



# How to maintain naturalness in nature-based tourism resorts?

Approaches to assessments of landscape quality for tourism planning

**Marja Uusitalo**

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## Abstract

This thesis addresses how nature-based tourism resorts should maintain naturalness while also building the capacity to accommodate an increasing number of visitors. Considering tourists' perceptions of compact building patterns is part of the solution. Therefore, impact of land use on landscape quality in those resorts that aim at encouraging year-round tourism is assessed. The ecosystems' functioning and tourists' perceptions are aspects of landscape quality that are focused on in this thesis, which is comprised of four sub-studies.

The study used multisource data and Geographical Information System (GIS), and was carried out in the Levi and Ylläs tourism resorts in Finnish Lapland. The case study areas were selected as being representative of the traits of the development and growth likely to occur among Nordic tourism resorts. Their landscape quality was viewed based on six attributes and four methods. The assessments of landscape structure focused, first, on land use at the high altitudes of the fell landscape and land-use impacts on ecological carrying capacity in the resorts, and second, on connectivity of wildlife habitats, wilderness quality and accessibility of natural landscapes via summer trails in Levi. Landscape character zoning and Least-Cost Path (LCP) –modelling were used as the methods. The relationship of tourists' landscape preferences to the amount of nature and compact building patterns were examined through the use of a questionnaire, which involved image-edited photos of different building patterns. Additionally, tourists' and local residents' spatial perceptions of Ylläs were analyzed. The differences in the ways of perceiving the environment and nature areas were interpreted based on the contents and structures of the mental maps.

The results of the assessments of landscape structure showed that land use in the resorts have been quite ecologically sustainable and, therefore, have provided opportunities for various kinds of nature experiences in the frontcountry. It is likely to matter especially to first-time visitors, seniors and families with young members, since the quality of their nature experiences may be formed based on nearby nature. When growth strategies direct the new infrastructure in summit and upper-slope zones, resilience of the ecosystems weakens. The use of land within a built-up area for further construction narrows habitats of wilderness and arctic-alpine species in the frontcountry and, as a result, the diversity of nature experiences is decreased. Based on the landscape preferences, eco-efficient compact building patterns affect tourists, who wish to have their accommodations close to nature. Referring to the results of mental mapping, a

growing number of tourists are likely to consider nature areas inaccessible if natural elements decrease in built-up areas.

The findings of this thesis suggest that nearby nature is considered an important part of servicescapes of the nature-based tourism resorts in Nordic countries and that wilderness characteristics of the frontcountry are fostered. Nearby nature with its high quality trails that are designed for year-round use enables tourists to enjoy nature and encourages them to enter into unfamiliar nature areas, which can feel even frightening at the beginning, and to stay on trails to protect habitats. One solution is a green infrastructure that fosters functional connectivity of ecosystems, functions to limit land-use intensification and provides a basic structure for the trail network in the frontcountry.

The findings suggest that landscape planning is needed in nature-based tourism resorts to direct the future land use in order to protect high altitudes and to maintain naturalness of the built-up areas. For this process, the expertise of landscape architects and landscape ecologists, interactive devices for collecting tourists' perceptions of landscape quality and regular monitoring program of landscape changes are needed. These means assist in negotiating growth strategies and limits of acceptable changes. Additionally, they tell the growing numbers of environmentally aware tourists that the tourism resort promotes sustainability.

To build on the findings of this thesis, areas of need for future research studies are suggested. This research was based on two case study areas and, therefore, additional research could serve to verify the outcomes concerning, in particular, the role of the frontcountry and principles for a green infrastructure in nature-based tourism resorts.

*Key words:* nature-based tourism, tourism resort, land use, landscape ecology, landscape perception, nature experience, growth strategy, Lapland

## Tiivistelmä

Neljästä osatutkimuksesta koostuvassa työssä pohditaan, kuinka luonnonläheisinä matkailukeskusten tulisi säilyä matkailijamäärien kasvaessa ja ympärivuotiseen matkailuun pyrittäessä. Siksi tutkimuksessa tarkastellaan maankäytön vaikutuksia maiseman laatuun. Monilähde- ja paikkatietoaineistoa hyödyntänyt tutkimus toteutettiin Levin ja Ylläksen matkailukeskuksissa. Näiden katsottiin edustavan pohjoismaisten matkailukeskusten yleistä kehityssuuntaa.

Levin ja Ylläksen maisemia analysoitiin ekosysteemien toimintakykyä ja matkailijoiden maisemakokemuksia kuvaavan kuuden laatuominaisuuden ja neljän menetelmän avulla. Maisemarakenneanalyseissa tarkasteltiin selänteiden lakialueiden ja ylärinteiden maankäyttöä ja niiden vaikutuksia keskusten ekologiseen kantokykyyn sekä Levillä elinympäristölaikkujen kytkeytyneisyyttä, maisemien erämaisuuutta ja vetovoimaisten luontoalueiden saavutettavuutta kesäreittejä käyttäen. Apuna käytettiin maisemavyöhykkeitä ja pienimmän kustannuksen polku (Least-Cost Path) -menetelmää. Matkailijoiden suhtautumista rakentamisen luonnonläheisyyteen ja tiiviuteen selvitettiin maisemapreferenssikyselyllä, joka sisälsi erilaisia rakentamistapoja ilmentäviä kuvasarjoja. Lisäksi tarkasteltiin Ylläksen matkailijoiden ja alueen asukkaiden mielikuvakarttoja. Niiden symboleja ja tila- ja etäisyysuhteita analysoimalla tutkittiin eroja ihmisten tavoissa lukea matkailukeskuksen ympäristöä ja havainnoida luontoalueita.

Maisemarakenneanalyysit osoittivat, että matkailukeskusten maankäyttö on ollut ekologisesti melko kestävää ja tarjonnut mahdollisuuksia monipuolisiin lähiluontokokemuksiin. Lähiluonto on erityisen tärkeä ensikertalaisille, ikääntyneille ja lapsiperheille, koska heidän luontoelämyksensä voivat perustua pitkälti lähiluontoon. Jos matkailukeskuksen kasvustrategia suuntaa rakentamista ylärinteille ja lakialueille, ekosysteemien kyky sietää ja sopeutua muutoksiin heikkenee. Rakennetun alueen tiivistäminen puolestaan kaventaa erämaa- ja tunturilajien elinmahdollisuuksia lähiluonnossa, mikä yksipuolistaa luontoelämyksiä. Maisemapreferenssien perusteella tiivistäminen vaikuttaa myös matkailijoihin, jotka haluavat majoittua luonnon keskelle. Mielikuvakarttojen perusteella yhä useampi matkailija alkaa kokea lähiluonnon saavuttamattomaksi, mikäli luontoelementit vähentyvät rakennetussa ympäristössä.

Tutkimustulokset kannustavat pitämään lähiluontoa tärkeänä osana pohjoisten matkailukeskuksen palveluympäristöjä ja vaalimaan sen erämaisii piirteitä. Lähiluonto ja siellä kulkeva, ympärivuotiseen käyttöön suunniteltu reitistö auttavat matkailijoita nauttimaan luonnosta ja tutustumaan ympäristöön, joka saattaa tuntua alussa vieraalta tai pelottavalta. Hyvin suunniteltu reitistö kannustaa matkailijoita liikkumaan luon-



nossa ja pysymään reiteillä. Yksi ratkaisu lähiluonnon vaalimiseen on toisiinsa kytkeytyneistä viher- ja luontoalueista muodostuva viherrakenne, joka rajoittaa voimakasta tiivistämistä ja jonne lähireitit sijoittuvat.

Tutkimus osoittaa, että matkailukeskuksissa tarvitaan maankäyttöä ohjaavaa maisemasuunnittelua. Sen avulla suojataan lakialueita ja ylärinteitä sekä saadaan rakennettu alue säilymään mahdollisimman luonnonläheisenä. Suunnitteluun tarvitaan maisemaekologien ja maisema-arkkitehtien osaamista, matkailijoiden näkemyksiä ja maisemamuutosten systemaattista seuranta. Tällä tietämyksellä palvellaan myös keskustelua kasvun periaatteista ja hyväksyttävän muutoksen rajoista sekä kerrotaan yhä ympäristötietoisemmille matkailijoille pyrkimyksistä kestäväan matkailuun.

Levin ja Ylläksen alueisiin perustuvat tulokset tarvitsevat tuekseen laajempaa tutkimusta erityisesti lähiluonnon merkityksestä ja matkailukeskusten viherrakenteesta.

*Asiasanat:* luontomatkailu, matkailukeskus, maankäyttö, maisemaekologia, maiseman havainnointi, luontoelämys, kasvustrategia, Lappi

*To My Family*

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I can vividly remember many moments of my life when I was so overwhelmed by the landscape. Some of those moments were related to sunny midsummer mornings when the air was full of bird songs. I was admiring the scenery of open fields in my grandparents' farm in the southern Ostrobothnia and listening to my grandfather's stories about the old times. I also recall those moments when I was spending my school holidays on the island of Tammio in the eastern Gulf of Finland inspired by the amazing sunset and dreaming about becoming an artist. How I felt so tiny when walking in Manhattan of New York City and looking at skyscrapers side by side. Or how the dazzling light of the April sun was shining on the snowy scenery of Skibottn and took my breath away on the skiing tour in the Käsivarsi wilderness area.

The fascination and diversity of landscapes that frame our daily lives and holidays inspired me to apply for academic studies in horticulture as my major subject, minor-ing in landscape architecture. Landscape has also been the topic of several practical and scientific projects in which I have participated after becoming a research scientist. Through these journeys I have gained many insights into landscapes. I have learned the tools to view and assess landscape as a multidimensional entity that can be approached from many different perspectives and methods, such as how a painter captures its aesthetics with a brush, how a landscape architect modifies its design with AutoCAD or how a foreign tourist sees it as a reflection of unfamiliar culture.

I have had the privilege of continuing my journey during this thesis. The process has given me more frameworks to understand how landscape affects us and vice versa. There are many people whom I wish to thank for advising and helping me in this long learning process. First of all, I want to thank my supervisors, professor Liisa Tyrväinen and senior researcher Seija Tuulentie, for their meaningful guidance and instructions that helped me to complete the thesis. I have been lucky to have them also as my colleagues. I want to express my gratitude to associate professor Outi Rantala who advised me as my PhD process mentor, as well as to the pre-examiners professor Peter Fredman and professor Juan Jose Galan Vivas and the examiner professor Jarkko Saarinen for their valuable comments. I am grateful to the co-writers, Eija Hasu, Esa Huhta, Vesa Nivala, Pertti Sarala and Harri Silvennoinen, for their contribution. They have brought valuable insights to the topic from other disciplines. I am thankful to my "American sister" Tania DuBeau for her kindness. She proofread the majority of the articles and the revised version of the synopsis. I also want to mention Hanna Huitu, Jouni Hyvärinen, Aarno Niva and Jouni Puoskari who also assisted me on the way with visual,

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April, 2017

Marja Uusitalo

## List of original articles

This thesis is based on the following papers, which are referred to throughout the text by their Roman numerals as follows:

- I Uusitalo, M. & Sarala, P. (2015). Indicators for impact management of subarctic mountain resorts: Monitoring built-up areas at high altitudes in Northern Finland. *Scandinavian Journal of Hospitality and Tourism*, 16(1), 1–23. doi:10.1080/15022250.2015.1046483
- II Tyrväinen, L., Uusitalo, M., Silvennoinen, H., & Hasu, E. (2014). Towards sustainable growth in nature-based tourism destinations: Clients' views of land use options in Finnish Lapland. *Landscape and Urban Planning*, 122, 1–15. doi:10.1016/j.landurbplan.2013.10.003
- III Uusitalo, M. (2010). Differences in tourists' and local residents' perceptions of tourism landscapes: A case study from Ylläs, Finnish Lapland. *Scandinavian Journal of Hospitality and Tourism*, 10(3), 310–333. doi: 10.1080/15022250.2010.489786
- IV Uusitalo, M., Huhta, E., & Nivala, V. (2015). Trail network as a mediator of nature experiences in nature-based tourism: A case study of the Levi resort in Finland. Manuscript submitted to *Tourism Management*.

Author's contributions:

Article I was developed jointly by two authors, led by MU. Both contributed to the GIS-analysis, led by PS. Both contributed to the structure of the article. The writing was mainly done by MU.

Article II was developed by the four authors; LT was the lead author, initiator and coordinator of the project. All contributed to the idea, analytical approaches, structure of the article, and writing process. Data was collected by Jouni Puoskari and Aarno Niva. HS carried out the statistical analysis. LT supervised the work. MU contributed most to the writing.

Article III was developed based on data collected and analyzed, and written by MU. Article IV was developed by the three authors, led by MU. MU initiated the research idea and the method, and contributed to the structure of the article. EH provided ecological expertise in the analysis. VN carried out the GIS-analysis and contributed to the description of the method. MU and EH contributed to the analytical approaches. MU contributed most to the writing; EH participated in the description of findings and the discussion.

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# 1 Introduction

Nature has become the key motivator of travel along with the rise of environmental values, which has increased nature-based tourism globally. The commercialization of outdoor recreation and increasing urbanization feed it further (Buckley, 2000). Two-thirds of the world's population is estimated to be living in urban centers by 2050 (United Nations, 2014). This means that fewer and fewer people will have contact with nature in their daily life and therefore will be drawn to nature areas during their holidays. Furthermore, the rise of environmental values has increased awareness of tourism impacts in nature. Hence tourism operators who are involved in destination management face a constant dilemma of how to promote tourism growth without degrading natural attractions and losing the destinations' naturalness when making land-use decisions, which impact quantity and quality of nature areas. Part of the concern is how tourists would react to the intensification of land use in built-up areas.

