, as opposed to the discontinuity of endless provocation and novelty (avant-garde) (Corner 1991).

According to Häkli (1999) the task of positivistic geography was to find spatial order. In the 1970's and 1980's, with the advent of cultural geography, the interpretation of space, place and the meaning of environment, e.g. Tuan's (1993) phenomenological research became important. Humanistic methodology asserts that the landscape is not real until individuals become conscious of it (Karjalainen 1986). In that sense, this research assesses landscape from the viewpoint of Sauer's culture geography (1925), which examines landscape as a process and human impact on nature, instead of the interpretation of landscape without ties to visual assessment as developed in humanistic geography (Olwig 1996).

The meta-scientific basis of research can be found in different general philosophies describing reality, as in the positivistic, hermeneutic and Marxist tradition (Salonen 2001). This study examines the physical focus of the research which contains cultural meanings, allowing the forest landscape to be analysed both as both a natural and cultural object. The approach of the study is most closely connected to the hermeneutic philosophy of science. In that sense the study has e.g. a teleological human concept, where individuals are seen as intentional and their goals and ways of implementation are examined (Repo 1990). It examines landscape details as a part of a whole. Another basic feature of hermeneutic philosophy is the implementation of a participatory method, where the intention is to understand relationships between planning processes and residents' environmental values.

The main hermeneutic tradition has been envisaged in the humanistic paradigm. The humanistic approach emphasises individuality, subjectivity, phenomena's intentionality, research on meanings, values, needs and goals (Repo 1990), and the basic nature of such an approach is reflected in this study. Furthermore, the qualitative methods used belong to humanistic science philosophy, which is also implemented in this study. The principles of phenomenological philosophy are seen in the study as how individuals experience a phenomenon, like different types of landscape or planning processes. The latter can be observed e.g. in place, space and landscape concepts and studies of how they are experienced subjectively. In ontological problem setting, the core issue includes a physical nature science approach, as the study is partly based on positivistic causal explanations. Natural scientific examination of landscape and its structural relationship model are clearly integrated into a positivistic cognitive-behaviouristic approach. The study has been influenced by e.g. environmental psychology (Kaplan & Kaplan 1982) and architecture (Allas 1993, Lynch 1960, Steinitz 1990).

Makhzoumi & Pungetti (1999) divide landscape research into three different types, morphological, interdisciplinary and holistic research. The first, originating with Sauer in the 1920's until the 1970's, concerns the study of landforms and the consequent relationship between man and land. The second type integrates several disciplines such as geology, hydrology, biology, agriculture, forestry, history, social sciences and politics etc. Each discipline has influenced the approach and outcomes of the study. The third type is holistic research, which emphasises the whole hierarchical organisation of multilevel stratified systems. Recent developments in landscape ecology research have indeed made relevant contributions in providing intellectual and practical tools for a better comprehension of the complex interrelationships between man and nature.

Research dealing with the analysis of landscape often takes into account such dualities as quantitative-qualitative and objective-subjective. Quantitative analysis is mainly related to the physical environment, qualitative analysis to the social environment. Makhzoumi & Pungetti (1999) suggest that a holistic research method should consider them together, since both approaches are important in landscape analysis.

Jurgen Habermas (1968) divided the human interest of research knowledge into three approaches: technological, practical and emansipatorial. They answer the question as to why certain objectives are set in the research. This study combines technical and practical approaches. The technical approach aims for the better integration of land use into nature and the environment based on the natural sciences, while in the practical approach the researcher and community identify the problem, the effective factors in the context and solutions, together (Toikko & Rantanen 2009).

This study is hermeneutic in its scientific nature, but it also has a clear positivistic approach. Hermeneutics is especially seen in chosen transactional planning theory, which emphasises the understanding of a person as a human and intentional creature. On the other hand, positivism is reflected in the chosen natural science landscape study method, which concerns objective layers of the environment. Differing from the pure positivistic approach, the appearance of landscape with its various shapes and forms does not depend on whether the environmental elements can be counted, measured and rigorously analysed. In this study, which is based on a double-part concept model where an individual acts in an objectively constructed landscape, hermeneutics and positivism complement each other.

The spatiality of nature

Instead of an atomic meta-scientific approach, where "form-follows-function"-thinking and pieces of landscape determine the whole environment, the approach of this study is more holistic. In the holistic approach the dimensions and functions of a system are comprehended and derived trough the laws of whole unity (von Wright 1987). In the study, the direction of surveying moves from a larger scale to smaller units, as an understanding of the small parcels of landscape requires knowledge of the broad landscape and its developmental processes.

In her dissertation, Stenros (1992) emphasises the complex and multi-explanatory nature of space. She suggested that restoring the holistic approach as a basis of the relationship between space and locus, and the practice and theory of architecture, means transferring the ideology of cosmos from a technical and fragmented model as in poetry: a holistic, direct and unique perception with an undivided picture of reality. Hence a change in ideology toward a more holistic approach, new approaches, the conceptualization and theory of space structure are needed in architectural theory.

Stenros (1992) sets the following preconditions to spatial theory: 1) a more holistic viewpoint of the nature of entity, 2) a more pluralistic approach and content (postmodernism) 3) change in the focus of the theory towards relationships and processes. Hence the proposed concept of space is holistic and pluralistic, where studied as a process, within a spatial experience environment. This approach is reflected in the study by integrating visual principles into the geomorphologic landscape structure.

The spatial theories of Cullen, Lynch, Alexander and Norberg-Schulz, as compared by Stenros (1992) can be considered as early cognitive architecture theories (place theories) because they have created as basis for the examination of the interdependency between human beings and a space within the theory of architecture. The objective of the cognitive architecture theory is to create a cognitive model of the space structure, which connects both an

observation site (a space), an observer (a human being) and the observation event (a spatial experience); and it explains interaction between them.

Furthermore, an attempt is made to explain and understand regularities with the help of research. Concepts are the elements of theories and laws connect them. Theory consists of a group of laws which systemise empiric regularities (Stenros 1992).

According to Stenros (1992), in modern planning theory an important concept mentioned by Kahn exists, the parallelism of the non-quantitative (emotion) and the measurable (thought) in the planning process; both are needed to understand the essence of reality.

Stenros (1992) proposes that experiencing space is the external environment experience while the place experience is a more internalised evaluation based on the same observation event. Place is a personal experience, a unison discourse, including an observation of space as seen by one person. Space, however, is like a polyphonic novel, a horizontal continuum, from the edge of a multitude of spaces to the other edge. In turn place is a vertical continuum, it pierces all levels of the space structure creating depth and reaching its essence.

Stenros speaks of the music of space, i.e. in the architectural planning of E. Saarinen, the ability of the observer to understand the relations and rhythm created in a space. In a successfully proportioned space human beings instinctively seek their way to the section of the space commanding the best understanding of the space in question. Aesthetic criteria include unity and depth, which are valued according to how large a part of the universe the theory uncovers.

The multidimensional, mythic place is poetic, as in it the multitude of reality manifests itself in a flash. Place is an individual unique experience based on a commonly shared universal. The poem is a prototype of place: it perceives the position of the human being in the universe (Stenros 1992).

The theory of positivism forms conceptual structures, which are used to describe that which takes place and what to predict in the world around us. Positivism in this study is the description of the case study area landscape structures and the predictive models of the preference studies. Therefore the study also touches on normative theories that it attempts to present as the code of ethics, concerning how forest felling could be better designed to suit the landscape. This has been done by connecting the description of case study areas and the results of the preference studies to different management alternatives of landscape types. Hence the study has a pragmatic starting point to find new information about the landscape for use in practical forestry. Thus the result will be a general planning framework of the spatial structure for cultural forest landscapes or for valuable landscape areas.

Approaches of forest landscape research

As well as definitions of landscape, there are also a variety of landscape research approaches depending on the discipline and research problem. Forest landscape research approaches can be divided into an expert approach and into the study of the layman's experiences and preferences (appreciation, liking) (Karjalainen et al 2009).

The expert approach includes, among others, landscape ecology, environmental aesthetics and landscape architecture. Landscape ecology studies the landscape as the functional process and network of ecological and abiotic factors (Forman & Gordon 1986). In turn environmental aesthetics is the philosophical and critical research of beauty. Descriptive environmental aesthetics studies different taste and value systems whereas normative aesthetics defines the good, beautiful and valuable. In ecological environmental aesthetics, the founda-

tion of norms is ecological health and sustainability, i.e. the ecologically sustainable is also beautiful (Sepänmaa 1986).

In landscape architecture the landscape can be approached from the point of view of land use planning, historical garden art and park planning. Modern landscape architecture, which is based more on geomorphology and ecology and is related to land use planning, has extended landscape architecture from the application of visual factors to local landscape structure. In planning and guiding change, information on all factors which make up the landscape (natural elements and cultural elements) and about their mutual interaction mechanisms (ecological and cultural processes) is required.

In addition to the expert approach, the quality of the landscape can be examined by studying human experiences and appreciation of the landscape, e.g. using preference studies or the phenomenological sciences. The objective of preference study is to find the features of the landscape, which affect the experienced quality of the landscape. In these studies different interviewee groups evaluate the quality of the landscape, e.g. its beauty, the acceptability of measures that change the landscape, suitability to outdoor recreation, naturalness etc. (Karjalainen et al 2009). The landscape is illustrated with the help of imaging (site visits, original or manipulated photographs, computer graphics, landscape simulators). The connection between the features of the landscape and an experienced, perceived beauty is estimated using statistical models and/or description.

In a psychophysical preference study, the variables which explain the quality of the landscape are physical features which are measured from a terrain or pictures, for example the amount of logging residue, the basal area of forest, the depth of view, among others. In a cognitive approach the beauty of the landscape is explained with psychological variables which the interviewees evaluate, for example amongst others, mysteriousness, unity and diversity (Karjalainen 2006).

The phenomenological (cultural, humanist) research approach examines human landscape experiences, for example interaction between people and a landscape or the significance of the landscape to certain individuals. The research subjects are human descriptions, interpretations and experiences of the landscape in the form of landscape descriptions in literature, historical documents or inquiry and interview materials. The phenomenological research approach often produces qualitative information (Karjalainen et al 2009).

However, the border of the expert and layman approach is not clearly defined. For example management models produced by experts can be utilised in preference studies when creating alternatives to be examined by inhabitants. Likewise information about users' preferences can be utilised in landscape architecture. Both landscape preference research and landscape architecture are multidisciplinary in character. The disciplines central to preference research are psychology and silviculture whereas forest landscape planning combines planning sciences and forest ecology information (Karjalainen et al 2009).

The scientific background of this study lies in landscape architecture and ecology. One school of landscape architecture, in addition to the park design school, focuses on e.g. the systematic classification of a landscape's geographical factors, the defining of landscape areas and their boundaries, the interpretation of a landscape's formation, and the analyses of visual and cultural qualities e.g. for land use planning purposes (Rautamäki 1990, Panu 1994). Landscape ecology collects information on relationships between landscape elements and landscape patterns, and their interaction with the ecosystem (Forman & Godron 1986). The landscape-ecological approach examines landscape holistically, where there is a certain hierarchy of identifiable and classifiable levels.

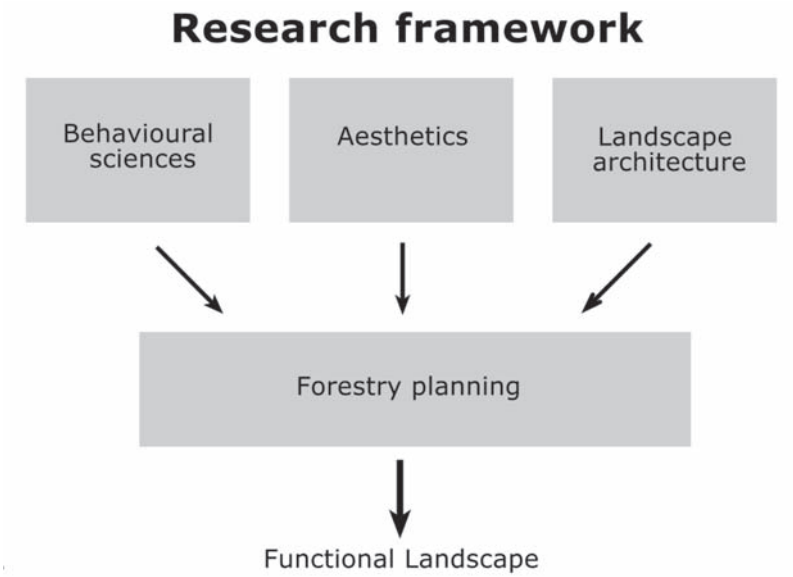


Figure 3.2.1 The research framework of the study is based on the behavioural sciences, aesthetics and landscape architecture seen through the prism of forest planning which aims to produce functional landscapes.

The study consists of two parts: theoretical-methodological and empirical. The former part presents landscape research traditions and develops a classification study matrix as described in chapters 3.3-3.5. The latter part examines the empiric location of different elements and processes in the case study areas based on the landscape structural analysis method described in chapter 5. The classification research approaches a horizontal series of forest landscape types in their surrounding environment providing a forest landscape type description, classification and charting synthesis.

3.3 Methodology in planning

Planning occupies a central position in the process of preparing land-use for construction and spatial decision-making. Creating new development, choosing goals and tools and their evaluation are core issues in the planning process (Keränen & Malinen 1997). According to Mintzberg (1994), planning could be interpreted as the design of a desired future and means of creating controlled change in the environment. Mintzberg (1994) and Faludi (1973) characterized *planning* from a broad perspective due to its processual nature, as a formalised procedure to produce an articulated result, in the form of an integrated system of decisions. In planning, multiple alternatives are identified, analysed, and choices are made. Planning is especially important in guiding change. According to Friedmann (1973) and Bramsnaes (1992), society is undergoing continuous change and will not wait for planning to give it a one-way direction. Therefore planning should act upon social and economic processes to guide society towards desired objectives.

As soon as normative planning models failed to integrate common values, the advent of transactionalism and more integrated approaches with new paradigms in environmental plan-

ning and management was obvious (Magnerum 1997, Bramsnaes 1992, Friedmann 1973). An increased understanding of how the ecosystem and society functioned generated more holistic planning approaches. Magnerum (1997) studied this planning approach in the different fields of watershed, forestry, biological, sociological, and regional planning. E.g. in regional planning there has been a *comprehensive rational approach*, with rational procedures and methods of data gathering, which have been criticised for producing plans that are too general and remote to the public. Instead, the new theory of planning emphasised more interactive and participatory approaches.

In the transactional approach the human being is considered an active participant with and in the landscape (Zube 1984). Such thinking is based on the human transformation and shaping of the landscape which in turn, influences human activity (Aura, Horelli & Korpela 1997).

According to Bramsnaes (1992), the comprehensive planning process involving people directly concerned, would constitute a basic element in the integration of agricultural and environmental policies. Traditional planning models, however, would not be able to cope with such integration. In agriculture, land-use is not only a precondition, but also an important tool of production. Therefore, agricultural land use planning would need the development of new participation models: a dialogue and cooperation between planning authorities and the farmers involved. In other words, the top-down approach would have to be supplemented by a bottom-up process.

Furthermore, Olav Skage (1993) and Andreas Faludi (1973) emphasised the social context of planning and the democracy of decision-system. Skage defined landscape planning as an open-ended procedure for the coordination of man's actions in physical space. Planning has, as in the myth of *Janus*, had two faces: one presenting the sharing of information and an open dialogue (communication) and the other representing the execution of political power (rules, regulations and control). An understanding of context, evaluation of functions and processes, appreciation of physical patterns and normative regulations should be integrated into the process of planning.

Magnerum (1997) admitted that successful integrated approaches are largely dependent on participants who develop common objectives and goals. The interaction of authorities and the involvement of the general public are crucial to putting this concept into operation. Actions are more likely to be implemented when they are based on goals and policies shared by all those involved in the policy area.

Planning theories and their values can be divided according to their main traditions in the following way (Hautamäki 1991):

- Rationalism is based on positivistic philosophy and emphasises sense and comprehensiveness.
- Transactive planning is one of the most important approaches in the hermeneutic post-humanistic tradition. It emphasises the human and planning as a social learning and development process in a pluralistic society (as in self-reliance- and participatory planning).
- The critical tradition based on Marxist philosophy attempts to control society intensively, based on the viewpoint of a certain group.
- The main stream of ordinary planning belongs to the positivistic, rational planning tradition. All the main traditions however, exist in current planning systems in various levels and organizations. Normative planning theories emphasise the rational component of the planning process, whereas the behaviouristic approach analyses restrictions and borders occurring in planning while implementing a rational action plan.

Zube (1984), Faludi (1973, 1986) and Friedman (1973) stated that planning research and applications in the field of landscape assessment have reached a level where future growth is limited by narrowly defined approaches and the lack of a general unifying theory. Conceptual and theoretical bases and the need for a general theoretical framework have become obvious. In spite of very few general theories such as Appleton's (1975) *prospect- refuge* –theory and Kaplan & Kaplan's (1982) cognitive models, planning applications keep coming in the absence of theoretical foundations. Zube (1984) critically assesses the weak theoretical development that has lead to an overemphasis of empirical preference models at the expense of theory building.

According to Zube (1984), general landscape architectural theory should include the following:

- Provide a framework for encompassing and bridging professional, behavioural, and humanistic paradigms – that is, to contribute to the conducting of landscape assessment and the understanding of human/landscape interaction
- Recognise the need for and relationships between quantitative and qualitative information
- Encompass interests in both urban and natural landscapes
- Encompass diverse geographic scales ranging from the site to the region

According to Zube (1984), Moore, Tuttle & Howell (1982) have suggested a four level structure of theory that helps to conceptually bridge differences between paradigms. The first level, *theoretical orientations* represents broad concepts that serve as heuristics in orienting ways to look at the phenomena and identify the lines of research. The second level, *frame-*

Figure 3.3.1 Axial layout and geometry of the gardens of the Vatican in Rome.

works, represents the relationship between existing findings that provide a conceptual and systematic organization data about phenomena. *Conceptual models* are the third level that provides descriptions of variables and their relationships, but not necessarily explanations of phenomena within a larger theoretical context. The fourth level, *explanatory theories* represents a testable hypothesis based on assumptions and concepts about relationships between variables leading to an explanation and understanding of the phenomena.

If we are to gain a better understanding of the meaning of landscapes and the significance of landscape experience, individuals must be treated as active participants with and within landscape. Ittelsson (1973) suggested the transactional view as a condition of providing a basis for a theoretical orientation for landscape assessment (Zube 1984). It suggested a way of broadly conceptualising landscape assessment as multi-model and multi-experiential. According to the theory, landscape is part of action. Landscapes cannot be passively observed; they provide opportunities for action, control, and manipulation. They are always counted as part of social activity. They have both a definite aesthetic and systematic quality (Zube 1984).

Development implies change, specifically when modifying and adapting the landscape for human purposes (Lyle 1994). The purpose of development is usually economic and it always produces economic results, the essential physical reality of development is change in the ecology of the landscape. Development might also permanently disrupt the processes occurring in the landscape. Concepts and models of planning from the Renaissance and 17th century by Andre Lenotre in Versailles featuring axial layout and strict geometry led to the reductionism of nature. Lyle mentions that development should not just be the destruction of nature for human gain, but that varied levels and types of development are possible.

Lyle (1994) asserts that the ecosystem and its modes of order provide a conceptual model of the world that serves well as a basis for regenerative design. The modes of order are the following:

- Structural order, composition of living and non-living elements
- Functional, the flow of energy and materials, dynamics and change
- Locational order, patterns in varied structural and functional compositions

Landscape is the physical context of an ecosystem and its visible manifestation (Lyle 1994). The order of the ecosystem - its structure, function and spatial distribution of activities - determines the effects of resource use and environmental quality. In nature, development means increasing complexity. Nature forms varying, complex network of unique places adapted to local conditions and diversity, whereas humans have designed readily manageable uniformity, simple forms and regularity.

Furthermore, the theory of landscape management needs more research. According to Zube (1984), Faludi (1973, 1986) and Friedmann (1973) the development of planning research and its practical models were restricted because of limited determined approaches and a lack of integration into the general theory. Integrating landscape structure, landscape-ecology and spatial organisation with aesthetics is an important research challenge. The proper integration of such implementation would also require the research-based analysis of economic and social factors.

Integrated approaches are emerging as the new paradigm in environmental planning and management. According to Magnerum (1997), the impetus for putting a plan into practice can be found when people are involved in planning processes. This same process has been used e.g. in Finland in forestry, where public participation has become popular in the planning sector. The lack of public involvement can be recognised e.g. in landscape management, when landowners are not consulted during planning, the plan is not widely implemented.

Magnerum (1997) identifies the research steps necessary to develop models of integrated environmental planning. Holistic, interconnected, goal-oriented and strategic elements are essential components in an integrated approach. E.g. successful integrated approaches are largely dependent on the participants developing common objectives and goals. The interaction between stakeholder and public involvement is the key to putting the concept into operation. Actions are more likely to be implemented when they are based on goals and policies shared by all involved in the policy area. The holistic approach needs to be action-oriented and strategic to be feasible.

The opportunity for participating in planning and governing regional policy has become topical in recent years (Turtiainen 1995). Particular emphasis was placed on the revision of legislation (EIA, Construction and Nature Conservation Laws) since there was controversy about decision-making and the accuracy of implementation of the law in participatory planning. Based on the Rio and European Forestry Minister Conference in Helsinki international agreements of 1993 concerning the management of ecological, economical and socially sustainable forestry, the concept of socially sustainable forestry has been understood as common locally, regionally and nationally accepted silviculture and use of forests. According to Loikkanen (1995) socially sustainable forestry is based on the combination of various interests, preferences and objectives integrated into the multiple use of forest.

E.g. rural planning always involves the interests of various stakeholders: planners, inhabitants, etc. whose values can influence the process of selection of alternatives and their further implementation. A planner analyses environmental data from a professional viewpoint, produced from the environment by abstracting the world, and transforms it into theoretical principles resorting to various scientific modelling techniques. The knowledge of the inhabitants is generated by the direct personal interpretation of immediate experiences. However, a planner's qualification indicators are not believed to differ from those of the user's, hence the analyses fail to reveal the environmental preferences of the latter (Tuovinen 1992).

Development of forest landscape research

Forest landscape planning methods have been developed e.g. in the United States (U.S. Forest Service 1972, 1973, 1974) and in the 1980's in Great Britain (Forestry Commission 1989, Crowe 1978, Lucas 1991). According to the Visual Management System (VMS) landscape has been assessed with the help of main factors (form, line, texture and colour), space structure and variable factors (direction, light, distance, weather, seasons, location, scale and time). Landscape sensitivity has been assessed on the basis of attendance and the purpose of use of the area (for example motoring, hiking) (U.S. Forest Service 1972).

The Forestry Commission's planning methods focussed to a larger extent on site factors. According to Crowe (1978) the visual character of the forest is affected by the shapes of the terrain and the variation of its scale; types of vegetation and patterns; colours of the surface structure and texture. The forest landscape can be analysed with the help of different visual factors: form, scale, visual force, diversity, unity and spirit of the place (Lucas 1991).

British landscape architect Simon Bell (1993, 1994) emphasized the diversified natural and cultural patterns in the landscape and their internal organization as the starting point for forest landscape planning. Bell's (1999) approach of holistic landscape planning widens to include the assessment of whole ecosystem units and their landscape-ecological analysis. In Bell & Apostol (2008) the concept of landscape structure has been used in the meaning of landscape ecological structure with patches, matrixes, and riparian zones. Bell & Apostol (2008) presented the integrated forest design process with a wide range of landscape ecologi-

Figure 3.3.2 A clear cut can be distinguished on a slope in Karelia, in the region of the case study area of Koli.

cal analyses and management designs with colourful sketches. The forest design process applied visualizing techniques to slopes, and presents constraint and opportunity analyses.

Nordic landscape planning methods developed in the 1980's and 1990's (e.g. Gustavsson 1986, 1993, Axelsson-Lindgren 1990, Bååth et al 1993, Komulainen 1998) and they emphasised the functional wholeness and dynamics of the landscape, created from ecological and cultural processes to a larger extent than the methods developed in the United States and England. The ecological and visual stratification of the landscape has been applied to planning research, for example of historical vistas (Brusewitz & Emmelin 1985, Stalhschmidt 1983).

The pioneer of landscape preference research, based on visualisation (site visits or pictures) was the United States, where many preference studies were conducted especially in the 1970's and the 1980's. The first landscape preference study, based on the visualisation of the forest landscape, was published in Finland by Kellomäki (1975). Furthermore, in the 1970's a small number of studies were conducted, based on mere verbal landscape descriptions, that attempted to analyse qualities, which affect the pleasantness of the forest landscape (Loven 1973, Eskelinen 1979, Karhu and Kellomäki 1980). In the 1980's the pioneer work of Kellomäki was followed by a few other landscape preference studies in which the forest landscape was illustrated mainly with photographs (Savolainen & Kellomäki 1981, Saastamoinen 1982, Pukkala et al 1988).

Based on the development of forest politics in the 1990's more landscape preference studies appeared, meanwhile research on forest landscape planning started. Computer based graphics programmes; GIS-systems and simulation programmes have enabled the imaging

of time series of future forest views (Pukkala 1988, Tahvanainen et al 1996, Karjalainen 2000). In forestry planning there were experiments to integrate landscape values into forestry planning programmes (Pukkala et al 1995, Nousiainen et al 1998, Tahvanainen & Tyrväinen 1998). As discussed further in chapter 4.3. Karjalainen & Komulainen (1997 a&b, 1998, 1999) combined the disciplines of landscape architecture and landscape preference research in several studies. Based on landscape architecture, different forest regeneration and afforestation alternatives were created, and the users of the landscapes evaluated their preferred management methods.

Landscape classification research and its planning applications are further discussed from the viewpoint of integrated planning in the following sections.

3.4 Methods of landscape classification research

Landscapes can be defined as recognisable parts of the Earth's surface, which have a characteristic composition, structure and scenery (Meeus 1995). Landscape classification sorts landscape into different types based on similar characteristics (Makhzoumi & Pungetti 1999). This chapter explores landscape classification research approaches in order to construct the theoretical framework for research conducted in the case study areas. The examples of classification research are evaluated by combining their methodological similarities and differences, and applicability to the study.

In the 1970's the emphasis in land use planning and management was on landscape evaluation – i.e. what makes one area "better" than another? Landscape assessment emerged in the mid 80's as a tool to separate the classification and description of landscape character (i.e. what makes one area different or distinct from other) from landscape evaluation (Landscape Character Assessment 2002). Makhzoumi & Pungetti (1999) and the Landscape Character Assessment (2002) separate landscape classification and evaluation in their approach. Landscape classification is the sorting of landscape into different types based on similar characteristics. This approach should be as objective as possible. Landscape description concerns the systematic collection of information about each type of present landscape. By contrast, evaluation is a form of subjective assessment, where the personal element plays a very important role. It is landscape evaluation that gathers and analyses the subjective responses to landscape.

The characterisation process normally results in the identification of landscape types or landscape character areas or both of them. Landscape character can be defined as a distinct and recognisable pattern of elements that occur consistently in a particular type of landscape (Landscape Character Assessment 2002). Landscape types are distinguished by the degree of anthropogenic influence and are defined by a particular configuration of land form, soil, topography, climate, vegetation, land use, history and scenery (Jellicoe 1975, Meeus 1995, Beer 1993).

In the 1990's, landscape character types and areas started to be commonly used in landscape and environmental planning in Europe (Beer 1993, Countryside Commission 1991, Rautamäki 1990, Panu 1994). Moving from one zone to another, aerial mapping helped to identify pattern changes within zones. The character is further developed by the landscape's geology, climate, culture, historical changes in land ownership, etc. Beer (1993) describes the zones as landscape structure zones. Their existence enables the planner to gather environmental information specific to a zone, analyse the local environmental issues, determine local action and propose detailed zone-specific planning and management. It is also useful

for identifying the zones with the greatest environmental problems and promotes the efficient allocation of financial resources (Beer 1993).

Landscape assessment has been employed for practical planning purposes, for example in helping define the boundaries of designated protected zones such as areas of outstanding natural beauty (Countryside Commission 1991, Haapanen & Heikkilä 1993b). According to Blankson and Green (1991), many approaches to landscape assessment have tended either to define landscape as an essentially visual phenomenon (like the U.S Forest Service 1973, Lucas 1991) or as a particular configuration of topography, land use, vegetation cover and settlement pattern (McHarg 1969).

Land classification, based mainly on soils and topography, has always been important in agriculture and forestry and for military purposes. However, because of the mixture of subjective, visual appreciation of scenery and the more objectively describable physical elements in the traditional British concept of landscape, there seems to have been resistance to the idea of landscape classification (Blankson and Green 1991). Taking a more limited physical concept of landscape as a cornerstone, they determined that classification is a descriptive analysis involving physical characteristics of the landscape based on basic survey and specification.

Approaches of landscape classification studies

To construct a hypothetical model to be tested, the previous research on landscape classification was reviewed. The methods, similarities and differences and usability of this study were examined. The selected studies had two criteria in common: they dealt with classification of landscape types in the context of spatial planning and their classification had management or planning purposes.

Each typology had its own purpose. The selected typologies can be organized in accordance with their purpose and emphasis on the following:

- Combination of physical and visual factors (Blankson & Green 1991, Meeus 1995)
- Holistic approach to planning (McHarg 1969, Rautamäki 1990, Panu 1994)
- Typologies based on location or spatial structure (Falini, Grifoni & Lomoro 1980, Gustavsson 1986)

Combination of physical and visual factors

Meeus (1995) presents the pan-European landscape typology, which is based on the integration of landscape formation factors. The basis for a regionally differentiated geography, morphology and scenery is provided by landform, soil and climate and regional culture. Six selection criteria are applied in identifying the most important landscape types in Europe:

1. Representing the main land forms that characterise the geological and climatic zones.
2. Recognition of the economic potential of land use and landscape. Landscapes are the expression of past and present economic activities.
3. Identification of landscapes characterised by a combination of ecologically sound processes and sustainable use of natural resources.
4. Importance of extensively managed areas as substitutes for rare wilderness areas for recreation.
5. Traditional, preserved heritage is an indicator of local need to express cultural heritage.

6. Scenic quality and visual characteristics.

Meeus illustrates a classification model with the Holdridge diagram, according to the climate, scenery and degree of human impact. Then he describes the major types, their general character and location.

Blankson and Green (1991) compared the relationships of landscape evaluation based on physical characteristics and scenic quality in Stour Valley, Kent, UK. Two sets of landscape characteristics, landform and land cover (woodland, water bodies, hedgerows, grassland, arable farmland and urban industrial settlements) were recorded in each 0.25 km square of the study area and their values scored into three categories.

Comparison of the direct landscape evaluation of the study area with the landscape classifications showed a close spatial relationship. The highest quality landscape corresponded to the upland mixed woodland and grassland landscape of the Wye Downs. The medium quality landscape coincided with the upland mixed woodland and arable landscape type of the Chalk plateau, whereas the lowest-quality landscape covered the four lowland farmed landscape types including the urban and industrialised group. Using the same raw data, but different methodological approaches, two rather similar groupings of grid squares on the basis of landscape attributes could be made.

However the potential utility of their results was very different. The methodology of the classifications (i.e. descriptive or inventory type assessment) is much freer of value judgements, which are combined in scenic evaluation in an attempt to put value on an area's landscape through component weighting and combinations. The classifications are by no means completely objective; for example, in the selection of landscape variables. But they do not have the direct aim of making value judgements. The classifications merely attempt to identify landscape types in the same way as, for example, habitat types that are already widely accepted.

According to the British case study by Blankson and Green (1991), the close spatial relationships between the distribution of landscape quality grades and landscape types, revealed by their comparison in the Wye study area, seemed to suggest that evaluation based on landscape types could be similar to direct evaluation, but based on less subjective, more readily explained and justified principles.

A holistic approach to planning

McHarg (1969) introduced the least-social-cost/maximum-social-benefit method for highway construction in the United States, a relative value system that could consider many non-priced benefits, savings and costs, and the measure of scenic experience as a potential value. The method included the categories of physical factors, ecological sensitivity and social values (each graded into three classes) that are inventoried in overlapping transparencies. The summary map revealed the sum of physiographic factors influencing high route alignment. Then he identified natural-process value types by their degree of tolerance and suggested their suitability for urban use. McHarg's planning methods formed the skeleton for many land use-planning methods used in Western Europe. The methods of work in this study are the same as in the mapping physical factors method, but different in regard to visual assessment.

In Finland, the planning theory based on landscape structure was developed in the landscape Laboratory of Helsinki University of Technology, and has been used e.g. in areal landscape surveys (Rautamäki 1990). Natural and cultural landscape factors such as rocks, soil, climate, water, vegetation and cultural land cultivation are examined layer by layer in this way (Rautamäki 1989).

Rautamäki defined the concept of landscape structure as the dynamic integrity formed by terrain and its natural and cultural processes. Landscape has developed as a result of geomorphologic, ecological and cultural processes. Its basic elements are bedrock, soil, climate, hydrology, vegetation and culture systems (Rautamäki 1983). Differences in character zones are found in landscape structure, vegetation patterns, land use patterns, scales of spatial structure and visual qualities (Rautamäki 1983).

Panu (1994) applied a similar approach in studying landscape plans made in Northern Finland to analyze areal landscape structure and planning methods. He stated that landscape structure is one of the most important factors in spatial planning but also one of the least examined. Planning based on local conditions is necessary in Finland but especially in the north the significance of the fragile conditions is emphasised. Concentrating on securing the character and ecological potential of the landscape structure are crucial in the northernmost areas of Europe. The landscape should be the starting point of planning environments shaped by man, and not the contrary. Ideal land use models, measures, scale and shapes can be found from the regional landscape structure.

Panu (1998) stated that in community planning the functional green area system integrated into landscape structure is a suitable planning model for Finland's northern conditions. Studies and reports based on landscape structure distinctly show the need to move away from unifying planning norms which determine the whole country in the same way, and move instead, towards integrated planning taking into account functional preconditions. The target of landscape structure analysis is the foreseeing of possible changes, to able to direct and to manage them in the context of landscape tolerance. In landscape structure analysis the landscape is examined as a structural whole instead of as a visual assessment of individual features.

Panu (1998) divided landscape structure analysis into two main stages: the simplification and enrichment of the landscape structure. Simplifying the landscape structure means examining the ridges and valleys of the basic structure of the terrain. Simplification also forms the basis of landscape structure zoning. Enrichment involves the surveying of potential landscape structure development and the basic characteristics of the whole landscape (terrain, vegetation, culture). In his study on the northern landscape Panu (1998) defines the landscape types as the ridge summit, the upper slope, the lower slope type and valley-shore type according to Veisterä (1988) and Rautamäki (1990). These types were also roughly divided as a basis of this study in which I started to examine whether the classification in question would suffice in the planning of forest areas, or would a more specified classification be needed.

Typologies based on locational or spatial structure

Falini, Grifoni & Lomoro (1980) determined the feasibility of a comprehensive landscape policy for areas of rural heritage, in the Terni Basin, Umbria, and Central Italy. Agricultural and historical analyses are presented as the basis of classification of the area into heterogeneous units, which when defined can help in the formulation of an active economic and social policy for similar areas.

Falini, Grifoni & Lomoro (1980) stated that it is necessary to introduce parameters suitable for the evaluation of the physical structure of the countryside. The work of synthesis following upon the historical-topological analysis represents an attempt to identify morphologically homogeneous areas, i.e. those in which a prevailing type of settlement recurs. Eight varying types of landscapes, three in plains, two in hills, and three in mountains were identified. From the combination of the production criteria with topological parameters it was

Study phases	Objectives	Basic steps
Phase 1	Understanding of existing landscape features	Analysis of landscape change Identification of landscape typologies Identification of characteristic topological elements
Phase 2	Determination of sensitivity to transformation	Assessment of permanent topological elements Identification of special environmental interest areas
Phase 3	Indication of constraints and compatible interventions	Compensation measures Incentive mechanisms Economic multiplier effects

Table 3.4.1 Suggested method of application in case areas by Falini, Grifoni & Lomoro (1980).

possible to subdivide the area into four homogeneous zones, defined as follows: zone of agriculture with environmental-aesthetic value, normal agricultural zone, special agriculture zone and mountain zone. Then the study described the structural qualities of different types. The classification strategies, presented by Falini, Grifoni & Lomoro (1980) are the following: identifying the various types of countryside and discovering the laws which have governed their formation; assessing the degree of transformation and decline, criteria for their restoration; pointing out the classes of appointed use (suitable for the types identified) among those which maximize the social benefits.

In the dissertation on spatial architectural theories, **Stenros** (1992) proposed on the basis of the literature that the birth of place requires the existence of a unique factor - the distinguishing of a certain space from its environment forming "Something" (a place) in the middle of "No-where". Commonplaceness, its objects and operations are inaccessible because they are so familiar that we pass without paying attention to them. The homogeneity of objects makes them insignificant participants in the moments of non-distinguishing magma of each other without tones or extremities. Commonplaceness is never really present; it only exists as an abstraction. All exist but nothing is seen. Releasing an object from the surrounding "anywhere" makes it materialise, creating a special, significant value which has its own identity and form. The usual only becomes visual in connection with something special, as its contrast.