Scientists have tried to understand people's travel decisions and behavior in order to help to solve the dilemma. Hence tourism studies have focused on demand-related push factors and supply-related pull factors underlying the behavior (e.g., Bansal & Eislet, 2004; Fredman & Tyrväinen, 2010; Hall & Page, 2006; Järviluoma, 2006; Kim & Lee, 2002; Pomfret, 2006; San Martín & Rodríguez del Bosque, 2008). The ongoing research on destination management has centered more on the demand side, especially on reflecting the management of destination images (Bornhorst, Ritchie, & Sheehan, 2010). Only few studies have, however, focused on how tourists perceive the spatial structure of a destination driven by land use (Kelly, Haider, Williams, & Englund, 2007). In many practical cases, tourists' choices and decisions are anticipated chiefly based on the analysis of global tourism trends and the statistics of overnight stays (Staffans & Meriluoto, 2011). This is despite the fact that the quality of the visitors' experiences is at least as important a determinant of destination success in global competition as product and service offerings and location/accessibility (Bornhorst et al., 2010).

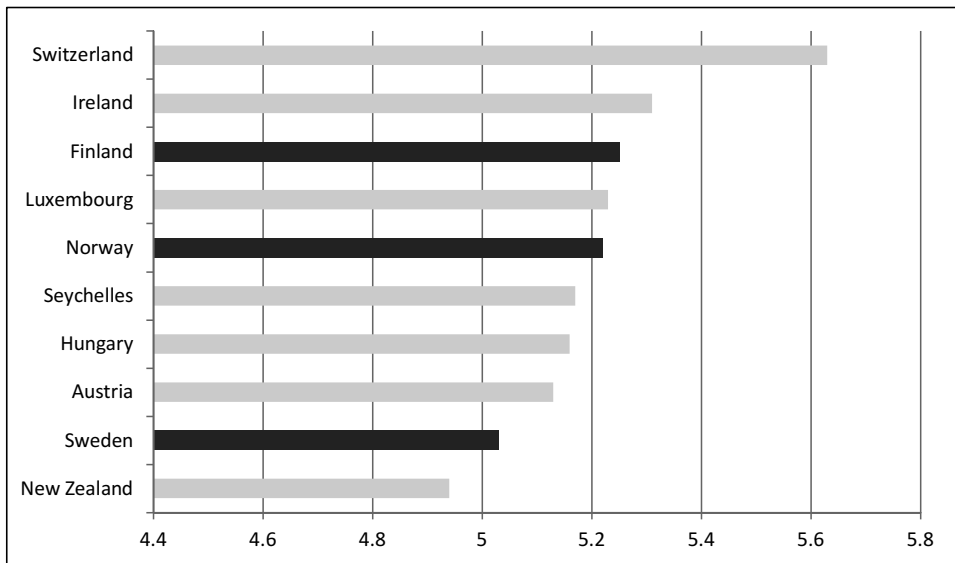
This thesis focuses on destination management of nature-based tourism, as it evaluates how different land-use options affect resorts' landscape quality in nature-based tourism resorts. The thesis discusses the issue mainly in the Nordic context, where nature-based tourism has many untapped opportunities and is accelerated by new global trends in tourism.



## 1.1 Nature of nature-based tourism

When nature experiences function as the major purpose of travel, tourists seek destinations where they can enjoy rather undeveloped natural areas, landscapes, and wildlife (e.g. Goodwin, 1996; Järviluoma, 2006; Valentine, 1992). In recent years, it was estimated that 10-20 % of all international travel is related to nature experiences, even though there are no exact figures for the sector due to the lack of a global database (Newsome, Moore, & Dowling, 2012). The percentage is even greater in Northern Europe. For example, in Finland approximately a third of all foreign tourists (Krzywacki, Potila, Viitaniemi, & Tanskanen, 2009) and 40 % of domestic visitors (Sievänen & Neuvonen, 2011) participate in nature activities. This is due to the assets of the area. The largest European wilderness areas, national parks, Natura 2000 areas, clean nature, and well-equipped and versatile tourism resorts that promote nature activities have become important driving forces of nature-based tourism in North Fennoscandia (Fredman & Tyrväinen, 2010; Hallikainen, 1998; Järviluoma, 2006; Ministry of Employment and the Economy, 2015; Wall-Reinius, 2009).

Even though North Fennoscandia is a considerably smaller destination compared to the arctic areas of North America, the number of visitors has exceeded those of Canada and the US (e.g., Hall & Saarinen, 2010; Mason, 1998). This largely explains why nature-based tourism resorts have become the focus of regional development in North Fennoscandia. For example, in Finnish Lapland, the regional tourism strategy targets a 4 % annual increase in the registered visits and doubling the figure to 5 million visits by 2040 (Regional Council of Lapland, 2015). Nordic countries practice national policies that enhance their competitiveness in the travel and tourism sector (World Economic Forum, 2015). The Fennoscandian countries performed especially well in ecological sustainability scores. They were ranked among the 10 best countries in the comparison of 138 countries based on Travel and Tourism Competitiveness Index (TTCI) in 2015 (Figure 1).



**Figure 1.** The best rankings in ecological sustainability of the TCI in 2015 (World Economic Forum, 2015). The black bars illustrate the scores of Fennoscandian countries. The TCI is composed of the set of factors and policies that enable the sustainable development of the tourism sector.

### Seasonality and environmental impacts

Despite the good ranking, the analysis of the present state of tourism in Finland showed that nature-dependence of tourism is still largely ignored in tourism development and that master planning of resorts should pay more attention to year-round activities and ecological sustainability (Ministry of Economic Affairs and Employment, 2015). Even though low-season tourism services and products have been developed, many resorts are still perceived chiefly as winter-activity destinations or ski resorts where peak season of visitors typically starts in December and lasts until March or April.

Some suggestions and strategies are already made for nature-based tourism business to overcome seasonal dependency. For example, the latest tourism strategy of Lapland aims at the summer season becoming the other peak in addition to the winter season (Regional Council of Lapland, 2015). The strategy relies on the network of protected areas as a large supply of year-round products, whereas the European Commission (2016) encouraged the business to focus more on tourists who are able to travel during the low season, i.e., seniors and young adults. The recommendation concerning seniors is supported by the steady increase of senior tourism. As the population ages, a future tourist would most often be an experienced senior citizen (Alén, Domínguez, & Losada, 2012; Moutinho, Rate and Ballantyne, 2013). He or she not only has the ability to travel any time of the year, but is also less loyal to brands and places. Pearce (2005) related the emphasis of nature as a travel motivation especially for the aging

and those with a high level of travel experience. Decreasing mobility may bring some limitations for senior tourists' nature activities (Alén et al., 2012; Pearce, 2005). These issues require a shift of perspective in destination management.

Ecological sustainability is the other widely discussed challenge of nature-based tourism, which is typically considered as an economic activity that promotes nature conservation. However, as nature-based tourism grows and affects natural resources and local development, this positive relationship changes (Saarinen, 2005). Skiing and other snow-sport activities and supporting infrastructure have been reported to cause various kinds of environmental impacts alongside visual ones (Table 1). Resorts have flourished economically and population wise, while the rural villages have been impoverished, as demonstrated by Kauppila (2004) in Finnish Lapland. He concluded that the resorts have differentiated themselves from their 'wild' and rural surroundings. In many cases, resorts have also visually transformed and become urban-like centers on the periphery (Saarinen, 2004; Tuulentie & Mettinen, 2007). As a consequence, resorts lose some of their naturalness in the process and face a global challenge of carrying capacity. When ecological and visual carrying capacities are exceeded due to damages, there is always a risk that the number of visitors starts declining, especially of those who seek naturalness and nature experiences (e.g., Butler, 2006; Goonan, Manning, van Riper & Monz, 2010; Holden, 2008; Manente & Pechlaner, 2006; Tyrväinen, Silvennoinen, Nousiainen, & Tahvanainen, 2001; Weaver, 2006).

**Table 1.** Environmental and visual impacts of construction in ski resorts (adapted from Holden, 2008; Huang, Wall, & Bao, 2007; Tolvanen & Kangas, 2016; Weaver, 2006).

Action	Impact
Clearance of original vegetation and boulders	Loss and fragmentation of forests and arctic-alpine habitats Alteration of soil hydrology Increased avalanche, landslide and erosion risk Visual pollution especially in the summer Introduction of alien species
Cable wires of ski lifts	Reduction of local bird populations due to collisions
Artificial snow making	Intensive use of local water and energy supplies Air pollution and contamination of the soil Noise pollution Reduction of recuperation time for vegetation on slopes
Construction of tourism infrastructure and housing development	Displacement of wildlife from its winter habitats Decreased densities of disturbance-susceptible wildlife Increased death rates of wildlife Higher abundances of human-associated birds Suburbanization of remote natural landscapes Eroded sense of place (homogenous appearance)

The impacts and their prevention become especially important when ski resorts aim at providing year-round activities. Snow is a protective element for a number of reasons. First, it provides good insulation, which may to a certain extent also protect the soil from erosion caused by trampling (Törn, Tolvanen, Norokorpi, Tervo, & Siikamäki, 2009). Second, snow cover can hide extensively eroded ground and construction work in a ski resort. A landscape preference study has proven, for example, that people perceive more types of commercial forests suitable for nature-based tourism in the winter season compared to summer, since signs of soil preparation or logging residue are out of sight (Tyrväinen, Silvennoinen, & Hallikainen, 2016). In other words, snow makes the area look more natural and coherent. Once the snow has melt, the wearing is exposed. The site may now seem as lacking stewardship and upkeep, which are important to visual quality of an area according to Tveit, Ode and Fry (2006).

### **Definitions of nature-based tourism**

The first definition of nature-based tourism had its origin in alternative tourism that not only denoted an antithesis to mass, conventional or commercial tourism, but also emphasized sustainable practices and individualized products (Lanfant & Graburn, 1992; Valentine, 1992). The oldest and narrowest definitions apply nowadays mainly to wildlife tourism or ecotourism (e.g., Lanfant & Graburn, 1992; Newsome et al., 2012; Weaver, 2006). Nature-based tourism is currently seen as an ambiguous concept, which does not have any universally agreed upon definition (Fennell, 2000; Fredman & Tyrväinen, 2010; Mehmetoglu, 2007).

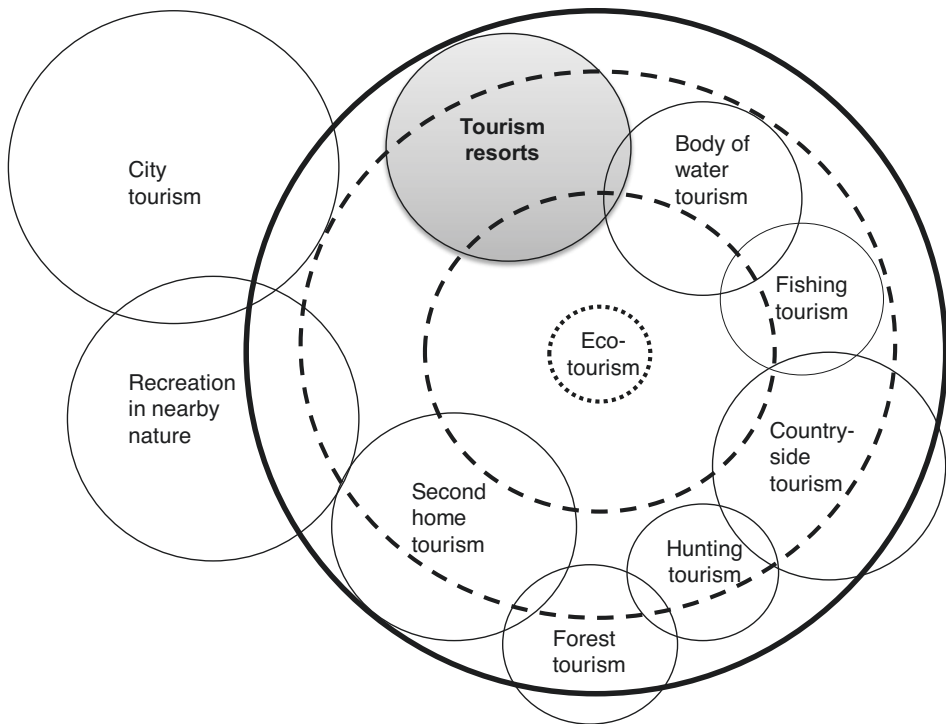
There are various forms of outdoor activities in nature-based tourism, e.g., ice-fishing, down-hill and cross-country skiing, hiking, biking, river rafting, mountain climbing, and wildlife watching. The activities have a range of time and nature-dependency, which in part explains why the wider definitions of nature-based tourism were needed. Fredman, Wall-Reinius and Grundén (2012, p. 290) talked about the naturalness dimension of nature-based tourism in their review of the recent discussions. Referring to Valentine (1992) they argued that tourism activities that are dependent on nature (e.g., wildlife watching) or enhanced by natural environments (e.g., camping) are usually regarded as nature-based tourism undoubtedly. It is more disputable when referring to activities in which natural settings are only secondary to experiences (Fredman et al., 2012; Wearing & Neil, 1999). An example of such activity is a tourist bathing in an outdoor tub in the compact hotel district of a resort. Due to many nature-indifferent activities related to nature-based tourism and significant visitor volumes, nature-based tourism cannot be considered an alternative any longer. Instead, it is becoming part of the mainstream, which includes a wide range of tourism activities.

Furthermore, new definitions have been partly pushed by nature-based tourism facing challenges of promoting sustainable solutions as its image and the original definition suggest. Tourism transportation in the era of climate change concerns demonstrates why

sustainable solutions are so difficult to be applied in nature-based tourism. Most visitors need good connections by air or road network in order to reach the periphery, where the nature-based tourism destinations are located. Tourism often depends on motorized vehicles also within resorts, even if urban-like cores with compact districts were designed to minimize the need. For example, snowmobiles have become an essential part of program services as efficient and convenient transportation in the wintertime to nature areas in backcountry of resorts.

Newer and broader definitions of nature-based tourism incorporates interests of a variety of tourists who have different and sometimes contradictory motivations but share a mutual interest in outdoor-oriented activities and experiences in natural settings (Cooper, Fletcher, Gilbert, & Wanhill, 1993; Mehmetoglu, 2007). This is well reflected in Goodwin's (1996, p. 287) conception: "Nature-based tourism encompasses all forms of tourism – mass tourism, adventure tourism, low-impact tourism, ecotourism - which use natural resources in a wild or undeveloped form – including species, habitat, landscape, scenery and salt and freshwater features."

This thesis uses the broader definition, which gives the flexibility to identify sub-categories of nature-based tourism including tourism resorts, but does not consider sustainability as an intrinsic quality of the business (Figure 2). This choice is justified, e.g., by nature-based tourism needing the same infrastructure as 'average tourism' to transport and accommodate people in the peripheries where the natural attractions exist (Saarinen, 2005, p. 45). Since the thesis focuses on places in the Nordic context, it follows the definition proposed in Sweden by Fredman, Wall-Reinius and Lundberg (2009, p. 24): "Nature-based tourism is human activities occurring when visiting nature areas outside the person's ordinary neighbourhood". Finland has adopted a similar conception, which was originally suggested by Development of outdoor recreation and a nature-based tourism committee in Finland (Taskinen, 2002). Since sustainable practices are linked to landscape quality, which has proven to be a key attraction factor in nature-based tourism (e.g., Brown & Raymond 2007; Franch, Martini, Buffa, & Parisi, 2008; Innolink Research Oy, 2010; Khan, 1997; Proebstel, 2006; Tyrväinen et al., 2016; Tyrväinen, Silvennoinen, Hasu, & Järviluoma, 2011; Tyrväinen et al., 2001), these practices are given special attention in this thesis.



**Figure 2.** The narrow and wider definitions of nature-based tourism (Koivula & Saastamoinen, 2005). Nature-based tourism in tourism resorts is the main focus of this thesis (the gray circle).

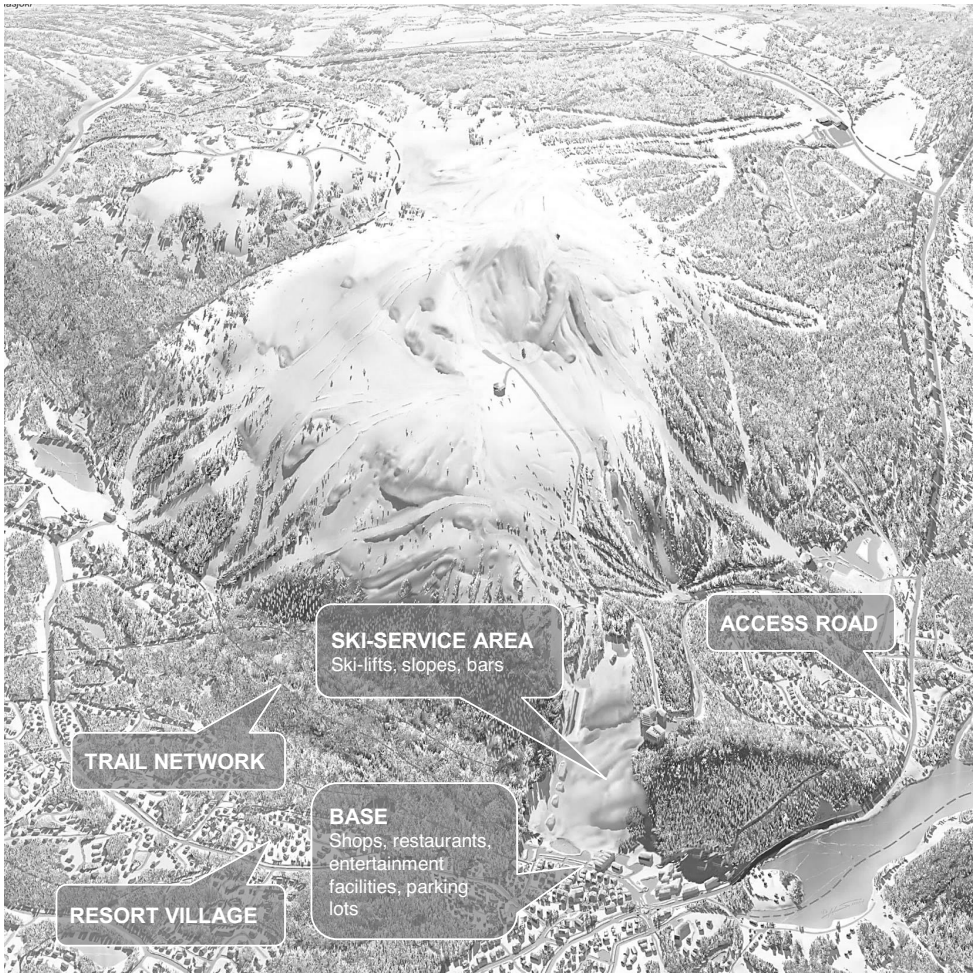
The identified concept that emphasizes sustainable practices reflects the changes in tourism demand. The more experienced, independent and quality conscious but also environmentally aware “new tourist” who believes that nature has intrinsic value has entered into the global tourism market (Dwyer, 2015; European Travel Commission, 2010; Poon, 1993). Weaver (2006) acknowledged that even though environmentally conscious tourists represented a minority of global tourists, they are increasing rapidly. Despite the trend, many resorts have been shown to lack a shared vision and policy of sustainable development, even though many companies and business sectors within the tourism industry have already adopted environmentally sound policies (Forsyth, 1995; Saarinen, 2006; Sharpley, 2000). Moreover, the contemporary land-use planning approaches have been noticed to neglect a holistic perspective, ecological context and planning on a landscape scale that are essential aspects in ecologically sustainable development (Ruhanen, 2004; Simão & Partidário, 2012). This motivates the need to view the land-use of nature-based tourism resorts.

## 1.2 Land use of tourism resorts

Nature-based tourism is an economic activity that often stages wilderness settings for tourism purposes and advertises positive images attached to wilderness, e.g., freedom, naturalness, and authenticity (Saarinen, 2005). When creating the commercialized natural spaces, i.e., natural servicescapes, for nature activities (Arnould, Price, & Tierney, 1998; Fredman, et al., 2012), tourism relies on a supportive infrastructure that affects the tourists' environmental perceptions. The infrastructure provides access to natural and cultural attractions, e.g., national parks, pre-historical sites of Sami culture, and scenic lookouts to wilderness areas, for independent travelers as well as for program services, and supplies other basic amenities, such as accommodation and food.

A basic infrastructure, which usually forms functional areas, is common to many nature-based tourism resorts. When commercializing natural spaces for winter activities, the functional areas of resorts typically consist of a ski service area, a base for retail, catering and hotel accommodations, a resort village (incl. special water, sewage and electricity systems), and a trail network (incl. ski tracks) (Figure 3). The resorts are either purpose-built centres in the middle of large wilderness areas or they create semi-urban environments in the vicinity of rural villages and nature areas. When the built-up area of a resort expands to abandoned fields and 'wild' land, the landscape of the resort is comprised of urban, rural and wilderness elements (Mettiäinen, 2007).





**Figure 3.** Basic structure of a ski resort (source of the map: Levi tourism resort, reprinted courtesy of Oy Levi Ski Resort Ltd)

**Spatial planning system**

Tourism-specific planning and management systems aim at controlling negative impacts and offering more environmentally-friendly tourism products and services (Williams & Ponsford, 2009). In Nordic countries, national spatial planning systems that are regulated by laws are applied. The systems are similar across the Nordic countries (Newman & Thornley, 1996). For example, the Finnish hierarchic system means that the national and regional goals set for spatial land use steer local land-use planning (Ministry of the Environment, 2016b). Local master plans give instructions for land use on a general level, whereas the local detailed plans are precise in their instructions. Moreover, a predictive impact assessment of a local master plan is always required, if land use is considered to have significant impacts on the environment or communities according to the Land



Use and Building Act (Ministry of the Environment, 2013). The impact assessment typically involves environmental inventories (e.g., assessments of key biotopes, flora and fauna). The criteria for the content of the inventories is less detailed compared to the Environmental Impact Assessment (Haapanala, 2010), which is recommended for all designs of ski-lifts, cable cars, roads, holiday villages and hotel complexes in the European Community by the European Commission Directive (97/11/EC).

Due to the hierarchic system and outdated or inadequate inventories, the local master plans of nature-based tourism resorts are claimed to be too interpretative to promote sustainable development in Finland. The plans lack strategic and directive approaches with clear long-term goals and solutions and are based on planners' interpretation of needs (Staffans & Meriluoto, 2011). Hence the local master plans have weaknesses in defining the contents of a local detailed plan and in steering the development of the resort. Additionally, Holden (2008) noted that destination management is often rather reluctant to use the Environmental Impact Assessment, which slows the planning process and requires a variety of specialists, e.g., geologists, hydrologists, geographers and environmental scientists, which renders it costly.

One outcome can be that a trail network has no legal status within built-up areas to begin with and hence new building blocks re-define the location of trails. This was seen as one of the threats related to growth by the tourists who participated in the focus group interviews in the Ylläs nature-based resort in Lapland (Uusitalo & Rantala, 2006). Another outcome of weak master plans is adoption of similar land-use patterns and architecture, which makes tourism resorts to become copies of one identifiable spatial model (Hautajärvi, 2014; Varvaressos & Soteriades, 2007). These arguments motivate viewing the spatial planning of resorts more closely.

The physical and spatial planning approach is most widely adopted in tourism among the planning traditions that emphasize environmental land-use planning and management (Hall & Page, 2006). It regards ecology and carrying capacities as the basis for the development of resorts. The tradition usually applies space and place manipulation from urban planning frameworks to management and mitigation of negative impacts, as Weaver (2006) described. The task is mainly executed with zoning ordinance or by-laws (Inskeep, 1991) and development standards (Bosselman, Peterson, & McCarthy, 1999). The tradition uses single-use zoning that designates different types of land use (e.g., accommodation, retail, recreation) in divided areas in a local master plan. Development standards regulate, e.g., number, height and configuration of buildings, lot size, and amount and extent of vegetation buffer from buildings or routes in each zone (Weaver, 2006). In other words, the standards create a toolset for a local detailed plan for defining different land-use patterns of zones that affect the amount and quality of tourists' nature contacts.

Weaver (2006) noted that zoning of tourism resorts often produces frontstage and backstage areas that have different functions. The division was introduced by MacCan-

nell (1976) who was inspired by Goffman's (1959) private and public stages of social life. MacCannell (1976) argued that frontstage presents the elements of the natural environment and local culture to tourists, whereas backstage preserves authenticity of the area. The recent land-use strategy of Lapland tourism development (Sweco, 2014) introduces four zones of tourism resorts that emphasize outdoor activities in the resorts. The most important accommodation and shop services are concentrated in the urban-like core and zone I includes resort villages and nearby nature. Zone II includes nature trails and the starting points of hiking trails that extend further to III-IV zones. Accordingly, the core area and zones I-II belong to the frontstage areas and zones III-IV to the backstage. The recommendation indicates that zoning is considered an essential part of the planning framework of the Finnish nature-based tourism resorts and that the trails are seen as an important asset of nature-based tourism and the outcome of land use.

### **Promoting resource efficiency**

The urban tradition of single-use zoning is criticized today. It produces car-dependent urban communities where accommodation areas are dominated by single-family homes in large lots, shopping areas are situated far from one another and built-up areas spread out consuming green spaces and natural wildlife habitats (Chin, 2002). The sprawl of built-up areas is also seen as the negative outcome of growth of tourism resorts (Gosling et al., 2005; Kytzia, Walz, & Wegmann, 2011).

More resource-efficient principles for land use have been initiated as a response to the urban sprawl and demands on protection of landscapes through promotion of sustainable land use (e.g., Säynäjoki, Inkeri, Heinonen, & Junnila, 2014; Schiller, 2007; Van Stigt, Driessen, & Spit, 2013). The principles favor building patterns that decrease the demands for energy, water, building materials, and motorized vehicle traffic. Local master plans of resorts designate the foundation of building patterns that are specified by standards that can advance material and energy efficiency (Staffans & Meriluoto, 2011) and infill development, i.e., the use of land within a built-up area for further construction, as growth management of resorts (e.g., Kytzia et al., 2011; Sweco, 2014; Weaver, 2006).

However, people are generally rather sensitive to the balance between manmade and natural areas when they assess the environment (Kaplan & Kaplan, 1989; Schroeder, 2007; Tuan, 1974). This argument seems to apply also to tourism resorts. Tyrväinen et al. (2011) claimed that eco-efficiency models, which are developed for urban environments, should not be copied as planning norms for the resorts in northern Finland. Instead, they need to be adapted to the regional and social context. Likewise, Kytzia et al. (2011) argued that there might be an acceptable level of visual changes caused by land efficiency. Beyond that level, tourists' behavior changes due to the loss of scenic beauty that are irreversible or costly to reverse. Cui (1995) argued that ecological car-

rying capacity is often higher than the threshold of acceptable visual or social changes.

Applying eco-efficiency in the planning of nature-based tourism resorts is more than likely to be the right choice. However, it is important to know if we can expect that tourists are willing to travel to eco-efficient urban-like centers to experience nature and if the infill development can be executed as part of smart growth in a similar manner as in urban areas. If land-use patterns matter to tourists, these types of questions are relevant.