Stenros (1992) presented correspondingly that as objects and operations can be made significant by releasing them from their surrounding environment, a significant space can be formed in a homogenous neutral space by distinguishing space sections; that a certain place also activates the immediate surroundings making it into an identifiable space. The topological character of space is also significant, place is always related to other places, space is the system of places.

Stenros (1992) presented the manifestation of serial space order as the typologies of space series, which at the same time define the mutual joining of space series to each other. The typology of space series is created by the location of the primary end space. The typology is

specified as the general spatial arrangement, which has taken shape over the course of time. Stenros divided the space series into three basic types: lateral, focusing and central. When compared to the typology of the case study areas of this study, Ruissalo as an island represents the focusing type having a fixed point and a destination. According to the classification of space series, Melalahti village could represent the lateral type whereas Vuokatti and Naapurinvaara, being located in the middle of a plain and being distinct ridge formations, represent the central type of spatial structure. A similar central type can also be perceived in the National landscape of Koli, which as an ancient holy place, has been experienced as its own microcosm. In addition to the primary space, Stenros presented transition spaces, which are like passes and rivers in character. They are interceding spaces between primary spaces, such as ponds and lakes.

Stenros (1992) proposed that place and its mythic contents are created by the interaction of man and space. The objective of cognitive spatial theory is to create a model of space structure, which combines the observation site, observer and observation event. The modification of the ideology of architecture to poetry as a comprehensive, unique and condensed philosophy of spatial reality requires the examination of space, place and man as a comprehensive system.

The Landscape Character Assessment (2002) in Britain provides a structured approach for identifying character and distinctiveness of environmental and cultural features, to monitor change and to understand a location's sensitivity to development and change. The Landscape Character Assessment is defined as addressing both the characterisation process, involving identifying, mapping, classifying and describing landscape character and the process of making judgements based on landscape character to inform a range of decisions. The end product of characterisation is usually a map of landscape types, together with relatively value-free descriptions of their character and identification of the key characteristics, which are most important in the creation of this character. Forces of change will often be identified, such as ongoing land use change and types of development pressure.

Landscape classification is central to the Landscape Character Assessment and it is concerned with the process of dividing landscape into areas of distinct, recognisable and consistent common character, and grouping areas of similar character together. It states that classification provides the central framework on which subsequent judgments about landscape character are based. The Landscape Character Assessment (2002) presents several practical tools to identify patterns in the landscape, recognising the classes of landscape character and their appropriate boundaries.

Landscape Character Assessment (2002) defined that a single landscape type will have broadly similar patterns of geology, landform, soils, vegetation, land use, settlement and field pattern in every area where it occurs. This does not mean that every area will be identical but rather that there is a common pattern, which can be discerned both in the maps and in the field survey records. On the other hand, Landscape Character Assessment makes a clear distinction between landscape types and landscape character areas, which are the unique individual geographical areas in which the landscapes occur.

The Landscape Character Assessment (2002) states the importance of boundaries, which are required around landscape character areas and types, although their precision will vary with the scale and level of detail of assessment. In reality, landscape is a continuum and character does not, in general, change abruptly. While landscape character and a character type or area may be clearly defined and distinctive in the centre, there may be transitions at the edges where the influence of land-cover, land use, settlement and field pattern may be less consistent. Tynkkynen (2007) also asserts that the landscape type should reflect something essential in its character, not the average elements. The belts of transition are important in some case

areas e.g. Naapurinvaara, the abrupt change of landscape type on the slope is clearly visible, and in some cases the boundaries are smoother, but well identified on the contour and vegetation maps.

The Landscape Character Assessment (2002) suggests the following principles in naming landscape types. Each type should be described with two to three words, which reflect the dominant influences on landscape character, usually relating to geology, landform, land cover and settlement. In this study the names of forest landscape types are a combination of landform and land cover.

The Landscape Character Assessment (2002) suggests summarising the key characteristics of each landscape character type. If the key characteristics identified were to change or be lost there would be significant consequences for the current character of the landscape. They should be the prime targets for monitoring change and for identifying landscape indicators.

Landscape Character Assessment will normally identify the character of an area and the factors that are particular important in creating such a character, referred to as key characteristics. If the distinctive character of a certain landscape is to be maintained, the assumption must be that its positive key characteristics should be protected from adverse change, and conversely, that the effects of negative characteristics will be overcome by some form of enhancement.

Gustavsson (1986) classified different forest and edge types following their structural development and visual appearance according to their differing forms of management. In his study of Furulunds fure, a pine forest in southern Sweden, the application of different management strategies helped change the character of some forest parts, thereby creating a variation in a visually unified area, for example, from a pillar-hall pine forest to dense mixed forest (Gustavsson & Fransson 1991).

Conclusions

Classifications based on landscape structure can serve e.g. practical forestry planning as a framework for identifying suitable management for certain location types. Blankson and Green (1991) and Beer (1993) suggested that a comprehensive landscape classification would assist to promote landscape planning, protection and management, especially for defining boundaries of heritage areas, and areas eligible for agricultural subsidies for environmentally friendly farming practices.

Hence the classification of forest landscape types integrated into topographical-geological-vegetation pattern zones can be applied as a framework, aimed to support forestry planning and landscape management of forest areas. Derived from the classification research review, the framework was chosen to be based on landscape structure theory with the help of visual assessment. That choice was due to the Nordic planning context and tradition, where the landscape structure theory has been applied in Finnish northern conditions. Furthermore as an ecological approach it is applicable to forest planning procedures, and the typologies of landscape types and forest types, whose classification is commonly used in forestry, have similar approaches.

On the basis of the landscape classification research review, the planning model should integrate visual principles into landscape structure, providing a basis for landscape management alternatives, and guiding sustainable land-use change.

Based on the above landscape research and guidelines (Landscape Character Assessment 2002), the following aims of the planning model were formulated:

- to classify and describe the landscape, identifying the landscape character types which occur in the case study areas
- to identify the forces or pressures for change in the landscape which may affect its distinctive character
- to assess the sensitivity of the landscape to change and identify which areas have the greatest and least capacity to accommodate development and land use change
- to provide guidance on how various types of land use change might be best accommodated within different landscape character areas identified
- to recommend guidelines for the conservation/enhancement of the different landscape types and identify opportunities for these activities and priorities for specific landscape initiatives

To summarise the review above, classification research has attempted to examine the physical factors of the perceived environment. Hence there are relatively minor approaches to clarify the visual factors and meanings of the landscape in classification research. Such approaches are generally dealt with through preference studies or interviews. However the combination of both visual and physical factors forms a core basis in integrated rural planning for forest areas. The preference studies often lack a locational aspect, stating where or in which places in the broad landscape the management alternative or forest view would be tolerated by the public. This integrative aspect is an interesting question, and is further examined in chapter 4.3 and focussing on the visual perception of forest management alternatives in various locations; and furthermore combined within the physical site studies in chapter 6.

3.5 Approach of landscape structure theory

In this section, the applied theory of landscape structure is examined from the viewpoint of its planning applications in forest areas. The theory's strengths and weaknesses are also discussed from the viewpoint of forestry planning. The theory of landscape structure, which forms the basic framework of the study, is critically examined here in the spirit of contextual reality. Why has this theory been chosen, rather than other theories e.g. theory of landscape-ecology? What are the theory's strengths and weaknesses in terms of its application in forestry planning? What planning questions can it answer and what is it unable to answer?

Development of the Landscape structure theory

Geographers and biologists have used classification as a tool for describing the environment from the beginning of this century in Finland. The criteria have often been very specific according to certain variables, such as climate, vegetation type, and housing type, amongst others. One of the earliest approaches was presented by J.G. Granö (1930). The landscape geographical classification was based on visual form types. Granö studied 16 geographically varied counties and found that it was difficult to define border zones or edges where one type switched to another. According to Granö, one needed not attempt to attribute clear distinctive borders or sharp edges to areas with similar uniform character edges, because overlapping zones with varying width are more common in nature (Granö 1930).

The concept of landscape structure was brought to Finnish landscape planning by Katri Luostarinen from Germany. She emphasized the idea that the comprehension of the landscape as a single whole in its beauty could not be achieved without identifying its structure

and development. Harmonious landscape planning also includes soil, vegetation and cultural history. In connection with intensified agricultural and silvicultural land use she also introduced the concept of landscape types (Luostarinen 1951). Furthermore she based planning principles on diversified landscape provinces, divided according to their geology, climate and cultural history. She identified and classified areal differences with regard to the factors of ground, nature, rural culture patterns, space, contrasting elements, symmetrical organisation, balance, tension and integration into the surrounding environment.

Based on Granö's research, geographers and landscape planners have developed their areal classifications further, especially planning theory based on landscape structure, developed in the Landscape Laboratory in Helsinki University of Technology (e.g. Luostarinen 1951, 1972, 1976, Rautamäki 1983, 1989). Their method has been successfully applied to areal landscape and land-use plans (e.g. Rautamäki 1990, Saarainen 1975).

There are various typologies developed e.g. for the management of urban green areas. E.g. in general green plans, the green areas are divided into green area types based on the areal landscape characteristics and opportunities, town structure and functionality. In the classification of green area types, suitable visual appearance, use and level of management can be assessed (Aalto 2007).

The theory's strengths and weaknesses from the viewpoint of forestry planning

The landscape structure theory was chosen as the framework for this study as it gives information on physical matters, which are also important site factors in forestry. Compared to the landscape-ecology theory, landscape structure theory combines visual factors that are crucial in visual design, that are lacking in the landscape ecological approach, whereas landscape-ecology theory mainly produces ecological information. The strength of the landscape structure planning approach evidently lies in the combined physical and visual features that are integrated into the landscape plan.

The landscape structure theory can also be related to the forestry type theory, which is commonly applied in Finnish forestry as a planning tool. The classification of forest vegetation in Finland is based on the forest site type system of Cajander (1909, 1926). In this system, individual communities are related to community types by a certain character of structural and compositional similarities (Kuusipalo 1985). The forest types are bound by vegetation types found at ground level, indicating the terrain and soil. In contrast, forest type classification has an important role in the research of Luostarinen (1951), Rautamäki (1983) and Panu (1994), and in the landscape and green area plans of wooded areas (Aalto 2007).

The landscape structure planning method is feasible for land use planning at various scales in green areas, economic land use and nature resources (Rautamäki 1997). According to Beer (1993) the approach provides an effective tool for linking the "top down" to the "bottom up" approach to land use and environmental planning. She pointed out that the essence of landscape planning is not simply in producing a rigid landscape design for every part of town or countryside, but in describing the limits, within which specific changes can occur, so that a locally appropriate landscape could develop to the benefit of a larger area.

Beer (1993) suggested that zoning has a useful role in relation to rural planning. There have been arguments that the deterioration of rural landscape qualities could be the result of delivering grants for landscape change directly to individual farmers, as generally done in the EU's agri-environmental programmes. To prevent this, clear local landscape policies and guidelines need to be introduced. Such policies and guidelines have to be developed from

an ecologically sound understanding of the local agricultural landscape and with regard to farming economics.

The weakness of using the landscape structure theory for forestry planning is that it has been developed for land-use purposes and multi-layered map analyses are time-consuming. So how useful is the planning approach in ordinary forestry planning? This question was tested using the case areas: is it possible to create a lighter and simpler tool based on this theory, which is, at the same time, useful in forestry planning? The theory and planning method was used in the eight selected case study areas to help discover if there were suitable models for different areas.

Chapter 4

Materials and Methods

4 MATERIALS AND METHODS

4.1 Applied methods in case studies

The applied methods in this study were action research and qualitative case studies, based on empiric research using diversified analytic tools to gather information from the studied areas, as suggested by Yin (1983). The aim was to understand the phenomena of various parts of forest landscape more profoundly using multiple disciplines and methods. In case study research a researcher generally searches for common qualities and otherwise for special and unique characteristics whose patterns are not repeated. The methodology of case study can be understood as a central data gathering strategy in qualitative research, as most of the research strategies apply it (Metsämuuronen 2006).

In this chapter, the construction of the landscape typology model is described phase by phase. The study analyses eight case studies in various landscape provinces in Finland to find unified spatial characteristics. The model was processed by means of action research by comparing previous classification research and the preliminary assessment of case areas and hypotheses were made about landscape preferences. Hence quantitative data of public landscape preferences is also used as background information to enlighten the examined phenomena from multiple viewpoints.

The case study creates a natural basis for making generalizations about the phenomena. Using case study methods the complexity of truth and interaction can be assessed. The results of case studies often form often an archive of descriptive materials, by which various interpretations can be made. The epistemological question related to the case study is: what can be learnt from one case study? Metsämuuronen (2006) suggests that in case studies generalization is not a matter of course, but it is more important to understand the case profoundly. Thus developed landscape types in each case area were analyzed in chapter 5 separately, and the applicability of the landscape types at a general level was discussed in chapter 6.

Kurunmäki (2008) emphasised that comparing case studies is an essential approach in the case study methodology. Instead of analysing one case profoundly, it is beneficial to choose more than one case, and examine them at the same time. It is then possible to find research questions and results, which are not visible in the analysis of one case, and to develop sound solutions. Using a comparative framework aids finding interaction, as in the applied landscape type matrixes of this study. For example, a common concept can be discovered in a group of case studies by which similar and separate characteristics can be classified.

Kurunmäki (2008) estimated the challenges of finding a suitable amount of case studies when it became necessary to make generalizations based on case study. If the cases are few and similar in character, it may not be possible to guarantee the reliability of the study outside the examined group of cases. If there are many case studies that differ from each other to a large extent, it could be difficult to find common factors and generalizations among the group of cases.

Landscapes can be classified according to their location and qualities in the landscape structure. According to Meeus (1995) it is not possible to identify one single approach for analysing landscapes that suits all purposes. Because of the many diverging connotations hidden in landscapes locally and regionally, a typology of landscape must be multidimensional. The interaction of human activities and natural systems and the resulting scenery of the landscape are the most important dimensions. Thus geological, ecological, agricultural, silvicultural and visual criteria are used to determine the landscape types.

In Finland landscape provinces have been defined in the working group report of Nationally Valuable Landscape Areas defined by the Ministry of Environment (Haapanen & Heikkilä 1993a). This study identifies the qualities of landscape types from various landscape provinces in Finland. As the selected case study areas represent mainly heritage landscapes or cultural forest landscapes, the average variety of landscape types may vary in the studied landscape character areas compared e.g. to timber-production areas. Although the case areas hold a special character as landscape heritage areas and sites of cultural forest landscapes, they are also the most important sites urgently requiring the development of forest management methods with an integrated landscape approach.

Due to the long-standing debate about the role of objectivity and subjectivity in dealing with landscape and the difficulty in removing personal judgements during planning processes, the Landscape Character Assessment (2002) suggests the following procedure to maintain the objectivity of landscape assessment and research: in landscape character assessment it is acceptable that there is a role for subjective input, but this must be carried out in a systematic and transparent way. The process of characterisation should be an objective process in the main, while making judgements involves an element of subjectivity, which can be clarified by selecting the criteria beforehand. Nevertheless, the Landscape Character Assessment (2002) states that it is important that everyone involved in the process understands which elements are relatively objective, unlikely to be disputed, and which ones are more likely to be viewed differently by different stakeholders.

According to Lyle (1991) a model is as an abstract description of reality. For centuries designers and planners have constructed three-dimensional models to study and illustrate visible form. Since the late 1950's, the concept of modelling has been expanded to represent invisible processes and relationships, e.g. climate change, traffic emissions. Often such models are formal, mathematic and highly quantified.

Formal mathematical models have proven to be difficult to use in landscape planning due to their complexity, occasional circumstances and lack of qualitative data. According to Lyle (1991), models are useful in making invisible processes and their relationships concrete. The most useful models in landscape planning are those, which define the relationships between the processes and visible form of the landscape. To avoid formality and strong quantification by adapting an applied and pragmatic approach to modelling, they can be used creatively in planning processes. Lyle describes them as semi-formal models, because the model produced has a defined form and consistency without the rigid formality of strict quantification. Such models can represent processes and relationships together with physical form in general or specific ways.

In semi-formal modelling the following principles have been represented by Lyle (1991). Models representing processes and their relationships with a physical shape: structure, function and locational patterns:

1. Visibility and communication
2. Models as complex and inclusive as possible
3. Modelling occurs in the direction qualitative to quantitative
4. Models representing change: past – present – future
5. Models provide a medium for progressing from process to form in planning and design processes.

Steinitz (1990) presents the conceptual framework for landscape planning (Table 4.1.1). In this framework six different types of problem setting are identified: descriptive, processual, evaluative, prediction of change, relationship models and decision-making models. The basic focus of this study is on descriptive, processual and evaluative models.

PROBLEM SETTING	TYPE OF MODELLING
How should the landscape be described?	Descriptive models
How does the landscape function?	Processual models
Is the landscape functioning well?	Evaluative models
How can it change?	Models predicting change
What kind of differences can changes make in the landscape?	Impact models
Should the landscape change? How is the decision made?	Decision making models
How does the landscape function?	Processual models

Table 4.1.1 The conceptual framework of landscape planning models by Steinitz (1990).

Construction of the hypothetical classification model and formulation of its factors

Phase 1: Desk study

According to the literature study, the landscape-planning model should include landscape structure analysis, a historical map survey and visual assessment. The following approaches have been combined in the planning model: the ecological survey of landscape structure according to the positivistic science tradition and hermeneutic spatial analysis approach. Below are the principles that determined the inclusion of specific factors in the model.

The landscape structural analysis was based on a map and site survey of landscape factors. It began with the broad landscape surrounding the case study area and moved to the single site. Rautamäki (1990) states that the inventory of single elements, like solitary trees, stones, and rocks, for example, for landscape management is not enough, as landscape planning should embody the whole entity. The planned area was to be assessed in large geomorphologic units, not only as near-distance views of single stands. A map inventory is a well-applicable tool for the general assessment of landscape changes (Heikkilä 2007).

The broad landscape was assessed according to its areal topography, bedrock, soil, fluviation and microclimate, which were assessed with the aid of a map survey. Rocky, moraine and esker ridges that dominated the landscape, as well as edges, valleys and river corridors were all defined on the maps (Rautamäki 1990, Panu 1994). Forest inventory maps were used to search for information on tree species and vegetation potential, and their location in the landscape (Antikainen 1993a).

The landscape inventory started from a broad landscape assessment and advanced to details that were considered in the light of logical and environmental relations. Initially, all the landscapes were surveyed using large-scale ordnance and soil maps (e.g. map scale of 1:50 000). Then, the survey focussed on more detailed sites, single locations and the areas in question - using detail scale maps (e.g. 1:10 000 or 1:5000). Different elements like summits (moraine, rocky and esker summits), valleys, lakes and river corridors, node points, land routes and settlements were drawn on sieve maps. Based on the landscape structure the area was divided into landscape sub-areas, with a basic description of their qualities. The distinctiveness of the area, its historical continuity, diversity, unity of space, and clarity of borders served as assessment criteria that facilitated orientation and a meaningful search. The landscape units were studied in zones, development direction and borders.

Phase 2: Field survey

On site it was examined how landscape structure foreordains terrain patterns, land-use and vegetation types: summits, slopes, edges, valleys, open spaces and settlements. Visual character was assessed with the help of visual analysis, which was assumed to reduce landscape deterioration caused by the operations (Landscape and Visual Impact Assessment 1995). The main character of the site was examined using visual assessment by evaluating the typical shapes, scale, direction, depth of views, skylines, location of open spaces and woods (Lucas 1991, Bell 1993). Visual assessment was made in the case study areas in order to analyse previously applied forest management practices.

Landscape decay and their main viewing directions were mapped to evaluate management alternatives. The sensitivity of the landscape depended on the steepness of the topography, visibility and other factors of the broad landscape (diversity, unity, genius loci, character) (U.S. Forest Service 1973 & 1974). As suggested by the results of Karjalainen & Komulainen (1998), landscape decay may become visually obvious against the harmonious and homogeneous background of the landscape. Thus the most sensitive areas are skylines, edges of ridges, rocky slopes, lake shores, islands and tips of capes, where careful assessment is required in order to preserve landscape value (Antikainen 1993a). From the routes the most visible areas were determined as well their scale, skylines and areas that are in active recreational use and those areas that are beyond visible reach (U.S. Forest Service 1973 & 1974).

Phase 3: Classification and description

The landscapes of the case areas were classified on the basis of the unit inventory and their distinct sub-factors. The basis of the classification was geomorphologic, because the shapes of the topography and soil types determined the vegetation potential and the prerequisites for human operations, which in turn affected the visual appearance and cultural development of the place. Information derived from the landscape structure and landscape type classification is the basis for the objectives and criteria of areal landscape management and planning (Rautamäki 1990, Panu 1994).

An evaluation of the landscape types, their sensitivity and forestry feasibility was made using landscape structure analysis. The main survey concentrated on analysing classification and its procedures. Each case study area was analysed and illustrated using a landscape structure map, the classification of landscape types, their visual analyses and diagrams of cross-sections of landscape structure. Similarities and differences between landscape types were compared and the alternatives for landscape management of the types were studied. Alternative management instructions were suggested for each type in other to maintain or improve the landscape qualities.

During planning, the landscape structure was assessed layer by layer by examining its patterns and defining landscape units on the basis of their distinctive characteristics. The results of the map surveys were supplemented with a site-based inventory of the existing features of the visual landscape and a forest inventory. Furthermore, a historical analysis, based on old land-use maps from the end of the 1800's and 1900's, was conducted in order to obtain a deeper understanding of cultural landscape features, to assess cultural values and predict future development. For example, the mapping of traditional meadows and pasturelands can save relicts of traditional slash-and-burn-culture, common in Finland in the 1600-1800's. As e.g. Seppälä (2006) shows the connection of traditional biotopes to early settlement and land

use history, as a means of how research on settlement history and archaeology can be used to search for traditional landscapes and also to track signs of human activity.

The thematic map surveys of planning areas:

1. Landscape structure
2. Landscape-ecological structure (e.g. location of soil types, exposure, water, microclimate)
3. Landscape character zones
4. Visual analysis (e.g. view types, shapes, landmarks, dominating elements)
5. Historical maps during different time periods
6. Landscape plans, types and their management guidelines

The third phase involved the description of the overall character of the landscape, with reference to geology, landform, land cover and land use to draw out the way that these factors interact and are perceived. According to this analysis the forest area was divided into landscape types, with respect to their location in the landscape structure. For example, in forest ridge areas the main types were summit forest, slope forest, edge forest and valley forest.

Phase 4: Deciding how to approach judgements

The classification matrix was constructed by comparing the locational qualities of each type to the characteristic visual factors in case study areas in various landscape regions as shown in table 4.1.2. Based on the principle of linking visual factors of each type to location in landscape structure and general forestry practices the procedure for landscape management for each type is evaluated.

Type	Location	Visual appearance	Procedure
Type 1-n...	Location in landscape structure and characteristic ecological qualities	Visual factors, like shape, unity, scale, direction, texture, sensitivity, and visual problems	Landscape management options, preferred felling/planting alternatives for each type

Table 4.1.2 The tested matrix of classification shows the model of integrating visual factors into landscape structural locations.

During the assessment of visual appearance professional analysis criteria were used, with the concepts of shape, scale, direction, diversity, and unity. The preferences related to the case studies were applied to the sub-section of the procedure, as preferred management alternatives for each type. As the preference studies revealed differences in landscape types, particularly in their sensitivity to change and visual appearance, it was necessary to take the next basic step of developing management alternatives. Because the preference studies only examined two forestry practices (regeneration felling, afforestation), there was a need to include an expert approach in the form of visual assessment of case areas to ensure that the model contained all types of forest practices. Therefore it was possible to include management models such as thinning, management of edges or traditional pasturelands, which are common in cultural landscapes.

It should also be mentioned that the preference studies (Karjalainen & Komulainen 1998, 1999) were applied in two specific regions in Northern Finland, while the researched photographs described ordinary Finnish forest landscape scenery. Thus some preferences might

vary in other landscape regions in Finland, and the results are not directly applicable. Therefore the matrix of landscape types has to be a combination of expert-based judgements and public preferences in studied landscape regions, with the main emphasis on the structural and visual assessment of landscape.

Landscape, as discussed in chapter 3, can be located between a natural and cultural landscape, and thus both need to be taken into account, therefore present research needs to integrate the landscape classification approach, descriptive in its nature to integrate the natural and human impact on the Nordic landscape. To accomplish its purpose, the procedure proposed here consists of an investigation of the present landscape research, preference studies, testing the planning approach in case study areas and finally an examination of how classification of landscape types and their guidelines might be developed for such an approach.

The method of testing classification further is described in chapters 4.3 and 5. First, chapter 4.3 summarizes the results of the preference studies related to the case studies. Chapter 5 presents the eight case studies, where the classification was tested in practice, in order to find the type's characteristic qualities and visual problems. Finally, in chapter 6 the matrixes of preference and case studies were compared and the landscape management recommendations were made based on this comparison.

4.2 Selection of case study areas

The differences and unities of forest landscape types were examined in practice by analysing the case study areas. The main material for this study was gathered from eight physical rural landscape areas and their planning processes.

The model of a forest landscape typology was tested in eight areas in different Finnish landscape provinces from Southwest to Northern Finland. The selection of case study areas was based on current landscape projects, approved by local municipalities, environmental authorities, village associations and private forestry boards. The inhabitants of villages often initiated the total resource planning process, to avoid potential conflicts within timber-production versus other income-generating livelihoods with the integrated planning approach. The selected case areas present, in general, high aesthetic and cultural values with the added interest of multiple land-uses for rural tourism, agriculture and forestry. Planning was activated because many of the areas were listed as nationally valuable landscape areas by the Ministry of Environment (Haapanen & Heikkilä 1993b). One area, namely Tipasoja, represents an ordinary agricultural and forest landscape, but it is located near the Hiidenportti National Park, which could be expected to benefit from nature tourism.

The selection of the case study areas in this study was based on actual landscape projects, for which I made landscape plans in 1989-2008. This ensured a similar, comparative approach between the studies, but the limited amount of case study areas presented some restrictions to the further general application of the management models in commercial forests. Since the results of the study were collected from cultural landscapes or areas with a high amenity value, their management alternatives may not be directly applicable to ordinary timber-production forest areas. The structural qualities of landscapes of high amenity value may hold more easily distinguished characteristics than ordinary forest areas. The application of the outcomes to normal forest areas is further evaluated in chapter 7.

The distribution of the case areas is shown in figure 4.2.1 Location of case areas. The selected case study areas cover the following landscape regions: representing flat coastline (Ruissalo, Häntälä), lake-shore villages in Middle-Finland (Peränne, Melalahti), and the up-

per ridge regions of Kainuu and Eastern Karelia (Koli, Naapurivaara, Vuokatti, Tipasoja). As seen from figure 4.2.1 the distribution of case areas focuses on three general landscape character areas, the coastline in the South, middle Finland and Northern Finland's ridge areas.

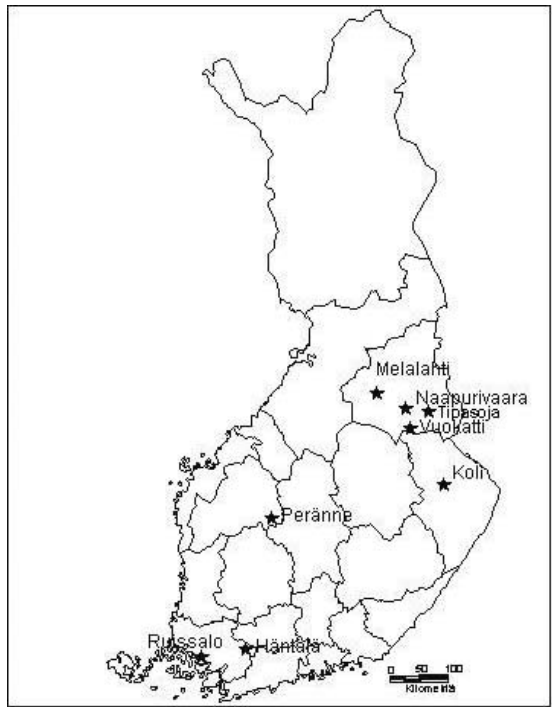


Figure 4.2.1 Location of eight case study areas in Finland.

The case studies are presented in chapter 5 in chronological order, according to when they were conducted. The studies started in Ruissalo in 1989 and ended in Tipasoja in 2008. During this twenty-year period of time the theory proceeded gradually, and the construction of the forest landscape typology is summarised within the analysis of case studies below. The case areas vary in their general character and land use. Most of them are rural agricultural landscapes surrounded by woods, some of them are recreation and island forest areas near cities and others are wilderness areas with high tourism interests. For example Ruissalo is a special oak wood-recreation island near Turku; the dells of Häntälä are well-known for their geomorphology; and the National Park of Koli is one of the most famous national landscapes in Finland. In spite of their status, their landscapes present various ordinary patterns of land-use, like felling coupes, tourism construction and afforestation.

As a landscape planner and forester I posed the following questions with reference to the forest landscapes: What particular forest areas should be emphasised with management practices? Which landscape types are visually the most vulnerable? Which forest operations might create visual conflicts with the surrounding landscape? How should felling be adjusted to a landscape in a more aesthetically appreciated way? These issues were studied by analysing the landscape types, their location in the landscape structure, their general visual appearance, aesthetic problems and the employment of appropriate landscape management. The original descriptions of the types were implemented during landscape projects in 1989-2001

and in 2008, and the sites were visited and photographed again in June 2006-2008 to illustrate changes in the landscape.

The case study areas and the years of published plans were as follows:

1. Ruissalo (South West-Coastline, 1991)
2. Koli (Ridge-Carelian, 1993)
3. Melalahti (Region of Oulu Lake, 1993)
4. Häntälä (Häme, 1994)
5. Peränne (East-Bothian, 1994)
6. Naapurivaara (Ridge-Kainuu, 1995)
7. Vuokatti (Kainuu, 2001)
8. Tipasoja (Kainuu, 2008)

Landscape classification was carried out for all the case areas according to the landscape's structural patterns. Thematic maps and cross-section of types described the localization of types in the landscape structure. The co-planners of the case study areas were mentioned in connection with the detailed case area analyses. The original plans with various analyses maps were published separately in the publications mentioned in connection with the case studies below.

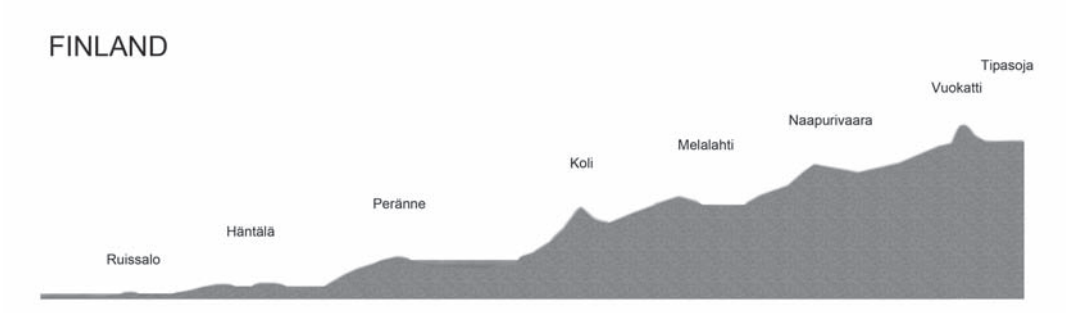


Figure 4.2.2 Cross-section of local of case study areas in the Finnish landscape structure.

Chapter 5 provides the results of case study areas by describing the characteristics of each forest landscape type, assessing their typical locations in the broad landscape, and naming the types based on their location in the landscape structure. The evaluation aspect of the case studies is explored in chapter 6 through the comparison of preference studies and the findings of a field survey.

4.3 Preferences of landscape management alternatives

Quantitative preference studies were made to assess the preferred management alternatives of landscape types. The results were applied as the background empiric material to construct a forest landscape typology. This section summarises the results from the viewpoint of perception of forest landscape types and their preferred management alternatives.

Objective 2 was to evaluate the perception and management alternatives of forest landscape types by comparing the results of site studies to preference studies. The two preference studies were made in relation to the planning process, and they examined the perception, sensitivity and preferred management alternatives of forest landscape types from the viewpoint of local inhabitants and foresters. The above-mentioned preference studies are separately

published as articles of “Karjalainen, E. & Komulainen, M. 1998: Field afforestation preferences: A case study in North-eastern Finland”; and “Karjalainen, E. & Komulainen, M. 1999: The visual effect of felling on small-and medium-scale landscapes in North-eastern Finland”.

The aims of the preference studies were to assess how to locate logging operations and field afforestation in small- and medium-scale landscapes in the scenically most appropriate way. Practical questions were concerned with the shape and location of felling operations, as well as solitary trees retained on felling sites. Creating management alternatives was based on landscape structural theory and recent felling methods. The two studies were carried out using preference research and photographic simulation.

The preference studies were examined with the following questions: Were there notable differences in forest landscapes, which could be considered as different visual management types through public perception? Were there differences in the visual effect of felling in different parts of the landscape structure? Were some parts more sensitive to forest operations? What were their preferred management alternatives according to public perception?

In the preference surveys, the landscapes are referred to as experimental human environments perceived through the senses and through cognitive and emotional processes (Karjalainen et al 2009). The environment is observed mainly by sight because the visual phenotype of landscape is significant when the quality of the landscape is estimated on site.

According to Kaplan & Kaplan (1982) a central issue in the appreciation of landscape is visual perception. It is in fact the visual system, which enables man to distinguish landscape features within their context and composition. This provides a basis for a consequent aesthetic judgement. Hence, considering landscape in terms of information provided by human perception, the researcher can discover and eventually predict preferences for landscape. Bourassa (1991) suggests that certain types of landscape are preferred because people associate their features with certain habitats.

Furthermore, Makhzoumi & Pungetti (1999) separated landscape perception and landscape experience, two of the major fields of landscape psychology. The perception of landscape involves the characteristics of space, exploring the way in which the observer looks at landscape, while the experience of landscape deals with the characteristics of the observer, in investigating the satisfaction that is derived from contemplating landscape, which is related to biological, cultural and personal factors.

Below is a summary of the results of the preference studies of two case studies. They assessed whether there are differences in landscape types, particularly in their perceived existence, their sensitivity to change and visual appearance. The two case studies were conducted side-by-side within the landscape planning processes of Melalahti, Naapurinvaara and Vuokatti villages during 1994-1997. Later the results were combined in the matrix tables produced according to the eight case study areas in chapter 6.

Material and methods

Study areas. Two villages, Vuokatti and Melalahti, were chosen as case studies. The villages belong to the same province, Kainuu. According to the Ministry of Environment (Haapanen & Heikkilä 1993b) the two villages have been classified as nationally valuable landscape areas. The villages are important to tourism. The forests of the villages are under private ownership. Private estate borders, individual logging and a lack of integrated planning cause problems in the landscape.

Photographic simulation. The landscape of both villages was divided into different landscape types and captured in one photograph. Logging alternatives were visualized by photographic simulation with Photoshop computer software. Only one aspect in the landscape was changed at a time. This made it easier to study what people assessed in the slides.

One basic slide was chosen from both villages. Each slide described a forest slope with an actual felling area and a lake in the foreground. The choice criteria were that the view was an important part of the village landscape. Ten different felling alternatives were created on two basic slides. Most of the options were similar in both scenes. The alternatives represented actual felling methods; many examples of which can be seen in the present-day landscape of Finland.

Respondents. A total 190 respondents evaluated the felling alternatives on the basis of 23 slides of felling alternatives and 11 photographs, which presented five different afforestation options. The respondents consisted of residents of the study areas (33 persons), tourists (99 persons) and forestry experts (58 persons). The Private Forestry Board was carried out landscape projects in the villages during 1993-1995, and therefore it was easy to involve inhabitants in the survey. The same respondents and same study areas were used in both studies.

Assessment procedure & analysis of data The assessments made in graphical scale were transformed into numerical form by measuring the location of the mark made by the respondent. The scale was assumed to be interval and so parametric statistical analysis was used. Eeva Karjalainen was responsible for this part of the study.

The perception of forest landscape types

In the article of Karjalainen & Komulainen (1999), the perception of different landscape types was tested by analyzing the following factors: if there are notable differences in forest landscapes, which could be considered as different visual management types according to public perception? The hypothesis of whether there were differences in the visual effect of the felling in the different parts of the landscape structure was examined, and if, in fact, there is a hierarchy of different forest landscape types.

According to the evaluation of 190 people *felling was considered significant in the broad landscape*, as felling photographs shown were attributed a value generally 50 % lower than pictures of untouched forest scenery in each answer group.