### 1.3 Aims and scope

This thesis aims to guide discussions about how much and where nature should be maintained in nature-based tourism resorts to support sustainable growth and to enhance tourists' nature experiences. Knowledge is pursued that can assist in finding the principles of land use, which can support sustainable growth of summer tourism. Summer is usually the off-peak season of tourism resorts in Nordic countries. Summer tourism relies even more than winter tourism on natural attractions. Hence, tourists' nature experiences enhanced by high environmental quality are a necessity. This thesis also pursues knowledge on the suitability of eco-efficient land use, which aims at protecting nature areas in the vicinity of resorts.

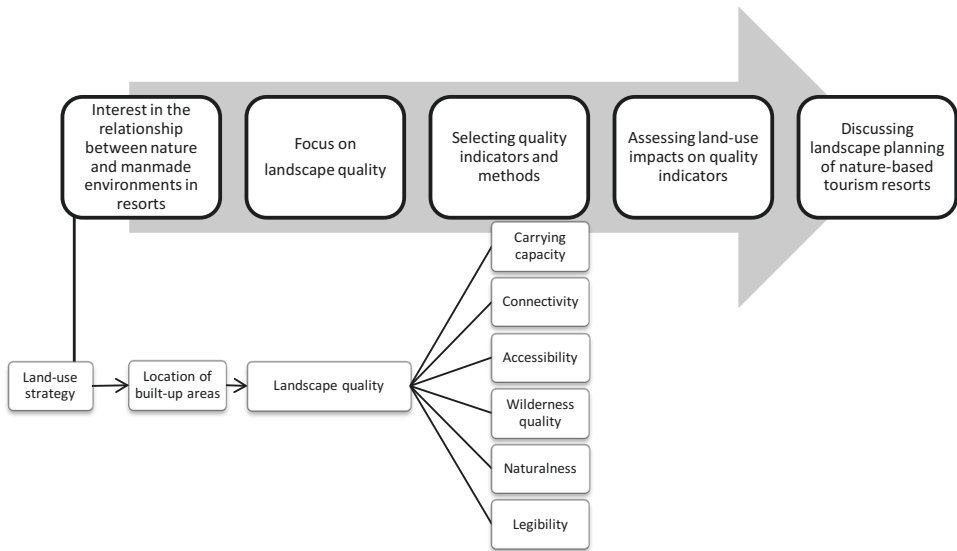
In order to reach the goal, a deeper understanding of spatial management of the relationship<sup>1</sup> between natural and manmade<sup>2</sup> environments is needed (Figure 4). Resorts' land-use strategies determine the location and pattern of land use and contribute to landscape quality, which is considered to be one of the key drivers of nature-based tourism. The compatibility of the land use with nature relates to a resorts' closeness to nature, i.e., naturalness in this context.

This thesis focuses on the landscape quality of nature-based tourism resorts, which is defined by several attributes involved when perceptions and experiences of nature develop or ecological processes are operating. Six quality indicators or attributes are used to identify the land-use impacts on the landscape quality of resorts and some of their functional areas (Figure 4). The indicators are expected to reveal the existing land-use practices and interpretations of land-use eco-efficiency that enhance and impair landscape quality of nature-based tourism resorts.

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1 The relationship, i.e., configuration, is a production of biophysical process and human use (Selman, 2006). It can also be seen as the interplay of built-up areas and nature.

2 Manmade refers here to "human altered areas where the natural environment has been modified to such an extent that it has lost its original characteristics and has been transformed into human created places and spaces" (Newsome et al., 2012, p. 3).



**Figure 4.** Process and scope of the thesis.

In order to identify how land use impacts the landscape quality of nature-based resorts, this thesis addresses three questions. The first one concentrates on impacts on landscape quality at a broad scale, whereas the second one complements the knowledge with tourists' perceptions of quality. The last question centers on resorts' naturalness in the implementation of sustainable growth involving eco-efficient land use to enhance the experiences for tourists. It brings together the outcomes of the four sub-studies and their relationships to landscape quality (Figure 4).

1. How do locations of built-up areas affect ecological aspects of landscape quality? (Article I, IV)
2. How do tourists perceive resorts' landscape quality? (Article II, III)
3. How can resorts' naturalness be fostered to promote tourists' nature experiences? (Article I-IV)

While searching the answers to these questions, the thesis tests a novel approach in the field of tourism planning. It combines landscape architectural and landscape ecological assessments and further integrates user perception-based approaches for gathering tourists' perceptions of the quality. The assessments and study areas are chosen to complement each other. Hence this multi-scientific landscape study introduces cognitive and psychophysical paradigms to practical tourism planning, which usually places a strong emphasis on expert knowledge of landscape quality. This thesis aims to serve particularly those resorts where visitor flows are growing fast, efficient land use is being favored and year-round tourism is targeted.

## 1.4 Key concepts

*Landscape* as a framework can provide a holistic approach to the evaluation of land use of tourism resorts. Selman (2006, p. 3) argued that landscape is an amalgam of environmental possibilities and human aspirations. Hence, it is a good framework to study strategies and changes of land use that modify the environment. Having material, spatial, temporal, multisensory and mental dimensions, the same landscape can be understood and studied from several perspectives, which makes landscape research a transdisciplinary field (Tress & Tress, 2001). Buijs, Pedroli and Luginbühl (2006, p. 11) have noted that “much more than nature, landscape is recognised as a social construct, strongly related to the way it is being perceived.” This is acknowledged in the definition of landscape within the European Landscape Convention (Council of Europe, 2016) that involves both ecological aspects, such as habitat patterns, and human perceptions, like visual preference. The convention also displays general concerns about human impacts on the quality of European landscapes and promotes landscape assessment, protection, management and planning. The international treaty, which was ratified by all Nordic countries except Iceland, additionally stresses that the people and their aspirations should be at the heart of national landscape policies.

A research discipline usually defines which of the landscape dimensions and attributes are focused on and which methods are used. The discipline of *landscape architecture* employs design processes to guide intentional change in the environment to improve its value and fitness for the sake of human experience, social equity, and ecosystems (Murphy, 2005, p. 18). The process involves gathering and evaluating diverse information on the area through completion of landscape assessments prior to the creation of a landscape design. Hence, landscape architecture provides one usable framework to carry out the task of the thesis.

The discipline of *landscape ecology* has also introduced spatial approaches to the complex interrelationship of humans and nature. Similar to landscape architecture, landscape ecology is concerned with areas that are over a kilometer-wide and where the mix of local ecosystems or land uses is repeated in similar form and does not respect administrative boundaries (Forman, 1995). Landscape ecology provides a broad-scale approach to environmental management of the whole ecological system in which resorts’ land use effects. Applying the scientific landscape ecosystem approach is rather unusual in the Finnish landscape architecture, which has more often been a practice-oriented than theory-oriented discipline so far (Komulainen, 2010).

*Affordance* is another useful concept to explore landscape quality. It is particularly well suited for studying trail networks, since the concept highlights that perceiving affordance needs functional activity; “we must perceive in order to move, but we must also move in order to perceive” (Gibson, 1986, p. 223). The environment consists of affordances, i.e., physical opportunities and threats that the organism, such as a human

being, perceives while acting in a specific setting (Gibson, 1986; Heft, 1997). Therefore, it is expected in this thesis that the environment, which provides diverse natural affordances, enhances nature experiences. This requires accessibility to natural areas within the resort. In Nordic countries the requirement is rather easy to implement in principle, since visitors have the right to access nature areas (excluding nature reserves, home yards, fields, and plantations) under the traditional legal concept known as everyman's right (Ministry of the Environment, 2014). It is often a trail network, which is constructed to allow access. It affects how easily tourists can reach nature and what kinds of on-site nature experience the visitors may have. Rantala (2010) argued that trails and tourist guides' choices in program services affect the natural affordances that tourists perceive in the forests of nature-based tourism resorts in Finnish Lapland.

As shown, landscape quality concurrently has both biophysical and perceptual dimensions, or attributes. The land-use impacts on landscape quality and management of growth were evaluated with the help of two ecological indicators (Figure 5). The first one is *ecological carrying capacity*, which relates to landscape ecosystem. The amount of high altitudes of fell landscape was expected to reflect ecological carrying capacity in this thesis (Article I). Respectively, land use of high altitudes would imply how sustainable growth has been implemented in the resorts. The second one chosen was *connectivity*, which indicates how easily wildlife can reach their natural habitats and is dependent on natural affordances (Article IV). In comparison, tourism carrying capacity refers to a maximum number of people that can visit or be accommodated in a tourist destination concurrently, without decreasing visitors' contentment with the resort due to the destruction to the physical, economic and socio-cultural environment and to the quality of the experience gained by visitors (Weaver & Lawton, 2014; World Trade Organization, 1992, 2004).

The other selected landscape attributes contribute to individuals' *visual and aesthetic preferences*. According to Kaplan and Kaplan (1989), there are some shared visual characteristics of different types of landscapes, i.e., coherence, legibility, complexity, and mystery, which people consider aesthetic and pleasant. Tveit et al. (2006) introduced later more variables that they expected to correlate with aesthetic preferences. Addition to coherence and complexity, the attributes included naturalness, disturbance, visual scale, imageability, stewardship, historicity, and ephemera. Sevenant and Antrop (2010) noticed, however, that not all of attributes correlate strongly with aesthetic preferences and their usefulness often dependent on context or landscape types. Since the thesis is about the resorts where large nature areas surround built-up areas, especially accessibility, legibility, naturalness and wilderness quality were seen relevant to tourists' perceptions of landscapes of the frontcountry. The attributes are somewhat linked with each other (Figure 5).

*Accessibility* enabled by a trail network was expected to reflect tourists' possibilities to approach appealing landscape areas with wilderness characteristics (Article IV). Tourists' mental images of a resort were anticipated to reflect how "natural" and legible the



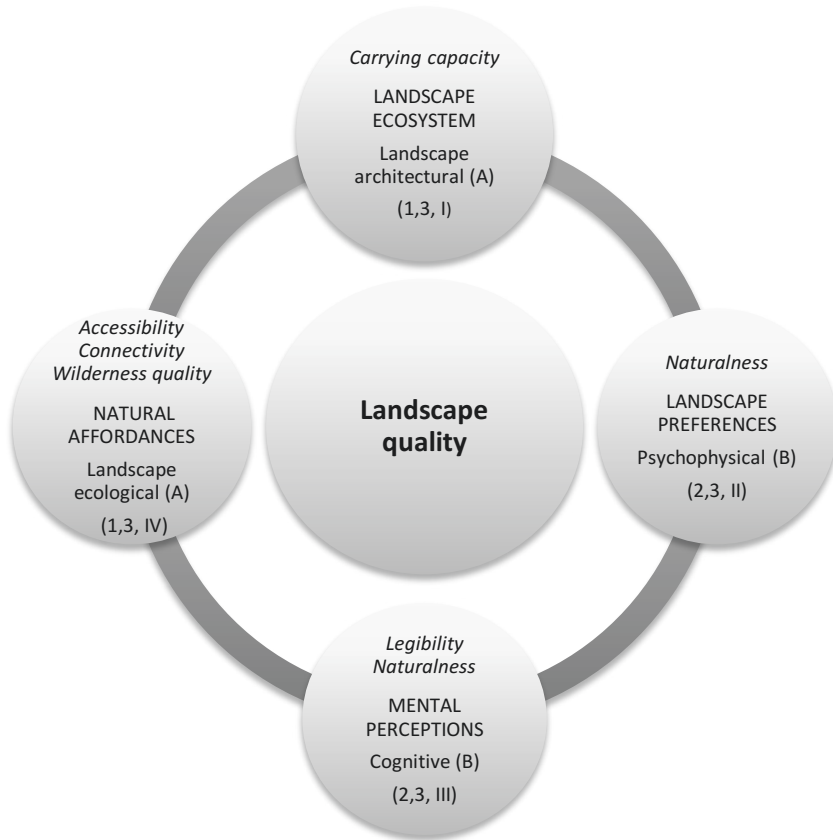
area is perceived (Article III). *Legibility* is a quality that prevents tourists from getting lost in unfamiliar environments. In this thesis, legibility also gives some indications of how accessible nature areas are perceived to be by tourists. In this thesis *naturalness* is associated with amount of nature, closeness to nature, and compatibility with nature, whereas *wilderness quality* refers to certain types of landscapes and habitats that have wilderness characteristics.

Wilderness quality is usually associated with the areas that people perceive as being affected primarily by the forces of nature. Additionally, natural landscapes that provide opportunities for solitude, or contain ecological, geological, or aesthetic values have wilderness characteristics. Hence landscapes with wilderness qualities may contain infrastructure. The interpretation of 'wild' nature bearing presence of manmade elements have basis on social and cultural constructions of wilderness (Saarinen, 2005). For instance, Tuan (1974, p. 112) noted that wilderness "is as much a state of mind as a description of nature". Hence wilderness cannot be defined objectively or be located in a definite area. Tourists' wilderness experiences and ecological values of a site supporting ecological functioning are not necessarily linked (Sæþórsdóttir, Hall, & Saarinen, 2011). Referring to Kaplan and Kaplan (1989), tourists can have satisfying wilderness experiences even though a site exhibits only some wilderness characteristic. Intensity of the experience may, however, depend on the physical characteristics of the landscape or its status.

Pearce (2005) pointed out similar attributes of a site associated with tourists' positive place experiences. He modeled a good tourist site, where three components were integrated to generate positive experiences. Such an accessible site gave a clear understanding. Once legible, the place reveals how to act or what is offered there. It further provides activities and has attractive physical settings. In addition, its biophysical elements are distinctive, aesthetic and pleasing, which can relate to wilderness qualities of the site. The selected indicators are also similar to those suggested by Weaver and Lawton (2014) for describing qualities of tourism attractions.