The results of the preference study support the main hypothesis in the perceived differences in forest landscape typology. The *visual effect of felling depended on its location in the landscape structure*; therefore it seems that there is a certain hierarchy of different forest landscape types. It was shown that the evaluations differed depending on the location of the operation in the landscape, which could be one proof of how the visual forest landscape type is perceived. The aesthetic effect of the location of a felling area was tested with the Vuokatti scene only. Felling was located in a summit forest, a slope forest and in a forest along a lake shoreline in order to compare their valuation through public perception.

Preferred management alternatives

This section summarises the results of the preferred management alternatives. Landscape types were determined according to landscape structure, and they were a summit forest, slope forest and a lakeshore forest edge. The felling alternatives were created by changing the scale, direction, unity, location, shape or diversity of the felling operation, or the amount and location of solitary trees retained on the site. Hypotheses of the aesthetically best logging

alternatives were constructed on the basis of landscape architectural principles and felling practices. In the afforestation survey this consisted of the location of afforestation, shape of afforestation and the choice of tree species.

The studies distinctly demonstrate that those involved in the study did not like changes in the rural environment and regarded forest regeneration and field afforestation as scenically disturbing. Although some hypotheses remained unproved, the way of implementing forest regeneration or field afforestation significantly affects their visual quality. Even small changes in forest regeneration or field afforestation measures can improve the scenic quality of such work (Karjalainen & Komulainen 1998, 1999).

LANDSCAPE TYPE	Management options tested in hypothetical order	Preferred options
Summit forest	*Felling a summit forest* 1. unbroken skyline 2. clear felling 3. seeding felling	*Felling in a summit forest* 1. unbroken skyline and seed-tree felling 2. clear felling breaking the skyline
Slope forest	*Felling in a hillside forest; shape and direction of felling area* 1. irregular shape 2. geometrical horizontal shape 3. geometrical vertical shape	*Shape and direction of felling area in a hillside forest* 1. irregular shape 2. geometrical horizontal felling 3. vertical shape
Edges	*Felling along lake shore* 1. dense strip with an opening to lake 2. evenly spaced thinned strip and clearance of bushes 3. clear felling without strips	*Felling along lake shore* 1. dense strip of forest with an opening to lake 2. evenly spaced thinned strip of forest and the clearance of bushes 3. clear felling without trees and screening
Valley forests	*Shape of afforestation* 1. oblong irregular shape 2. oblong geometrical shape 3. quadratic shape *Location* 1. near forest edge 2. middle of fields 3. closing long-distance view	*Afforestation reflecting the shapes of the surrounding landscape most preferred* 1. oblong irregular shape 2. oblong geometrical shape 3. quadratic shape *Location* 1. near forest edge 2. closing long-distance view 3. middle of fields

Table 4.3.1 Findings of preferred management alternatives linked with landscape types. The alternatives are in the following order: 1. best; 2. second best; 3. worst alternative (Karjalainen & Komulainen 1998, 1999).

The management options of the aesthetically best logging and afforestation alternatives were constructed on the basis of landscape architectural principles and felling practices. The preferred alternatives were grouped below in table 4.3.1.

Summit forest. As far felling in summit forests was concerned, an unbroken skyline and seeding felling were the preferred alternatives while clear felling was the most undesirable option. The results were contrary to the a priori hypothesis. Seeding felling was expected to be the worst alternative. Seed trees along the horizon, against the sky may draw attention to the felling area (U.S. Forest Service 1972, Kardell 1978).

The results of the study suggest that the conservation of the silhouette of the hill is important, regardless of whether the skyline is uniform or ragged. It is notable that seed trees also improved the scenic appearance of felling in summit forests. This was true both when well-shaped seed trees were near the viewer and when thin seed trees were further away. In the summit forest clear felling was the least preferred option, probably because it breaks the silhouette more distinctly than seeding felling and makes the felling more visible.

Slope forest. According to the a priori hypothesis irregular diagonal shapes are more acceptable than geometrical ones, because geometric shapes may conflict with the natural shapes of the landscape (Lucas 1991, Bell 1993). In addition, it was presumed that horizontal shapes fit the landscape better than vertical ones (Lucas 1991, Bell 1993). The results were quite consistent with the hypotheses. Kardell (1978) found that people liked felling which was square or rectangular in shape, the least (Kardell 1978).

Edges on the lakeshore. The results concerning felling along lakeshores were consistent with the a priori hypothesis. The most appreciated logging alternative was to leave a dense forest strip. According to visual design guidelines a dense forest belt changing gradually to overlapping, irregular groups with properly shaped clear-cut margins behind, is the most natural alternative (Lucas 1991, Forestry Authority 1992). People usually pay attention to the edges (Wagar 1974, Shafer and Brush 1974). An evenly spaced thinned strip was less preferred than the dense strip. This may result from the impression that a thinned strip creates a parallel shape and a geometrical scale (Lucas 1991, Forestry Authority 1992). Clear felling without screening was the most disliked alternative. The felling area and its shape are most visible in this option (Lucas 1991, Forestry Authority 1992).

Most of the options were presented for both study areas and the preferences were quite similar in both sceneries. It has to be remembered that this is a case study, which relates only to one landscape region in Northern Finland. The results are thus only applicable locally and tentatively, but they create a basis for future research. The following restrictions also arose during the analysis of the results. When modifying the slides, the aim was to preserve a constant felling area size in each slide, but it was not always possible. This might have affected the results to some extent, because size seems to be a very important factor to the public when evaluating felling areas.

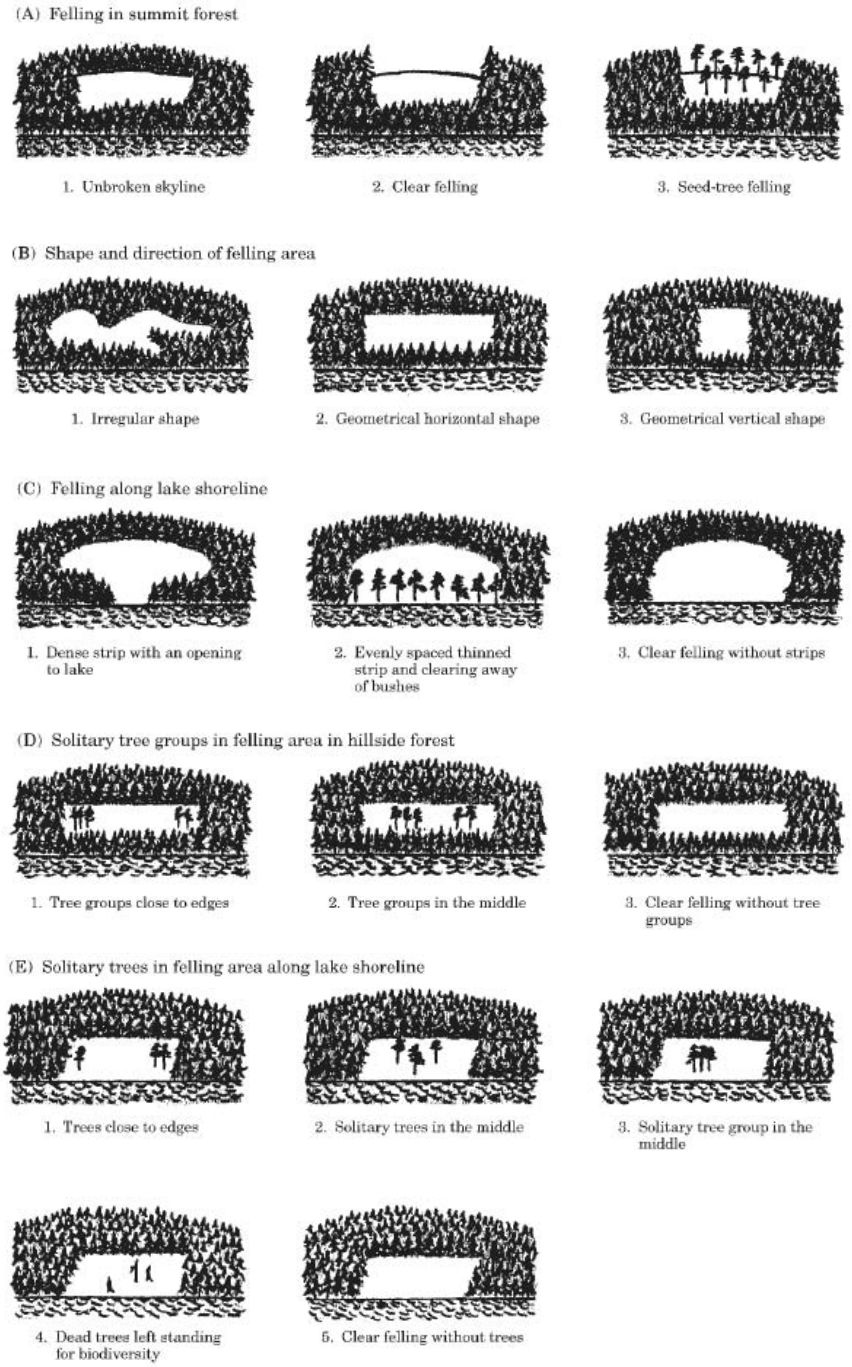


Figure 4.3.1 A priori hypotheses of the scenically best logging alternatives. 1=best alternative, 2=second best alternative, etc. (Karjalainen & Komulainen 1999).

Results on afforestation. Results show that afforestation was considered disturbing even though the afforestated area was small. In particular, it disturbed local residents who had learned to highly appreciate their everyday landscape. Overgrown fields and views have also been stated as greatly reducing the quality of the landscape in other landscape perception studies (Savolainen & Kellomäki 1981, Tyrväinen & Silvennoinen 2005). The scenic effects of power lines, telephone masts and road building can also be fast and visible in the rural landscape.

The most important studied factor concerning the scenic beauty of afforestation was the location of the afforestated area. According to the results, afforestation should be situated on the forest edge, while afforestation in the middle of a field was the least preferred option. Oblong and irregular shapes melted best into the landscape. The tree species used in afforestation made no difference to the preferences. Results suggest that the scenic quality of the surrounding environment is more important than the method and details of afforestation. In addition, the study hints that afforestation might be more disturbing in appealing and valuable landscapes than in less attractive environments.

The results of the study show that afforestation decreased appreciation of the scenery even though the afforestated area was quite small and unnoticeable. However, contrary to the a priori hypotheses, the results of this study show that the loss of a long distance view was unimportant. In Melalahti, afforestation situated in the background was most appreciated although it closed the long distance view to water. The preference of this option may be due to the fact that this area was located further from the viewer and thus it was probably perceived as less noticeable and smaller, although the size of the afforestated area was equal in every option.

The shape of afforested area was a focus of interest in the study. In Melalahti an oblong irregular shape of afforestation was preferred to geometrical shapes. In Vuokatti, oblong shapes were preferred to quadratic shapes. This means that irregular, oblong shapes and afforestation situated according to the shape of the landscape were more appreciated than quadratic shapes. This result is consistent with the principles of landscape architecture according to which irregular shapes adapt better to the landscape than geometrical shapes (Bell 1993, Lucas 1991).

The preference studies show that areas of regeneration or afforestation should not attract attention in the landscape. The regeneration stand can be better integrated into the landscape by defining its borders with natural shapes and by leaving retained trees in the stand evenly or one by one. Retained solitary trees are liked more than groups, as they make the regeneration site look more like a forest and they fill the space more effectively than a harvested space without any trees or bushes (Karjalainen & Komulainen 1998, 1999).

The management option is not the only factor affecting the scenic attractiveness of afforestation or forest regeneration, since the examination point, distance and landscape where such an operation is carried out are also important. Indeed it seems that in attractive and varied environments afforestation and regeneration implementation methods are more important than in less charming and more monotonous environments. It would seem that the changes caused by forest regeneration and afforestation are more accepted in monotonous environments in the landscape than in less attractive landscapes. The examination distance affects the attractiveness of the different management alternatives because some features of the landscape cannot be distinguished in the broad landscape (for example solitary trees) whereas some properties are not clearly distinguished in a closer view, for example the shape of the felling coupe (Karjalainen & Komulainen 1998, 1999).

The preferred management alternatives provided background information to the manage-

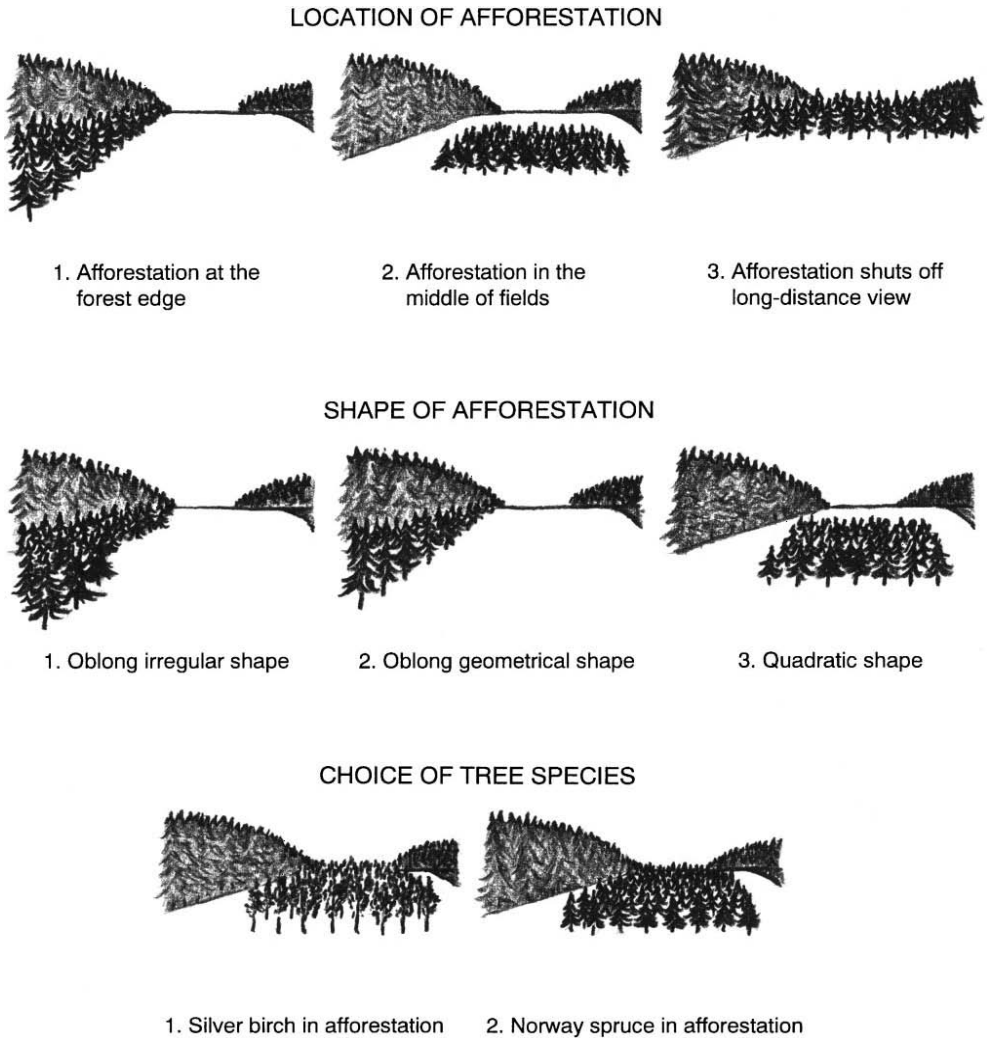


Figure 4.3.2 A priori options of the scenically best afforestation alternatives. 1. Best alternative, 2. Second best alternative, 3. Worst alternative in the study of Karjalainen & Komulainen (1998).

ment alternatives of forest landscape types. Due to the restrictions in their interpretation, based on the diversified viewing distances and other such variables, the management models were further tested in the case study areas. Later in chapter 6, the results of preference studies were compared to the case study findings. Based on this comparison, the recommendations were revised in the landscape management alternatives.

Chapter 5

Analysis of case study areas

5 ANALYSIS OF CASE STUDY AREAS

This chapter collects the results of case studies, describes their forest landscape types and examines their location in the broad landscape. Finally section 5.9. summarises the progress made from the landscape planning cases and analyses the lessons learnt in order to build a general planning framework for cultural forest landscapes.

5.1 Ruissalo (South-West coastline)

Landscape character region

The island of Ruissalo is situated off the Southwest coast of Finland, near the city of Turku, and its old medieval castle and the harbour. It has been listed as a nationally valuable landscape area by the Ministry of the Environment (Haapanen & Heikkilä 1993b). Being a part of the city recreation area, it is of national and cultural importance. It constitutes a rare type of natural oak forest on the Southwest coastline together with wide nature-conservation areas, culturally valuable milieus, and ancient royal hunting lands and a modern recreation and tourism area.

Area

The island's area is 872 hectares; it is 7 km in length and 1 km in width. The island is owned by the Municipality of Turku.

The Environmental Agency of Turku municipality ordered a multiple-use forest plan to integrate the land-use of tourism and forest management of old oak forest, its regeneration and preservation. Analyses were carried out in 1989-1991 and published in the following publications: "Antikainen, M. 1991. Ruissalon metsäsuunnitelma. Turun kaupungin ympäristönsuojelutoimiston julkaisuja 7/1991." (Forestry plan of Ruissalo. Publications of Turku Municipality, Environmental Agency nr 7/1991) and in "Antikainen, M. 1992. Tammimetsien hoito. Helsingin yliopiston Metsäekologian laitoksen julkaisuja nr 1." (Management of Oak Woods. Helsinki University Publications, Forest Ecology Department Nr 1).

The landscape structure of Ruissalo

The landscape structure analysis was based on the topographic-geological shapes of landscape and localization of vegetation zones. The basic structure of the Ruissalo landscape was born during the ice age, following the Baltic Sea Lake and sea periods, when deep valleys and esker and moraine hills were shaped. Ruissalo consisted of multiple islands during different phases of the Litorina Sea. The idea of landscape structure analysis came from the natural historic layers of Ruissalo. The summits, "former islands" rose from the youngest part of the landscape, clay valleys, which were under water in the year 1000 A.D. The oldest part of the landscape, present summits (over 20 m above sea level) rose from sea at the beginning of the Litorina Sea period. The most fertile oak woods are located (over 5-15 m above sea level) at the edges of valleys and summits of the ancient shores.

The topography of the island is small-scale and scattered like the Southwest coastline. Basal rocks are common in Ruissalo, and lush vegetation exists especially in the broad zone rich

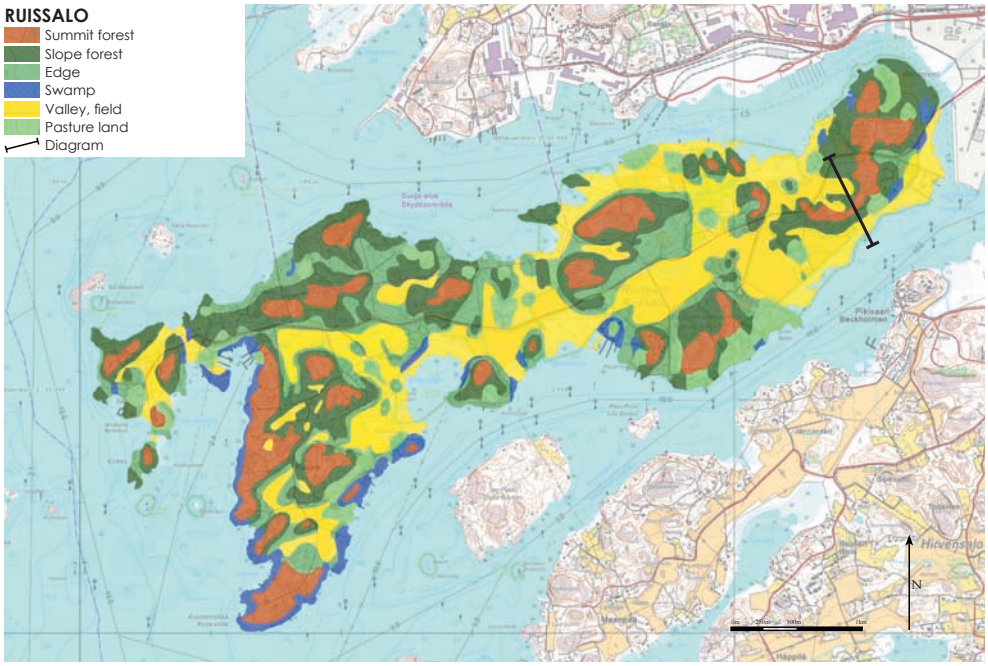


Figure 5.1.1 The landscape structure map shows the location of summits, slopes, edges, swampy meadows, valleys and cultural areas. Reproduced with permission of The National Land Survey of Finland, 809/MML/08.

in amphibolites. The northern part of the zone consists of gneiss and slate stone, whereas in the southern part more granite is present. By studying the land-use and soil maps, soil qualities can be characterised into two opposing main types: sub-aquatic summits and sediment valleys. This division can be seen in the landscape structure and land-use. On the coastline, the field and forest border zone is often marked by an edge of clay and rocky moraine.

The Landscape types of Ruissalo

In the landscape plan (Antikainen 1991), landscape types were defined and their characteristic qualities and visual problems were described. According to the location of vegetation

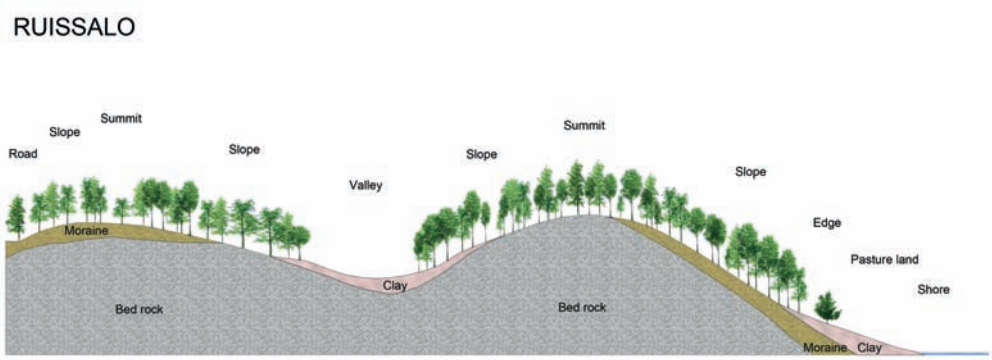


Figure 5.1.2 Diagram of landscape types in Ruissalo. The cross-section presents how forests reflect the landscape structure.

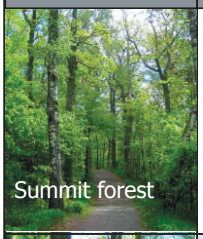
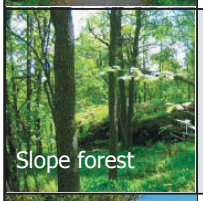
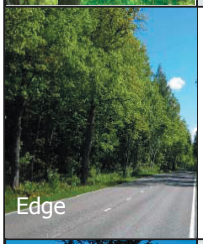
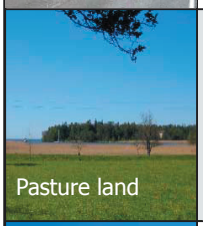
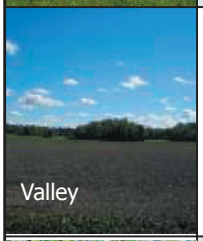
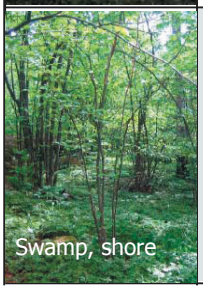
TYPES	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
 Summit forest	Sub-aquatic, rocky moraine hill tops, pine-oak woods, CiT, CT, VT	Visually important, uniform skylines, forming sensitive background woods in broad landscape, light and spacious pine forests with soft texture, rounded shapes, large scale in skyline	Emphasise of local character by conserving unity of skyline, emphasise scenic node points with broadleaves.
 Slope forest	Rolling moraine slopes of MT	Visually less sensitive, medium scale, mixed oak woods	Extended circulation time, richness of species, save bush and ground vegetation, improve durability, retain solitary trees.
 Edge	Fertile groves in clay and sandy clay sediments, between open fields and woods, OMaT, OMT	Semi-open oak-lime and oak-hazel woods, lush biotopes, visually sensitive, rounded shapes, forest structure varies from semi-open to dense position, small scale	Small-scale management of solitary trees, tree groups and bushes, long circulation time, regenerate woods using small-scale openings and in the most vulnerable places under shelter wood position, retain dense wood positioned a shelter against traffic.
 Pasture land	Cultural areas in clay valleys, no natural forest type specified	Semi-open parks, gardens, arboretum, small-scale cultural and aesthetic scenery, visually sensitive, rounded shapes, small scale, soft texture	Create scenery by grouping trees and bushes, maintain safety and health of trees, small-scale management of trees and tree groups, prefer long circulation time, improve soil tolerance of recreation, conserve ancient trees.
 Valley	Fields and meadows in clay valleys with small woods, forest islands, solitary trees and tree groups, OMat, OMT	Dense small-scale woods, visually very sensitive, rounded shapes, soft texture	Small-scale management of dense, multi-layered tree and bush vegetation, pollution tolerant tree species should be favoured, dense forest edge zones, avoid clear felling, favour shelter wood position in regeneration.
 Swamp, shore	Shores and brook dells, clay soils, wooded, minerotrophic mire	Swampy, dense mixed broadleaf woods or alder groves, small-scale, rounded shapes, soft texture	Reduce the risks of erosion, windiness & fluviation by improvement of sustainability of trees in edges by thinning, thinning of tree groups to open views to sea, dense bush layer, avoid ordinary felling or soil scarification, consider wind conditions and wind direction in the width of shoreline woods.

Table 5.1.1 The landscape types of Ruissalo, off the Southwest coastline of Finland are presented in the table above. Six different landscape types were distinguished from the surrounding landscape. Their location in the landscape structure, main visual appearance and suggested landscape management actions are also described.

patterns, Ruissalo was classified with the landscape types of summit forests, slope forests, edges, swampy groves, valleys and pasturelands. The shape of the vegetation patterns were emphasised by defining the borders of forest management units according to the shapes and scale of the terrain.

Forest management instructions were compiled for each forest stand in the Forestry Plan. It was suggested that pine-oak woods be favoured on summits, whereas oak-lime-maple-spruce woods of the slopes and oak-hazel woods of the edges were to be conserved. Important cultural landscapes were to be managed and saved as open spaces. Small woods in open valleys were to be managed and regenerated as a multi-layer structure in order to save their skylines and forms in open spaces. It was proposed that the forest edge zones of valleys be emphasised with special solitary trees and lush oak multi-layer edge zones depending on their natural qualities. Moist woods in hollows, lower soils and wetlands were often broad-leaved mixed woods or alder groves.

Thanks to its special characteristics, the Ruissalo case study offered an interesting platform to test the preliminary ideas of classification and to find the management options based on the landscape structure.

5.2 Koli (Ridge-Karelia)

Landscape character region

Koli national park has been named as the national landscape representing a unique combination of northern Taiga-zone forest ecosystems, open lake sceneries of the Finnish lake-district and barren, wild forests of the Ridge-Karelia (Putkonen et al 1993b).

Area

The planned area is the national park (2909 hectares) and its surrounding landscape of Lake Pielinen, situated in Northern Karelia, north of Joensuu. The land is owned by the state. Koli national park was an example of integrated forestry and tourism in Karelian ridge areas.

The landscape plan was ordered by the Finnish Forest Research Institute and it was published in the following publications of “Antikainen, M. 1993a. Metsämaiseman suunnittelu Kolin kansallispuistossa. Metsäntutkimuslaitoksen tiedonantoja nr 456.” (Forest Landscape Planning in Koli National Park. Publications of Finnish Forest Research Institute nr 456) and in “Antikainen, M. 1993b. Forest Landscape Planning in Koli National Park. Proceedings of the IUFRO Working Party, Landscape Ecology Conference. IUFRO Proceedings Landscape Ecology in Forestry, Ljubljana, Slovenia.”

Landscape structure of Koli

The landscape of Ridge-Karelia is characterized by a large-scale landscape structure, a Southwest-to-Northeast-direction of topography, long panoramic views and fertile hilltop vegetation. The most dominant factor in the Koli landscape is a rocky ridgeline, which gives shape and scale to the broader landscape. The landscape character is born of large-scale shapes, Southwest-to-Northeast directions and strong contrasts in visual diversity. Such diversity is created by forms of topography, rocky hill peaks and variation in forest texture from dark spruce forests to light birch woods. The large lake basin balances the high visual contrasts.

The strong contrast of high ridgeline and open lake creates unique *genius loci*, the spirit of the place.

The Koli ridgeline is a relic of the ancient Karelian mountain area, consisting of granite and quartzite. The ice age has shaped the topography of the ridges, and created an esker island line on the lake. High relative height differences are typical to the area. Ukko-Koli is the highest peak at 253 m above Lake Pielinen. The quartzite ridge zone area and its unique topography were the main criteria for the foundation of the National Park in 1991.

The landscape of Koli, although highly characterised by its natural landscape, has been affected by human land-use for centuries. Shifting cultivation was common in recent centuries on its steep slopes, and nowadays vertical shapes are a sign of the human touch, including downhill ski slopes, roads in summit areas and clear felling coupes. Various land-use needs and borders of private land ownership reflect the signs of human activity in the landscape.

Landscape types of Koli

The northern ridge area in Koli National Park was studied by means of landscape structure, visual and historical analyses. It was divided into landscape types according to the location in landscape structure. In Koli the different forest landscape types were summit forests, slope forests, groves, swamps, valleys, natural shores and islands. Each type's visual appearance was studied according to its natural structure depending on its location in the landscape. The consequent landscape management guidelines were determined by assessing the visual qualities and their aesthetic problems caused by forestry and tourism construction.

The landscape type map (Figure 5.2.1) shows the matrix of landscape structure. The highest parts of the landscape are supra-aquatic summits of ridgeline, followed by upper and lower slopes, where natural and cultural groves (with forest types of OmaT, OMT) have settled. Down in the valley there are pasturelands, edge zones along the shoreline and on the islands.

The diagram below (Figure 5.2.2), shows how the landscape has changed from 1843 to 1991 and how the landscape types are located within the landscape structure. The cross-section presents, from the West of Paimenvaara to Ukko-Koli and to Lake Pielinen in the East, how the forests reflect the landscape structure and traditional land-use prevalent in the area. The diagrams were drawn using old land-survey maps from the years 1834, 1909 and 1991, which show how the forest landscape of Koli has changed from burnt-over areas to broad-leaved and spruce forests as a result of shifting cultivation and natural succession.

The management models and analysis maps are described in detail in the comprehensive landscape analysis of Koli (Antikainen 1993a); and the summary of the general character of each landscape type is represented in the table below.

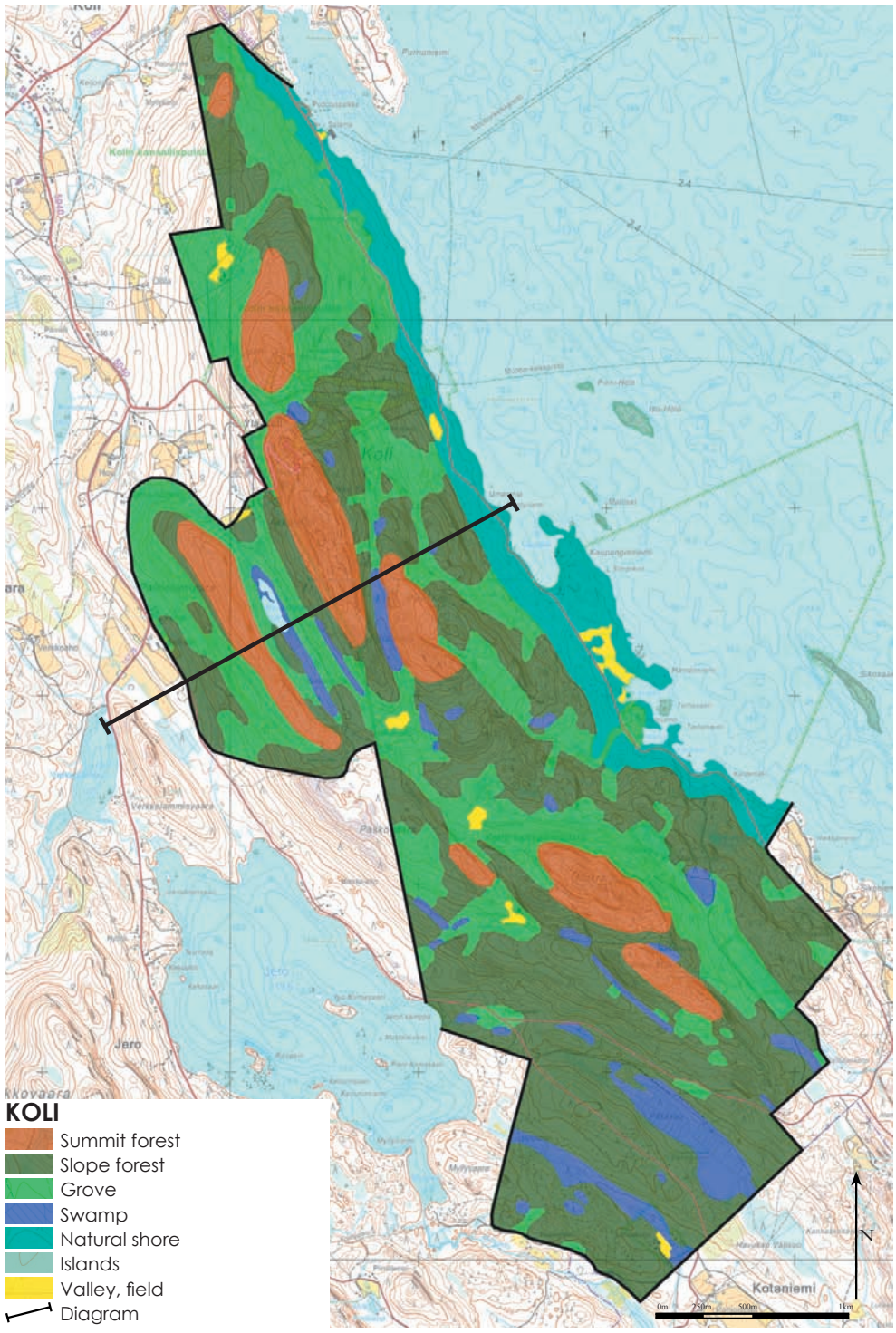


Figure 5.2.1 The landscape structure analysis map of Koli shows the locations of landscape types. Ridges, steep slopes and esker islands on the open basin of Lake Pielinen dominate the landscape. Reproduced with permission of The National Land Survey of Finland, 809/ MML/08.

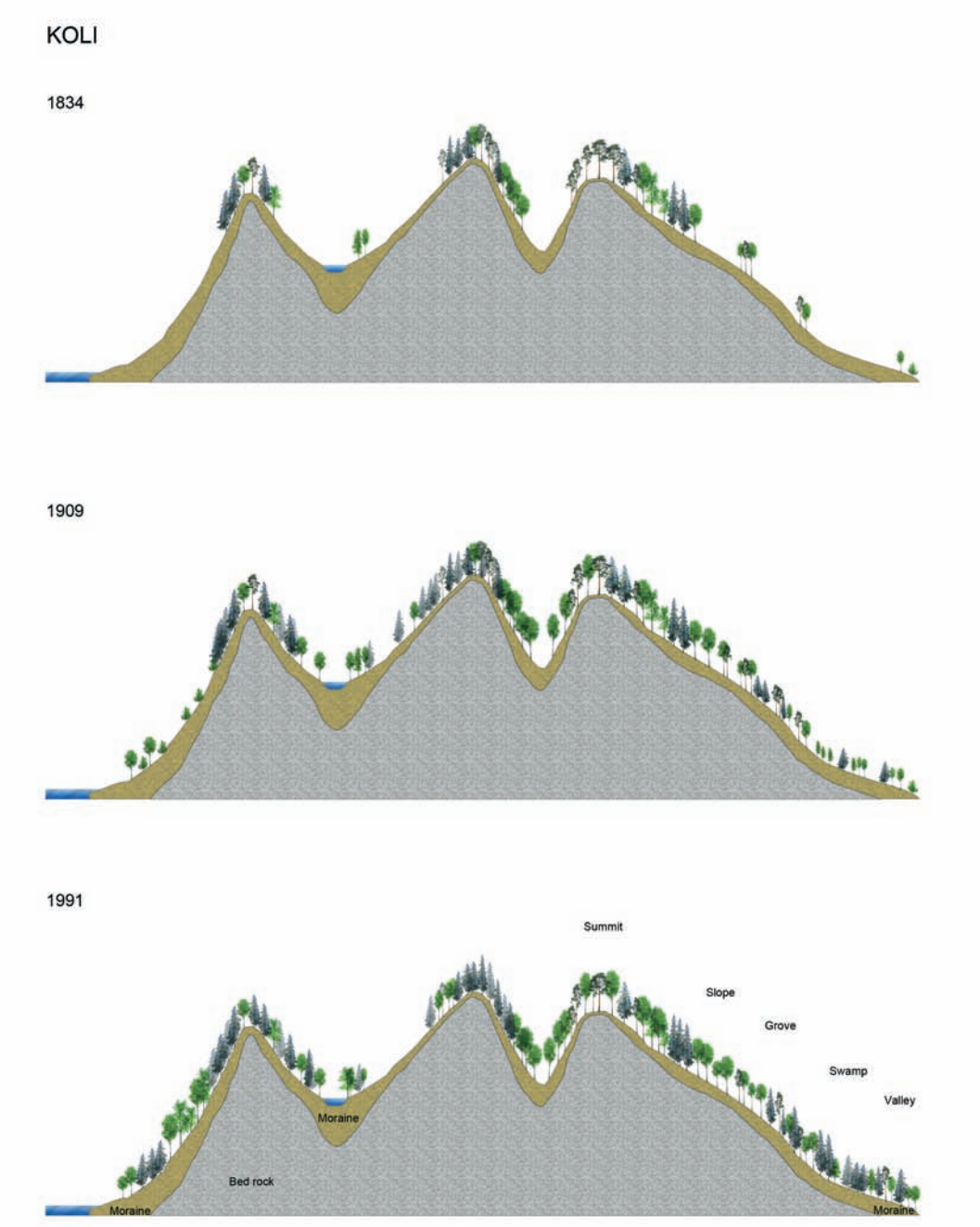


Figure 5.2.2 The diagram of landscape change and types in Koli National Park, from the West of Paimenvaara to Ukko-Koli and to Lake Pielinen in the East. The cross-section presents how forests reflect landscape structure and land-use. Diagrams from 1834, 1909 and 1991 show how the forest landscape of Koli has changed from burnt-over areas to broadleaved and spruce forests by shifting cultivation and natural succession.