When landscape quality is associated with sustainable land use and "sustainable aesthetics" (Nohl, 2001, p. 227), which values self-dynamic and self-regulation power of nature, *sustainable tourism* is manifested. It is defined as "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities" (UNEP & WTO, 2005, p. 12). When addressing the needs of the environment, sustainable tourism maintains essential ecological processes and promotes the conservation of natural heritage and biodiversity. The controlling of tourism's environmental impacts is carried out chiefly by *destination management* led by local authorities (Global Development Research Centre, 2017). Destination management usually includes land-use planning, business permits, zoning controls, environmental and other regulations, and business association initiatives. One of the techniques contributing to sustainability is *eco-efficiency* in which environmental impacts of businesses and urban environments

are reduced by increasing resource productivity (DeSimone & Popoff, 2000; World Business Council for Sustainable Development, 2000). When the local plans promote adaptive reuse of infrastructure, infill development, compact and walkable neighborhoods and restoration of damaged sites in existing built-up areas, *smart growth* is applied (Randolph, 2004).



**Figure 5.** The concepts related to the approaches of the thesis: indicators (in italic type), research objects (in capital letters), types of landscape assessments (A technical, B observer-based), research questions (1-3) and articles (I-IV). In this thesis, carrying capacity, legibility, accessibility and connectivity belong to the spatial qualities that were studied by using maps, whereas naturalness and wilderness quality represented the non-spatial qualities of a resort’s landscape.

## 1.5 Dissertation structure

This thesis is composed of four sub-studies and research articles (Table 2) regarding nature-based tourism resorts. The sub-studies are presented in the following order:

1. Monitoring built-up areas at high altitudes (Article I)



2. Clients' views of land use options (Article II)
3. Differences in tourists' and local residents' perceptions of tourism landscapes (Article III)
4. Trail network as a mediator of nature experiences (Article IV)

The first sub-study (Article I) views how locations of built-up areas affect landscape quality of nature-based tourism resorts. It focuses on the management of growth in two resorts, Levi and Ylläs. First, it identifies natural constraints that affect the location of built-up areas. Second, it assesses the resorts' land-use trends and evaluates the chance of a new infrastructure causing broad-scale ecological impacts based on a carrying capacity indicator. Landscape ecosystem, involving the interrelationship of ecosystems, is the research object (Figure 5). Finally, the ecological sustainability of land-use strategies and the resorts' aspirations towards sustainable growth are evaluated accordingly. The likely influences of growth strategies on nature experiences and acceptability of ecological and visual changes in nature-based tourism resorts are also anticipated. The study tests the landscape architectural assessment in tourism planning and discusses its usefulness as a monitoring tool in growth management.

The second and third sub-studies assess how tourists perceive the quality of the resorts' environment. The second sub-study (Article II) focuses on Levi and Ylläs tourists' landscape preferences for spatial structure of resorts and their accommodation sites. The key interest is the amount and type of nature available in housing environment. The study also reflects indirectly preferences for sustainable practices, especially whether tourists support eco-efficient land-use options illustrated in far-views and on-site. In addition, influences of tourists' backgrounds on the preferences are sought, since it is believed that tourists would express their preferences mainly according to their values and motives. Finally, the study addresses eco-efficient land use as a goal and the use of the user perception-based approach in tourism planning.

The third sub-study (Article III) focuses on tourists' perception of nature areas of resorts. It evaluates the content of sketched maps of Ylläs, which represent tourists' mental constructions of the spatial arrangement or configuration of the resort. The drawings indicate how comprehensible (legible) and natural the resorts are perceived to be. First, the sub-study identifies landscape features, built and natural, and linkages that people recalled. Second, differences between tourists' and locals' spatial cognition systems are viewed. Implications of the findings to land-use management are discussed. Finally, the sketch-mapping technique is evaluated as a potential landscape assessment tool, which has rarely been carried out by studies for tourism planning.

The fourth sub-study (Article IV) explores landscape quality of the trail network in the Levi resort by combining environmental and perceptual knowledge. The assessment examines natural affordances as appealing landscapes with wilderness quality and wildlife habitats. It focuses particularly on how the affordances are distributed in

the trail network of semi-urban cores, where built-up areas fragment habitats. First, accessibility to the natural attractions is assessed. Then Least Cost Path (LCP) models that reveal the distribution of different wildlife habitats are reflected. The outcomes indicate how visual diversity and biodiversity are displayed for tourists in the resort. Accessibility is viewed to evaluate whether eco-efficient land use may decrease the quality of nature encounters. Visual diversity and biodiversity, as objectives of sustainable trail planning, are discussed as well as the usefulness of LCP models.

**Table 2.** The articles in brief.

	<b>Article 1</b>	<b>Article 2</b>	<b>Article 3</b>	<b>Article 4</b>
Research question	How do locations of built-up areas affect ecological aspects of landscape quality?	How do tourists perceive resorts' landscape quality?	How do tourists perceive resorts' landscape quality?	How do locations of built-up areas affect ecological aspects of landscape quality?
Main focus	Amount of built-up areas in vulnerable high altitudes	Amount of nature areas in tourists' landscape preferences	Amount and location of nature areas in tourists' images of resort	Location of wildlife habitats and appealing landscapes (types with wilderness characteristics) in trail network
Key indicator(s) of landscape quality	Carrying capacity	Naturalness	Legibility	Connectivity Accessibility Wilderness quality
Data	Environmental data & land-use statistics	1054 responses from tourists	36 mental maps (14 locals, 22 tourists)	Environmental data & indicator species
Method	Landscape character zoning	Questionnaire including image-edited photos	Cognitive cartography	Least Cost Path models
Key outcomes	Land use is concentrated in the zones having good buffering capacity. Resorts have conflicting growth strategies indicating pro-growth mode. They are likely to reduce resilience of northern ecosystems and landscape quality as a result.	Tourists favor decentralized accommodation and nearness to nature. Eco-efficient land use is counter to these preferences.	Buildings dominate in number and connections between areas are faint in tourists' perceptions of resorts' environment.	The existing trail network enables various nature encounters in frontcountry. The quality can be impoverished by eco-efficient land use.
Managerial implications / How can resorts' naturalness be fostered to promote tourists' nature experiences?	Upper-slope and summit zones should be maintained in natural state. The development should be monitored regularly.	Natural landscapes involving original vegetation should be preserved or replanted and maintained as far-views and on-site.	Natural landmarks, edges and gateways should be highlighted in frontcountry.	Accessibility of attractive landscapes should be improved in frontcountry.

## 2 Conceptual background

Several paradigms guided the methodological choices and organization of the empirical research of the landscape quality of tourism resorts and the users' different perceptions of it. Landscape ecology introduces some useful principles to view ecological and visual carrying capacity of nature-based tourism resorts. As for environmental psychology, it provides analytical frameworks to understand how people perceive characteristics of landscape and why they prefer one over another. Given these approaches, this thesis is theoretically positioned chiefly in the field of landscape research.

### 2.1 Landscape ecology

Landscape ecology is a branch of ecology that provides conceptual templates to understand how location and pattern of land use affect ecosystems. Biological, hydrological and ecological processes are changed through loss of habitats, decrease in habitat size or increase in isolation of habitat patches (Andrén, 1994; Forman 1995; Forman & Godron, 1986; Leitao & Ahern, 2002; Selman, 2006). The discipline studies the interactions of ecosystems or community types of wildlife with the help of land cover mosaic or vegetation patchiness in order to interpret human influence on the processes (e.g., Forman, 1995; Hilty, Lidicker, & Merenlender, 2006).

Forman (1995) claimed that vegetation patchiness can be converted to a patch-corridor-matrix model. A pattern of landscape structure, which is composed of habitat patches, linear landscape linkages, i.e., corridors, and a background ecosystem, i.e., matrix, is the key to ecosystem processes. The three spatial elements can be natural or manmade and vary in size and shape. Each combination of the elements designates the direction, route and rate of movements of species, energy, water, material, and human-induced disturbances across the land (e.g., Ahern, 1995; Forman, 1995; Leitao, Miller, Ahern, & McGarigal, 2006). Animal species breed and forage basically within their home patches. They use habitat corridors only when moving or dispersing from home patches to other suitable patches in order to avoid exposure to a matrix, which is composed of hostile environments (e.g., Crooks & Sanjayan, 2006; Forman, 1995; Moseley, Marzano, Chetcuti, & Watts, 2013; Taylor, Fahrig, Henein, & Merriam, 1993; With, Gardner, & Turner, 1997). Hence, the spatial arrangement or configuration gives an

estimate of the inter- and intra-patch movement rate of animals across the landscape (Pascual-Hortal & Saura, 2006).

Resistance and resilience of ecosystems define the degree of impacts of disturbances (Forman, 1995). Resistance describes the buffering capacity of the ecosystem to resist changes. It reflects the ability of the ecosystem to maintain its functions and visual quality, e.g., through sexual reproduction of the local flora after trampling (Manninen, 2016). When resilient, the ecosystem adapts to changes and is modified in response to disturbances. It happens, for example, through alterations of the composition of plant species (Manninen, Stark, Kytöviita, & Tolvanen, 2011; Manninen & Tolvanen, 2013). The capacities are influenced by the sizes, shapes (edge effect) and connectivity (isolation) of habitats (Forman, 1995). For example, resistance is lost, when edge effect and isolation start to prevent other populations of the species from occupying the original habitat patches. Resilience is lost once a certain threshold of changes is reached (Andrén, 1994; Llausàs & Nogué, 2012). Impacts on the visual quality of the ecosystem become often irreversible at this point as well.

In northern Fennoscandia, resistance and resilience of ecosystems are strongly affected by the harsh climate and the scarcity of assorted materials. The conditions make the subarctic and arctic ecosystems vulnerable to human-induced changes, which are shown, for example, by weak erosion resistance of local vegetation. The innate fragility and slow rates of recovery of the subarctic birch forest and forest-tundra ecotone intensify tourism impacts in the ecosystems (Forbes, Ebersole, & Strandberg, 2001; Manninen, 2016; Speed, Cooper, Jonsdottir, van der Wal, & Woodin, 2010; Tolvanen & Kangas, 2016; Willard, Cooper, & Forbes, 2007; Williams & Todd, 1997). Forman (1995) argued that ecosystems may have mosaic stability, which is regulated by feedbacks via links and loops (greenbelt rings) between ecosystems that have different intrinsic resistance and resilience. Broader a scale more links and loops are created and better mosaic stability is achieved. In other words, the interaction makes a vulnerable ecosystem more resilient. Hence land-use decisions of tourism resorts in northern Fennoscandia should be founded on interactions of ecosystems on a broad scale.

There are other broad-scale approaches that study landscape patterns. One of them is implemented in landscape architecture to characterize the landscape prior to preparation of landscape design or management plan (e.g., Falini, Grifoni, & Lomoro, 1980; Komulainen, 2010; Panu, 1998; Rautamäki, 1997). In order to find the areas that are the most resistant to land use, a wide range of environmental data, such as geology, landform, soils, vegetation, land use, settlement and human inventions (Makhzoumi & Pungetti, 1999), are integrated and complemented with visual qualities, such as coherency of skylines (Komulainen, 2010; Swanwick, 2002). The outcome of the characterization is a landscape typology, which involves landscape character zones that are morphologically homogeneous areas. Each zone expresses certain visual and ecological qualities, which are lost if irreversible changes occur in the characteristics. Due to the

abundant environmental data used for the specification, the landscape character zones reflect the relative resistance (in relation to other zones) of their ecosystems to changes. The resistance in this conception is based on biomass productivity of the zone, which is bound by vegetation types and underlying geomorphologic conditions.

Overlay techniques that originated from the methods of landscape architect McHarg (1969) are now applicable in Geographical Information System (GIS) and widely used in landscape assessments. The GIS is able to store and integrate a vast array of environmental data in spatial form to carry out different spatial analysis and to display the outcomes (Hall, 2012). New GIS software packages for spatial analysis are developed in landscape architecture and landscape ecology, for example to study landscape fragmentation with landscape metrics (e.g., McGarigal & Marks, 1995) or to rank ecosystems by their naturalness (e.g., Machado, 2004). In tourism planning GIS is usually applied to identifying the natural assets and the impacts of tourism development (e.g. Carver, Evans, & Fritz, 2002; Carver, Comber, McMorran, & Nutter, 2012; Hall, 2012; Hall & Page, 2006).

In sum, landscape ecology provides usable approaches to study the sustainable of land use by focusing on landscape pattern, as demonstrated with two landscape assessments. The descriptions showed that a landscape character assessment is not specific enough in locating the fundamental ecological flows. In other words, the composition of landscape character zones cannot tell, for example, how the wildlife of a nature-based tourism resort behaves in the area. An analysis of a patch-corridor-matrix model helps with this identification. Landscape ecology also highlights the ecosystems' functioning at the landscape scale. The issue refers to tourists' nature and wilderness experiences, which are triggered by healthy and functioning ecosystems (Hallikainen, 1998; Hill, Curtin, & Gough, 2014).

## **2.2 Landscape perception**

Llausàs and Nogué (2012) highlighted that landscape fragmentation does not affect only ecosystems but also people and their appreciation of landscape. Environmental psychology has provided many frameworks to explain people's preferences and perceptions related to landscapes (Gifford, 2014). The frameworks deal with the multifactorial process of environmental perception involving people's motives, preferences, and experiences, for example.

### **From evolutionary theories to cultural ones**

According to the evolutionary theories, all humans are quite sensitive to the contrast between built-up and natural features and have a universal attraction to natural settings (Gifford, 2014). Preferences to natural environments are explained by several factors,

such as central human needs and goals or common evolutionary history (Hartig, 1993; Norton, Costanza, & Bishop, 1998; Ulrich, 1993). Natural environments are seen as favorable to biological survival (Appleton, 1996; Gibson, 1986; Kaplan & Kaplan, 1989; Zube, Sell, & Taylor, 1982) or stress-relieving due to a vast supply of fascinating and pleasurable objects, with which people sense oneness (Kaplan & Kaplan, 1989; Van den Berg, Koole, & van der Wulp, 2003).

According to Tuan's (1974, p. 247) topophilia framework, the affective bond, which develops between people and a place or a setting and is accelerated by healthy and vital ecosystems, "takes many forms and varies greatly in emotional range and intensity". This is due to our different cultural backgrounds and personal traits, such as age, gender, education, occupation, and residence. Tuan's thinking represents cultural preference theories (Gifford, 2014), in which a human being is seen as "an active socially embedded individual manipulating and managing experience according to motivational patterns and within a context of social representations that frame the phenomenon encountered", as Pearce (2005, p.190) noted. Also Urry (1990) and Holden (2008) stressed the importance of cultural background in perceiving resorts' nature. They claimed that different lenses are used when tourists evaluate properties of a place and decode its meanings.

The socio-cultural lenses and the ways of speaking about wilderness have changed throughout historical periods and have been influenced by fashion and politics (Saarinen, 2005). These changed attitudes towards wilderness provide a good example of the historical shifts and cultural differences in images of nature and landscape. Wilderness was perceived as impenetrable, inhospitable, frightful and repulsive until it became accessible thanks to the innovations of travel technology, e.g. railways and motor vehicles, during the industrial revolution (Tuan, 1974; Urry, 2002). In Nordic context, wilderness was subjected to use, such as hunting and fishing, for long periods of time (Saarinen, 2005). People may still hold the functional image, and perceive nature as part of the cultural landscape and manmade elements as life-supporting (Buijs et al., 2006).

During nature-romanticism, people began to see wilderness as an aesthetic quality of landscape that produces mainly positive feelings and benefits. Wilderness became a place where cognitive freedom, escape from routines, sense of wholeness, and self-actualization were seen (e.g., Hallikainen, 1998; Saarinen, 2005; Sæþórsdóttir et al., 2011; Tuan, 1974; Young & Crandall, 1984), a potential antidote to an increasingly industrialized and technocratic world (Kaplan & Kaplan, 1989). In the later discourses wilderness was considered to need legislative protection and seen as a touristic commodity that can be produced and consumed (Saarinen, 2005). Nowadays many people hold these wilderness images of nature. They see nature as wild and not being subject to human society (Buijs et al., 2006). The image may explain the outcomes of the recent landscape preference studies. They have indicated that buildings, roads, cultivated



land and many other cultural elements reduce attractiveness of landscapes (e.g., Chon & Shafer, 2009; Hietala, Silvennoinen, Tóth, & Tyrväinen, 2013; Tveit et al., 2006).

In sum, the studies that produced evidences on individual differences in landscape perception and preference triggered criticism against the assumption that naturalness is a reliable predictor for people's landscape preferences across individuals, groups and cultures (Sevenant & Antrop, 2010). Accordingly, perception of landscape may vary between different tourists, as acknowledged in various tourist typologies (e.g., Hvenegaard, 2002; Sung, 2004).

Holden (2008) classified tourists into four segments based on the different motivations and perceptions of nature. 'Loungers' constitute the largest segment. They search for relaxation and enjoyment on holidays, which makes the nightlife a more important factor than outdoor opportunities in a tourism resort. Hence their perception of the environment is restricted to the near surroundings that are expected to be pleasant. 'Loungers' have a conceptual form of involvement with nature, which means that "the simple knowledge that a place where one can enjoy nature is nearby may be a source of pleasure" (Kaplan & Kaplan, 1989, p. 157). The second largest group is 'users' who pay more attention to nature. They typically perceive what nature offers when looking at its objects. 'Eco-aware' tourists are more interested in knowing about the resort's nature and culture. Therefore, they may even look for evidence of environmental commitment and environmental practices, e.g., how CO<sub>2</sub> emissions are minimized, how threatened species are protected, or whether the resort has set a limit for visits or public transport. High commitment to the environment motivates 'special eco-tourists' to actively protect nature. The last two groups make up the smallest segments of tourists.

### **Spatial perception and landscape qualities**

In their landscape preference framework Kaplan and Kaplan (1989) described people's spatial cognition process. They argued that certain attributes make landscapes and environments more attractive or preferable than others. When perceiving the content of the environment, people pay attention to the balance between manmade and natural elements and favor patterns that increase complexity and mystery of the environment (e.g., Bell, 1999; Daniel & Vining, 1983; Kaplan & Kaplan, 1989; Tveit et al., 2006). According to Kaplan's theory on informational processing, complexity refers to the number of different visual elements and describes the scene's capacity to occupy an observer without becoming bored or overstimulated (Kaplan & Kaplan, 1989). People associate complexity with biodiversity, which relates to landscape type as well as to species (e.g., Kellert & Wilson, 1993; Pouta, Grammatikopoulou, Hurme, Soini, & Uusitalo, 2014). In addition, complexity relates to affective experiences that deliver closeness with nature, essence of naturalness, and bonds with the area (Kaplan & Kaplan, 1989; Tuan, 1974).

People pay attention also to the organization of space. Then they assess how easily one can move around, or what possibilities for activities are provided within the settings (Kaplan & Kaplan, 1989). The issues refer to coherence and legibility of a site, which are often considered the most important qualities of landscape from users' point of view. Lynch (1960) introduced the legibility concept first in his seminal cognitive architectural place theory. Legibility associates with the ease of recognizing and organizing a setting. Based on his perceptual exploration framework, Gibson (1986) claimed that it is typical with our visual system to start looking around for opening vistas and landmarks that are value-rich ecological objects, such as hills or prominent trees, which stand out from their environments. Such recognizable features can also be unique manmade structures that function as anchors when people enter new environments (Lynch, 1960). Anchors draw attention, heighten our awareness and open up new options for experiences and directions for movement. They are used for navigation (Lynch, 1960; Stevens, 2006).

Gibson (1986) argued that legible environments give promises for further information based on what can be perceived within a site. Kaplan and Kaplan (1989) believed that people need cues about what lies ahead for maintaining their orientation, which makes them feel safe, competent, and comfortable. Lynch (1960, p. 4) associated “sense of emotional security” with visually and structurally coherent spaces of built environments that contribute to our sense of order and speed up our spatial learning.

In other words, people can tie the landscape scene together, create mental models of the space and store the information in long-term memory with the help of natural or manmade anchors (e.g., Downs & Stea, 1977; Golledge & Stimson, 1997). Depending on each perceiver's personal experience and familiarity with the area the anchors in the mental models are disconnected, loosely connected or interconnected (Appleyard, 1970; Golledge, 1978; Hart & More, 1973; Lynch, 1960; Piaget, 1976). Golledge and Stimson (1997) noted that when people expose themselves to an environment for a long time, they gradually construct a more complex and comprehensive picture at a cognitive level due to spatial learning. In other words, the mental models that are produced by a person's evolving coding system are completed with new knowledge and experiences (Hart & More, 1973). At first this system of reference is relative to the location of a person's body (egocentric). Later the system is fixed to recognizable and memorable features. Finally, it involves abstract places that are coordinated by imaginary axes. The coding system indicates personal differences in a tourist's landscape perception.

In sum, environmental psychology provides evolutionary and cultural approaches to study landscape perception. They highlight non-spatial (complexity and mystery) and spatial (coherency and legibility) qualities of landscapes in tourists' perception of unfamiliar environments. Naturalness and wilderness quality are associated with complexity of the landscape, which affects how stimulated people feel. Legibility is related to emotional security in nature-based tourism resorts that are surrounded by



large natural areas where one can easily get lost. Based on the cultural theories, tourists' motivations, spatial cognitions and landscape preferences differ. Thus, visitors of nature-based tourism resorts may have different degrees of involvement with nature that affects how landscape quality is perceived. Based on the selected indicators of landscape quality, this thesis appears to point more to evolutionary theories, but the existence of personal differences in landscape perception is acknowledged.

### 3 Materials and methods

The thesis is based on multiple approaches, which is a typical procedure in case studies (Yin, 2003). The approaches were classified into technical and observer-based landscape assessments based on Gifford's (2014) division. This chapter introduces the study areas and the chosen assessments.

#### 3.1 Study areas

The Levi and Ylläs tourism resorts that are the most visited tourist resorts in Finnish Lapland were selected as the study areas of the thesis. They are the largest among 23 resorts (10 in Finland, 8 Sweden, 5 Norway) with ski activities above the Arctic Circle in Nordic countries (Table 3). There were 448,845 registered overnight stays in Levi and 284,343 in Ylläs in 2014 (Regional Council of Lapland, 2016). Due to a large share of private chalets and other small-scale accommodation units with fewer than 20 beds, all visits to Levi and Ylläs are not registered.

**Table 3.** Ski resorts that practice internet marketing above Arctic Circle in Fennoscandia (Ski resort Service International, 2016). The resorts that are situated in the fell area of Western Lapland in Finland are marked with *Italic letters*.

Finland			Sweden			Norway		
Resort	Lifts	Runs	Resort	Lifts	Runs	Resort	Lifts	Runs
<i>Ylläs</i>	26	63	Björkliden	5	25	Fagernessfjellet	6	14
<i>Levi</i>	25	43	Riksgränsen	6	16	Målselv Fjellandsby	5	14
Pyhä	7	14	Dundret	6	11	Vestvatnet	3	8
Salla	6	15	Svanstein	5	16	Skaidi Alpin	2	4
Saariselkä	5	15	Kåbdalis	4	4	SarvesAlta	1	6
Suomu	5	10	Kiruna	3	4			
<i>Olos</i>	4	10	Ruskola	2	3			
Ounasvaara	5	8	Nuolja	1	off-piste			
Luosto	3	7						
<i>Pallas</i>	2	9						

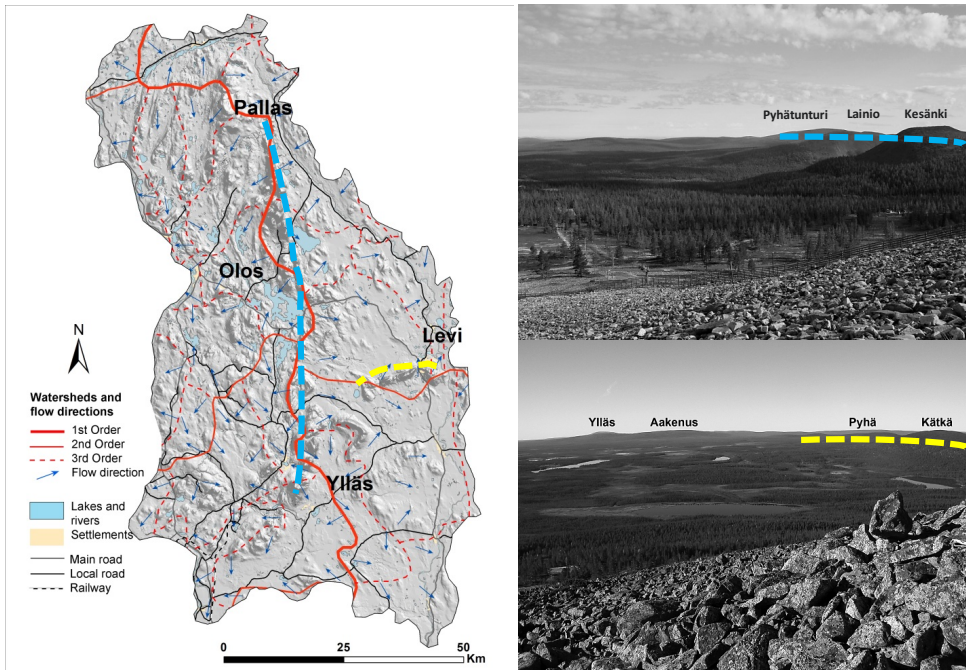
According to the latest Lapland travel statistics, the average annual growth rate of visitor numbers has been 5.1 % in Levi and 8.3 % in Ylläs during 2001-2014. The growth of infrastructure has been noticeable at the resorts as well. The average annual increase in bed capacity during 2001-2014 has followed more or less the growth rate of visitor numbers, being 5.8 % in Levi and 7.3 % in Ylläs (Regional Council of Lapland, 2016). The actual increase in capacity, being approximately 160 beds annually in the resorts, has been moderate compared to the planned increase. The development strategies have targeted approximately 1100 bed units per year (Nordic Marketing, 2007; Suunnittelukeskus, 2004). Also the actual growth of the infrastructure has been significant globally. For example, the increase in bed-unit capacity has been limited at 50 annual units in the Whistler resort of British Columbia in Canada (Story, 2012).

The study areas are situated in the southern part of the fell area of Western Lapland (Ministry of the Environment, 2016a) in the North Boreal zone, approximately 150 kilometers north of the Arctic Circle (Figure 6). The region consists of the valleys of Muonionjoki, Tornionjoki and Ounasjoki rivers and several watersheds. The main ridgeline Ounasselkä is the major watershed, which stretches about 100 kilometers south–north. This chain of fells and highland ridges forms the backbone of this region and creates a powerful contrast to the mire, water and coniferous forest landscapes in the lowlands (Uusitalo, Sarala, & Tuulentie, 2006). The region was covered by ice sheets 10,000 years ago and afterwards went through several glaciation stages, which produced only minor erosion and marginal meltwater deposits along the slopes of the fells. Therefore, the fells remained fairly high. The Levi fell reaches up to 530 meters above sea level and the Ylläs fell to 719 meters. The fells are covered by forest, excluding their supra-aquatic treeless and craggy summits.