Koli

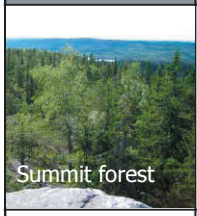
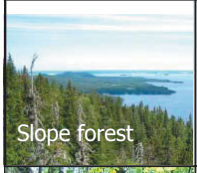
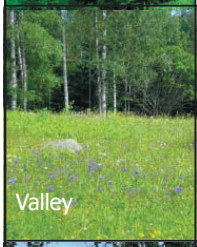
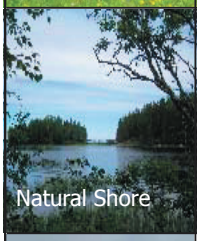
TYPES	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
 Summit forest	Supra-aquatic summits of ridge lines on the highest rocky peaks, semi-open pine forests, CT, VT, MT	Broken skyline, visually vulnerable to clear cutting and seeding felling, coarse texture by spruce, large scale, with sharp shapes	Conserve closed skyline, prefer horizontal, narrow clear cutting or dense shelter wood felling, avoid sparse seed tree position
 Slope forest	Slopes of moraine ridges, VT, MT, dense natural structure	Visually less sensitive, coarse texture, visual problems caused by geometrical, vertical cutting on steep slopes	Consider shape and scale of felling, emphasise topography by different tree species, bears wear- and –tear of recreational use best
 Grove	In lower slopes, rich mixed birch and spruce forests, old slash-and–burn cultivated land, OMaT, OMT	Small scale, soft texture, high visual diversity, often vertical shapes due to brook corridors or shifting cultivation, visually sensitive	Conserve broadleaf wood's natural structure and dominance of birches by thinning, conserve rare species and wetland zones
 Swamp	Low basins between ridges, wetland, springs, wooded, minerotrophic mire	Rich small scale structure, high diversity, soft texture of broadleaves, shady woods	Reduce risks of erosion, improve sustainability of trees in edges by thinning, dense bush layer, avoid ordinary felling or soil scarification
 Valley	Lower slope meadows and pasture lands on valley or flat topography, semi-open woods and tree groups, MT, OMaT	Diverse foreground scenery, unity of small forests, small scale, soft shapes, medium sensitivity	Conserve traditional cultural structure of pasture lands by mowing, grazing and clearance, enrich foreground with solitary trees, avoid closing views by afforestation of fields, design shape and scale of planting carefully
 Natural Shore	Between open area and forest, shores and fields, rocky pine shores or lush mixed woods; MT, OMaT	Naturally small-scale and dense structure, rich in diversity, visual problems by monotonous sharp edges, straight clear cutting or removing bush layer, visually sensitive skylines against lake	Enrich edge zone with different tree species, e.g. broadleaves, conserve the skyline along the lake shore, maintain dense edge zones to reduce wind along the lakeshore, prefer sensitive thinning of tree groups to open views to lake near recreation sites
 Island	Esker islands, rocky small islands in front of shore line, CIT, CT	Light and spacious structure of pine woods, soft shape, large scale, unity of islands horizontal direction, visually sensitive contrasts against the lake	Conserve the scenery by considering unity and skylines of woods, which create perspective and depth to the wide lake scenery, reduce windiness & improve the sustainability of tree crowns in edges by thinning

Table 5.2.1 Classification of the forest area by landscape type in Koli National park. The different forest landscape types were summit forests, slope forests, groves, swamps, valleys, natural shores and islands. Each type's visual appearance was studied according to its natural structure depending on its location in the landscape.

Figure 5.2.3 Birch woods on slopes between the summits enhance the topography in the landscape of Koli.

5.3 Melalahti (Region of Oulu Lake)

Landscape character region

Melalahti is a nationally valuable landscape area, which represents a typical village settlement along the lake shoreline of Oulu Lake with a unique combination upper ridge pastureland.

Area

The planning area covered 783 hectares, of which 545 hectares were forest for timber production, 218 hectares agricultural land, 20 hectares settlement area and the Myllymäki nature conservation area. The land is privately owned by almost 190 landowners.

The planning process was initiated by the Ministry of Environment's report (Haapanen & Heikkilä 1993b) on a nationally valuable landscape, in which Melalahti was listed. Then it was the local inhabitants, who, driven by the need to preserve the cultural and aesthetical values of their own landscape within other various land use needs, played a key role in initiating this particular landscape process.

The Melalahti landscape plan was the first integrated planning process guided by the Private Forestry Board, where landscape and nature values from a local village plan and separate landowner plans were integrated. The landscape plan was published in "Antikainen, M.

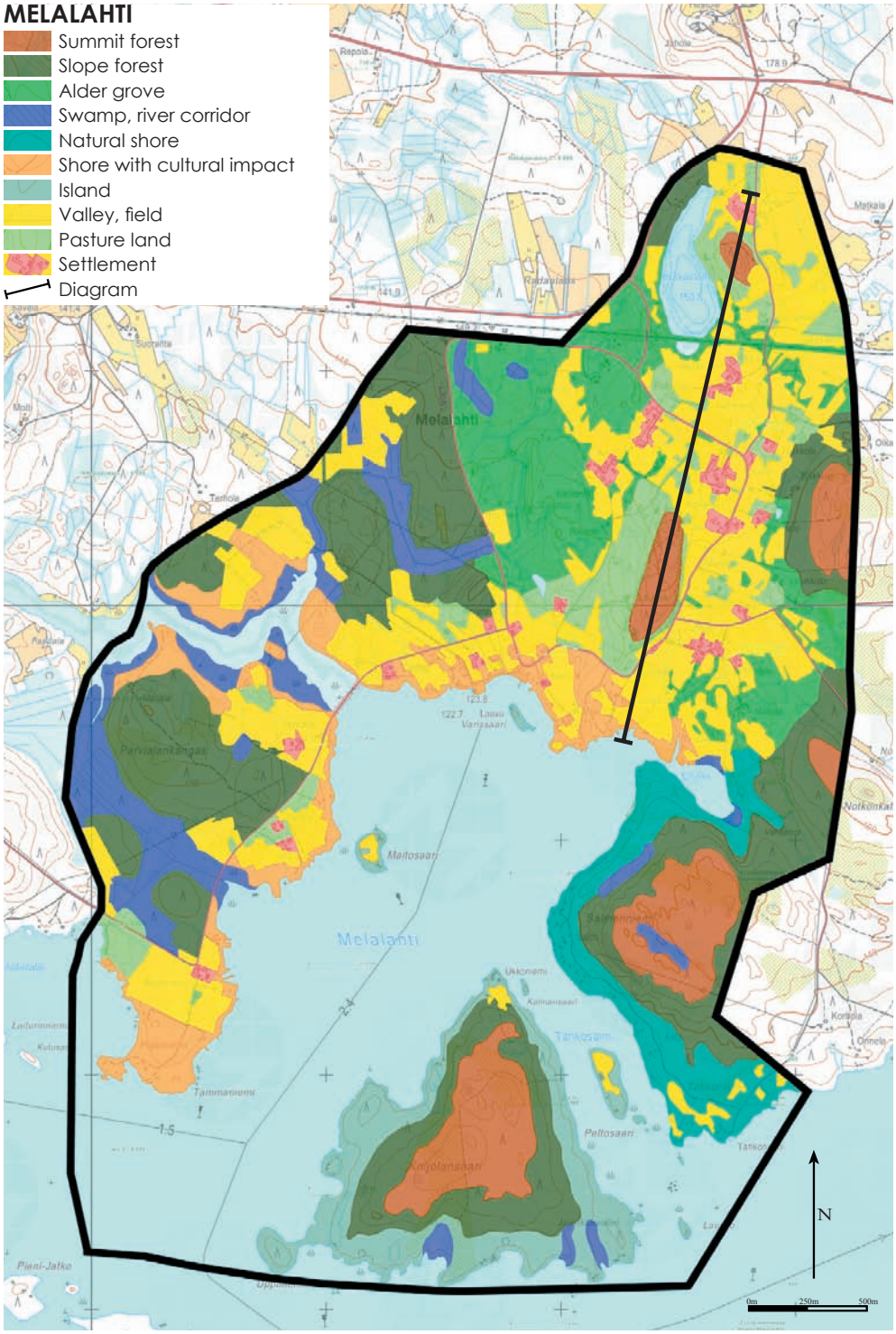


Figure 5.3.1 Location of landscape types in Melalahti village. The different forest landscape types were summit forest, slope forest, alder groves, pasturelands, swamps, valleys, shores and islands. Each type's visual appearance was studied according to its natural structure depending on its location in the landscape. Reproduced with permission of The National Land Survey of Finland, 809/MML/08

& Tolonen, J. 1994 (ed.). Melalahden maisemasuunnitelma. Metsäkeskus Tapion julkaisuja 7/1994." (Melalahti Landscape Plan. Publications of Forestry Centre Tapio nr 7/1994).

Landscape structure of Melalahti

The village Melalahti belongs to the Kainuu ridge region, whose topography has smoothed out around the Oulu Lake. Due to the basal rocks and mild microclimate, the vegetation is notably lush there compared to the surrounding environment. The village landscape is divided into two different parts. The structure of the settlement on the shoreline is somewhat similar to Southern Savonia, with the village located above and distinct house groupings that have wide ridge vistas, a so-called scattered settlement structure, so typical of the Kainuu area. The localization of the basal rocks in a vertical North-South direction and the formation forces of the Ice Age have affected the formation of the landscape structure and settlement location.

Basal bedrock and green quartz are typical of Melalahti. The dominating hill of Myllymäki in the middle of the village lies on dolomite bedrock, which features rich old spruce groves, now being a nature conservation area. The Ice Age has shaped the Eastern part of Melalahti, where there is a thin moraine layer on top of the bedrock. The western part of the village is more flat, with elements of geomorphologic sediment. The islands opposite the village also provide permanent signs of sedimentation carried there during the Ice Age. Between the hills, the smooth slopes and shores, there are drainage basins which feature open moors, groves, ponds, river corridors and lush meadows.

The landscape type map (Figure 5.3.1.) shows the landscape structure matrix of Melalahti. The highest parts of the landscape, summits are followed by upper slopes and on the lower slopes alder groves and pasturelands are common. The upper parts of the landscape such as slopes and summits are clearly distinguished as main types in themselves. There is more variation near the shoreline, with various edge types of valley woods, swamps, cultural and natural shores, and islands. In the original plan there were nine types, characterised by the nature of impact, human or natural.

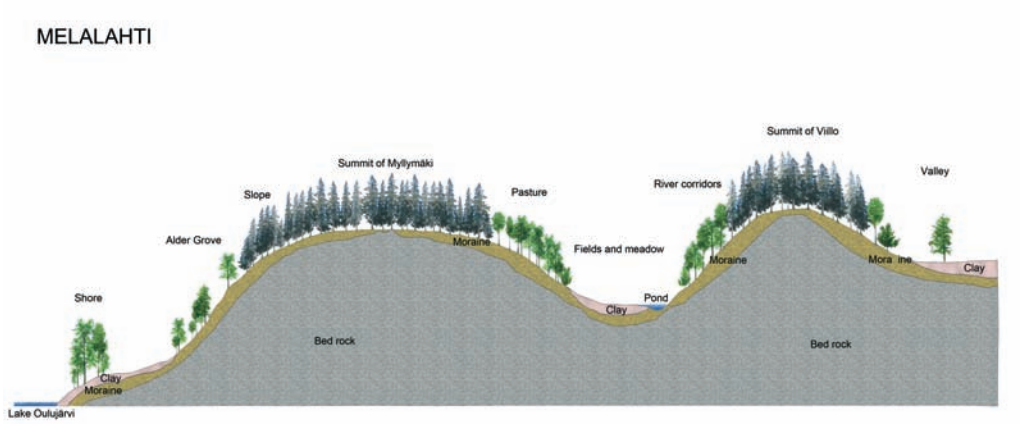


Figure 5.3.2 Diagram of landscape types in Melalahti. Cross-section presenting how forests reflect the landscape structure. Above the old bedrock there is a moraine layer and the valleys are clay terrain. The slopes of the spruce hills are typically pastureland. Settlements are located in the shore basin and on the upper ridge terrace.

Figure 5.3.3 The original view of the valley in 2006, where the research on field afforestation was implemented by Karjalainen & Komulainen (1998).

Landscape types of Melalahti

The landscape of Melalahti has been conserved as a harmonious, traditional landscape until the present day. The most characterised elements of Melalahti are a variation of steep hills and wide scenery with alder groves; pasture lands, semi-open juniper meadows and traditional yards. There are some signs of landscape deterioration in the form of over-grown fields and felling coupes on forested hills.

The *genius loci*, the spirit of the place arises from the lush pasture landscape, alders, the contrasts of the main coniferous hill with the open agricultural valley and open lake sceneries. Thus the classification of landscape types in Melalahti was more affected by traditional land-use than by natural forces.

Melalahti

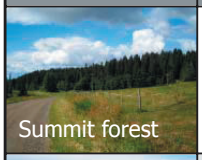
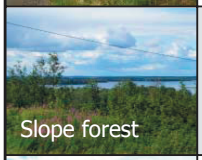
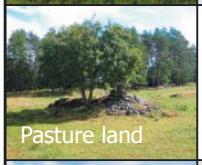
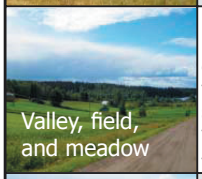
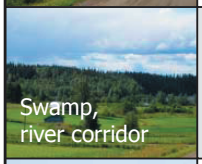
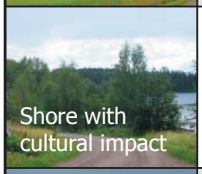
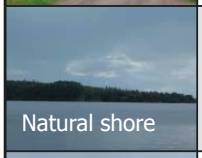
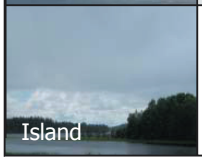
TYPES	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
 Summit forest	Summits of hills, coniferous, spruce-pine forests, VMT, EVT	Dominated by dark, coarse texture, visually vulnerable to clear cutting and seeding felling, coarse texture by spruce, large scale, sharp shapes	Conserve the closed skyline, prefer horizontal, narrow clear cutting or dense shelter wood felling, avoid sparsely positioned seed trees
 Slope forest	Upper slopes of moraine ridges, EVT, VMT, dense natural structure	Visually less sensitive, coarse texture, visual problems by geometrical, vertical cutting	Design of felling coupes by shape and scale, emphasise topography by different tree species
 Pasture land	In the middle of village, west of main hill, forest type not specified	Multiple layers semi-open mixed forests threat of over-growing	Management of semi-open structure thinning, clearance, grazing
 Alder grove	In lower slopes, rich mixed alder forests, old burn-and–slash cultivated land, West-side of Myllymäki, GOMT	Density and lushness, small scale, soft texture, high visual diversity, medium sensitivity	Conserve broadleaf wood's natural structure and dominance of alders by light thinning of spruce, conserve rare species
 Valley, field, and meadow	Fields, juniperous and pasture meadows on valley or flat topography, semi-open woods and tree groups, forest type not specified	Round shapes, diverse foreground scenery, unity of small forests, small scale, medium sensitivity, threat of over-growing	Conserve traditional cultural structure of pasture lands by mowing, grazing and clearance, enrich foreground with solitary trees, avoid closing views by field afforestation, and design shape and scale of afforestation carefully
 Swamp, river corridor	Lowest, moist land, fluviation areas, springs, wooded, minerotrophic mire	Rich small scale structure, high diversity, coarse texture of spruce	Conserve natural fluviation zones, reduce risks of erosion & fluviation, improve the sustainability of trees in the edges by thinning, favour dense bush layer, avoid ordinary felling or soil scarification
 Shore with cultural impact	Between open area and forest, shores and fields, shoreline of the village, lush mixed woods, GOMT	Deciduous, rounded shapes, small-scale and semi-open structure, rich in diversity, visual problems caused by monotonous sharp edges	Open views by thinning and clearance, enrich edge zone with different tree species, favour thinning of tree groups to open views to lake near recreation sites
 Natural shore	Eastern part of village, on quartzite bed-rock, rocky pine shores, VMT, EVT	Coniferous, naturally small-scale and dense structure, rich in diversity, visual problems caused by clear cutting or removing bush layer, sensitive skylines against the lake	Retain density on the shoreline in natural state, conserve skyline along lake shore by cautious regeneration felling and clearance, dense edge zones reduce wind and erosion along the lake
 Island	Small islands in the bay, broadleaved woods, GOMT, VMT	Cultural impact, light and spacious structure of broad-leaves, soft shape, large scale, visually sensitive contrasts against the lake	Conserve skyline of islands, improve sustainability of trees in edges by thinning

Table 5.3.1 In the table, the landscape types of Melalahti, Northern Finland, are presented. Different main types were distinguished from the surrounding landscape. Their location in the landscape structure, main visual appearance and suggested landscape management actions are also described above.

5.4 Häntälä (Häme)

Landscape character region

The pasturelands of Häntälä are a nationally valuable landscape area. The landscape area is located in the Southwest agricultural landscape region of Finland (Haapanen & Heikkilä 1993b).

Area

The area is 130 hectares of privately owned agricultural lands. The planning process started after the Ministry of Environment had nominated Häntälä as a nationally valuable landscape area in 1993. The Southwest Forestry Centre and other authorities carried out a wide co-operative planning process to conserve the rare brook dells of Häntälä and their special vegetation and fauna, especially rare butterflies. A landscape inventory was carried out by forestry student Antti Sipilä and landscape classification and coordination was performed by Minna Komulainen in 1994. The landscape plan was published in 1996 as the "Landscape and Nature Management Plan of Rekijoki. 1996. Southwest Forestry Centre." (Rekijoen perinnemaisema- ja luonnonhoitosuunnitelma. 1996. Lounais-Suomen metsälautakunta).

Landscape structure of Häntälä

The pasture meadows of Häntälä are a unique combination of wide and diverse pasture-landscapes. The river of Rekijoki has created a deep zigzag river valley with steep slopes. Typical to the landscape are clay basins and running narrow rivers, alongside fertile and flat cultivation areas. The area is the bottom of an ancient sea that began to rise, forming dry soil approx. 7500 – 4500 years ago.

The rock-bed of the area is basal, with meta-basalts, amphibolites and gneiss. Typical to the South-West of Finland are small drumlin hills, forming ridgelines in a Northeast-Southwest direction. Drumlin hills can also be defined as wooded and distinguished from the surrounding topography by the art of land use, only small parts of them have been cleared for fields. The shapes formed by the Ice Age have later been modified by flowing rivers. The famous dells of Häntälä have been transformed by grooving water and fine clay sediment sands. The brooks flowing at the bottom of the valleys are quite narrow (2-5 m) and low. Whereas in the deepest grooved dells they can even be 30 m lower when compared to field level.

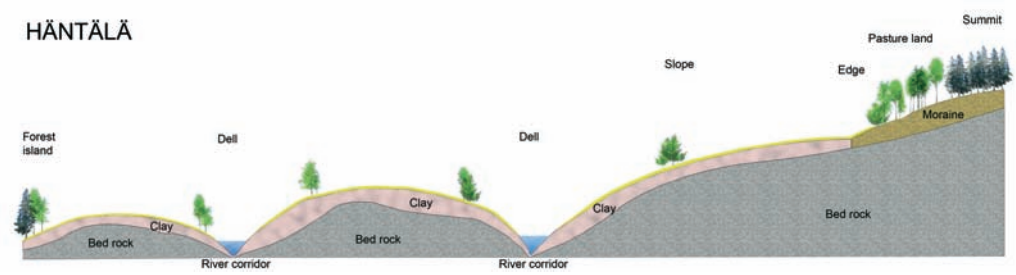


Figure 5.4.1 Diagram of Häntälä. Narrow brook dells and agricultural lands are featured in the landscape structure of Häntälä.

Häntälä

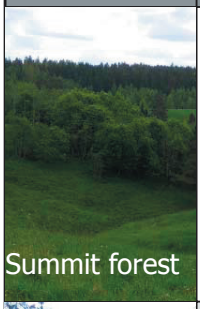
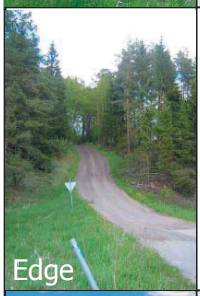
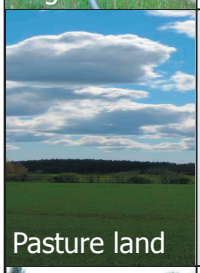
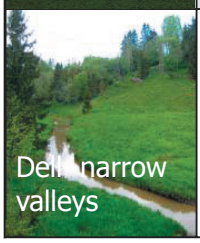
TYPES	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
 Summit forest	Rocky hill tops, mixed pine woods, VT, CT	Uniform skylines, forming sensitive background woods in the broad landscape, light and spacious pine forests with soft texture, rounded shapes, medium scale	Emphasise local character by conserving the unity of the skyline, emphasise scenic groups of broadleaves, cautious felling to keep woods semi-open
 Slope forest	Steep slopes of river, MT, OMT	Spruce dominated, coarse texture, medium scale, important in skylines	Conserve the skyline, reduce the risks of erosion and drainage, improve durability by ground vegetation
 Edge	Forest islands in the cultural landscape in the middle of fields, border zones between open fields and woods, OMT, MT	Visually sensitive, rounded shapes, semi-open to dense structure, small scale	Managed as border zones of cultural landscapes, management of solitary trees, tree groups and bushes, long circulation time, regeneration with small-scale openings
 Pasture land	Special broad-leaved woods of bird-cherry, oak, alder, lime and rowan, natural forest type not specified	Small-scale woods near the village	Favour special broadleaves by thinning and clearance of spruce
 Del narrow valleys	Narrow river valleys of the River of Rekioja, clay soils, natural forest type not specified	Open meadows with steep slopes, small-scale mosaic, high diversity	Grazing and mowing to keep meadows open for rare plants and fauna, reduce the risks of erosion & fluviation

Table 5.4.1 The table above presents the landscape types of Häntälä, South-West Finland. Five different main types were distinguished from the surrounding landscape. Their location in the landscape structure, main visual appearance and suggested landscape management actions are described above.

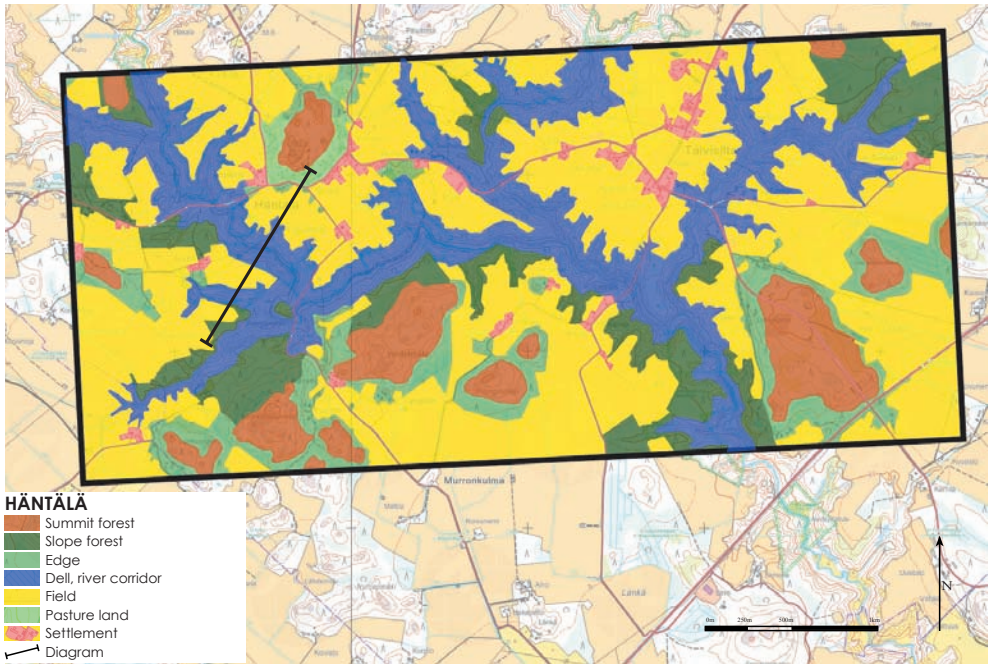


Figure 5.4.2 Location of landscape types in Häntälä village. The different landscape types are summit forests, slopes, forest edges, pasture lands and brook dells. Reproduced with permission of The National Land Survey of Finland, 809/MML/08.

The characteristic feature the Häntälä soil is silt, fine clay sands, which commonly flow by impact of rivers. Deep, relatively steep narrow brook dells and erosion are typical of this soil type. The drainage and erosion of brook dells in the landscape develop rapidly and then remain unchanged for a long period of time. However they can grow rapidly after heavy rain or forest felling. Erosion is increased by a lack of vegetation in field cover, when there is no longer enough undergrowth to bind the soil.

The amount of fields is notable, which is a common feature of the southwest agricultural region. Flat clay soils have been widely cleared for agricultural use. Man had changed from shifting cultivation to permanent field cultivation and cattle raising in the region as early as the prehistoric Iron Age and the Middle Ages. Thus the location of fields and edge zones has been clearly defined. The slopes of the river dells have traditionally been used as cattle pasture lands until recently. Developed through grazing, the traditional pasture biotopes now represent fresh, lush meadows. Vegetation has conserved its openness and a richness of species. Amidst the fields there are small-scale, very dense woods, forest islands. The views along the roads and dells have been cleared of bushes to reduce over-growing and the risk of moose accidents.

The broad landscape is often quite monotonous; sceneries of flat agricultural land border on small woods in the middle of the fields. In the middle of the village, a ridge, south of river Rekioja, divides the visual space and forms the skyline in the broader landscape. In the closer landscape, especially in the dells, there are fine views and details, such as curves of dells, and solitary trees, e.g. woody junipers and willows. The close landscape is especially impressive in springtime, when the grazed dells burst into flower as the wild meadow flowers bloom.

The village centre of Häntälä is located on a densely structured small hill amidst the fields. Old, well-conserved houses reflect the village's high cultural values. Old stony cow barns and rural manors are signs of a long settlement history, dating back to the 13 century. Häntälä was close to the ancient "Häme Bull Road", the main postal route between Turku and Tampere.

Landscape types of Häntälä

Following the landscape analysis, the area was divided into five general landscape types: summit forests, slopes, forest edges, pasture lands and brook dells. The most important landscape types in Häntälä are narrow valleys, open dell meadows alongside the narrow river valleys of the river Rekioja. Grazing and mowing are essential to the cultural landscape as they keep the meadows open and preserve rare plants and fauna.

The dells and small-scale forest summits mainly characterize the landscape types of Häntälä. The summit forests form the skyline in the cultural landscape and are thus visually sensitive to felling. The slope forests are spruce-dominated and located in the upper parts of the river dells. Small-scale forest islands and edges surround the cultural landscape. The pasturelands feature special woods of bird cherry, oak, alder, lime and rowan that grow near the village, where special tree species should be favoured by thinning spruce tree stands.

5.5 Peränne (East-Bothnia)

Landscape character region

The village of Peränne has been listed as a nationally valuable landscape area in Central Finland by the Ministry of Environment (Haapanen & Heikkilä 1993b). It is situated between the Northern Häme lake-district and Suomenselkä of Bothnia.

Area

The planned area, including that of landowners' for which the landscape and forest plans were made, comprised 3560 hectares. The main village area is wide, almost 2000 hectares, which was why landscape assessment was used as a basic analysis tool to map the amenity values of the cultural forest landscape.

The landscape plan was published in "Komulainen, M. & Sipilä, A. 1995. Peränteen maisema. Matila, A. (ed.) 1995. Kylämaisema Peränteellä. Metsäkeskus Tapion julkaisu nr 11/1995". (Komulainen, M. & Sipilä, A. 1995. The Landscape of Peränne. In: Matila, A. (ed.) 1995. The Village Landscape of Peränne. Publications of Forestry Centre Tapio nr 11/1995). The landscape inventory was carried out by forestry student Antti Sipilä, and the analysis was coordinated and written by Minna Komulainen in 1994.

The landscape structure of Peränne

The topography of Peränne is small-scale and varying. The settlements, surrounded by swamps and forests, are concentrated along the shoreline. The landscape heritage area is characterised by the long-shaped Lake Peränne, with fine vistas from the village (Haapanen & Heikkilä 1993b).

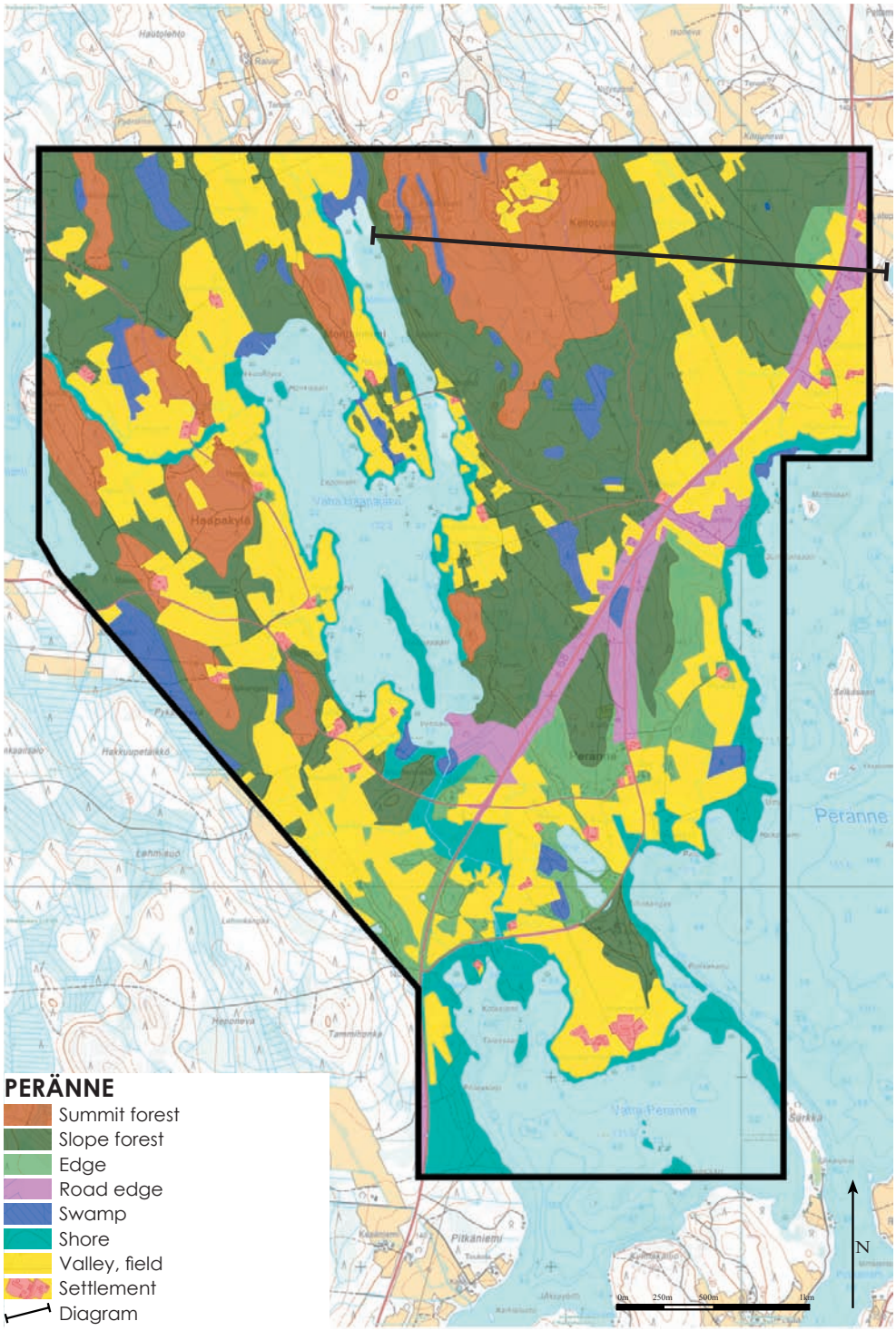


Figure 5.5.1 Location of landscape types in Peränne. The different landscape types are summits, slopes, road edges and cultural edges, valleys and shores. Each type's visual appearance was studied by its natural structure depending on its location in the landscape. Reproduced with permission of The National Land Survey of Finland, 809/MML/08.

Peränne

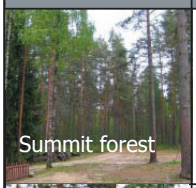
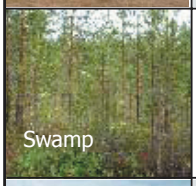
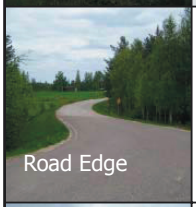
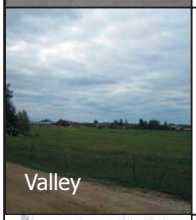
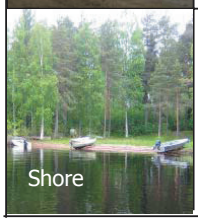
TYPES	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
 Summit forest	Summits of hills and eskers, rocky moraine hill tops, pine forests of VT and CT	Visually important, uniform skylines, forming sensitive background woods in broad landscape, light and spacious pine forests with soft texture, rounded shapes, medium scale in skyline	Emphasise local character by conserving a unified skyline, enrich scenic node points with different tree species, design felling coupes to shapes of terrain
 Slope forest	Upper slopes of moraine ridges, VT, MT, dense natural structure	Spruce dominated, on smoothly rolling slopes, density and richness, visually less sensitive, coarse texture, visual problems caused by geometrical, vertical cutting	Develop natural structure of mixed forest, design felling coupes according to shape and scale, emphasise topography by different tree species
 Swamp	Hollows on the slopes, fluviation areas, springs, low, moist land	Rich small scale structure, high diversity, coarse texture of spruce	Reduce risks of erosion & fluviation, improve sustainability of trees in edges by thinning, favour dense bush layer, avoid ordinary felling or soil scarification
 Cultural edge	Between open area and forest, and fields, rocky pine shores or lush mixed woods, OMT, MT	Rounded shapes, naturally small-scale and dense structure, rich in diversity, visual problems caused by monotonous sharp edges, straight clear cutting or removed bush layer	Avoid clearance in edge zone and clear felling, favour mild thinning, enrich edge zone with different tree species, e.g broadleaves
 Road Edge	Moraine terrains by main roads, MT	Variation between open and closed space	Design felling in irregular shapes with tree groups, open views to lake, avoid clearance in middle of woods due pollution, management of dense, multi-layered tree and bush vegetation in edge zones, favour pollution tolerant tree species
 Valley	Fields, meadows and pasture landscape in clay valleys with small woods, forest islands, solitary trees and tree groups	Openness of fields with dense small-scale woods, diverse foreground scenery, unity of small forests, round shapes, medium sensitivity, soft texture	Conserve traditional cultural structure of pasture lands by mowing, grazing and clearance, enrich foreground with solitary trees, avoid closing views by field afforestation, design shape and scale of afforestation carefully
 Shore	On agricultural terrains and shoreline, clay soils, MT, OMT	Semi-open due to cultural impact, small-scale, rounded shapes of broadleaves and pine, soft texture, visually sensitive skylines against lake	Conserve skyline along the lake shore by cautious regeneration felling and clearance, dense edge zones reduce wind and erosion along lake, open views and improve sustainability of trees in the edges by thinning tree groups, consider wind conditions and direction in the width of shoreline woods

Table 5.5.1 In the table above, the landscape types of Peränne, Central Finland, are presented. Five different main types were distinguished from the surrounding landscape. Their location in the landscape structure, main visual appearance and suggested landscape management actions are described above.