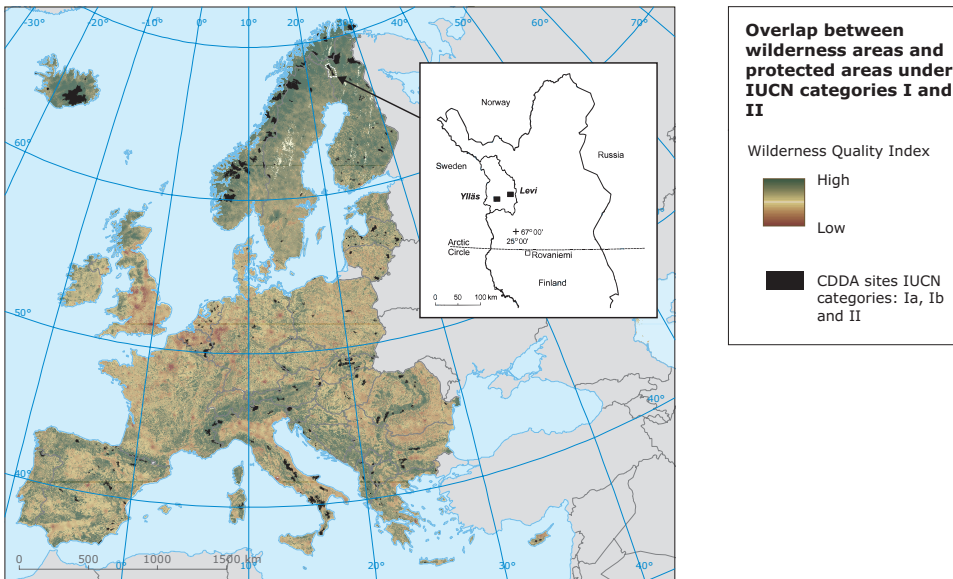
The Levi and Ylläs resorts are named after the Levi (67°78'N, 24°85'E) and Ylläs (67°56'N 24°22'E) fells located about 63 km away from each other. The development of the Levi resort originated from the village Sirkka in the valley between the Käkätunturi and Levi fells. Small rural villages are traditionally situated beside lakes and rivers in the region, which have been inhabited since the Stone Age (Muhonen & Savolainen, 2014). The ski runs and tourism accommodation and service districts are constructed around the Levi fell along a circular road. The development of the bipolar resort of Ylläs originated from old rural villages, Ylläsjärvi and Äkäslompolo, which are situated in the southern and northern sides of the Ylläs fell. The centers are connected by a fairly new road, which was constructed on the upper slope of the fell. The Pallas-Ylläs national park has restricted the extension of the built-up areas into the eastside of the fell.

Nature of the region is diverse, especially in the abundant protected areas, including the Pallas-Ylläs national park (Figure 7). The relief and the contrasting weather phenomena with occasional heat waves and very cold freezing temperatures provide variation to the local climate, flora and fauna (Uusitalo et al., 2006). Even though pine

and mixed conifer forests and mires are abundant, arctic-alpine species thrive on the fell summits and in the elevated boulder screes. The biodiversity is also increased by southern herb-rich forest species that occur in the fertile and moisture rich soils of the valleys. The southern species are on the northern limit and the arctic-alpine species are respectively on the southern limit of the species distribution area. The same applies to the fauna, since southern, eastern and northern species meet in the region, where almost half of the regular nesting birds of Finland reside.



**Figure 6.** The fell area of Western Lapland on the left (© Maanmittauslaitos, 2017). The Ounasselkä main ridgeline of the area starting from the Ylläs fell (upper right). The shorter ridgeline starting from the Levi fell (underneath right).



**Figure 7.** European protected areas (Ia=strict nature reserve, Ib=wilderness area, II=national park) overlapped with wilderness index (<http://www.eea.europa.eu/legal/copyright>, European Environment Agency, 2012). The Pallas-Ylläs National Park (red) within the fell area of Western Lapland (white borderline).

Fells and long and snowy winters have provided good opportunities for the development of ski tourism in the region. For a long time, the tourism business has been focused on winter activities, mostly downhill and cross-country skiing, snowmobiling, and reindeer and husky safaris. Temperatures stay below zero ( $^{\circ}\text{C}$ ) for approximately 200 days per year and half of annual precipitation (450–550 mm) is produced by snowfall (Uusitalo et al., 2006). The ski season typically lasts for seven months (October–April). Therefore, the large share of visits, being 80 % in Levi and 87 % in Ylläs, takes place in the winter season based on the statistics in 2014 (Regional Council of Lapland, 2016). The region provides various sites and conditions for wildlife watching and hiking, for example, for targeting year-round nature-based tourism. Summer activities have been promoted in the area by offering new program services, such as canoe safaris, and by building special environments, including the Levi Adventure Park and the Levi Golf Course.

The visitor profiles of the resorts differ somewhat. Approximately 30 % of tourists are international in Ylläs, whereas the number is slightly higher, being 41 % in Levi (Kittilä airport situated 15 km from the resort). Over half of all foreign visitors are Brits, Russians and Norwegians in Levi (Art-Travel, 2015). Middle-aged Finns who live in bigger cities and favor travel by private car or flying are met more often in Levi than in Ylläs (Tyrväinen et al., 2011). Moreover, hiking-camping, walking-jogging, landscape viewing and wildlife watching are the most favorite activities in the autumn season, and the latter especially in Ylläs. Tourists that visit the resorts in autumn or in

Ylläs value privacy, nearness to nature and environmentally friendly practices somewhat more than winter tourists of the resorts and visitors in Levi. They are typically older and more experienced travelers whose travel motivation, according to Pearce (2005), is often nature.

Due to the growth rate of nature-based tourism, it was expected that the development phase of Levi and Ylläs represent the likely future of the other ski resorts above the Arctic Circle in the long run. The analysis of the land use and landscape qualities of Levi and Ylläs could help to identify the challenges that the growth of nature-based tourism in vulnerable natural environments may bring. Levi and Ylläs were thought to complement each other. As a larger resort with its two centers and being attached to the national park, Ylläs was considered to be better suited for studying legibility with the help of tourists' mental maps (Article III). As a more compact resort, Levi was expected to better demonstrate the pressures of land use on the trail network (Article IV).

### **3.2 The technical landscape assessments**

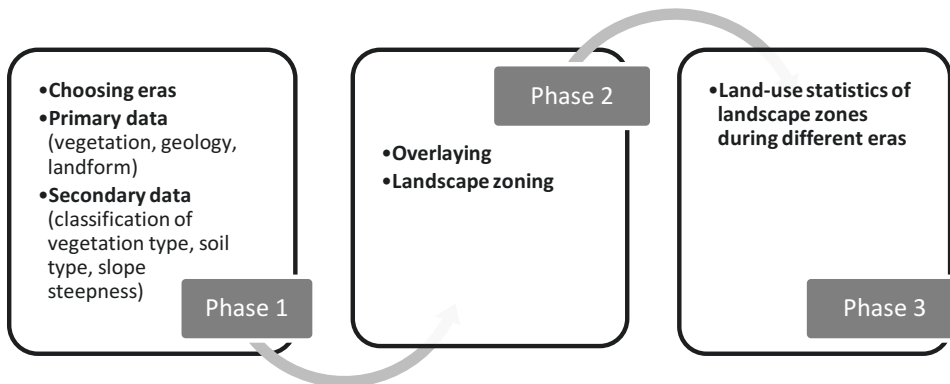
Two ecological landscape-scale approaches were implemented to assess landscape quality of nature-based tourism resorts. These technical assessments, which represent the expert paradigm (Zube et al., 1982), focused on landscape patterns of the resorts.

#### **Landscape architectural approach and land-use changes**

The resorts' ecological carrying capacity was studied through the landscape architectural approach (Article I). The landscape assessment was executed in three phases (Figure 8), two of them in an EU project. Data on natural factors was acquired during the LANDSCAPE LAB-project that was supported by the EU LIFE Environment Fund. The project took place in the Levi and Ylläs resorts in 2004-2007. The main aim of the EU project was to evaluate natural and cultural impacts of tourism (Arctic Centre, 2004). Digital elevation models of the studied resorts and landscape character zones were produced in the project.

The assessment focused on the configuration of manmade and natural features in the different landscape character zones of fell landscape. In order to identify the landscape zones that have particular characteristics and certain location in the area, land cover and geological data were interpreted in the assessment. First, the slopes were classified into steepness categories, soils were grouped into permeability classes and vegetation into erosion resistance classes by using the primary data (Figure 8). Second, the geo-referred data were overlapped to define the homogenous landscape zones and to produce a model of landscape structure. Zones of summit (i.e., ridge and fell tops), upper slope, lower slope and valley were identified. ArcGIS 9.2 software and its Spatial Analyst extension were used in the visual overlay analyses.

The sub-study was completed in 2013-2014 when the EU project had ended. The land-use statistics were acquired in the third phase of the assessment (Figure 8). Three maps were chosen to represent the evolution of the resorts over the past 40 years. The base maps in 1970 mirrored the tourism era prior to the intensive growth of winter sport activities. The maps of local master plans in 2003 reflected the period when annual growth was fast particularly in Ylläs and nature-based services became business as usual. The latest maps of local master plans in 2009 symbolized the current era, which targets year-around and sustainable tourism. The land-use plans were provided by Kittilä and Kolari municipalities. Then, the surface area that had undergone substantial underground construction, meaning mainly building lots, was counted in each landscape zone. The statistics aided in comparing the different land-use occupation levels between the zones, the studied resorts, and the eras. The high altitude areas, i.e., upper slopes and summits zones that are the most vulnerable to human-induced changes, were the special focus of the monitoring.



**Figure 8.** The study process in Article I.

### **Landscape ecological approach and trail network**

The second technical assessment studied the connectivity and accessibility of natural landscapes and attractions in a tourism resort. The attributes are associated with natural affordances of an area. The models of landscape pattern were produced in the Levi resort in three phases during a project of Natural Resources Institute Finland, Luke, in 2014-2015 (Figure 9). The models involved two types of least-cost path networks crossing three land-use zones.

The first phase of the assessment focused on accessibility of appealing nature areas with wilderness qualities (Figure 9). In this sub-study, it was assumed that all humans share more or less collective perception of the environment in favoring certain natural landscapes (Gibson, 1986; Kaplan & Kaplan, 1989). In order to select the appealing



areas, former research studies on people's landscape preferences were reviewed. Then, the data of occurrence of main forest species and timber volume were acquired for the resorts. Information on land cover other than forest land was picked from a land-use database, including water areas, agricultural land, built-up areas, and roads. The data set was categorized into 27 land cover and landscape types. Seven of them were seen to reflect landscapes with wilderness qualities, natural beauty, and high recreational value. In addition, three land-use zones were created; built-up area, nearby nature of the core area, and backcountry. The first two zones constituted the frontcountry that is achievable by an estimated 15-minute walk. This is how far people usually walk to reach green spaces in Nordic daily-life (Koppen, Sang, & Tveit, 2013).

Next, spatial modeling of multi-functional greenway networks was adapted and followed the least-cost path method, which was formerly applied to the city of Wuhan, China (Teng, Wu, Zhou, Lord, & Zheng, 2011). The least-cost path toolset in ArcGIS v9 was run to identify the trails of Levi that lead from each built-up area (source) to each attractive nature area (destination) via the most cost-efficient route that favors natural landscapes along the way. For this purpose, the land cover raster data was reclassified into the cost surface, which then reflects how each land cover type relates to the ease and appeal of passing through the landscape. Hence, attractive landscape areas on land, as well as roads and tracks, which improve accessibility of the sites, were given the lowest cost values. Respectively, water areas that are unpassable on foot during summer, fields and built-up areas had the highest cost values. Based on the LCP model, the trail network was recategorized to existing high-cost trails and existing least-costs trails. A new class, non-existing least-cost trails (potential new trails), was added in the network of trails for the further analysis.

It was expected that tourists have good possibilities of encountering wildlife when fauna thrives and moves in the area. Therefore, the second phase of the assessment (Figure 9) focused on predicting where wildlife encounters on a trail network are likely to happen. The analysis was based on connectivity, which indicated how species can disperse within the area based on vegetation patchiness and stepping stones. Small natural patches can function as continuous corridors or as a series of non-connected habitats (i.e., stepping stones), especially in fragmented landscapes (e.g., MacArthur & Wilson, 1967; Wilson & Willis, 1975).

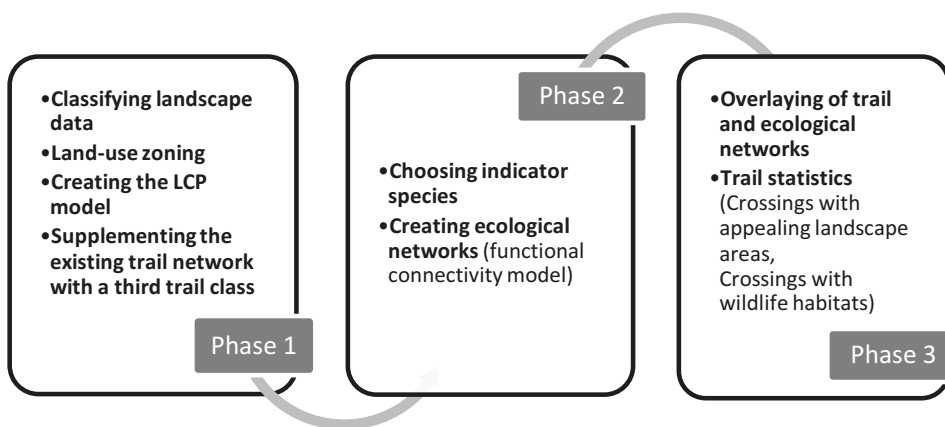
The habitat modelling toolset of FunConn was chosen to carry out the assessment. It is one of the extensions of the least-cost path method and belongs to landscape pattern indices, which are also applicable to digital data and different spatial levels in the GIS (Botequilha Leitão, Miller, Ahern, & McGarigal, 2006). FunConn is a freely available software package for the geoprocessing toolbox written for ArcGIS v9. It was developed by Theobald, Norman and Sherburne (2006) to manage functional connectivity of wildlife's habitat patches. The toolset is based on a patch-corridor-matrix model (Forman, 1995), which is applicable to all types of areas and therefore also suitable



to evaluations of land-use impacts in tourism resorts. The toolset generates a network of suitable wildlife's home patches in an "inhospitable" landscape for chosen animal species. The network is defined by the cost surface, which is created on the basis of the quality of foraging resources, structure of patches (edge or core effect), and distances from disturbances, for instance, from compact built-up areas (see the description of the trail analysis above). The cost surface reflects the perception of the environment by the wildlife passing through.