The landscape structure is quite flat. The topographic difference from the lowest point (Peränne 131.6 m above sea level) and highest point (Kyrövuori 195 m above sea level) is relatively high, but with a smoothly ascending topography the forests hide this difference.

Strongly split bedrock forms the shapes of the broad landscape in Peränne. The valleys feature lakes and hills lying in a southwest-to-northeast direction. However, sediment areas are more visible than bedrock in Peränne. The sediment soils have shaped smoothly rolling meadow and forest areas and flat shore terrains. Moraine is the most common soil type.

In Peränne, lakes are the most dominating factors of the broad landscape. Open fields with deciduous woodland and also in part, bare, rocky pine-forests, surround the lake sceneries. The *genius loci*, the spirit of the place comprises open lake sceneries and wilderness rocky woods on the shoreline.

Landscape types of Peränne

The landscape of Peränne can be divided into six different types according to the landscape structure: summits, slopes, edges on roads and agricultural land, valleys and shores. The highest areas in the landscape are rocky summits, which sometimes rise steeply from the shorelines. In the summit areas the openness of the pine forests and views could be emphasised by thinning the spruce stands.

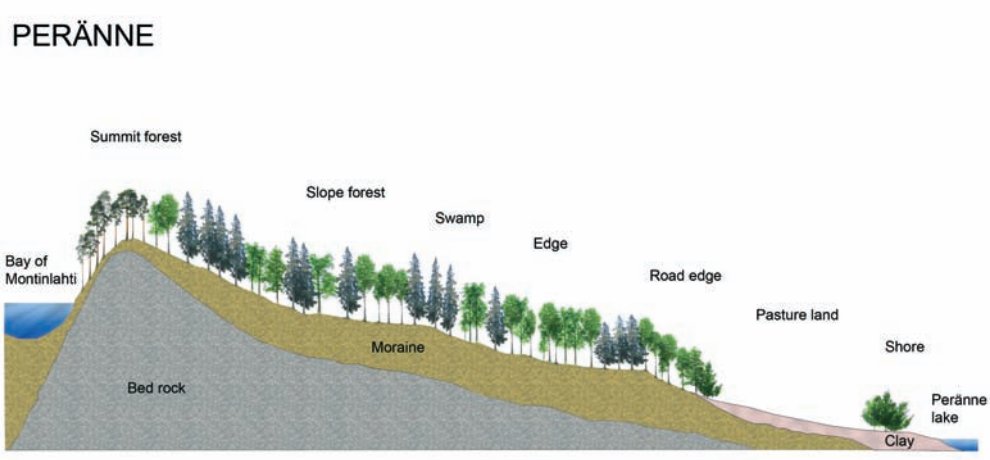


Figure 5.5.2 The diagram of landscape types in Peränne presents, how the forests reflect the landscape structure.

5.6 Naapurivaara (Ridge-Kainuu)

Landscape character region

Naapurinvaara is listed as a nationally valuable landscape area in the ridge region of Kainuu, in Sotkamo, located in Northern Finland (Haapanen & Heikkilä 1993b).

Area

The area of the village from the shoreline to the upper ridge and its surroundings is 2200 hectares and it is owned by several private landowners.

The planning process in Naapurinvaara was carried out as an integrated multiple-stakeholder process in 1994-1995. The planning initiative was raised by the municipality of Sotkamo and the Naapurinvaara village association in order to actively support the preservation of a unique cultural landscape, which was nominated as a nationally valuable landscape area by the Ministry of Environment (Haapanen & Heikkilä 1993b).

The scenic ridge landscape was visually sensitive to expected changes in agriculture, forestry and construction activities. The Kainuu Environmental Centre coordinated the integrated planning process with the stakeholders and regional forestry, agriculture, and land-use planning authorities and Kainuu museum. The landscape plan with analysis maps was published in ”Aronpää, H., Jaakola, H., Karhu I., Komulainen M. et al 1996. Naapurinvaaran kylämaiseman tavoitesuunnitelma. Kainuun ympäristökeskus. Alueelliset ympäristöjulkaisut nr 13.” (The Strategic village landscape plan of Naapurinvaara. Environment Centre of Kainuu. Areal Environment Publications nr 13. 1996).

Landscape structure of Naapurinvaara

The landscape structure of Naapurinvaara was assessed using ordnance maps, rock maps and aerial maps; the assessment examined how natural elements affected the scenery, and what kind of development potential each zone had in the landscape.

As both an important and traditional cultural landscape, Naapurinvaara can be distinguished from its surrounding Kainuu ridge area by its fertile lush vegetation and woods. The houses have been traditionally built on the summit of the hill and along the shoreline. A wide panoramic view over lakes to Vuokatti and Sotkamo opens out from the village above. The *genius loci*, the spirit of the place is apparent in Naapurinvaara hill’s visual connection to the opposite hill and the national scenery of Vuokatti, which explains its Finnish name of Naapurinvaara - the neighbouring ridge. The symbolic value of Naapurinvaara is constructed by the contrast of its lush alder pasture lands with the barren wilderness landscape of Vuokatti over Lake Nuasjärvi.

The core areas of landscape, the upper village and Naapurinlouhi hill, are situated on a meta-basalt strip. In the background areas of the landscape there are flatter areas with sediment soils, smoothly rolling pasturelands, alder woods and open lake sceneries.

Landscape types of Naapurinvaara

The goals of landscape management were different for various landscape types, which were divided in landscape analysis according to the landscape’s structural qualities, geomorphologic locations and present state. The landscape types of Naapurinvaara were summits, slopes, pasturelands, swamps, shoreline and valleys. Due to a special geomorphology and traditional land-use, the landscape types are clearly visible and easily distinguishable in Naapurinvaara. For example, on one of the ridges of Naapurinlouhi, the border zone where one type passes into another can be seen.

Summits are the highest areas on the old quartz bedrock. Summit forest and farms on the top of the hill form a skyline in the broad landscape and thus they are visually very sensi-

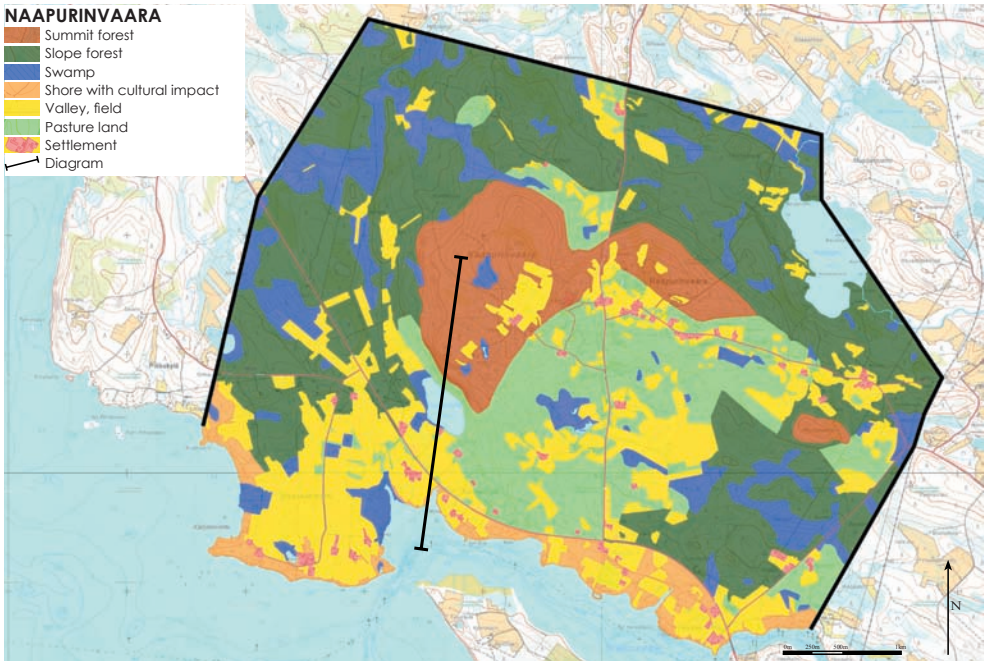


Figure 5.6.1 Location of landscape types in Naapurivaara. The dominating ridges shaped by the Ice Age, vertical meta-basal strips on the slopes and pasture lands are characteristic of the landscape of Naapurinvaara. Reproduced with permission of The National Land Survey of Finland, 809/MML/08

tive to new operations. Seeding felling and field afforestation that close the views should be avoided on the upper summit and in the main open area of the upper village.

Slope forests have appeared in areas of sediment soils. They are often mixed or spruce forests of the vaccinium-myrtillys-forest type (VMT). Broadleaves should be favoured on the slopes by means of thinning. Slope forests also form important edge zones within open areas. The sharp texture of spruce edges can be avoided by opening space for broadleaves and solitary crooked, old pines, especially along the roadsides.

Pasturelands, semi-open, woody grazing areas and meadows, are located on a meta-basalt strip, which goes under the village bedrock. Their visual appearance is represented by semi-open alder groves, which are rich in bird cherries. The problem of pastureland is rapid over-growth after the active grazing period is over. If they are to be maintained as semi-open spaces, the alders should be thinned and the spruce removed.

Swampy groves, river dells and moist areas serve as corridors between the upper slopes and the shoreline. Their drainage basin should be conserved in a natural state.

The valley on the shore basin is a former lake basin of clay. Conserving the openness of the cultural landscape is the main goal for this landscape type. Field afforestation was in the process of closing broad views to Vuokatti. Problems also arose because of the rapid growth of willow on clay soils, causing the closure of the cultural landscape, especially on the old village road and crossroads.

In the shore basin, active landscape management is therefore necessary to open the views and shape the edges of field afforestation.

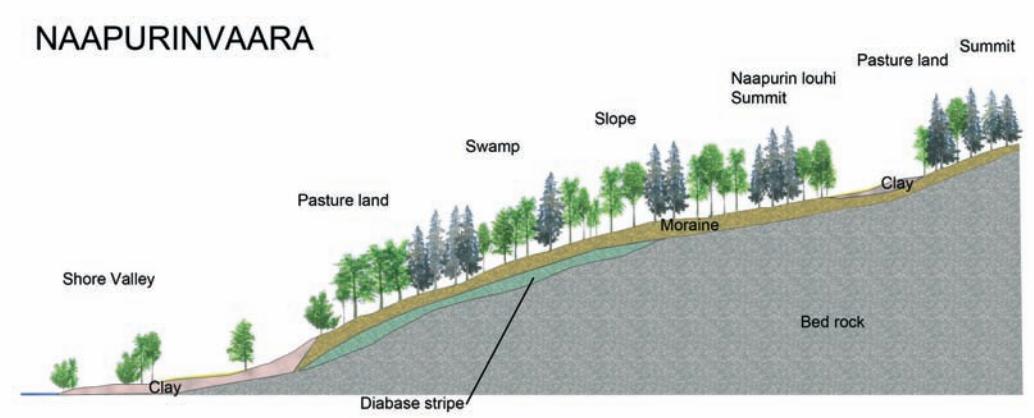


Figure 5.6.2 The diagram of Naapurinvaara shows the relation of location of landscape types and the bedrock under them.

Figure 5.6.3 The border of two landscape types are clearly visible in the ridgeline, where the basal rocks (meta-basalt) and quartz meet. This change is reflected by forest stands that change from alder pasturelands into coniferous forests in Naapurinvaara.

Naapurinvaara

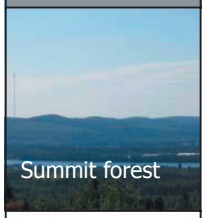
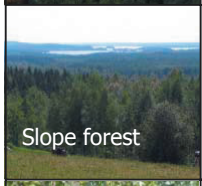
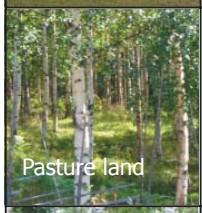
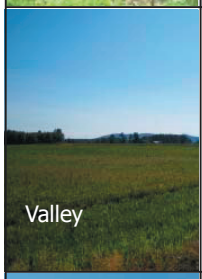
TYPES	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
 Summit forest	Old quartz bed-rock, summits of ridge lines, coniferous, spruce-pine forests, VMT, EVT	Dominated by dark, coarse texture, visually vulnerable to clear cutting and seeding felling, coarse texture of spruce, large scale,with sharp shapes	Conserve closed skyline, favour horizontal, narrow clear cutting or dense shelter wood felling, avoid sparse seed tree positioning
 Slope forest	Upper slopes of moraine ridges, VMT, dense natural structure	Mixed forests, visually scattered, less sensitive, coarse texture, visual problems caused by geo-metrical, vertical cutting	Favour broadleaves, improve road sceneries by creating vari-ation of open, semi-open, dense wood positions by thinning, design of felling coupes accord-ing to shape and scale
 Pasture land	On meta-basalt stripes, alder groves, grazing areas on smooth slopes, GOMT	Semi-open structure, threats of overgrowth by spruce, density and lushness, small scale, soft texture, high visual diversity, medium sensitivity	Small-scale management of semi-open structured woods by thinning, clearance, grazing, conserve natural structure and dominance of alders by light thinning of spruce
 Swamp	Hollows on slopes, fluviation areas, springs, low, moist land, river dells, swamp, springs, wooded, minerotrophic mire	Rich small scale structure, high diversity, coarse tex-ture of spruce	Reduce the risks of erosion & fluviation, improve the sustain-ability of trees in the edges by thinning, dense bush layer, avoid ordinary felling or soil scarifica-tion
 Valley	Clay areas, on ancient lake bot-tom, fields and meadows on valley or flat topography, semi-open woods and tree groups, GOMT, VMT	Openness, cultivation areas, broadleaves, round shapes, diverse foreground scenery, small scale, medium sensitivity, threat of over-growth	Manage as open areas, open views, conserve of traditional cultural structure of pasture lands by mowing, grazing and clearance, enrich foreground by solitary trees, avoid clos-ing views by field afforestation, design the shape and scale of afforestation carefully
 Shore	Moist land, fluvia-tion areas	Dense, lush, fertile veg-etation, rich small scale structure, high diversity, coarse texture of spruce	Improve the sustainability of trees in the edges by thinning, dense bush layer, thinning of tree groups to open views to lake near recreation sites, re-tain density on the shoreline in a natural state, conserve sky-line along lake shore by cau-tious regeneration felling and clearance, dense edge zones reduce wind and erosion along lakeshore

Table 5.6.1 In the table above the landscape types of Naapurinvaara, in Northern Finland, are presented. Five different main types were distinguished from the surrounding landscape. Their location in the landscape structure, main visual appearance and suggested landscape management actions are also described above.

5.7 Vuokatti (Ridge-Kainuu)

Landscape character region

Vuokatti is a nationally valuable landscape and an important winter tourism area, located in the Ridge landscape of Kainuu province (Haapanen & Heikkilä 1993b).

Area

The planning area was 3488 hectares, of which 3204 hectares were forests and 284 hectares were fields. There were 72 farms in the village.

The Vuokatti hill region is a nationally valuable landscape area that has been the target of several studies and planning projects. The most significant of these are the "Vuokatti-picture" and the general land-use planning of the tourism area. An international seminar led by the landscape architect Simon Bell, on the land use of the Vuokatti hill region, was held in the summer of 1996. During the seminar a broad plan concerning the landscape management of the area was developed.

As part of the Cross-plan project this broad scale plan was supplemented by additional landscape management studies in order to refine and apply the general principles of single estates and forest stands (Komulainen et al 2001). The objective of the Vuokatti project has been to combine forestry planning and management with other, non-timber types of land use and values. The case study has been reported comprehensively in the following publications, and the text below is a summary of the whole landscape plan:

- Bell, S. (ed.) 1996: Vuokatti Landscape Ecology project. Forestry Centre Tapio.
- Bell, S. & Komulainen M. 2001 (ed.): Cross-Plan. Integrated participatory planning as a tool for rural development. University of Oulu.
- Komulainen, M., Tolonen J. & Virkkunen V. 2001: Osallistuva metsäsuunnittelu maaseudun kehittäjänä – Vuokatin maisemaselvitys. University of Oulu. REDEC Kajaani. Working papers nr 38. Kajaani 2001. (Participatory forest planning as a developer of rural areas – Vuokatti Landscape Plan.)

The landscape structure of Vuokatti

Vuokatti is an important tourism area of slopes and hills, located in the Kainuu region, near Finland's Eastern Border. Owing to durable rocks (quartz, granite, gneiss), the area forms a distinctive landscape of ridges and hills. The main spine of Vuokatti Hill consists of approx. 20 quartz ridges, five of which are over 300 m above sea level.

The landscape types of Vuokatti

Landscape zones developed in the broad landscape plan formed the basis for developing a long term or permanent framework for the landscape. With objectives identified through stakeholder interviews, various site and map inventories, a vision for the landscape and its future were formulated. Landscape character analysis was used to ensure that the main boundaries between sections of the area fitted together, and to specify the kind of design to be adopted at the next level of the single ownership plan (Figure 5.7.1).

The landscape type map (Figure 5.7.2.) shows the matrix of the landscape structure. The highest parts of the landscape are supra-aquatic summits of ridgeline, followed by upper and

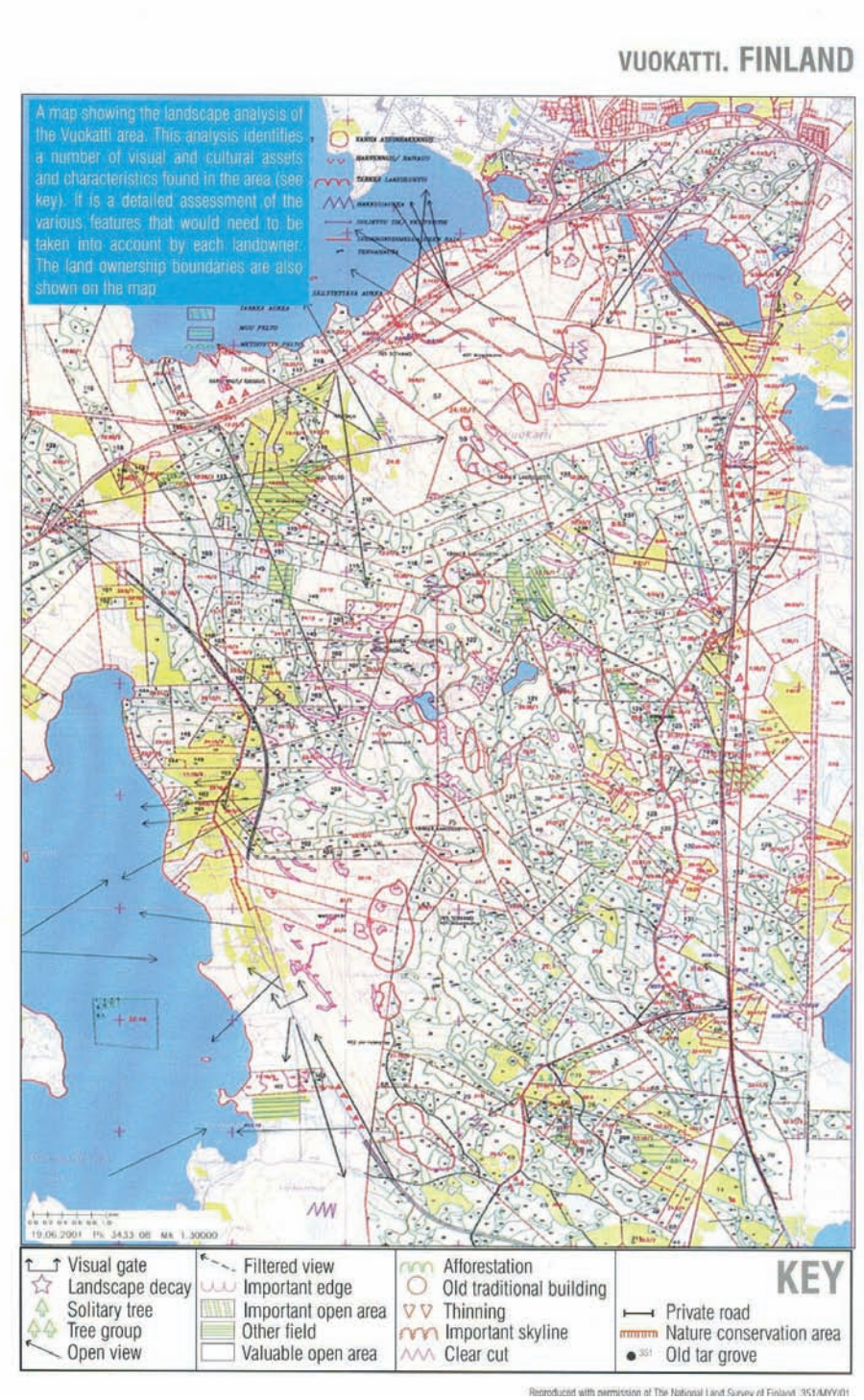


Figure 5.7.1 A map showing the landscape analysis of the Vuokatti area (Bell & Komulainen 2001). This analysis identifies a number of visual and cultural assets and characteristics found in the area (see the key). It is a detailed assessment of the various features that would need to be taken into account by each landowner. The land ownership boundaries are also shown on the map. Reproduced with permission of The National Land Survey of Finland, 51/MML/09.

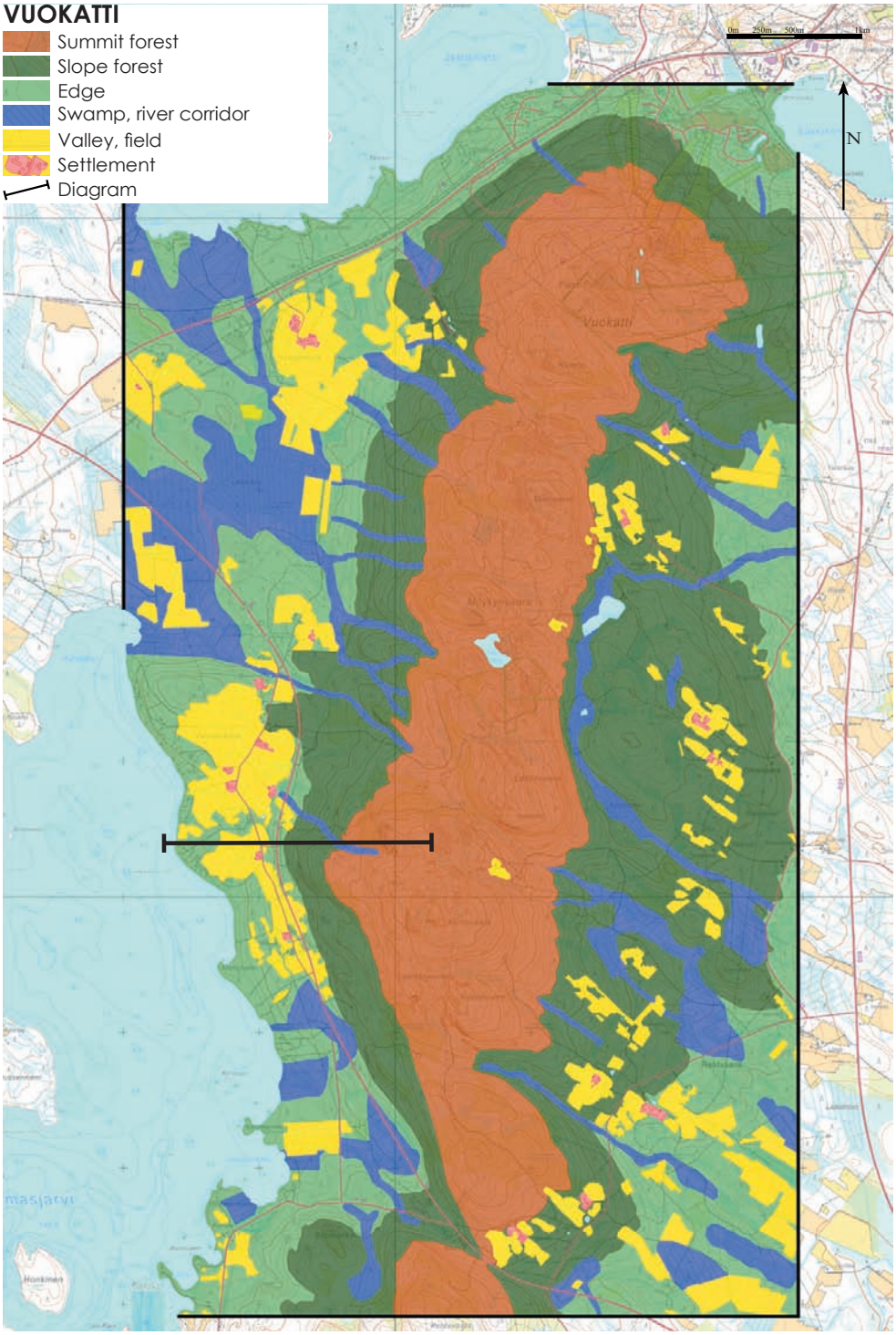


Figure 5.7.2 Location of landscape types in the landscape structure of Vuokatti. Reproduced with permission of The National Land Survey of Finland, 809/MML/08.

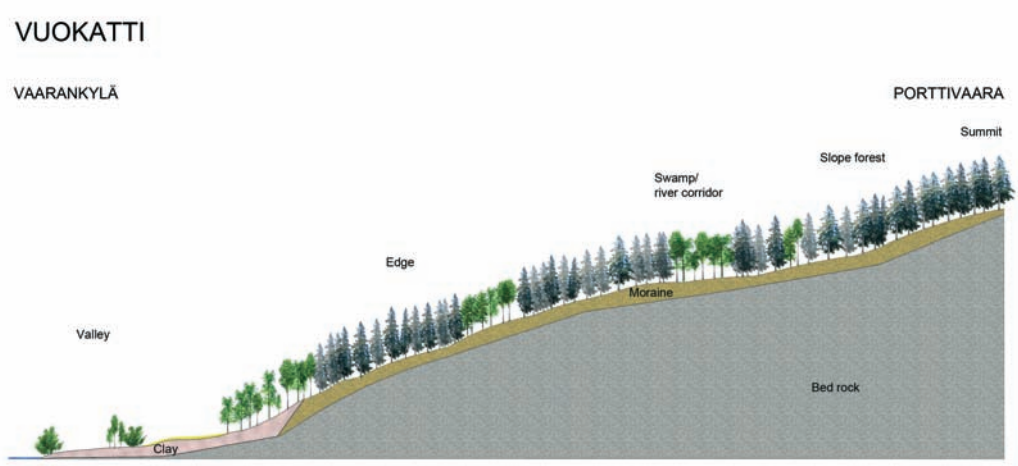


Figure 5.7.3 Diagram of Vuokatti showing the locations of landscape types.

lower slopes, where natural and cultural groves (with forest types GOMT) have settled. Down in the valley there are pasturelands, edge zones on the shoreline and islands.

In Vuokatti the landscape types were as follows according to the landscape structure.

Summit forests are rocky forests on the brow of the ridge. The texture of the ridge summit forests is generally coarse, mainly incorporating mature spruce mixed with pine, forming a sharp skyline with their canopies. It is a visually important area, especially the skyline, containing significant areas with strong genius loci, viewpoints, ancient forest, and hiking trails. Summit felling, especially clear cuts and seeding felling cause aesthetic problems in skylines.

Slope forests are the area between the ridge top and the lower mixed forest. They are important for timber and visually sensitive, which is why felling areas should be designed to blend into the landform (shape, size, edge, texture). Large, geometrical clear-cuts, especially vertical coupes cause the most striking aesthetical problems.

Edges are border zones, located in the lower mixed forest, including mature, felled and regenerating spruce, pine and birch. They surround open cultural landscapes, thus their structure and shapes are important elements in the landscape.

Swamps include small lakes, lakeshores, mires and wetland. Swamps are interdependent with moist soils and drainage basins. They also occur in hollows between ridges and spring areas. They often have a dense, small-scale structure and high diversity. The presence of water, shadows of trees and high under-vegetation of ferns characterise the *genius loci* of this landscape type.

A valley incorporates the settled landscape of farmlands and village. It represents traditional places and cultural heritage.

Vuokatti

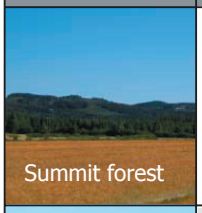
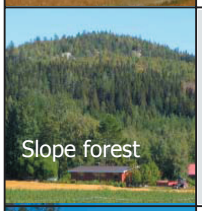
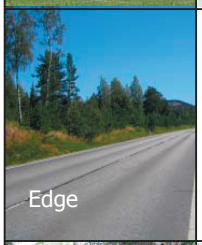
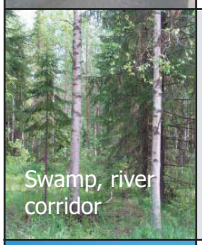
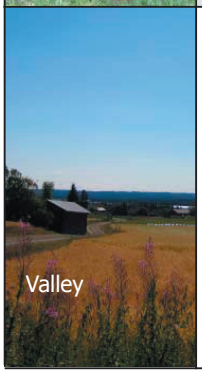
TYPES	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
 Summit forest	Ridge top forests on old quartz bed-rock, mature spruce woods, VMT	Broken skyline with many felling coupes, visually vulnerable to clear cutting and seed-ing felling, coarse texture with spruce, large scale, sharp shapes	Conserve and restore unity of the skyline, design felling coupes to landform, favour horizontal, narrow clear cutting or dense shelter wood felling
 Slope forest	Spruce on lower ridge slopes, between the ridge cap and lower mixed forest, im-portant for timber, GOMT, VMT	Visually less sensitive, coarse texture, visual problems caused by geo-metrical, vertical cutting on steep slopes	Felling coupes should reflect nat-ural character and be designed to landform (shape, size, edge, texture), emphasise topography with different tree species, bears wear-and –tear of recreational use best
 Edge	Lower mixed for-est, spruce-pine-birch forest, along roads and shores, most productive timber area, VMT, GOMT	Less visible in the broad landscape, naturally small-scale and dense structure, rich in diversity, visual problems due to monotonous sharp edges, straight clear cutting or clearance of bush layer	Increase connectivity and strengthen the matrix of the edges, design felling to relate natural character in shape, with varied edges, enrich the edge zone with different tree species, e.g broadleaves
 Swamp, river corridor	Hollows on the slopes, fluviation areas, springs, low, moist land	Rich small scale structure, high diversity, coarse tex-ture of spruce	Maintain in a natural condition to provide habitat and water protection, reduce the risks of erosion & fluviation, im-prove the sustainability of trees in edges by thinning, dense bush layer, avoid ordinary felling or soil scarification
 Valley	Settled landscape in val-leys, farmland and pasture lands, wild-flower mead-ows, VMT, GOMT	Small-scale variation of pasture lands, strong con-trasts of open views from lake to hill-top, diverse foreground scenery, unity of small forests, small scale, soft shapes, me-dium sensitivity	Open views and visual contrasts should be maintained, abandoned fields should be re-used, old village roads maintained for tourism use, conserve the traditional cultural structure of pasture lands by mowing, grazing and clearance, enrich foreground with solitary trees, avoid clos-ing views by field afforestation, design the shape and scale of afforestation carefully

Table 5.7.1 In the table above the natural landscape types of Vuokatti, Northern Finland, are summarised. Five different main types were distinguished from the surrounding landscape. Their location in the landscape structure, main visual appearance and suggested landscape management actions are also described.

5.8 Tipasoja (Ridge-Kainuu)

Landscape character region

Tipasoja belongs to the ridge region of Kainuu and Kuusamo. It is an ordinary village landscape with woods and fields, near the Hiidenportti National Park. Glacial deposits such as sediment are dominant in the area. Drumlins and other moraine hill-formations, rocky headlands, and fracture valleys shape the landscape in northwest southeast and west-east directions. There are both a lot of wide lake water systems and smaller lakes, brooks and rivers in the area. Also the swamps also represent more than 59% of the surface area (Haapanen & Heikkilä 1993b).

The region is a mid-boreal vegetation zone from its southern parts and its forests are mostly pine-dominated of the rugged Vaccinium-Myrtillys type (VMT). As a memento of burn-beat cultivation, there are in places, fairly many deciduous trees and birch woods. The slopes of the ridges and edges comprise fertile spruce woods and rich fen swamps (Haapanen & Heikkilä 1993b).

The planning area was 67 km^2 of which the largest part comprises forest. The planning area was defined according to the villagers' needs. The original plan was reported in the landscape plan of Tipasoja (Komulainen & Suihkonen 2008).

Landscape structure of Tipasoja

The Tipasoja landscape structure is created by an esker formation and Tipas river, from which the name of the village originates. The terrain presents small-scale variation in the esker area. On the north side there is also a lower ridge area, which consists of relatively low moraine ridges through which, the main village road passes. The Tipas River flows between the ridges, winding its way through the bottom of the valley.

Settlements have formed on the slopes of the ridges and esker in the vicinity of the water system. Fields are located on the slopes or in the valley near housing. The water systems have formed in the lowest sections of the valley. To the South, the village road follows summits and water systems through a small-scale esker area. The node point of the landscape structure is located in the middle of the village and the cultural landscapes of the school and Räätäkylä in which the village forms a headland into Räätä Lake.

The bedrock of the Tipasoja region is gneiss granite. In the north of the area there are rocky soils. In the middle of the village with the widest agricultural zone, the bedrock also contains meta-basalt, which is pierced by pre-Karelian stones. The rock direction and topography are from northwest to southeast (Geological map 1:100 000: Ontojoki).

The soil of the ridge slopes is supra aquatic and the fields are fertile. The old settlement follows the northwest to southeast direction of the terrain created by the Ice Age. The slopes of individual hills or ridges rise gently from the southeast towards the northwest, providing a preferable place for houses with their meadows and fields, located prior to the summit (Tervo 2008). The esker of Räätäkangas belongs to the Natura 2000 network and to the Natura esker conservation programme.

The eastern villages of Sotkamo were populated in the 1600's by people from Savonia. Pioneers following the waterways found suitable places of residence along a descending route encompassing the Tipas River and Sapso rapids. War destroyed many houses, however the middle of the 1700's was followed by a rapid period of growth, when the last ridge slopes were populated. According to ancient land division maps the oldest fields were located

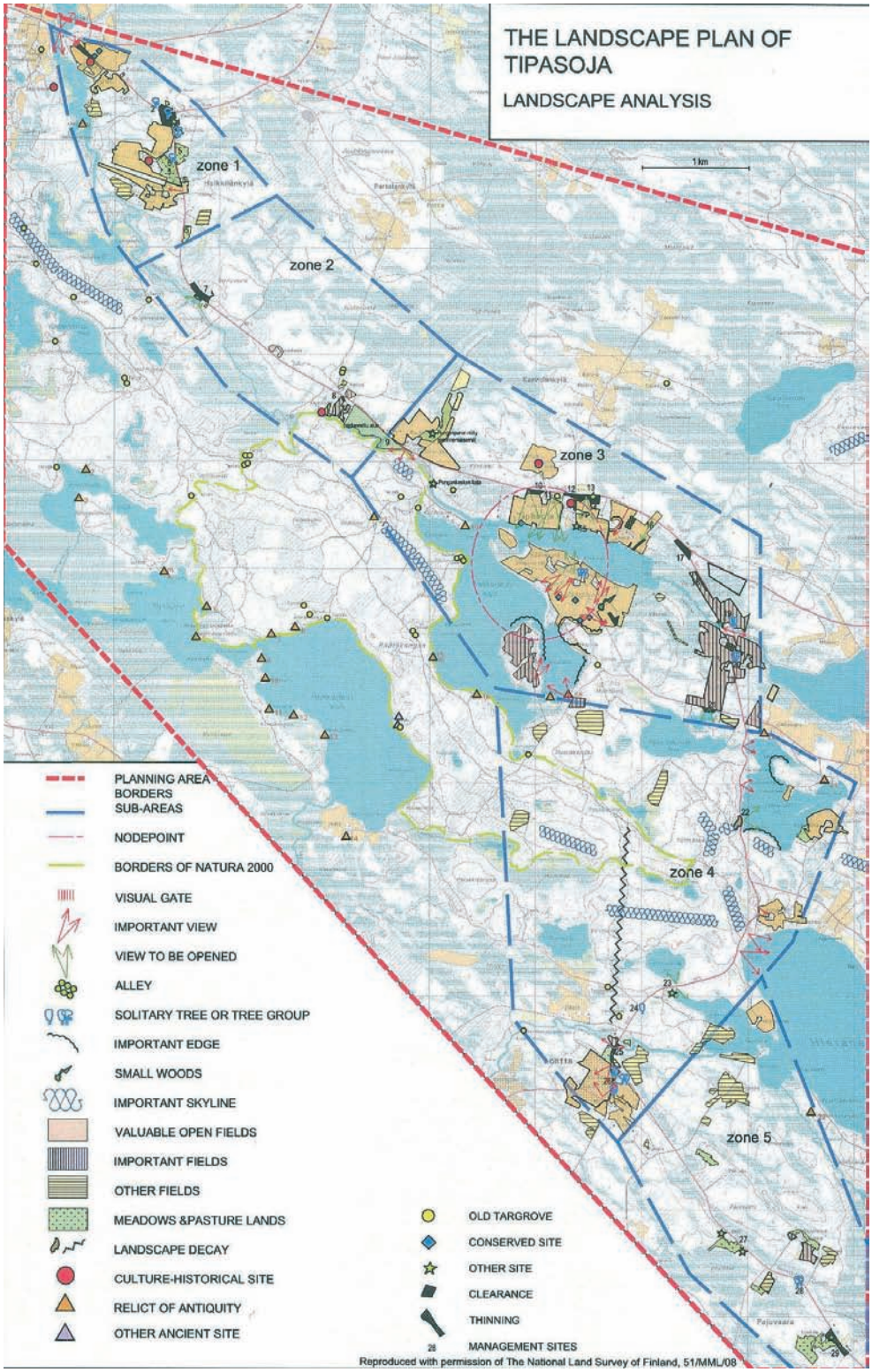


Figure 5.8.1 Landscape analysis of Tipasoja. Reproduced with permission of The National Land Survey of Finland, 51/MML/08.

around the houses, while the meadows were further away on the slopes or on the shores. The oldest fields have been marked as valuable field areas in the landscape analysis map. The valuable field areas also include scenically important fields to be retained as open spaces in the cultural landscape.

The concentration of Stone Age settlements in the area also proclaims the early presence of travellers. Ancient places of residence and hunting holes abound. Stone Age relicts found in the area vary from clay dishes to axes and arrowheads. There are exceptionally many tar-burning pits in the area (Tervo 2008).

The landscape types of Tipasoja

The landscape types were assessed using maps and a field survey based on the landscape structure of the area. The visual characteristics and management objectives of the landscape types are as follows.

Summit forests are located on the ridges, hills and eskers, especially at the highest points of the moraine ridges on the north side and in the highest parts of the eskers on the south side. The forests are conifer-dominated and the forest types are mainly represented by VMT and EVT forest types.

The slope forests are located on perpendicular to the slopes of the moraine ridges and eskers. The natural structure of the forest is often dense with EVT and VMT forest types.

The edge forests are located in the border zone of the forest and open area in which there is a naturally dense forest structure. In the pasture lands the structure of the forest is partly open due to animal grazing combined with tree groups. The forests of the zone are the fertile Myrtillys type or groves (GOMaT). A small scale, dense structure and high visual diversity characterises the scenic features of the type.

The road forests are located along the roadside, where forest types can vary. The scenery varies between open and closed spaces in the road forests. The shapes are variable and small-scale. Road-edge forests are visually sensitive.

The fields and meadows are the main features of the valley's cultural landscape and they are located on the plains and in the river valleys. Incorporating open fields with semi-open tree groups and solitary trees, they generate a diverse near landscape on a small scale, which is visually sensitive to change. This harmonious landscape is threatened by the over-growth of fields by shrubbery.

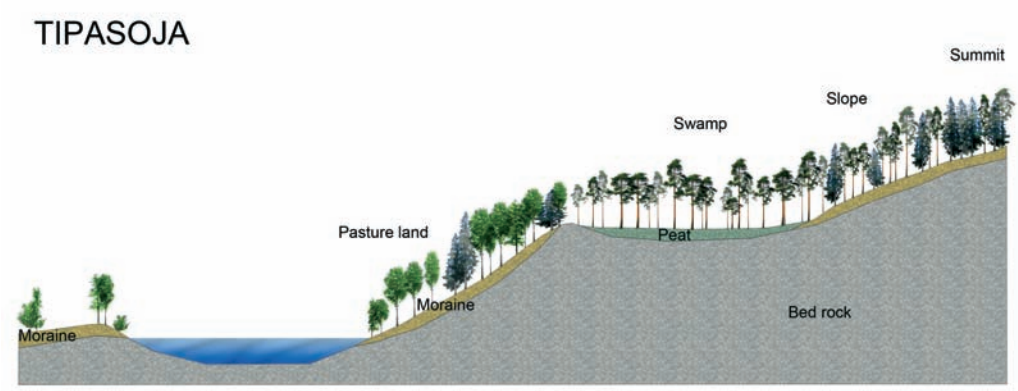


Figure 5.8.2 The diagram showing the location of landscape types in Tipasoja.

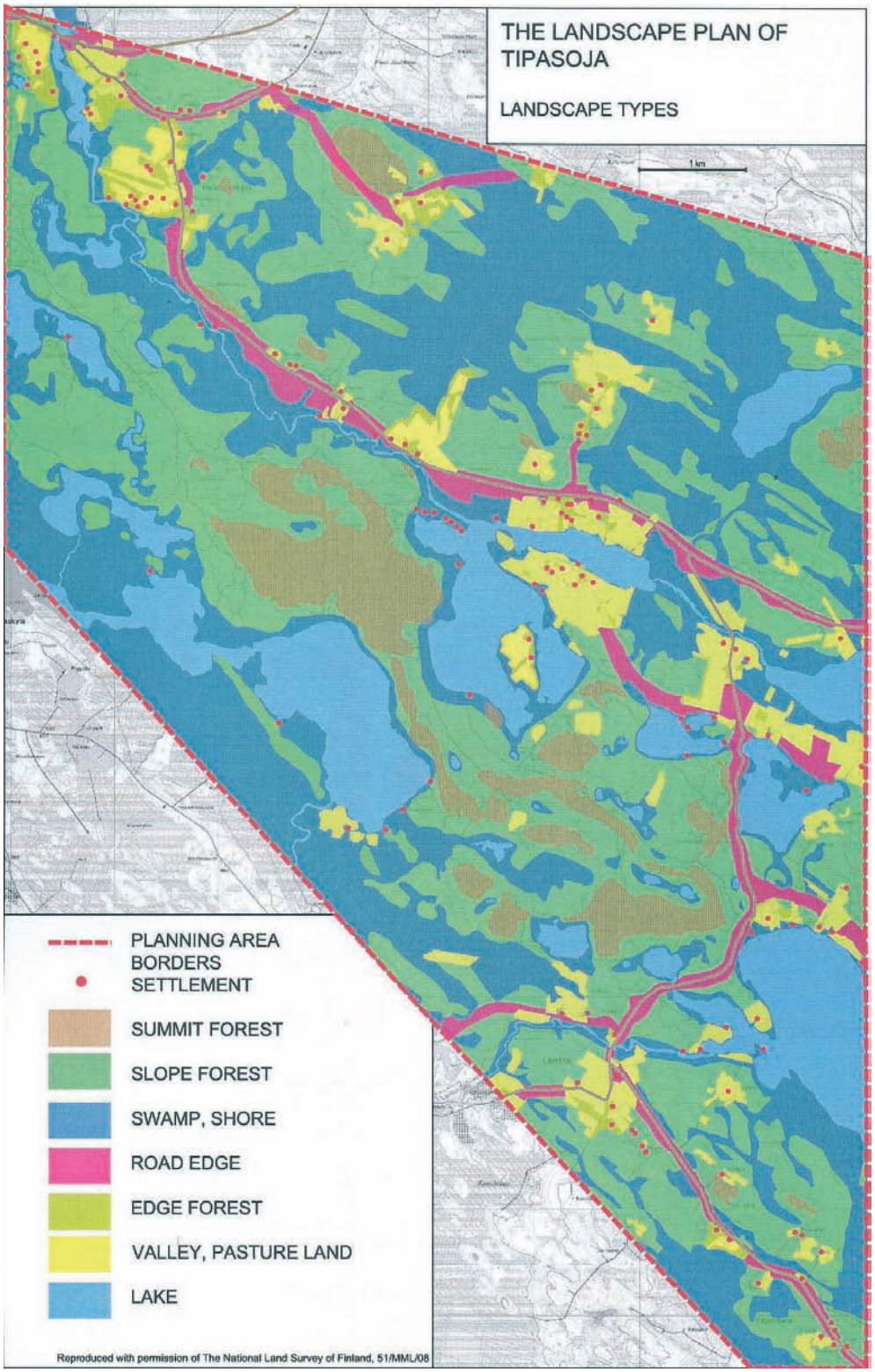


Figure 5.8.3 Location of landscape types of Tipasoja. Reproduced with permission of The National Land Survey of Finland, 51/MML/08.

Tipasoja

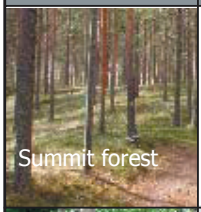
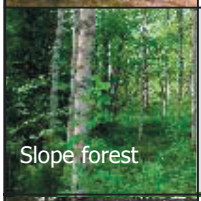
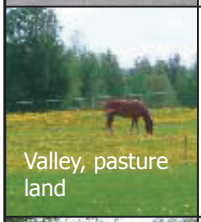
TYPES	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
 Summit forest	Summits of hills in ridge areas, conifer-dominated, fertile spruce-pine woods, VMT, EVT	Visual problems with broken skyline, the uniform silhouette is visually sensitive to clear cutting and to seeding felling, coarse texture in the spruce woods at the top of the hill, large scale, sharp shapes	Retain a uniform skyline, in regeneration favour narrow clear cutting, horizontally designed or dense shelter wood felling, avoid sparse seeding felling in the broad landscape
 Slope forest	Slopes of moraine ridges, dense natural structure of the forest, forest type often EVT, VMT	Visually less sensitive, coarse texture, on steep slopes the visual problems are caused by geometric vertical clear cuttings	Pay attention to the shapes of the landscape and to scale in felling, emphasise the topography with different tree species, tolerates recreational use best of the landscape types
 Edge forest	In border zone of forest and open area, naturally dense structure, in pasture lands semi-open, fertile forests of VMT, GOMT	Naturally small scale, dense structure, rich in diversity. Visual problems caused by monotonous edge forests with a sharp shape, geometric clear cutting or clearance of bush layer	Enhance of edge zone with various kinds of tree species, e.g. deciduous trees, felling designed to adapt to the terrain, favour of solitary trees
 Road forest	Edge zones along the roads, variation of forest types	Variation of open and closed space, visually sensitive, from semi-open to closed structure, small scale, varied shapes	Design felling according to the terrain, management of different views, solitary trees, tree groups and bush layer, filtering of traffic pollutants
 Valley, pasture land	Meadows and fields in valley or plain, features open fields with semi-open tree groups and solitary trees	Diverse foreground with a small scale, which is visually sensitive to changes, round shapes, overgrowth of fields as a threat	Conserve traditional cultural structure of pasture lands by grazing, mowing and by clearing, enhance the scenery by solitary trees, avoid closing the views by planting, careful planning of the shape and scale of afforestation
 Shore, swamp, wetlands	Hollows between hills, drainage areas, springs, wetlands. Culturally impacted shore woods, fertile mixed forests, forest types is often spruce swamp	Small scale structure, high diversity, often soft texture of deciduous trees or coarse texture of spruce, shady woods, vividness	Reduce wear-and-tear from soil surface, avoid risks of soil flow by permanent vegetation, improve the vitality of tree stand with thinnings, favour dense bush layer, ordinary clear cutting or soil scarification not recommended, in shore forests open views to lakes near recreation areas.

Table 5.8.1 The landscape types of Tipasoja and their management guidelines.

The shore forest, swamps and wetlands are located in the hollows between the hills and on the shores at the lowest level of the landscape. This type also includes wetlands, springs, culturally impacted shore forests and fertile spruce swamps. The peat-land scale is small and there is high diversity.

5.9 Summarised progress of case studies

Eight case study areas were examined in chapter 5. From each case study area, the landscape was distinguished and separated into landscape types whose qualities; visual problems and suggestions for landscape management were collected and compiled in matrixes. The case study experiments were conducted one after the other, not simultaneously. This provided the opportunity for learning through the planning process by taking into account lessons-learnt from the previous cases. Section 5.9 discusses how the theory proceeded during the planning cases. The purpose of the large amount of cases was to produce enough critical observations on local landscape structure and patterns to analyze the visual impacts of forest-use and landscape management alternatives.

Progress in Ruissalo

The first survey on forest landscape types from Ruissalo Island formed a cornerstone for further studies. During this first stage the survey focussed more on describing landscape types and their existing qualities, rather than ordinary forest management models. Since Ruissalo has been a cultural historic site due to its royal castle since the XV century and later on a recreation area of the town of Turku since 1845, its oak woods were used for recreation, hunting, ship building or grazing and there were few signs of ordinary felling for a long period. Such traditional land-use and a pleasant marine climate have created cultural-historical milieus and a special forest structure, which are untypical in Southern Finland.

The theoretical framework behind the planning stage in Ruissalo was based on the landscape structure theory (Rautamäki 1983, 1990), Kevin Lynch's visual analysis and Swedish models of description of the spatial structure of oak forests (Gustavsson 1986, Ståål 1986). It also somewhat reflected German landscape ecological biotope planning (Ammer & Utschick 1985, Ammer & Pröbstl 1991, Burschel & Huss 1987). The above theories offered descriptions of landscape character patterns and division into landscape types and tools for the visual assessment of the area.

During the Ruissalo planning process a need to find more comprehensive methods of describing a forest's visual elements and to distinguish them from the surrounding landscape, arose. As the above methods focused more on ecological and visual assessment, e.g. determining general character or ecological patterns, in Ruissalo it was discovered that the visual assessment of forest areas could be a more fine-detailed process, for which more specific, descriptive indicators needed to be found. Therefore a more profound visual assessment was the step required to further advance the planning developed in case studies after Ruissalo.

Progress in Koli

While constructing the planning theory of the thesis, the Koli case study provided the first step towards obtaining knowledge of cultural layers taken from different historical maps in order to trace the effects of former land-use on the present landscape. The Koli case study

area was the first area where I applied the integrated approach of landscape structure analysis, historical analysis and visual assessment to forestry planning. As Ruissalo represented a southwest region of special oak woods, Koli in turn was representative of a conifer-dominated ridge region, which is more common in Finland, and it also bore signs of forest felling.

Therefore Koli was the case study where the common landscape typology division was initially distinguished and analysed in my research. During the Koli planning process the visual assessment criteria of the British Forestry Commission was applied using visual factors such as shape, scale, unity, diversity and sensitivity. These visual qualities were linked to landscape structure and thus a preliminary idea for the forest landscape typology was born and presented in several articles (Antikainen 1993b, 1994, Komulainen 1995a, 1994).

Progress in Melalahti

Melalahti village consisted of a private land area belonging to almost 190 different landowners. Hence the plan became a pilot study on the participatory approach to village area landscape planning involving many stakeholders. The landscape project received support from landowners in many of the village events, and the inhabitants were proud of the aesthetic qualities of their village. Landscape planning was seen an asset that could attract tourists to the village and create income-generating livelihoods.

Thus the plan was compiled in large-scale co-operation with landowners, the private forestry board, and agricultural and environmental authorities. Based on the village landscape analysis, separate forestry plans were made for private landowners on the management of open areas, traditional pasturelands, landscape analysis, biodiversity, ponds, game, and silvicultural and felling design.

Photo simulation was tested in Melalahti for the first time, to visualize the landscape management models for the inhabitants. Melalahti was also one of the villages where the previous landscape photo simulation study was carried out (see chapter 4.3).

From the viewpoint of a landscape classification typology, Melalahti included fine examples of the general typical Finnish countryside landscape types. It had a wide variation of landscape from pasturelands to slopes. It was not as unique as Koli and Ruissalo, but typical characteristics could be visually singled out, enabling further classification development and testing. Since Melalahti was in ordinary agricultural and forestry use, not a conservation area as were Ruissalo and Koli, the different visual impacts of land use were more easily distinguished in the landscape there. In Melalahti the visual assessment factors were standardised for application in the later landscape planning cases of the study.

Progress in Häntälä

The Häntälä landscape planning process implemented a similar approach to the one used in Melalahti and Peränne, where the focus was on integrating landscape analyses into forestry planning systems. Forestry plans were made for single landowners according to general, large-scale landscape maps. Häntälä with its meadows and ravines presented a very special case in terms of Finnish landscape.

One special feature of Häntälä was that it was the first landscape area where a questionnaire for local people with the purpose of mapping their values, was developed and tested. In Häntälä the landowners received an integrated forestry plan for their land containing landscape and fauna data based on landscape and biodiversity assessments.

Progress in Peränne

The "Development of landscape in rural livelihoods"- project started in Peränne, near Ähtäri wildlife park in 1993. It began with forestry planning and then the need arose to integrate total resource planning as one of its components. In the first year, assessments of biodiversity, birds, forests and landscape as well a recommendation for conserving the traditional building style of the village were made. In the second year environmental management, product development and business plans were made for farms in the area.

The landscape assessment started with a map survey of the following thematic maps:

- land division maps from between 1825 and 1828 with explanatory annexes
- maps from the year 1989 (scale 1:20 000)
- soil map, in a scale of 1:20 000
- forest inventory map in a scale of 1:10 000
- aerial photographs in a scale of 1:10 000

The special feature of this planning process lay was that it represented a wider approach than existing integrated forest and landscape planning related to rural livelihoods. From the point of view of landscape classification, Peränne was a common example of Finnish countryside featuring typical landscape types of Middle-Finland.

The planning approach in Naapurinvaara

Naapurinvaara was also one of the villages where a previous study using landscape photo simulation had been carried out (see chapter 4.3). From the viewpoint of the landscape planner, the supply of various thematic maps (geomorphologic, historical and soil maps) and aerial photographs was sufficient. The maps formed a solid basis for the development of a deeper landscape assessment analysis by examining them separately from the field survey.

For the first time, in Naapurinvaara, the border zones of the forest landscape types were very visually distinctive in the broad landscape, whereas previous cases had displayed more overlapping or shifting, transforming border zones. This was due to ancient land-use that followed the geomorfological patterns.

In the Naapurinvaara planning process, the participatory planning approach continued. The planning process was an example of a widely integrated land-use planning process with active discussion between the stakeholders and authorities. Village events were held on a frequent basis and a landowner questionnaire and interviews were conducted.

Progress in Vuokatti

The Vuokatti case study was implemented in the Cross Plan Project's international planning team project. The exchange of knowledge generated during the project, created new models of thinking, and an exchange of methods between the Scandinavian countries and Scotland. Additionally, landscape analysis developed, the landscape-ecological approach arose and the planning techniques of the forestry centre offered new opportunities. The landscape analysis map (Figure 5.7.1) shows the main challenge of landscape planning, which was the application of landscape principles to the visually sensitive ridge that incorporated a high degree of tourism and plenty of private landowners.

The case studies differ in their landownership structure, especially in Vuokatti where the landownership boundaries can be seen on the landscape analysis map (Figure 5.7.1). The map presents landownership division dating back to the Kingdom of Sweden-Finland during

the reign of Carl Custaa III, later shaped by immigrants after World War II and then, more recently by the distribution of inherited land. Vertically divided land from the top of the ridge-line down to the lake forms a scattered mosaic of landscape patterns, shaped later by a variety of land uses reflecting the objectives of a multitude of landowners.

Vuokatti presented a good example of how challenging the planning task could be when having to integrate land-use needs. Thus, a new interview questionnaire was compiled, and land-use requirements were examined in more depth from the viewpoints of tourism, the Sotkamo municipal authorities and the inhabitants (Komulainen et al 2001). Furthermore, it was necessary to estimate the decrease in economic losses incurred if planned felling in the mature forests of the highest summit areas was not carried out (Komulainen et al 2001).

From the viewpoint of the forest landscape typology, the Vuokatti case study did not present new forest landscape types to be added for classification. With its basic forest landscape types, it offered a case study where the five existing types were easily distinguished in the landscape.

Progress in Tipasoja

The Tipasoja case presented a river and esker landscape with ordinary rural land-use. With its fine supply of varied forest landscape types it was able to enrich the description of characteristic qualities. The new revised planning techniques made it possible to present more information for the landowners.

Planning started at the initiative of the Tipasoja village association in May 2008, with the help of a village inquiry that surveyed the inhabitants' needs. Using map analysis the landscape structure of the area was studied using recent and ancient land division maps, aerial photographs and geological maps. The general landscape types were defined as a basis for landscape management in the area. The examination of the present landscape of the area, its strengths and targets for development was conducted by site visits. The landscape analysis and management map and landscape structure map with landscape types were created as a result of the planning process.

To summarise the progress made and lessons learnt from the case studies it was obvious that a large amount of case studies was needed to be able to implement generalization and to simplify the forest landscape types. In analysing the results it must be emphasised that the landscape character of each region always posseses something unique and context-dependant that could not be repeated in other landscape areas. Thus the forest landscape typology framework aims to present a planning model or "eye-glasses" demonstrating how to find the character of cultural forest landscapes, how the forest landscape types are located in the studied landscape, the visual problems that may arise, and what the potential management methods are in each location.

Chapter 6 summarises the results of the landscape classification of the case study areas and examines the similarities and differences between them. The findings of the case study areas will be compared with the results of the preference studies and the classification framework will also be evaluated.

Chapter 6

Typology of the forest landscape: results

6 TYPOLOGY OF THE FOREST LANDSCAPE: RESULTS

6.1 Evaluation of classification

Visual and landscape structural approaches were integrated in eight case studies in various landscape regions. In this chapter, the results from the case study areas are summarised to evaluate whether there were common similarities and indicators between the forest landscape types. Secondly, the findings of the site study analyses are compared to preference studies related to the case studies (Karjalainen & Komulainen 1998, 1999). Derived from studies of local landscape types, a forest landscape typology is presented as a result of the study.

The typology model was constructed by comparing the site-specific qualities of each type to characteristic visual factors in the case study areas. Based on the characteristics of visual and structural factors, the actual management procedures of sites were evaluated, and recommendations concerning landscape management alternatives were made.

Most of the case study areas were rural agricultural landscapes surrounded by woods; some of them were recreation forest areas near towns, while others were wilderness areas of high tourism interest. In spite of their status, these landscapes represent various kinds of ordinary land-use patterns, like felling coupes, tourism construction and afforestation. The results from the case study areas can be summarised as follows: although located in different landscape provinces, there were common similarities and characteristics, as compared below in figure 6.1.1. Furthermore, each landscape had some specific regional characteristics, which were found in various areas, whose management could not be implemented elsewhere, e.g. the Häntälä and Melalahti river corridors, which represent opposite landscape management alternatives due to the different birth processes of these landscape types.

The summarised typology is presented within the categorized types, which are internally as uniform as possible but externally differentiated from other quality groups. In order to serve practical landscape management purposes, the approach of searching for and describing unifying factors is necessary, although the findings from versatile environments will have to be generalised. A clear, clarified model is more applicable in forestry planning, as a regionally very detailed classification could cause a large amount of types to be considered in practice, which could be confusing and raise the costs of planning.

The comparison of various landscape types in different case study areas is represented below in figure 6.1.1. Similar colours represent the same types of landscape. The order of landscape types represents the types' location in the landscape structure in a horizontal order, from the highest level to the lowest in the landscape. The red line links the location of the type in each region, where regional variation in the different locations can be seen.

The main types can be divided into summits, slopes, edges, valleys and shores, as shown above in the summary table of eight case areas. The main types can be further divided into 11 sub-types, which describe the forest landscape types more precisely. Thus the types found in the eight case study areas can be summarised as summit forest, slope forest, edge, road edge, swamp, pastureland, valley, shore (cultural & natural) and islands. The highest parts of the landscape are often summits, followed by upper slopes and then lower slopes with groves and swamps. The upper slopes have been named as slope forests in each case area. The lower slopes have more variation; in the case areas they have often been distinguished as edges, groves, pasturelands, swampy groves or road edges. There is even more variation near the valley floor or shoreline, with versatile types of valley woods (forest islands, tree groups), and

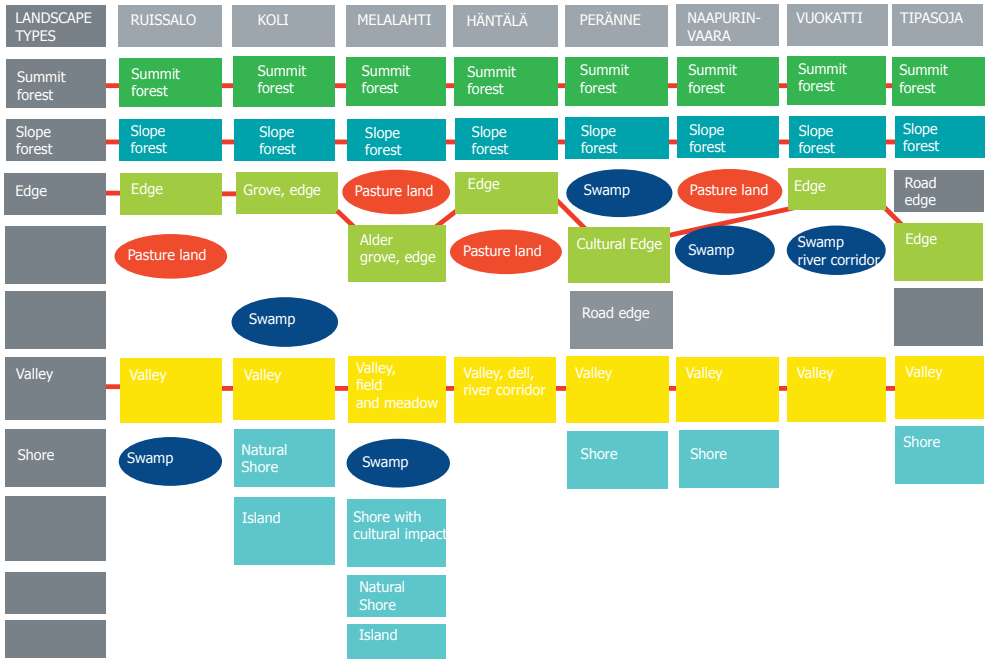


Table 6.1.1 The comparison of various landscape types in different case study areas. Similar colours represent the same types of landscape. The order of the listed landscape types represents its location in the landscape structure, from the highest level to the lowest level of the landscape. The red line links the location of the type in each region.

shores (cultural and natural shores) and islands. This variation is often due to the differences in regional cultural and natural processes that transform the landscape.

In the comparison of location of types between the case study areas, the forest landscape types can be divided into stable and variable types. The boxes drawn in the table present the stable types of summit forest, slope forest, edge, valley and shores. The circles present variable types of pasturelands and swamps, whose locations seem to very much depend on the regional landscape structure. For example, in the Northern ridge area, pasturelands are often located on supra-aquatic slopes dating from the Ice Age, while in the supra-aquatic areas of Middle and Southern Finland they are situated in valleys. However their characteristics are easily distinguished from the surrounding landscape and their management guidelines are often similar although the location varies.

Below in table 6.1.2 the forest landscape types summarised by their location in the landscape structure and their visual characteristics are described.

TYPE	SUB-TYPE	LOCATION	VISUAL APPEARANCE
1. Summit forest	1.1 Sub-aquatic summit forest	Sub-aquatic, rocky moraine hill tops, pine woods, CiT, CT, VT, case areas: Ruissalo, Häntälä, Peränne	Visually important, uniform skylines, forming sensitive background woods in the broad landscape, light and spacious pine forests with a soft texture, rounded shapes, large scale in the skyline
	1.2. Supra-aquatic summit forest	CT, VT, often coniferous, spruce-pine forests, case areas: Koli, Melalahti, Naapurinvaara, Vuokatti, Tipasoja	Visual problems with broken skyline, uniform skyline is visually vulnerable to clear cutting & seeding felling, coarse texture from spruce, large scale, sharp shapes
2. Slope forest		Slopes of moraine ridges, VT, MT, dense natural structure, in all case study areas	Visually less sensitive, coarse texture, visual problems caused by geometrical, vertical cutting on steep slopes, varying scale
3. Edge	3.1. Edges of lower slopes	Between an open area and forest, fields or swamps, naturally dense, in pasture lands semi-open woods, Mt, OMaT, case areas: Ruissalo, Koli, Melalahti, Häntälä, Peränne, Vuokatti, Tipasoja	Naturally small-scale and dense structure, rich in diversity, visual problems caused by monotonous sharp edges, straight clear cutting or removal of bush layer
	3.2. Road edges	Forest edges between forest and road, forest type varies, case areas: Peränne, Tipasoja	Variation between open and closed spaces, visually sensitive, varied shapes, semi-open to dense structure, small scale
	3.3. Swamps, river corridors	Hollows on the ridges, fluviation areas, springs, low-lying, moist land, case areas: Koli, Ruissalo, Melalahti, Vuokatti	Rich small scale structure, high diversity, texture soft (broadleaves) or coarse texture of spruce
	3.4. Pasture lands	Near settlements between valley and slopes, semi-open woods and tree groups; all case areas	Multiple layers, semi-open mixed forests, threat of over-growing, small scale

4. Valley	4.1 Valleys, fields and meadows	Meadows and (pasture lands) in valley or flat topography, semi-open woods and tree groups, forest islands in the cultural landscape in the middle of fields, all case areas	Diverse foreground scenery, unity of small forests, small scale, medium sensitivity, round shapes, threat of over-growing, visually sensitive, semi-open to dense structure
5. Shores	5.1. Shores with cultural impact	Woods along the shoreline with cultural impact, lush mixed woods, case areas: Melalahti, Peränne, Naapurinvaara	Deciduous, rounded shapes, small-scale and semi-open structure, rich in diversity, visual problems caused by monotonous sharp edges
	5.2. Natural shores	Woods along the shoreline without cultural impact, natural factors dominate, case areas: Melalahti, Peränne, Tipasoja	Naturally small-scale and dense structure, rich in diversity, visual problems caused by straight clear cutting or removal of bush layer, visually sensitive skylines against the lake
	5.3. Islands	Forests on islands, coniferous or broadleaved woods, case areas: Koli, Melalahti	Light and spacious structure of pine or broadleaved woods, soft shapes; coarse with spruce; large scale, visually sensitive contrasts against the lake

Table 6.1.2 The forest landscape types are summarised by their location in the landscape structure and their visual characteristics are described.

In the next chapter the case study findings were compared with the results of the preference study, and finally the landscape management alternatives were integrated into the model of forest landscape types in section 6.3.

6.2 Comparison of case study analyses with preference guidelines

During the implementation of the case studies, management alternatives were evaluated through preference studies carried out with inhabitants, foresters and tourists in two planning villages, namely Melalahti and Naapurinvaara. The actual studies were reported separately in the articles of “Karjalainen, E. & Komulainen, M. 1998: Field afforestation preferences: A case study in North-eastern Finland”; and “Karjalainen, E. & Komulainen, M. 1999: The visual effect of felling on small-and medium-scale landscapes in North-eastern Finland”.

The fact that these studies showed differences between landscape types, particularly in

their sensitivity to change and visual appearance inspired the basis for further developing the classification through classification research. In this chapter, the case area analyses are compared to the preference guidelines in order to evaluate their unifying factors and differences of types and to discover appropriate management alternatives.

In chapter 1.2, objective 2 of this study was set as follows: "to identify management alternatives of forest landscape types by comparing the results of site studies to preference studies". This objective is evaluated here by comparing the results of the case study areas to the preference studies by each landscape type.

A challenging question arose as to which forest areas should be emphasised by management practices and which landscape types were visually the most vulnerable? When studying the preferences for a felling area location, it was observed that the summit forest was the most aesthetically sensitive with respect to felling, while slope and lakeshore forests were scenically less sensitive. The findings oppose the a priori hypothesis according to which a lakeshore is scenically more vulnerable to felling, while it the slope forest is assumed to be the best location for felling (Rautamäki 1990, Antikainen 1993a). The observed preference for lakeshore felling may be due to an impression of smaller sized felling.

Summit forest felling was perceived as the most disturbing form of felling, which may result from them being the most visible form of felling in this type of location. This in turn, leads to the question of which forest parts are perceived first. According to Bell (1999), the human eye identifies main structural elements arising from edges: the skyline, shorelines, tree outlines, building outlines etc. Therefore it can be assumed that the edges of the landscape are the most vulnerable, whether seen as summit forests or lakeshore edge zones.

To the second question of which forest operations could create visual conflicts with the surrounding landscape, the results of Karjalainen & Komulainen (1998) and Karjalainen & Komulainen (1999) show that clear felling was the least preferred option. Scenically, the best alternatives in both areas were seed-tree felling and a uniform, unbroken skyline with the felling area located lower on the slope. The two alternatives did not result in significant differences in either area, suggesting that even seed-tree felling could improve the visible signs of felling, which is contrary to the hypothetical expectations. However, it makes forest management more flexible, as on the summit forest seeding felling is a common, natural regeneration forestry practice, whereas the previously suggested clear-felling in narrow horizontal strips with lower woods hiding the clear-cut, might be difficult to implement on steeper slopes.

The third question, of how felling should be adjusted to the landscape in an aesthetically appreciated way, is discussed and summarised by each landscape type linked with the results of the preference studies, in table 6.2.1, below.

When using the results of preference studies in this classification, it must be remembered that the two preference studies only relate to one landscape region in Northern Finland. Therefore a professional assessment of the three landscape analysis techniques in the case study areas also had to be carried out when constructing the model. Furthermore the preferences only touched upon two forestry practices: regeneration felling and field afforestation, when models for thinning and edge zone management are also implemented in forestry. For example, the order of sensitivity of landscape types may differ in other landscape types or there could be more sub-types in other landscape regions, located in a different order in the landscape structure, or their proportion (%) in the whole landscape might differ in ordinary forest areas.

Hence this study has only used the results of the preference studies as a rough, indefinite framework. The perception study based on landscape types would also need further studies carried out in other landscape regions. However although they were only located in one

LANDSCAPE TYPE	PREFERRED OPTIONS	RECOMMENDATIONS FOR LANDSCAPE MANAGEMENT
Summit forest	**Felling in a summit forest** 1. unbroken skyline and seed-tree felling 2. clear felling breaking the skyline	Conserve the skyline as unified as possible, even seed trees improve the profile, leave tree groups or solitary trees in the middle, design the shape and scale to the contour curves, horizontal felling direction preferred, narrow and dense shelter wood felling for spruce forest.
Slope forest	**Shape and direction of felling are a in a hillside forest** 1. irregular shape 2. geometrical horizontal felling 3. vertical shape	Consider shape and scale of felling, irregular and horizontal shapes are preferred. Leave tree groups to follow the natural structure of the forests. To create diversity of texture and variation, emphasize topography, (e.g. knolls or hollows of terrain) with different tree species.
Edge	**Felling along lake shore** 1. dense strip of forest with an opening to lake 2. evenly spaced thinned strip of forest and cleared away bushes 3. a clear felling without trees and screening	In the regeneration felling of a lakeshore, leave a dense strip of forest with an opening to the lake; avoid an evenly spaced thinned strip of forest and clearing away bushes or clear felling without retained trees. Leave tree groups to unify the felling area with the environment. Enrich edge zone with different tree species, e.g. broadleaves, conserve the skyline along the lakeshore. Dense edge zones reduce wind and erosion by the lake. Light thinning of tree groups to open views to lake near recreation sites.
Valley forest	**Afforestation reflecting the shapes of the surrounding landscape most preferred** 1. oblong irregular shape 2. oblong geometrical shape 3. quadratic shape Location 1. near forest edge 2. closing long-distance view 3. middle of fields	Locate afforestation on the edge of an existing forest. Avoid afforestation in the middle of fields. Design afforestation according to the shapes and scale of the landscape. Irregular and oblong shapes are preferred more than quadratic shapes. Conserve the traditional cultural structure of pasturelands by mowing, grazing and clearance, enrich foreground with solitary trees, and avoid closing views by the forestation of fields. Favour variety in tree species.

Table 6.2.1 Case study analyses of this study compared to preference guidelines (Karjalainen & Komulainen 1998, 1999).

landscape province and even landscape heritage areas, the chosen sceneries display a similar character to general Finnish landscapes, complete with forests, lakes and agricultural land.

Preferred management alternatives and recommendations

The results of the preferred management alternatives of each type were compared with the management recommendations for the case area studies, and the landscape management models were revised accordingly.

Summit forest. The results of the preference study suggest that the conservation of the hill silhouette is important, regardless of whether the skyline is uniform or ragged. It is also notable that seed trees improved the scenic appearance of felling in the summit forests. Clear felling was the least preferred option in the summit forest, probably because it breaks the silhouette more distinctly than seeding felling and makes the felled area more visible (Figure 6.2.1).

Therefore the summit forest management alternatives were modified by specifying that even seed trees improve felling appearance in summit areas. This is also confirmed by Karjalainen (2006) who proposed that leaving tree groups or any trees and bushes would improve the aesthetic quality of a clear cut. However according to silvicultural procedure, seed trees

Figure 6.2.1 Conservation of the hill silhouette was important, regardless of whether the skyline is uniform or ragged (above, left). It is also notable that seed trees improved the scenic appearance of felling in the summit forests (below, left, presents the original view of Melalahti). Clear felling was the least preferred option in the summit forest (above, right) by Karjalainen & Komulainen (1999). Original photographs of Melalahti by Erkki Oksanen/Finnish Forest Research Institute. Image processing by Tuomo Härkönen and Jarmo Laitinen.

are harvested some years after new saplings grow, and thus their presence does not provide a permanent solution in improving the landscape. For instance, shaping the felling coupe would be a better alternative in sensitive locations.

The adjusted recommendation for landscape management alternatives of summit forest is the following: The skyline should be conserved as unified as possible and even seed trees improve the appearance of the felling coupe in summit areas. Tree groups or solitary trees should be retained in the middle. Due to the visual sensitivity of summit forests, the shape and scale of felling should be cautiously designed to match the contour curves. Horizontal felling coupe direction would be preferable. The findings of the case studies suggest the following: If spruce forest is to be regenerated, narrow and dense shelter wood felling should be preferred in order to retain an unbroken skyline.

Slope forest. Irregular diagonal shapes were more acceptable than geometrical ones, because it is possible that perceived geometric shapes may conflict with the natural shapes of the landscape. The results also showed that horizontal shapes suit the landscape better than vertical shapes.

Therefore the recommendation for slope forests was revised as follows: Considering the shape and scale of felling, irregular and horizontal shapes should be preferred. Tree groups should be retained and follow the natural structure of the forests. The findings of the case studies were added to the recommendation as follows: In order to create diversity and a variation of texture, the topography of the landscape, and its knolls or hollows should be emphasized using different tree species.

Edges on lakeshore. The most appreciated felling alternative was to leave a dense forest strip with an opening to the lake. A dense forest belt, changing gradually to overlapping, irregular groups, reflects the natural shapes of the landscape. A view to the lake may improve the scenery of the felling area. An evenly spaced thinned strip was preferred less to the dense strip of forest. The thinned strip represents an artificial scale and does not follow the natural rhythm of groupings of trees and spatial structure. As expected clear felling without screening was the most unpopular alternative as it distinctly highlights a geometric shape and the felling area.

Therefore the recommendation of the lakeshore edge management options was revised as follows: During lakeshore regeneration felling a dense strip of forest with an opening to the lake should be retained, and evenly spaced thinned strips of forest, the clearing away of bushes or clear felling should be avoided. Tree groups should be left to unify the felling area with the surrounding environment. The findings of the case studies suggested the following: The edge zone should be enriched using different tree species, e.g. broadleaves, conserving the skyline along the lake shore. Leaving dense edge zones reduces wind and erosion along the lake and sensitive thinning of tree groups could be carried out to open views to the lake near recreation sites.

Valley forest. Two different management parameters concerning valley forests were studied using preference studies on field afforestation. The preference studies were limited to evaluate the preferred location and shape of afforestation. The case studies were wider in their approach and they indicated a variety of management procedures for valley areas as explained in chapter 5 and their summary in chapter 6.1.

The most important issue concerning field forestation is the location of the afforestated area in the open valley area (Figure 6.2.2). The results suggest that afforestation should be situated at the forest edge. Oblong and irregularly shaped forest stands adapt best to the landscape. It is significant that afforestation should be unnoticeable and not very clearly distinguishable from the surrounding landscape. The results clearly show that afforestation

Figure 6.2.2 The original view of Melalahti (above, left). Field afforestation disturbed the eye most when located in the middle of a field (above, right). Oblong and irregularly shaped forest stands adapt best to the landscape (below, left). By Karjalainen & Komulainen (1998). Original photographs of Melalahti by Erkki Oksanen/Finnish Forest Research Institute. Image processing by Tuomo Härkönen and Jarmo Laitinen.

disturbed the eye most when located in the middle of a field. This location is most distinct and if near the viewer it also closes the landscape to a large extent. However, in very vast and flat field areas, afforestation in the middle of a field may create a more varied and interesting impression.

The shape of the afforestation area is one means of making the new forest stand less noticeable in the landscape. Afforestation areas were more appreciated when designed as irregular, oblong and according to the shapes of the terrain rather than when they were quadratic and geometrical in shape.

Therefore the recommendation of the valley forest management options was revised as follows: The afforestation area should be located on the edge of an existing forest. Afforestation in the middle of a field should be avoided. Afforestation areas should be designed according to the shape and scale of the landscape; irregular and oblong shapes should be preferred to quadratic shapes. The findings of the case studies suggest the following: The traditional cultural structure of pasture lands should be conserved by mowing, grazing and clearance, enriching the foreground with solitary trees, and avoiding the closure of views by the afforestation of fields. Variety in tree species should be favoured to better unify the afforestation area with the surrounding landscape. More variation in the landscape can be created with a change of tree species appropriate to the environment, for example the planting of broadleaves can create light and soft texture in a coniferous forest area with a dark, coarse texture.

6.3 Description of forest landscape types

The assessment of eight case study areas defined eleven forest landscape types to consider in forest planning and landscape management. The highest parts of the landscape were often summit forests, followed by slope forests and edges. In the edge zone there was often variation, with edges to cultural landscapes, pasturelands, road edges and swamps. It was a zone of high, versatile cultural and natural activity. The lowest level of the landscape included the types of valley with small woods and tree groups, and shores, divided into cultural, natural shores and islands.

These landscape types were distinguishable from the broad landscape according to their location and visual characteristics. In order to find their management alternatives a professional analysis of the case study areas was combined with the preference studies. While the preference studies only examined the perception of two forestry practices of regeneration felling and afforestation in general, the expert approach of visual assessment was also applied to the case study areas to include versatile management types such as thinning, management of edges or traditional pasture lands, which are commonly applied in the management of cultural forest landscapes and areas of high amenity value.

Derived from the studies above and their comparison, the general forest landscape types were named and their management alternatives were summarised in table 6.3.1 as the main outcome of this study. The reliability and validity of the presented typology is later discussed in chapter 7.3.

The following basic types of forest landscapes were distinguished from the case study areas.

Summit forest is the area, which is defined by its shape, soil, water and vegetation potential. It is the highest level of the topography, formed by bedrock and moraine, gravel or sand. From the point of view of hydrology, ridges are groundwater areas, sources of surface water and watersheds. The vegetation potential varies according to soil content and leaching. Sub-aquatic ridges are often formed by rocky pine forests, too poor for agriculture. Supra-aquatic ridges are fertile enough for cultivation, and are mainly represented by the myrtillus-type of spruce-forest or, in ancient shifting cultivation areas, birch-forests. Summit forest can be rocky, moraine, supra-aquatic northern hills or sandy eskers.

Summit forests form the skyline in the broad landscape, thus they are visually vulnerable. Their texture varies depending on tree species and land-use, e.g. in ridge summit forests it is generally coarse with dominating spruce trees, which form a sharp, jagged skyline with their canopies. The skyline texture is more rounded and smoother where there are signs of the ancient burn-and-slash period and in pine-birch mixed woods. Summit felling, especially clear cuts and seeding felling cause aesthetic problems in the skyline. To conserve harmony, summits should retain a closed skyline, because solitary trees and tree groups are too small in scale compared to a large-scale summit area. Should the ridge summit area be regenerated, the shelter-wood position or horizontal strips carefully designed to follow contour curves, would be the better felling alternative, as trees on the lower slope will eventually grow and cover up the summit's clear felling area.

Slope forest is the forest area between the summit and edge zones. It is often visually important in Northern Finland. Slope forests are more sustainable in their visual sensitivity; nevertheless the shape of the felling area requires special consideration. Large, geometrical clear-cuts, especially vertical ones cause the most striking aesthetical problems. Where the shape of felling follows the landforms and tree groups can be retained, a relatively large-scale area of forest can be felled while still retaining the character of the landscape. Even felling

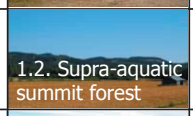
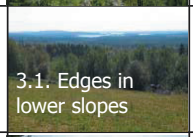
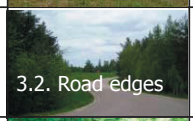
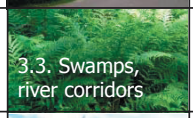
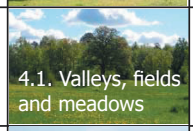
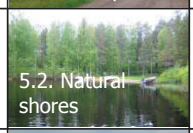
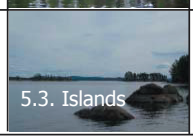
TYPES	SUBTYPE	LOCATION	VISUAL APPEARANCE	LANDSCAPE MANAGEMENT
Summit forest	 1.1. Sub-aquatic summit forest	Sub-aquatic, rocky moraine hill tops, pine woods, CiT, CT, VT	Visually important, uniform skylines, forming sensitive background woods in broad landscape, light and spacious pine forests with soft texture, rounded shapes, large scale in skyline	Conserve the unbroken, unified skyline, even seed trees improve skyline. Leave tree groups or solitary trees in the middle. Design the shape and scale to the contour curves. Prefer horizontal direction of felling, or narrow and dense shelter wood felling.
	 1.2. Supra-aquatic summit forest	CT, VT, often coniferous, spruce-pine forests	Visual problems caused by broken skyline, uniform skyline is visually vulnerable to clear cutting, coarse texture , large scale, sharp shapes	Conserve a closed skyline. Favour horizontal, narrow clear cutting or dense shelter wood fellings. Avoid sparsely positioned seed trees.
Slope forest		Slopes of moraine ridges, VT, MT, dense natural structure	Visually less sensitive, coarse texture, visual problems caused by geometrical, vertical cutting on steep slopes, varying scale	Consider shape and scale of felling. Prefer irregular and horizontal shapes. Leave tree groups to follow the natural structure of forests. Create diversity of texture. Emphasize terrain with different tree species.
Edges	 3.1. Edges in lower slopes	Between open area and forest, shores, fields or swamps, naturally dense, in pasture lands semi-open woods	Naturally small-scale and dense structure, rich in diversity, visual problems caused by monotonous sharp edges, straight clear cutting or removed bush layer	In regeneration felling, avoid evenly spaced thinned strip of forest or clear felling without retained trees. Leave tree groups to unify felling with environment. Enrich edge zone with different species, e.g broadleaves.
	 3.2. Road edges	Forest edges in forest and road	Variation between open and closed spaces, visually sensitive, varied shapes, semi-open to dense structure, small scale	Design felling to shapes and open the views. Manage solitary trees and tree groups Maintain shelter wood positioned against traffic.
	 3.3. Swamps, river corridors	Hollows on slopes, fluviation areas, springs, low, moist land	Rich small scale structure, high diversity, texture soft (broadleaves) or coarse (spruce)	Reduce risks of erosion & fluviation, improve sustainability of edge trees by thinning. Favour dense bush layer and avoid soil scarification.
	 3.4. Pasture lands	Near settlements in valley, or Northern Finland also on slopes,semi-open woods and tree groups	Multiple layers, semi-open mixed forests threat of overgrowing, small scale	Conserve traditional cultural structure of pasture lands by mowing, grazing and clearance to maintain semi-open forest structure. Manage solitary trees, tree groups, bushes.
Valley	 4.1. Valleys, fields and meadows	Meadows and fields, small woods in valley or flat topography, semi-open woods and tree groups	Diverse foreground scenery, unity of small forests, small scale, medium sensitivity, round shapes, threat of over-growing	Locate afforestation on edge of existing forest. Avoid afforestation in middle of field. Design afforestation to shapes and scale of terrain. Prefer irregular and oblong shapes than quadratic shapes.
Shore	 5.1. Shores with cultural impact	Woods along the shoreline with cultural impact, lush mixed woods	Deciduous, rounded shapes, small-scale and semi-open structure, rich in diversity, visual problems caused by monotonous sharp edges	In regeneration, leave dense strip of forest with opening to lake, sensitive thinning of tree groups to open views. Enrich edge zone with different tree species.
	 5.2. Natural shores	Woods along the shoreline without cultural impact, natural factors dominate	Naturally small-scale and dense structure, rich in diversity, visual problems caused by clear cutting or clearence of bush layer, visually sensitive skylines against lake	Conserve skyline along the lake shore. Dense edge zones reduce wind and erosion, thus retain density of woods in natural state.
	 5.3. Islands	Forests on islands, coniferous or broadleaf woods	Soft shapes, coarse texture with spruce, large scale, visually sensitive contrasts against the lake	Unity and skylines important for conserving the scenery, they create perspective and depth to the wide lake scenery. Improve sustainability of trees in the edges by thinning. Conserve skyline of islands.

Table 6.3.1 The general forest landscape typological model. Landscape types with sub-types, descriptions of location, visual qualities and recommendations for the landscape management of each specific type.

could enhance landscape diversity, by opening the views to cliffs or lakes by seeding felling. Selecting broadleaves on conifer-dominated slopes as the regenerating tree-species adds colour and a light texture to the landscape.

Edges are transition zones between closed forests and shores or open areas, like lakes, pasture land or swamp. Edges are border zones, where a slope passes into a valley. They are often sediment soil areas, mildest of all, and rich in vegetation. Their structure might be dense, from semi-open to open, depending on the soil, tree species, former land-use pattern and cultural impact. They surround an open area, thus their structure and shape are important in the landscape. Contrasts created by felling can be reduced if the felling coupe follows the shapes, lines, scales and texture of the surrounding landscape. Leaving solitary trees and tree groups in the width of the border zone to unify different contrasting landscape types can soften the sharp edge of the clear cut between forest and open area.

Road forests are located along the roadside, where forest types vary. The scenery varies from open to closed space in roadside forests. Their shapes vary and are small-scale. Roadside forests are visually sensitive. In their care, the objective of landscape management is the thinning of woods, the management of different kinds of views, thinning to create more space for solitary trees and tree groups, and the management of bush layers. In felling a shelter felling method should be favoured if possible, or clear cuts carefully designed to adapt to the terrain with an attempt to filter traffic impurities using the available vegetation. Bush layer management near or on possible elk routes improves traffic safety. Forest management has an impact on tourism, since tourists form an impression of the attractiveness of an area according to the appearance of the landscape.

Shoreline woods are often deciduous, due to a common cultural impact. Such measures as thinning may help to prevent the overgrowing of the main sceneries and preserve open views to lakes from settlements.

Swamps depend on moist soils and drainage basins. They also occur in hollows between ridges and spring areas. They often have a dense, small-scale structure and high diversity. They are characterized by the presence of water, the shadows of trees and the high under-vegetation of ferns. Management in swamps aims to reduce the risk of erosion and fluviation and to avoid ordinary felling and soil scarification. The sustainability of trees in the edge areas can be improved by cautious thinning, so that existing light and fluviation conditions can be maintained.

Pasturelands, semi-open, woody grazing areas and meadows, are often located on plains and river valleys, or in the edges of slopes. Their visual appearance presents semi-open alder groves and broadleaves. The problem of pasturelands is their rapid over-growing after active grazing period is over. If they are to be maintained as semi-open spaces, alders should be thinned and spruce removed.

Valleys consist of the lowest level of topography. In addition to the shape of the terrain, soil is also an important definition criterion. In the sub-aquatic areas of valleys there are fine sediment soils. Valleys can be rupture valleys, plains or river valleys according to their formation. Rupture valleys are often long and narrow, with clear edges and cliffs. Plains are common on the coastline, typically broad, levelled by fine sediments, occupied early for agricultural use, leaving small hillocks for housing and villages. River valleys often have a narrow, long shape, typical of the coast.

Fields and meadows are an important part of the cultural landscape of valleys. They feature the open spaces of fields with semi-open tree groups and solitary trees. They generate a diverse near landscape on a small scale, which is visually sensitive to change. A threat to the harmonious landscape in the form of overgrown fields is possible.

Following the small-scale shapes of the terrain in forest management can enhance the diversity of valley forests. The unity of large forest cultivation areas can be minimised with scale reduction by changing tree species according to the topography. For example in the regeneration area of a Myrtillus forest type, spruce could be planted on flat areas, pine on hill rounds, and birch and alder in river corridors and edges. Not all areas have to be afforested as dense forest, e.g. small open areas and tree groups can bring more diversity.

Shores are border zones between closed forests or open areas, like lakes, ponds or swamps. They surround an open area, thus their structure and shape are important landscape elements. Contrasts created by felling can be reduced if the felling coupe follows the shapes, lines, scales and texture of the surrounding landscape. Leaving solitary trees and tree groups in the width of the border zone to unify the contrasting landscape types can soften the sharp edge of the clear cut between the forest and open lake area. The management of shore forests includes opening views to the lakes and rivers and thinning near recreation areas.

In this chapter the forest landscape typology was summarised based on the case studies and preference studies. In the next chapter the validity and reliability of the results are discussed in view of the previously set objectives.

Chapter 7

Discussion and Conclusions

7 DISCUSSION AND CONCLUSIONS

Planning rural landscape is a challenge. The process requires an understanding of how to integrate natural principles, cultural and economical factors. This study evaluated eight case studies of cultural forest landscapes. Hereby the results are summarized based on previously set objectives, and they are discussed in the context of general landscape research. Furthermore the general meanings of the case study examples are evaluated from the viewpoints of what we could learn from them; can the results of the study be generalized in landscape planning and management; and what challenges do the findings set for future research.

7.1 Summary of results

This chapter discusses the results of previous chapters from the viewpoint of the research questions determined at the beginning of the study. The questions and objectives followed three pre-conditions as set in chapter 1.2:

1. Finding the variety of characteristics in the forest landscape;
2. Unifying visual characteristics classified into similar types; and finally
3. Description of the qualities, visual problems and management alternatives of perceived types.

Hereby the results are evaluated in the framework of the above-mentioned conditions.

Variety of characteristics in forest landscape

Objective 1 was to examine and describe Finnish forest landscape types. The research question was: Are there differences in the characteristics of Finnish forest landscapes, which should be considered in forest management? The research approach focused on comparing the site-specific qualities of each type to the characteristic visual factors in the case study areas. The assessment of eight case study areas defined the eleven forest landscape types to consider in forest planning and landscape management. The highest parts of the landscape were often summit forests, followed by slope forests and edges. In the edge there was often variation, with edges to cultural landscapes, pasturelands, road edges and swamps. The edge zones generally seemed to have a large amount of and versatile cultural and natural activity. The lowest level of landscape included the types of valley with small woods and tree groups, and shores, divided into cultural, natural shores and islands.

The above types were distinguishable from the broad landscape by their location and visual characteristics. The summarising typology was presented within the categorized types, which are as uniform as possible internally but still externally differentiated from other quality groups. In order to serve practical landscape management purposes, the approach of searching for and describing unifying factors is necessary, although this does, of course, mean that the findings from versatile environments could be generalised.

The results suggest that with applied methods it was possible to describe the characteristics of the landscape elements and the different types of landscape structure. However, it could be artificial to repeat the same elements in a similar order in landscape management if the instructions are scenic models without any connection to ecological processes or a local context. In the study the assessment of layers of landscape structure has provided one tool for combining the physical and visual factors.

In other words, the developed classification for forest landscape types is an abstract model, as is the general forest type classification. It can help the designer in the identification of different landscape types and in the understanding of the perception of the shapes and variation of the landscape. It does not present an absolute truth which when followed, develops a beautiful landscape when certain elements have been included and certain operations carried out. Instead of being a normative model, it aims to present a framework for planning to find, emphasize, and strengthen the unique characteristics of a landscape and avoid landscape decay caused by changes made to the landscape.

Thus the developed management principles for different locations of forest depend on the scale to which these principles are applied. The general management alternatives are useful as an introduction to each specific case of management. The actual management decisions should be made at each location using specific arguments in relation to general management principles. With the above-mentioned prerequisite the examined forest landscape typology is valid for the whole hierarchy of scale relations. This implies that landscape management results often will and should be the expression of a local cultural and economic awareness, but within general restrictions, which might be ecological, economical or ethical, and decisive depending on the forest-owners' values.

The forest landscape spatial sphere can be studied from the viewpoint of various methodologies and different paradigms. Here the case studies were assessed using a professional planning methodology. The study produced a viewpoint of how the character and elements of the rural landscape could be approached. The study provided answers through the landscape structure theory to how the characteristics of the forest spatial structure can be identified and what are the appreciated landscape management alternatives for cultural forest landscapes. The special value of this study lies in the creation of a planning method for cultural forest areas, the stating of the importance of paying attention to landscape types and how they are perceived. With the method applied it is possible to include forest landscape characteristics in the planning of landscape areas of amenity value. Thus the study fulfilled objective 1 as set in chapter 1.2.

Unifying visual characteristics classified into similar types

Objective 2 was to evaluate the perception and management alternatives of forest landscape types. The perception, sensitivity and preferred management alternatives of the case study area landscape types were compared to the results of preference studies of "Karjalainen, E. & Komulainen, M. 1998. Field afforestation preferences: A case study in North-eastern Finland" and in: "Karjalainen, E. & Komulainen, M. 1999. The visual effect of felling on small and medium scale landscapes in North-eastern Finland". Were there perceived differences in the characteristics of types and their management alternatives, which could be distinguished from other types? Were there unifying qualities, which could be considered similar types?

The results of the eight case study areas show that the differences in landscape types can be distinguished according to forest landscape types with the applied planning method and also how attention can be paid to their special characteristics. The proposed management guidelines for cultural forest landscapes are more suggestive in their nature and the research material does not define e.g. the order of beauty of landscape types precisely. When applying the results to commercial forests it must be stressed that they may present more variety in their visual problems or hold less characteristic qualities. To adapt and utilise the results in ordinary forest areas, the following restrictions or observations should be considered.

The landscape provinces of the case study areas only partly cover Finland's landscape

provinces. They represent five provinces out of 10 provinces nationwide (as described in chapter 4.2.). Thus further studies are needed to extend the results to other landscape provinces than those studied. The selection of the case study areas was limited for practical reasons, to locations where the inhabitants were particularly active in obtaining resources for integrated planning. In the middle phase of the research process, the analysis of other planners' landscape plans was considered to widen the coverage of regions, but in an inventory of the potential supply it was found that the plans were not comparable due to different methods applied, copyright ownerships, amongst other reasons. In fact, there were only a few landscape plans, which applied the approach of adjusting integrated village plans to separate private forest plans.

However, these findings were considered preliminary results in the study, indicating how to construct the landscape models, which were tested in the case study areas and modified accordingly. With its description of forest landscape types, the aim was to create a framework for forest planning and how to consider the differences in forest landscape, and to examine the different sensitivity of various areas in order to guide forest practices in the rural landscape. The results of this study are more conceptual and qualitative in nature. The findings create a basis for future research in forest landscape studies based on landscape structure.

Description of the qualities, visual problems and management alternatives of the types – Validity of the tested model

Objective 3 was to identify management models for forest landscape types in cultural forest landscapes by comparing the analyses of case areas. Was there common interaction of forest landscape types between the case study areas? Has the study produced applicable information for forestry planning?

As stated, in chapter 3.4, landscape architecture has applied various landscape classification approaches for use in integrated planning. In the study, landscape classification based on landscape structure was tested for forest areas and for forestry planning purposes. In forest areas, more landscape types were found, from five to nine in the case areas, combined with the general landscape types used in landscape architecture, such as summit, slopes, edges and valleys (Rautamäki 1983).

The case studies demonstrate the general interaction between types and landscape provinces. The study was based on the eight case studies of different landscape provinces in Finland. By the applied analysis method it was possible to distinguish and define the various visual properties of the different types from the landscape structure. As a result, the forest landscape typology model for cultural forest landscapes was created and the visual qualities of types were assessed. The case study areas presented versatile processes of change in the landscapes, thus common visual problems of landscape types were also analysed.

The study aimed to create a forest landscape typology as a framework for considering the broad landscape aspect in forestry planning. Based on the epistemological principles of action research, the effects of the research and development cycle should be evaluated. Did development operations have any effect on the target of development? Was the tested model valid for forest planning purposes?

To test the validity of the landscape types' classification model, one basic question can be posed. Were there signs in the studied landscapes that the planning process guided the process of change? The signs in the landscape whether positive, neutral or negative, were assessed during the site evaluation in 2006-2008, approx 5-15 years after the original planning process had taken place. Even a neutral change can describe that the character and aesthetic

qualities of the landscape have been protected in the process of changing the landscape. This was interpreted as a reflection of a positive attitude to the conservation of the local landscape during a variety of land-use operations, which were also measured on the sites.

According to the site evaluation of the case areas, the landscape types were observed to hold a similar character during the planning time period despite other landscape changes. They had been, and in some places they were, even more distinctively outlined in the background of the entire surrounding landscape due to landscape management. The changes that took place were as mentioned in the above chapters - such as forest felling, construction activities, amongst others, but in a general overview, the types still remained the same. It suggests that the forest landscape typology could be based on a permanent framework, if based on landscape structure analysis and historical land-use patterns. Hence the case study experiences suggest that the integrated landscape planning process seemed to have had a positive effect on landscape change processes.

The following practical examples and issues arose while evaluating the sites according to the question of whether the previous landscape planning process had helped to guide landscape change processes. There were areas where the landscape remained similar, whereas others had faced new land-use operations. The first case area – Ruissalo, being a recreational island and a historical area, was managed with care; new operations, car parking lots, silviculture and construction activities seemed to be well integrated in the terrain. Areal development suggests that the island benefited from the landscape plan, or at least it made managers more aware of development needs and the importance of conservation.

The Koli landscape plan was made in 1992-1993, soon after the National park had been founded in 1991. The main ridge area lay in state owned forest, managed for scientific purposes, and was surrounded by privately owned forests, small-scale fields and scattered tourism areas. Koli was a magnificent example of all the challenges of land use integration; the signs of forestry were clearly visible and distinctive. During a site visit 14 years later in 2006, observations showed that the landscape changes were positive; new tourism activities adjusted to the landscape, the central part of the village and the harbour had been restored in the traditional style, new slash-and-burn areas had been well-designed on the slopes and the new information centre of Ukko-Koli was harmoniously built. The signs of felling were softened by the growth of a new generation of broadleaves, and new felling coupes were designed to suit the landscape. The land use process in Koli seemed to be harmoniously adapted to the environment, achieved through by integrating landscape, forestry and construction planning activities.

Melalahti, planned in 1993, has not faced much change. In previous felling coupes new saplings had started to grow and hide the clear cuts. Pasturelands have been thinned and restored with fences. Otherwise the livelihood of the village was still based on agriculture and forestry with one new rural tourism enterprise. However the village association has been active in arranging events to raise the awareness of their rich cultural heritage in the scenes of a harmonious landscape (Figure 7.1.1).

Häntälä, planned in 1994, has not faced much landscape change over the last 12 years. Farming and grazing still took place in the traditional locations. The vegetation structure of the river dells varied from open to semi-open, shaped by natural forces. Some new landscape tourism operations had been developed and were a sign of harmonious landscape exploitation. A new abrupt felling took place in the western dell, which proved how difficult it is to shape a clear cut in a narrow river corridor, which may probably cause fluviation and regeneration problems (Figure 7.1.3).

Figure 7.1.1 View to the lake in 2006 from the school of Melalahti opened by thinning based on the landscape management plan of 1993.

Figure 7.1.2 Thinning in shoreline would reopen the water scenery in Peränne in 2006.

a. Häntälä 1994

b. Häntälä 2006

c. A clear cut in a dell of Häntälä in 2006

Figure 7.1.3 a. Dell of Häntälä, a home of the Clouded Apollo-butterfly (Parnassius mnemosyne) in 1994 (above, left) and b. in 2006 (above, right). c. A clear-cut has occurred on the other side of the road in 2006 (below, left).

Peränne, planned in 1994, has not faced much change. Forests on the shorelines had started to over-grow closing the views to the lake; therefore thinning would reopen the water sceneries (Figure 7.1.2). Agriculture and forestry were still the major livelihoods practiced in the village.

In the follow-up visit to Naapurinvaara in 2006, ten years after the planning process, it was evident that the integrated planning process has succeeded quite well in involving stakeholders and different authorities. The landscape types have remained similar and lay in the same locations. Small-scale nature landscape tourism activities were developed within the previously existing tourism site. The change of the landscape occurred under supervision, and obviously local inhabitants, aware of their landscape values, and being private landowners, were the key force in this process. There were no abrupt signs of felling, although some afforestation had taken place in ten years closing the road landscape (Figure 7.1.4). After the landscape plan had been delivered, the Environmental Centre cleared traditional rural biotopes and constructed wooden fences. The thinning and removal of spruce conserved the structure and vegetation patterns of the traditional heritage sites. Now the opened pasture-

a. Pasturelands in the upper village of Naapurinvaara in 1995

b. Naapurinvaara in 1995

c. Naapurinvaara in 2006

Figure 7.1.4 a. Pasturelands in the upper village of Naapurinvaara in 1995 (above, left). b. The road of Naapurinvaara in 1995 (below, left) and c. Afforrestation over ten years closing the road landscape of Naapurinvaara and the views to Vuokatti-ridge (below, right).

lands have started to over-grow again and the local inhabitants desire further landscaping activities to ensure that the landscape is properly managed.

While visiting Vuokatti, and its two villages of Vaarankylä and Ohravaara, where the actual landscape plan was made in 1999-2001, many changes were obvious. A new route from Kajaani to Joensuu changed the operational structure of the traditional village, as part of the previously functioning roads had been closed. However the new road is well designed into the landscape shapes and terrain, with woods grouped alongside and solitary trees left untouched to enhance the scenery (Figure 7.1.5). The new route also opens new views to barren ridgelines. New felling coupes have appeared on the summits, upper and lower slopes.

As long as the mature forest primarily consisted of spruce, the main regeneration method was clear-cutting in Vuokatti. It is obvious that the landscape has been well considered where felling is concerned – the felling coupe shapes are well designed, tree groups and solitary trees have been left standing. The traditional housing and farms show signs of conservation, and are well managed. There are also vital rural tourism enterprises in the area.

Figure 7.1.5 Forests designed along the new roadside in Vuokatti.

Conclusion

The long research period enabled progress in the studied cases to be evaluated. The research shows the transformation in society from one-function to multi-functional forestry, which can even be seen in the planning process. During the first cases, landscape planning was conducted from the professional perspective of the landscape planner; later the approach became more participatory. The first cases reflect the interesting pioneering period of the 1990's when forest and landscape policies began to be revised. After this period, landscape-related development work became more involved in agri-environmental programmes, though landscape development and research resources weakened in forestry.

Integrated landscape planning is in general, an expensive and slow process from the viewpoint of authorities and landowners. The economic viewpoint and financial resources for planning are often crucial in planning. Furthermore comprehensive landscape planning of cultural forest landscapes requires financial resources, while such a planning process is seldom implemented in commercial forests. Therefore, the need to develop a lighter planning method arose at the beginning case studies research. Thus the developed forest landscape typology became a practical tool.

Using the forest landscape typology model, it is possible to classify unified character types on a broader level and to distinguish them from other types. The model could be used as a framework to identify local forest landscape structure and the most sensitive landscape areas. Applied as the framework for an on-site forest inventory, a forest planner could assess how a separate forest stand forms a part of the broad landscape.

Hence a conceptual model could make it easier to understand the landscape as a whole and where to locate each stand in terms of the whole structure. In this way the planning of new operations will be better integrated into the landscape. Master plans and regional cultural landscape inventories are applied to integrate land-use into the whole composition of landscape and in addition to landscape type classification can support planning in the examination of locational characteristics of forest landscape and in the generation of nature resource management alternatives.

7.2 Discussion of results in the landscape planning research framework

In this chapter the results are discussed by comparing them to other landscape classification research and their methodology. From the viewpoint of the literature referred to in chapter 3.4, the following three principles became evident: 1) the combination of physical and visual factors, 2) location and structure, and 3) the holistic approach. Finally, based on the epistemological principles and methodology of the case study approach to the examined research material and process, the generalization of these case studies is discussed.

How did the model succeed in combining physical and visual factors? Did the model succeed in taking into account the locational aspect of the broad landscape? Did the model present a holistic and participatory approach?

Combining the physical and visual factors of landscape

The applied landscape structure surveys provided a summarized analysis of characteristic zones of forest landscape types. This analysis was based on the map and field survey on vegetation, location in topography, bedrock, soil, fluviation and microclimate of the case study areas. The visual aspects of each forest landscape type were described according to shape, direction, skylines, scale, unity, texture and sensitivity, following similar criteria as presented by Lucas (1991), Bell (1993), Bell & Apostol (2008).

Although an approach combining physical and visual factors was used, the applied methodology of landscape structure was different to that used in Britain or the USA, e.g. Bell & Apostol (2008) or Forman & Godron (1986), where the concept has been used in the meaning of landscape ecological structure with patches, matrixes, and riparian zones.

This difference may be due to the different epistemology and methodological approach of landscape ecology and Finnish landscape architecture. For example compared to the forest design process presented by Bell & Apostol (2008) the Finnish concept of landscape structure is very close to Bell & Apostol's landscape character analysis, where the design unit is divided into zones of different landscape character. E.g. in their Vuokatti analysis (Bell & Apostol 2008) the landscape structure was presented roughly in zones of a mature spruce matrix, mixed forest matrix, fields, regeneration forest, rocky forest, ski area and lakes. The pioneering one week workshop that took place in Vuokatti in summer in 1996 was followed by this case study in 2001, where the forest landscape types were specified with a site survey (Bell & Komulainen 2001, Komulainen et al 2001).

Bell & Apostol (2008) present the integrated forest design process with a wide range of landscape ecological analysis and management designs with colourful sketches. The case studies based on the forest landscape typology offer a simpler version, as it is based on and integrated with Finnish forestry planning tools, which were available in the years 1989-2008 during the planning time period. If the forest landscape typology were to be developed fur-

ther into GIS, it would benefit from the visualizations and the constraints and opportunities analysis based on the British model (Bell 1999).

Similar selection criteria were found in the case study areas, as classified by Meeus (1995): characteristic land forms, economic potential, identifying sustainable landscape, combination of managed areas versus wilderness, cultural heritage and scenic quality.

The planning model applied in the Finnish case study areas used both the visual quality evaluation with an ecological approach, because as suggested by Makhzoumi & Pungetti (1999) visual forms and landscape functions are interdependent. Makhzoumi & Pungetti (1999) emphasize that the developed tools should be functional, not cosmetic. In their ecological landscape design model, the planning process includes landscape classification, description, evaluation and final analysis. In their case studies of Sardinia and Cyprus, the landscapes have been divided into different landscape regions, types, land character zones, parcels and elements, by the three parameters of lithology, altitude and land cover. They stress zoning as an instrument of decision-making for local authorities. Landscape character zones in particular, can play a key role in the process; hence they might be used as basic units for gathering and examining the data of the studied site. In the Sardinian case study the landscape types have been classified by the landscape planning to present the land use and ecological features of the site.

Compared to this study, the landscape character zones of Makhzoumi & Pungetti (1999) seem to be closer to the Finnish versions of landscape type. They have also applied landscape evaluation with British respondents, but not with locals as in this study. Both of the case studies aim to identify various landscape types, examine their characteristics and describe their function and proposed management.

Considering the locational aspect and spatial structure

This planning approach followed similar processes as described in the studies of Falini, Grifoni & Lomoro (1980), Landscape Character Assessment (2002) on a broader level, and Gustavsson (1986) on a site level. The typology was created on the basis of the location in the landscape structure, to identify the ecological and visual characteristics, problems and management alternatives. The core idea of the classification model is to consider the location of the type in landscape.

What about the spatiality of forests? When comparing this typology to the classification of the typology of space series (Stenros 1992), which can be applied not only to built environments but to natural areas as well, similarities can be found.

Some of the landscape types found in this study on forest landscapes can also be identified as transitional types, as named by Stenros (1992). They are transitional phases between stable landscape types. Their location can vary in different landscape provinces. Some of examples are, among others, swamps, and traditional rural biotopes. The transitional landscape type does not have an independent character as it becomes significant through the surrounding environment. For example, water drains from above into an impression, creating a swamp. Or the traditional rural biotope is created based on grazing land use.

Stable landscape types are usually located at the same levels of the landscape. They create order to the spatial structure and they should be easily identified. As basic stable landscape types they create the hierarchy of space, which facilitates the formation of space series.

Providing a holistic and participatory approach

Public participation in forest planning and management is an increasingly important activity, stated Bell & Apostol (2008) in the process of sustainable forest design. The results of the study suggest that participatory planning and training was one of the motivation tools to engage landowners to implement landscape management measures in the eight case study areas. Similarly Tyrväinen et al (2007) and Tuovinen (1992) found that local inhabitants' participation in the management of areas and in taking care of valuable landscape features is often a basic condition of preserving landscapes.

The main idea of the study was to make landscape management a more permanent process by linking it to agri- and silvicultural planning systems, which are normally carried out in rural areas. Although landscape plans are not legally constituted as land-use plans, their use, coupled with active land management, can guide landscape change in the desired direction. The essential criteria for implementing such a plan were that landowners became engaged in the process, subscribed to its goals and considered the suggested actions meaningful and cost-effective. Although such environmental policy guidelines as promotion of landscape management are highly appreciated in society, as goals they can be less important to landowners in declining villages.

The importance of participatory planning arose in the planning process. Inhabitants and other local experts should have a central role in the follow-up of the landscape and in the definition of management objectives. Besides locals, other users were owners of summer cottages, travellers, tourists and rural entrepreneurs who were difficult to reach by the participation methods used. The landscape also has an economic and social meaning for such people. It was difficult for them to determine their opportunity and right to participate in planning on private land. Problems arose when considering more detailed planning. When making a regional forest plan and surveying valuable environments, the use of the method of participatory planning was restricted due to the need to preserve the confidentiality of the information concerning a private landowner's property. Also, open discussion concerning private landowners' property could only be carried out at a general level.

Another important opportunity indicated by the eight case studies was the potential of extended farm collaboration between farmers concerning farm practice and landscape management. The participatory planning process seemed to encourage people to implement management procedures, in spite of common obstacles, such as the EU-regulations, lack of time or retirement. Repo (1990) also found that a growing awareness of one's own environment was an important factor for awakening the inhabitants' interest in rural development. The values and needs of residents guide various measures in the physical village milieu (Repo 1990).

Even in the case of negatively experienced change in the landscape, it is also possible to experience something positive, if a clear reason is included, as in felling to open sceneries to the lake (Karjalainen 2006, Tyrväinen et al 2007). How the change has been made, how the felling is designed, and whether the inhabitants feel they have been active in affecting the change, are essential.

Antrop (1997) considers that landscape is mainly perceived subjectively, thus landscape can be understood only from the observer's point of departure. From the phenomenological viewpoint, the landscape perception and values of different people vary: the farmer, ecologist, tourist, geographer and planner may see the same landscape in many different ways.

In the planning process the dialogue between authorities and inhabitants is important because the inhabitants do not necessarily identify the quality of the landscapes from the same point of view and based on the same criteria as the experts (Karjalainen & Komulainen

1997a, b). Based on the case study areas, the integration of multiple values in planning requires closer co-operation between rural authorities and inhabitants. Information about agricultural land, nature conservation, landscapes and historical values and tourism were difficult to obtain and it is dispersed amongst various authorities.

The experiences from the case study areas suggest that the participatory approach and the ways of enabling people to influence the management of their own environment should be established. The vision of landscape planning should include self-reliance, with models for landscape management that enable land-owners to implement plans themselves; and where it is cost-effective for them to maintain landscape resources besides other management activities. If the landowner is unable to this, the third sector, such as the community's alternative models should be studied. Nowadays, the revised Leader-programme offers village associations a new opportunity to apply for EU-funding. However, only a few have done so fearing low subsidies or a lack of engagement on the part of their respective association, if the persons responsible change during the 5 – 10-year period of the agreement. Through participatory planning the villagers' consciousness of environmental values could be increased and landowners could be more closely engaged in planning.

Generalization of the case studies

The study was mainly made in nationally valuable landscapes, which present regional characteristics. Under which conditions could the case studies be generalized and applied other landscapes than those studied?

The criteria of reliability of qualitative research, is held to be credibility, transferability, certainty and verifiability (Tuomi & Sarajärvi 2009). Logical implementation and open reporting sustained the credibility of the study. The objective was to ensure the equivalence of interpretation of research material compared to the studied landscape planning processes as well as possible. Transferability is possible in qualitative research under certain conditions, because wide generalization is not relevant in qualitative research. Taking into account the subjectivity and hypothesis of the researcher in all stages of the research process increased the certainty of the study, and furthermore by comparing case study results to the preference studies. The verifiability of the research can be confirmed based on the observations and interpretations made that were supported by previous studies, and in that the results of this study confirm previous opinions.

The epistemology of case studies is always unique, and it can be asked how case research can be generalized. The description of one case study cannot be directly transferred; rather an evaluation in other areas may produce other matters and dimensions (Malmsten 2008). However Eskola & Sarparanta (1998) stated that case study could, as a whole, include possibilities of generalization, if the case study is profoundly described and conceptualised. Thus the central issues are the interpretation of materials, their durability and depth. It is crucial that the research material forms a whole and a well-described case study can act as a source of inspiration to others.

Generalization means under what conditions the results can be transferred to other landscape areas. The question of applying the model in ordinary forest areas is whether the status of the case areas as cultural forest landscapes would allow the application of the classification principles in normal forests. Therefore it is important to discuss in this chapter, how these results of nationally valuable landscapes may generate management guidelines in everyday landscape and commercial forest areas.

In the case study areas of nationally valuable landscapes, there were more visual land-

scape type qualities to be distinguished from the basic landscape than perhaps in ordinary forest areas. Therefore they provided a good examination arena for assessment, of rich in versatile landscape types; possibly providing more types than ordinary forests in the same landscape province. In a comparison between cultural forest landscapes and commercial forests the following differences can occur: the landscape scale might be different, the forest landscape types might not be so obviously visual in the landscape, or their characteristics may be more hidden. However, the results suggest that similar landscape types could occur in ordinary forest areas, although the locational order or scale of existence might vary. The preference studies suggested that the valuation of landscapes and their degree of tolerance to disturbance are lower in heritage landscapes and thus ordinary landscapes can be more visually sustainable in peoples' perceptions (Karjalainen & Komulainen 1998, 1999).

The discussion of the literature review of Nordic forest landscape management (Komulainen 1995a) suggests that general national landscape values act as archetypes. The results of landscape analysis comparing cultural values of national landscapes suggest that the higher the valuation of the landscape is in the cultural heritage, the more distinctive are the contrasting elements of the various landscape types (Antikainen 1993a, Komulainen 1995a). If the guidelines generated for cultural forest landscapes are implemented in more ordinary forest areas, an aesthetically sound environment can be created in everyday landscapes. This would raise the perceived landscape value of everyday environments and ordinary tourism locations, or it would at least lead to avoiding certain forest operation practices in sensitive parts of the landscape. The study suggests that the applied criteria and guidelines can be applied partly to commercial forests, if the approach of integrating multiple-use of forests is needed. To a certain extent the model can be applied as a conceptual framework to understand regional characteristic varieties.

On the other hand, gathering regional assessments from each landscape region of commercial forest might not produce a fully comprehensive, exclusive model, as there are always variation and locational qualities in the broad landscape. Landscape factors can never be standardised. Therefore it is more reasonable to produce a planning framework to understand characteristics in relation to a site's ecological, cultural and economical context.

7.3 Discussion on reliability and validity

In this chapter, the reliability and validity of the research are discussed by comparing results to the hypothesis set in chapter 1.2. The validity of the research is clarified by the question, has what was aimed to be examined actually been studied? Reliability means the repeatability of the results (Tuomi & Sarajärvi 2009, Toikko & Rantanen 2009).

The following questions based on the hypothesis were made to analyse the reliability and validity of the research:

1. Did the model provide the classification of structural and spatial differences of forest landscape according to the landscape structure theory?
2. Did the classification introduce different characteristics of types in selected case areas?
3. Is the model of forest landscape typology reliable and applicable to forest planning purposes?

Reliability and validity are evaluated from the viewpoint of general principles of reliability study in qualitative research. In this assessment the coherence and cohesiveness of the research process are evaluated (Tuomi & Sarajärvi 2009). In accordance with the researcher's

ethical duty, the questions of reliability and validity were considered throughout the whole research process.

Peltola (2008) questioned whether the aim of case study was to confirm certain theoretical arguments as valid or is it aimed at facilitating the further development of the theory. As defined in chapter 1.2, this study intended to develop applications of landscape structure theory for forestry planning.

The applicability of landscape structure theory to the classification of structural and spatial differences of forests - Validity

The main aim of this study was to find a method to guide forestry practices in a visually acceptable way in the broad landscape, which was examined by studying the characteristics of landscape types in case study areas. When considering the reliability of the landscape type classification, it should be remembered that a model is always a simplified representation of a real world problem, as reality is far too complex (Coyle 2004). It has a purpose, which is best expressed as a question – the model is a tool for considering such questions. As it is a simplification of reality, it embodies assumptions about what needs to be included and excluded.

Hence the landscape type classification is a simplification of reality, a tool to read a complex landscape with multiple factors affecting its processes. Its primary purpose was to understand the structure of the landscape while making forest plans: which parts are sensitive to forest operations, what can be done and where, what operations can the landscape undergo without losing its character? And finally, how to avoid the deterioration of the landscape causing prejudice amongst inhabitants and tourists against forestry. According to scientific disciplines, evaluation of a simplified model had to be made by means of abstracting relevant information from the wide-ranging planning material and focusing on a certain defined level of the study. Therefore, the comparison and evaluation of landscape types were selected from extensive planning material for further examination.

The first hypothesis of this dissertation (in chapter 1.2) was that "the structural and spatial differences of forest landscapes can be classified according to the landscape structure theory". The case studies of the eight areas and their comparison with two photograph simulations of the landscape types have proven this hypothesis accurately. In detailed original plans the amount of landscape types varied from five to nine types, as summarised in chapter 6.1.

The aim was to create a typology within the categorized types, which was as uniform as possible but still differentiated from other equal quality groups. The results of the typology depend upon the used criteria (which in this study is the landscape structure theory) and the qualities of classified areas in general. According to Laurila (1994) when making typologies, certain areal characters have to be generalised for a total area or class, although there might be certain variations inside types (sub-type). Therefore the main landscape types were generalised as a framework of five main landscape types, which were divided into 11 sub-types, as explained in chapter 6.1.

Perceived characteristics of forest landscape - triangulation

It was intended that the validity of the study be reinforced by triangulation, using a variety of disciplines, methodology and research approaches as suggested by Perttula et al (2005), Karjalainen (2006) and Stenros (1992). Thus this study applied methodological triangulation. The materials were collected on site during the landscape analysis and compared to the preference studies related to the two case studies of Karjalainen & Komulainen (1998, 1999).

Hence the studied research questions were examined from various perspectives. Triangulation of the studied material was justified, as it provided a means of obtaining interesting viewpoints for assessment from both the planners' professional perspective and the perspectives of users of the area, like inhabitants and tourists.

In the second hypothesis (in chapter 1.2.) it was assumed that classification could introduce different characteristic types in forest areas. It was assumed that there were differences in different parts of the landscape, particularly in their sensitivity to change and visual appearance. The objective focused on an evaluation of the potential difference show such qualities can be taken into account in forestry practices. This was accomplished by comparing the description of the case studies with the preference studies, which were carried out during the planning process in two of the case study areas.

In chapter 6.2, the perception of different landscape types and landscape management alternatives were tested by analysing the following factors: if there were notable differences in forest landscapes, which could be considered as different visual management types? It was further evaluated if there were differences in the visual effects of felling in different parts of the landscape structure according to public perception.

Two preference studies suggested that the *visual effect of felling depended on its location in the landscape structure*. Hence there seems to be a certain hierarchy of different forest landscape types. It was shown that there were different evaluations depending on the location of the operation in the landscape, which could be one proof of the perception of the visual forest landscape type.

The perception of landscape types indicated how to further classify the models, although there were restrictions in the application of the preference studies. When modifying the slides, the aim was to preserve a constant visible felling area size in each slide, but it was not always possible. This might have affected the results to some extent, because size certainly seemed to be a very important factor when evaluating felling areas, as well as the design.

Most of the options for both study areas were presented and the preferences were quite similar in both sceneries. It should be remembered that the preference studies were case studies only relating to one landscape region in Northern Finland. The perception study based on landscape types would also require further research in other landscape provinces.

Although located in one landscape region, the chosen sceneries hold similar characters to general Finnish landscapes, with forests, lakes and agricultural land. It could be considered whether it is possible to also use them in other landscape regions. In this study, however, these findings have been considered as preliminary results, which were tested in the case study areas and modified accordingly.

The developed matrix of landscape types was a combination of expert-based judgements and public preferences in the studied landscape regions, with the main emphasis on landscape structural and visual assessment. Although not tested in all the landscape areas in Finland, this approach can provide the framework for a planning typology, and create a basis for future research. For example the order of the sensitivity of the landscape types may differ in other landscape types or in more specific simulated slides. Hence due to the uncertainty of applicability to other landscape areas, this study has considered the results of the preference studies as a rough framework.

Reliability of the study

It was intended that the research report take into account the required evaluation and repeatability of the analysis. This means an estimation using applied criteria of the possibility that

similar results would exist. Below the objectivity and reliability of the research is discussed. However, repeatability in qualitative research cannot be demanded as such (Tuomi & Sarajärvi 2009). For example, in landscape planning the aims of the landowners or the community may affect the planning and lead to different management options compared to other planning contexts.

To increase the reliability of the study the sufficiency of the material and analysis has been taken account. Interpretations based on occasional sampling from the material have been avoided. The case study areas were evaluated using similar, comparable criteria, as set in chapter 4.1. However, in qualitative research empiric generalizations cannot be made directly from the material but only from interpretation of the material. Therefore generalization requires an appropriate form of material compilation. In order that the reader can evaluate the aptness of interpretation, an authentic description, maps, profiles and examples with photographs are presented in chapter 5.

Qualitative research aims to assess the studied phenomena as a whole (Häikiö & Niemenmaa 2008). When a researcher examines the quality of the research material, such an examination is based on the researcher's own choices and understanding based on personal value-bound points of departure. Pure objectivity cannot be reached in qualitative research, but it is the duty of the researcher to make the argument as clear as possible indicating on which points of departure the researcher's decision-making is based (Jyrhämä 2004). The open subjectivity of the researcher and the admission that the researcher is in fact the central research tool are common in various pieces of qualitative research. Therefore qualitative research often contains many considerations that are the researcher's own (Eskola & Suoranta 1996).

Hence I have aimed to highlight the factors linked to the research process which I feel are significant in the conclusions and interpretation and the reliability of the results for their evaluation by the reader.

Reliability may suffer due to an extensive uncertainty factor when the classification and interpretation of research material and the evaluation of the study is the work of a single researcher, creating a risk of intersubjectivity of interpretation and argumentation. In other words the interpretation of meanings can be affected by the meanings present in the minds of the researched and the researcher (Häikiö & Niemenmaa 2008). From an ethical point of view it is crucial that the researcher is conscious of her/his preconceived understanding and meanings based on the hermeneutic circle principle (Perttula et al 2005). The conclusions and interpreted meanings are reliable when they correspond to the meaning of the research e.g. the researcher does not over-interpret what is present in the research material.

Awareness of the intersubjectivity risk was important to ensure objectivity during the action research process. Due to the Master of Science in Forestry and Licentiate of Technology in Landscape Architecture education of the researcher and her professional experience the work of this study also had a lot in common with the work of the informants of the research, with foresters, whose work aimed to increase forest growth, and with landscapers, who aimed to protect aesthetic values.

Reliability also means that the results could be repeated if another researcher in another place conducted such research. The generalization of the research findings was discussed in chapter 7.2. In reference to subjectivity, if another planner were to conduct a landscape analysis in the same case areas, would the results be similar? If the same applied planning approach and classification evaluation factors were used the classification and descriptions of forest landscape types may be repeated elsewhere. The subjectivity risk was minimized by logically presenting the evaluated forms of descriptions of the forest landscape types in comparable

tables. The most subjective results may be the landscape management recommendations, as it is said, "beauty is on the eyes of beholder". To provide them with an objective foundation, the normative guidelines were summarized from reports of case studies based on the group work of experts involved in the planning process. During each planning process, village surveys were made to establish the landowners' objectives for and willingness towards landscape management. The hermeneutic approach encompassed how the inhabitants perceive their landscape and produced valuable information for the whole planning process of the areas. Comparing the landscape management alternatives of site studies to the quantitative preference studies also decreased intersubjectivity.

Reliability in the case studies is often restricted by the uniqueness of the research site. In evaluating the results it should be remembered that the research is bound to its context. The research was produced over a certain time period and under certain conditions. The generalization of results is thus always relative. Peltola (2008) mentions that case study at its best creates a dialogue between the researcher and the examined site. This dialogue is the basis of creative problem setting and the research methodology.

My position as a researcher and active actor in the planning process has often lead to ethical considerations as to my preconceived perception of the research site. During the research I was involved in many national working groups to draft national landscape management guidelines, training forestry professionals in landscape management principles around the country and launching landscape projects in Finland. My main aim in research and development work was to promote landscape management and to integrate its principles into silvicultural and agricultural practices. As is usual in qualitative research, the readers will conduct a critical assessment as to whether I have succeeded in developing an applicable framework, defined the concepts needed, and to construct a model which identifies and captures the examined phenomena.

Conclusion

The planning framework showed that various landscape types posed different problems. In the case areas, the most common problems and visual qualities of each type were identified and management options were found and distinguished in chapter 6.3. When using the developed landscape typology, a forest planner and forest owner simply needs to recognize the landscape type according to the location in the landscape structure. Then it is possible to find a suitable management alternative for each type to enhance the visual characteristics through forestry operations and to avoid landscape decay, as referred to in the third hypothesis.

In conclusion, the landscape structure theory was useful distinguishing the structural and spatial differences of the forest landscape. Setting classification framework for the case study areas, it was possible to find five to nine landscape types in each area, and to evaluate their visual qualities and problems. The comparison of preference studies also presented a certain hierarchy of different forest landscape types. It was shown that there were differences in evaluation depending on the location of the operation in the landscape, which could be one proof of the existence of a visual forest landscape type.

Referring to the main objective of this study: to find a method that will guide forestry practices to be conducted in a visually acceptable way in the broad landscape, one can summarise that the developed model can be used as a general framework supporting practical planning activities, in order to identify the sensitivity, character and sustainable actions for each landscape type. According to Meeus (1995) the typology can be an attempt to generalise the characteristics of landscapes and formulate a basic framework for assessing how natural

and anthropogenic factors affect the development of the environment. Therefore this typology, although generalizing landscape qualities for classification, could be an instrument for developing sustainable management strategies and priorities in forestry planning.

As the produced landscape type model is a simplification of reality, it could be asked whether the total planning process of multi-layer analyses are needed. They are expensive and time consuming. It can be assumed that a simplified model of classification would be more helpful for forestry planning. As described in chapter 1.1 a simple, practical model has been needed in forest landscape management.

In the research of Gustavsson & Fransson (1991) it was stated that problems, opportunities and optimal solutions could be very different in various landscape types. In this study, the developed forest landscape typology has been tested in eight case study areas, and the results suggest it to be an applicable tool for finding suitable landscape management alternatives for different parts of the landscape. That is planned to be tested further in the near future, as the forest landscape typology model is intended to be applied in the background information analysis in forestry planning programmes in order to produce a simplified landscape structure analysis of the planning area with GIS-based tools (Finnish Forest Research Institute 2009). The following chapter evaluates the challenges that the findings of this study have created for future research.

7.4 Future research perspectives

Landscape planning challenges

Landscape is a creation of natural and human forces. I am writing this chapter with the wide water landscape of Nuasjärvi in front of me, its islands formed by the Ice Age and ancient grazing, which shaped its forest structure. Take a glimpse at the background, where the massive ridgelines of Vuokatti define the borders of this landscape. The scenery displays signs of the tourism industry while simultaneously reflecting the symbolism of a national landscape. Landscape is a complex set of phenomena with natural and cultural forces that have shaped it, the single ownership of a tiny segment of the wider landscape and on the other hand, the wide aesthetic valuation of sublime beauty reflected by the arts (e.g. Veikko Huovinen 1959) and human perception.

The applied hermeneutic approach has assisted in understanding the processes, which shape the landscape. From the viewpoint of the landscape planner and manager, the landscape is a paradigm of challenges. One can analyse the landscape and create management recommendations for different parts of the landscape, but in order to put measures into practice in a landscape area a planner will probably need to work with hundreds of landowners, who may have differing values and land-use needs, as was the case in most of the case studies implemented. The village areas were often owned by one hundred to two hundred landowners, whose land was often vertically divided against the landscape structure due to ancient land division practices, where the land was divided into equal portions of good agricultural land and poorer forest land. This has caused problems in the landscape, when modern forestry designs felling coupes according to land-ownership borders, which are vertical against the horizontal landscape.

It can be discussed how the implementation of a developed forest landscape typology can assist forestry planning to integrate operations into the broad landscape in the context of the practical operational environment. The study shows that there are divergences in the different

areas as regards landscape types and their location. In addition to the physical environment, landscape planning faces challenges from a series of economic and social functions. Therefore the results that have been obtained in the management of a certain landscape area cannot be directly adapted to another area. However, the landscape type classification can form a general framework to describe the most common visual problems and management alternatives of the types.

Even if planning systems are developed and if there was information about every landscape province, it would still be difficult to carry out landscape management without the recommendations being based on the inhabitants' views and needs. Even the best of plans can fall through due to the inhabitants' opposition. Furthermore the inhabitants' purpose of landscape use could differ. It is impossible for an external expert to know exactly what the scenic focus areas are from the point of view of the users. This is why inquiries and teamwork are needed in map assessment with the inhabitants. More practical tools to engage landowners are needed.

Guiding change requires areal planning – as in this study, whereas ordinary forest and agricultural planning is mainly carried out on a single farm basis. The development challenge of integrating areal and single farm based planning was one of core issues of this research, bringing the locational to the forest site. The model's applicability to GIS systems of forest planning should be studied further. Developing an integrated approach, which considers the broad landscape, is still a crucial question in practice in many planning areas.

Antrop (1997) considers landscape management as difficult to coordinate, as landscape consists of numerous lands, whose owners each have their own goals. Although the landscape is often under private ownership, it also belongs to occasional visitors, hikers, tourists and neighbours. From the constructionist viewpoint, planners, landowners, developers and authorities can live in a separate development reality (Toikko & Rantanen 2009). As multifunctional phenomena landscape has an important common value to society, thus land use planning should not be restricted to the needs of each land-ownership unit, but its approach should consider the whole entity. Land-use planning is important, as the development of landscape is based according to Antrop (1997) on two issues: planning and autonomy, of which the latter depends on a variety of separate, independent environmental changes.

Further perspectives to forestry guidelines

Referring to the results of this study, the developed model challenges ordinary forestry guidelines to consider the more locational aspect of the site in the broad landscape. The site location is often missing in general forestry guidelines, where forest is often considered as a uniform area with characteristics not related to the local spatial structure. Thus the landscape management recommendations presented in chapter 6 could be partly applied to practical forestry guidelines. Although developed in a cultural forest landscape, which frequently represents more amenity value and sensitivity than uniform forest areas, the model also provides examples and directions on how to enrich the ordinary forest landscape. This can be achieved by considering the location of the site and by varying thinning and felling models, and by implementing them in various ways, to create versatile spatial structures.

The forest landscape types are connected to each other. It would be interesting to examine information on the spatial series of types in the future. What is the structure of their transition zones, and how do they transfer into another zone? And in which order of spatial series do they lie in the landscape, how are they located in the landscape? It means going further to study not only their location in the landscape and their characteristics in the broad landscape,

Figure 7.4.1 The forest landscape types are connected to each other. Spatial series of landscape types along the road in Naapurinvaara, 2006.

but also the foreground structure of forest. How do the series of types create versatile environments and how can management enhance such variety? Hence, knowledge of which kinds of spatial series are preferred, would offer new perspectives to recreation area management. For example: a space series from open space to mysterious dense woods, a glimpse from the forest edge to a lakeshore.

It would be interesting to combine the series of landscape types through the prism of a cognitive discipline. Will management based on natural forest landscape types create e.g. coherence, mystery and legibility in the landscape perceived by people?

Furthermore, examination of the sensitivity classes of forest landscape types would help forestry planning to integrate operations into more sustainable areas. The preference studies related to the case studies (Karjalainen & Komulainen 1998, 1999) provide directions on sensitivity, but because they are limited to one landscape province and only two case areas, more studies are needed to gather information on the sensitivity of location of forest landscape types. The preferences studies should be related to GIS-models to provide a tool to estimate future scenarios in forest area development.

Preference studies have often concentrated on examining the forest foreground. Therefore the visual factors have been easier to standardise using the amount of studied elements or their visible proportions and other environmental conditions such as light, weather amongst others. The broad landscape, as a focus of research, contains more challenges, which are not easy to standardise such as what is to be selected from it and evaluated. How are the case studies related to locational characteristics and how can they be generalised for use in other forest areas. In spite of the challenges, studying the broad landscape will provide necessary information in forestry planning, and it helps to avoid land use conflicts by integrating the various needs of nature tourism, forestry and agriculture in the region.

The applied methodology of landscape classification offers new opportunities in the ex-

amination of case studies. Although case studies are always bound to specific places and their local characteristics, their results offer applicable examples and management models for the enrichment and development of ordinary landscapes.

Karjalainen et al (2009) noticed, that in landscape research there is a trend to study preferences related to a certain place more than general models. However, forestry planning would need information about general landscape preferences so that landscape values could routinely be taken into consideration in the planning and management of all forests.

Rural development and economic perspectives

As stated above, landscape not only involves ecology and mental images, but is also strongly related to the regional economy, agricultural and environmental politics and land use forms, which shape the landscape in practice. Planning has become a political process for conducting business and creating instruments to transform the economy and society (Makhzoumi & Pungetti 1999). Therefore one future landscape research discipline is economics. The landscape experience includes the behaviour of man towards landscape, which leads to themes connected to ethics and politics. Hence practical tools for education in raising landscape awareness and engagement are needed.

Makhzoumi & Pungetti (1999) mentioned the emergence of regionalism in planning society, as the search for identity, where landscape often possesses a strong sense of place, and becomes repository of a region's history and embodies its cultural heritage. This trend could offer regional economies new prospects in the forms of rural tourism and other livelihoods.

The developed planning model is not for conservation alone, but it is more a framework to integrate agrarian land-use harmoniously into the local landscape, to allow forestry, farming and other modern land-use practices. As in the cultural heritage areas modern activities are seldom forbidden, so the planning model could be one tool for the implementation of "lighter" conservation. Instigating landscape conservation in an area including farmland might create conflict, fear for the development of livelihoods, and worry about loss of income, and has sometimes caused "fear" felling by landowners, when the conservation programme has been launched. Experiences from the eight case study areas suggest that the voluntary model of landscape planning and training supported by environmental subsidies can provide sustainability. Research on economic landscape management issues could raise the level of subsidy marketing and the implementation of landscape management.

Another economic prospect is generating local income from landscape heritage. An active landscape planning and management process can enhance local landscape characteristics and further develop their highly valued qualities increasing the attractiveness of the area to potential tourists. The Landscape Character Assessment (2002) suggests how planning can, especially when conducted with stakeholder input, help reinforce local identity and strengthen the links between the landscape and economy. Local symbols of place can be identified, for use in product labelling, marketing and with careful promotion, can encourage consumers to buy in the landscapes they wish to support. Such a market orientation and philosophy has been utilised for example in the territorial marketing of Italian national parks, like Marchi d'Area (Parco Nazionale del Cilento... 2007).

Furthermore the forestry sector faces many changes. New forms of forest and timber use are needed in addition to traditional wood production. New trends of use such as nature tourism services, forest tourism and wellness tourism, in which the production of landscape values are central, have become apparent. When a population becomes urbanised and elderly, the significance of the forest landscape for recreational use will probably increase still fur-

ther in Finland, as Finns have always used the forest for recreation and in many other ways (Sievänen 2001).

Therefore more conflicts between the different forms of landscape use, e.g. between forest for its landscape value and wood production can be expected than in the past. These different needs can be integrated by engaging the public in planning using negotiation and inquiries (Komulainen 1998, Kangas et al 2008). In landscape architecture the preference study results could be one component, observed in planning. However, the aforementioned tools (negotiation, decision-making method, landscape planning) are laborious and expensive and they can only be used in specific areas. Landscape value could be taken into consideration more routinely by including landscape preferences obtained using preference studies directly in forest planning (Karjalainen 2006).

Furthermore the developed forest landscape typology can offer a future tool to determine what landscape types are the most sensitive to change caused by forest management, what should be estimated in different landscape types and what are the best management options from a scenic point of view.

In the realisation of practical landscape management the landscape is an example of a commodity where private and public advantages and objectives do not necessarily meet (Karjalainen et al 2009). On private land in particular, the implementation of landscape management depends on the landowner's ultimate values and objectives for the land in question. In order to cover the costs and loss of income caused by landscape management measures on private land, a compensation system could be considered such as a trade in landscape value (Matila 2008). To maintain the quality of landscape it also is important to create the means by which the inhabitants can become engaged in the landscape management process.

Finally, there is an urgent need to develop nature-friendly or multiple-use forest planning concepts in private forestry based on the objectives of forest owners. A recent study of von Boehm (2008) showed radical changes in Finnish landowners' management objectives. The structure of landownership is also changing with more female, urban and younger ownership, with a lesser interest in ordinary timber-management and a pronounced emphasise on immaterial goods, such as recreation, landscape and cultural heritage and not timber-production. Recently, this current trend has led to a lack of timber available to the paper and saw mills in Finland. Further developed planning tools can promote landscape-friendly logging alternatives to avoid a lack of felling. Sound forest landscape planning may be the tool to obtain timber from private forests.

Chapter 8

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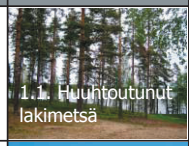
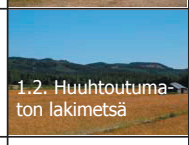
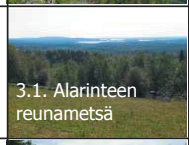
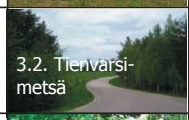
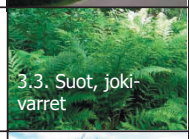
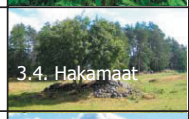
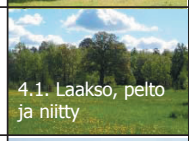
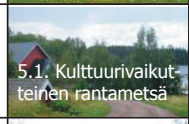
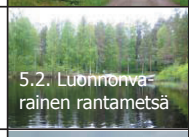
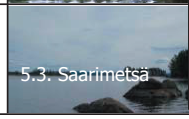
Annex 1. Metsämaisematyypit

Annex 1. Metsämaisematyypit. Komulainen, M. 2010. Forestscapes. Dissertationes Forestales 98.

MAISEMA-TYYPPI	ALATYYPPI	SIJAINTI MAISEMA-RAKENTEESSA	MAISEMAKUVA	MAISEMANHOITO
Lakimetsä	 1.1. Huuhtoutunut lakimetsä	Huuhtoutuneet, kallioiset moreenimäkien laet Etelä-Suomessa, usein mäntyvaltaisia, metsätyyppinä: CiT, CT, VT	Metsän yhtenäinen siluetti visuaalisesti tärkeä, muodostavat visuaalisesti herkän taustametsän kaukomaisemassa, valoisat ja avarat männiköt, pehmeä tekstuuri, pyöreät muodot, suuri mittakaava	Paikan luonteen korostaminen säästämällä laen siluetin yhtenäisyyttä, rajaamalla hakkuut niin ettei mäen ääriviivat katkea
	 1.2. Huuhtoutumaton lakimetsä	Keski- ja Pohjois-Suomen mäkien laet sekä vaara-alueilla, havupuuvaltaisia, reheviä kuusi-mäntymetsiä, MT, VT	Mäen ääriviivojen rikkoutuminen aiheuttaa visuaalisia ongelmia, yhtenäinen siluetti on visuaalisesti herkkä avohakkuille ja siemenpuuhakkuille, mäen laen kuusikoissa karkea tekstuuri, suuri mittakaava ja terävät muodot	Siluetin yhtenäisenä säilyttäminen, horisontaalisesti rajatut kapeat avohakkuut tai tiheä suojuspuuasento uudistamisessa, väljän siemenpuuasennon välttäminen kaukomaisemman herkillä alueilla
Rinnemetsä		Moreeniselänteiden rinteet, tiheä metsän luontainen rakenne, metsätyyppinä usein VT, MT	Visuaalisesti vähemmän herkkiä, karkea tekstuuri, jyrkillä rinteillä visuaalisia ongelmia aiheuttavat geometriset, vertikaaliset avohakkuut	Maiseman muotojen ja mittakaavan huomioiminen hakkuissa, topografian korostaminen eri puulajeilla, maisematyypeistä kestää parhaiten virkistyskäytön kulutusta
Reunametsä	 3.1. Alarinteen reunametsä	Metsän ja avoimen alueen rajavyöhykkeessä, luontaisesti tiheä metsän rakenne, laidunalueilla puoliavoin, reheviä metsiä, MT, OMaT	Luontaisesti pienimittakaavainen ja tiheä rakenne, monimuotoisesti rikas. Visuaaliset ongelmat: monotoniset muodoltaan terävät reunametsät, geometriset avohakkuut tai pensaskerroksen raivaus	Reunavyöhykkeen rikastaminen eri puulajeilla, mm. lehtipuilla, hakkuun polveileva rajaus topografian mukaan, maisemapuiden suosiminen
	 3.2. Tienvarsimetsä	Metsänreunavyöhykkeet teiden varsilla, metsätyyppien vaihtelu	Avoimen ja suljetun tilan vaihtelu, visuaalisesti herkkiä, puoliavoimesta suljettuun rakenteeseen, pienimittakaavaisuus, vaihtelevat muodot	Hakkuiden rajaus maaston mukaan, erilaisten näköalojen hoito, yksittäispuiden, puuryhmien ja pensaskerroksen hoito, suojuspuuasento, liikenteen saasteiden suodattaminen
	 3.3. Suot, jokivarret	Mäkien väliset painanteet, valuma-alueet, lähteet, kosteikot, metsätyypit: korvet, rämeet yms.	Pieni mittakaavainen rakenne, korkea monimuotoisuus, usein pehmeä tekstuuri (lehtipuut) tai karkea kuusen tekstuuri, varjoisuus, rehevyys	Maan kulumisen ja valumisen riskien vähentäminen pysyvällä kasvipeitteellä, puuston elinvoimaisuuden parantaminen harvennuksin, tiheä pensaskerros, ei tavanomaista avohakkuuta tai maanpinnan käsittelyä
	 3.4. Hakamaat	Kulttuurivaikutuksesta syntyneitä laidunalueita laaksoissa, Pohjois-Suomessa myös rinteillä, puoliavoimia metsiköitä tai puuryhmiä	Monikerroksellisia, puoliavoimia sekametsiä, umpeenkasvun uhka	Puoliavoimen rakenteen hoito harventamalla kuusia, raivaamalla pensaskerrosta ja laiduntamalla
Laakso	 4.1. Laakso, pelto ja niitty	Niityt ja pellot laaksossa tai tasangolla, joissa pieniä, puoliavoimia, puuryhmiä ja yksittäispuita	Monimuotoinen lähimaisema, pieni mittakaava, visuaalinen herkkyys muutoksille, pyöreät muodot, uhkana avoimen tilan umpeenkasvu, pusikoituminen	Lähimaiseman rikastaminen yksittäispuilla, välttämällä näkymien sulkeutumista peltojen metsityksessä, metsityksen muodon ja mittakaavan huolellinen suunnittelu, metsäsaarekkeiden pienialainen, vaiheittainen uudistaminen
Rannat	 5.1. Kulttuurivaikutteinen rantametsä	Kulttuurivaikutteiset rantametsiköt, rehevät sekametsät	Lehtipuuvaltaisuus, pyöreät muodot, pienimittakaavainen ja puoliavoin metsän rakenne, monimuotoisuuden rikkaus, visuaaliset ongelmat: monotoninen terävä reunavyöhyke	Näköalojen avaus vesistöön, harvennus ja raivaus, reunavyöhykkeen rikastaminen eri puulajeilla, puuryhmien harvennus näköalojen avaamiseksi lähellä virkistysalueita
	 5.2. Luonnonvarainen rantametsä	Luonnonvaraiset metsät vesistöjen rannoilla, luonnonelementit vallitsevat, usein kallioisia tai karuja, havupuuvaltaisia rantametsiä	Havupuuvaltaisuus, luonnonmukainen pienimittakaavainen ja tiheä metsän rakenne, monimuotoisuus, visuaaliset ongelmat: geometriset avohakkuut tai pensaskerroksen raivaus, visuaalisesti herkkä metsän siluetti vesistöön päin	Rantametsän luontaisen tiheän rakenteen säästäminen, metsän siluetin suojeleminen yhtenäisenä ranta-alueilla varovaisin uudistushakkuin ja säästöpuiden jättämisellä, tiheä reunavyöhyke vaimentaa tuulta ja eroosiota ranta-alueella
	 5.3. Saarimetsä	Saarien metsiköt, havupuuvaltaiset tai lehtipuuvaltaiset metsät	Valoisa ja avara metsänrakenne mänty-koivu-sekametsissä tai kuusikoiden varjoisuus, pyöreät muodot tai kuusikon terävä tekstuuri, suurimittakaavaisuus, visuaalisesti herkkiä maiseman solmukohtia	Yhtenäinen metsän siluetti tärkeä näköalan suojelemiseksi, saarimetsät luovat perspektiiviä ja syvyyttä avaraan järvimaisemaan, vähentävät tuulta, hoidon tavoitteena parantaa puuston kestävyyttä harvennuksin