The ecological networks of local wildlife were modelled with the help of three indicator passerine bird species. Arboreal species were favored not only because they belong to typical wildlife in the case resorts, but because they are usually sensitive according to Hilty et al. (2006) to the level of fragmentation, corridor quality and spatial isolation. A multispecies approach was chosen instead of one indicator species in order to increase validity and to get a bigger picture of wildlife use of the resort's landscape. Siberian jays (*Perisoreus infaustus*) represented old-forest oriented wildlife in the resort, whereas willow warblers (*Phylloscopus trochilus*) indicated managed-forest oriented species and northern wheatears (*Oenanthe oenanthe*) represented alpine and open-area oriented species. The information on habitat criteria of each species was entered into FunConn, which generated the networks for the indicator species based on the species-vegetation affinities.

The attractive landscape areas and the ecological networks were overlaid with the extended trail network in the third phase of the assessment (Figure 9). Then, the number of attractive landscapes that are reachable via the different trail types was counted in each of the predetermined land-use zones. Respectively, the parts of the ecological networks overlapping with three trail types were counted in kilometers. The statistics gave estimations of potential wildlife encounters per trail kilometer. At the end, the data of the existing trails were compared with the new least cost trails.



**Figure 9.** The study process in Article IV.

### 3.3 The observer-based landscape assessments

Two perceptual approaches were implemented to assess the landscape quality of nature-based tourism resorts from observers' perspective. The psychophysical and cognitive approaches gathered experiential knowledge of the users of the resorts. The knowledge also involves users' values, attitudes, preferences and memories that they employ when interpreting and processing information of the environment (see Faehnle, Bäcklund, Tyrväinen, Niemelä, & Yli-Pelkonen, 2014).

#### **Psychophysical approach and tourists' landscape preferences**

The first observer-based assessment was a rank-ordering method. It was chosen to assess naturalness, i.e., the desired compatibility of nature and tourism resorts' land use. The method belongs to the psychophysical paradigm and is typically applied when people's preferences in landscapes or management options are compared (Zube et al., 1982). The data were collected in the MATKA project, which was funded by Sustainable Community Program of Tekes and took place in Ylläs in 2009-2011. The project aimed at identifying the criteria of sustainable development for tourism resort planning. The project was carried out partly for preparations of a new land-use plan in the Ylläs resort.

A pretested questionnaire for winter tourists was conducted in 2009 in the resorts of Ylläs and Levi. Experienced field workers collected the data. Domestic and inbound tourists were approached randomly at airports, restaurants, hotel lobbies and cafes, where visitors were asked about their travel motives, outdoor activities, and accommodation preferences. Furthermore, the questions dealt with the importance of various sustainability practices to the respondents and their willingness to engage in the practices during the visit. At the end of the questionnaire, the tourists were asked to choose between illustrated options of accommodation facilities and building development.

For this purpose, the land-use options were illustrated with image-edited photos that represented different views from a chalet and a hotel window. The amount of natural views from a window was decreased and the number of buildings was increased respectively to reflect the degree of on-site naturalness quality. Hence, the series of photographs produced a naturalness-facilities continuum. Also four options of yard management were illustrated. One of them pictured an unfinished yard and the rest consisted of scenes that represented different landscaping practices in the yard, i.e., preserving original vegetation, planting flower beds, and site-hardening with a stone yard.

The final series of photographs in the questionnaire illustrated different types of land-use patterns of a nature-based tourism resort viewed from the backcountry. The different building patterns of these extended landscape scenes had the same amount of gross floor area in each photo, but the height and the placing of the buildings differed along the slope of a fell. The options illustrated decentralized and centralized (clustered) patterns that were created by either single chalets or multi-story buildings.

The photo-manipulations reflected the degree of naturalness quality on a landscape scale. The most land-use intensive window views and the centralized building clusters demonstrated resource-efficient land consumption among the options.

After the data was acquired, the respondents were categorized into visitors of Atlantic, Central European, Mediterranean, Nordic and Eastern European origin. The categories were formed according to demography, population density, state of urbanization and socio-economic conditions in the regions where tourists lived. The tourists' preferences were measured through 5-point Likert rating scales. Joint variations of accommodation attributes were investigated. Furthermore, sustainability practices were grouped with Varimax rotations in maximum likelihood factor analysis. In order to see whether tourists' geographic areas (or nationalities) would explain the differences in the preferences, the new groups were compared. The task was carried out with variance analysis and Tukey's test. The statistical analyses were computed using SPSS 15.0 statistics program.

### **Cognitive approach and tourists' mental maps**

The technique called cognitive cartography was adapted in the second observer-based assessment to view legibility and natural image of the Ylläs tourism resort and tourists' spatial learning. An analogous method was previously tested in an urban city in northern Finland by Allas (1993). The method belongs to the cognitive paradigm of environmental psychology and reveals human strategies for processing environmental information (Appleyard, 1970; Kitchin & Blades, 2002; Lloyd, 1999; Lynch, 1960; Zube, 1984; Zube et al., 1982). The sketch-mapping technique reveals people's mental constructions of the destination and the elements and linkages that are relevant to users in an area. A sketched map reflects the spatial structure of an area, i.e., how different sites are related and connected in a person's mind. The lack of connections between the sites may predict spatial behavior better than the knowledge gained by asking direct questions about the quality. Hence the method can produce usable place-related information for planning.

Tourists were asked to sketch Ylläs maps including attractions, landmarks and other special places, which could interest first-time visitors. The sketching task was executed in 2005 preceding focus-group interviews in the LANDSCAPE LAB-project. Altogether six interviews were carried out to inquire about tourists' landscape perceptions and favorite sites in Ylläs for the project. Background information about the tourists, such as age, gender, hometown, education, length of presence and outdoor activities, was gathered from the interviews. Additionally, local residents of Ylläsjärvi and Äkäslompola villages drew mental maps of Ylläs prior to a participatory landscape management workshop, which took place in the following year. The locals' sketches functioned as the reference to which tourists' perceptions were compared.

The sketch maps of Ylläs were analyzed in 2009, when the LANDSCAPE LAB-project had ended. First, the respondents were classified into experienced and first-time visitors and local residents with the help of the background information. Second, the analysis of the contents of the maps was executed. The method was based on Lynch's (1960) theory of legible cities and revisions made by Appleyard (1970) and Hart and Moore (1973). The arrangement of the visual elements, i.e., the structures of the maps, was investigated. Then the mental maps were compared to the topographic map of Ylläs to estimate the sketched areas in square kilometers (scale of map) and to gauge accuracy (distortions).

Finally, nonparametric One-Way ANOVA and Kruskal-Wallis p-value tests were computed to examine the differences of the map parameters between the uneven user groups. The groups were evaluated based on whether they shared a similar system of reference in their spatial cognition of Ylläs. Finally, a typology of users was created according to the map qualities.

## 4 Results and discussion

This chapter discusses how distribution of nature affects landscape quality of nature-based tourism resorts. The first section describes the outcomes of two assessments of the resorts' landscape patterns. It reflects the impacts of the location of built-up areas and growth strategies on ecosystems and natural affordances. The second section introduces the outcomes of two user perception-based assessments. It reflects how tourists perceive landscape quality of tourism resorts and, on that basis, whether they are likely to accept the intensification of land use that produces urban-like districts. The last section suggests some managerial implications that maintain or increase resorts' naturalness.

### 4.1 Landscape quality of growing resorts

The results of the assessments of landscape structure showed that the land-use strategies of the tourism resorts have succeeded in fostering ecological functions quite well (Article I, IV). They also implied that the new land-use trends are likely to impair the resilience of the vulnerable ecosystems in the frontcountry in the long run.

#### **Good opportunities to nature experiences**

The monitoring of land use indicated that ecological sustainability has been maintained quite well in the Levi and Ylläs tourism resorts (Article I). Tourism growth has been controlled through traditional zoning, which has directed the majority of the built-up areas in the most resilient ecosystems. The lowlands have taken the largest share of the increase in built-up hectares in the resorts, with 71% in Levi and 93% in Ylläs. The valley ecosystems (excluding mires) are, in general, quite resilient due to more favorable climatic conditions and fine-grained fertile and moist soils that have better bearing capacity and constructability.

The monitoring further showed that not only the natural constraints, which determine the amount of suitable lowland, but also road construction has played the leading role in the development of the resorts. Main roads have directed the later land-use development in Levi and Ylläs. Rather large areas of new accommodation sites that are easy to reach from the main road going around the Levi fell have been built above the tree line ecotone, i.e., the upper-slope zone. The location provides attractive wilderness

sceneries and proximity to the ski slopes. Similar development occurred in Ylläs, where the relatively new road goes along the boundary of the upper-slope and summit zones.

Consequently, there is a lot of potential for nature experiences in the resorts. This interpretation was further confirmed in the analysis of Levi's trail network. The assessment showed that tourists can perceive a broad range of nature in the built-up area fairly easily (Article IV). Half of the landscapes that have appealing wilderness characteristics can be reached on trails during the snowless time of year. Old-growth forests and pine mires are rather adequately displayed around the summer trails. These habitat types belong to the Finnish landscapes that carry wilderness quality (Hallikainen, 1989), and they increase towards the backcountry of the resort. On the contrary, the open landscape types can be entered merely via ski tracks and snowmobile routes. They are namely large treeless mires, lakes, rivers and tree-line alpine land that, according to Hallikainen's (1998) studies, also possess wilderness quality and promote the wilderness experience.

The functional connectivity models of wildlife produced parallel findings (Article IV). They showed that the trail network provides good opportunities to encounter various types of wildlife also in the built-up areas, despite the fact that forests prevail along the trails. This is due to the fact that natural areas cover approximately 70 % of the resorts' local master plans, since many accommodation districts are still composed of sparsely located single-family houses on large lots (Suunnittelukeskus, 2004). The tourists are less likely to encounter wildlife typical to the fells compared to the forest species. The managed-forest oriented wildlife exists in approximately 80 % of nature areas due to the prevailing middle-aged and young managed forests.

### **Risks of dual growth strategy**

The assessments of landscape structure indicated that the land-use trend of the tourism resorts is changing. The growth volume of the high altitudes has almost doubled in Levi and tripled in Ylläs (Article I) during the era when the resorts declared in their development strategies that sustainable tourism was the target (Nordic Marketing, 2007; Suunnittelukeskus, 2004). For example, a new district for 12 500 bed units (350 000 k-m<sup>2</sup>) in upper-slope zone of the Ylläs fell is allowed by a master plan (Stafans & Meriluoto, 2011). It seems that the road has motivated the new plans of the large accommodation and business districts that are located in the vicinity of the road. These findings imply that the resorts have locked on pro-growth mode, referring to Gill and Williams (2011), and apply dual strategy of land use.

On one hand, the major share of new infrastructure is directed to the existing districts in intrinsically resilient valleys and lower slopes. Compact building blocks are targeted through the infill development for the sake of environmental protection. On the other hand, sprawl of new accommodation occurs concurrently in vulnerable high altitudes due to two main drivers. First, the amount of available lowland is becoming a scarce resource. Second, the high altitudes provide space to satisfy the demand for

solitude through more private accommodation and closeness to nature or ski lifts. The perceptual assessments (see the second section) implied that such demand can arise, if new buildings in the neighborhood start to push nature and recreational trails further away from the doorsteps.

The findings also revealed that the old-growth forests, which are large enough to create home patches of the wilderness-oriented wildlife, locates predominantly in the resort's backcountry (Article IV). People can trespass the home-patch habitats of wilderness species approximately three times more often in the backcountry compared to the frontcountry. The findings further implied that the encounters with the wilderness-oriented species in the frontcountry are likely to occur in habitat corridors and are therefore quite incidental. The built-up areas have fragmented the living environments of the local fauna into smaller habitat patches within 1.5 km walk from the accommodation and service districts. This is part of the reason for the domination of the habitat corridors. The functional connectivity model of the alpine-oriented wildlife, in turn, showed that the summit of the Levi fell above tree line forms a rather isolated home patch for the species.

The models demonstrated that habitat and connectivity losses are risks particularly to wilderness and alpine species of the growing resorts. Habitat loss happens when forestland or arctic heaths are converted for human uses, whereas connectivity loss means that dispersal corridors between home patches become insufficient and cause isolation of habitats (MacArthur & Wilson, 1967; Turner, Gardner, & O'Neill, 2001). Former studies have evidenced habitat and connectivity losses that have declined territory occupancy and nesting success rates of disturbance-susceptible bird species in the region (Kaisanlahti-Jokimäki et al., 2008). Referring to Hilty et al. (2006), the wilderness-oriented species, in particular, can start avoiding the frontcountry, if the increasing land-use intensity narrows or breaks the corridors. The fragmentation easily leads to higher abundances of human-associated bird species, as evidenced in the most disturbed sites in a former study (Huhta & Sulkava, 2014). This indicates shifts in the species composition in the area.

The growth that sprawls to the high altitudes does not have only on-site effects but also wider consequences to landscape ecology of the resorts in the long run. The fragmentation alters interactions of neighboring ecosystems that dampen fluctuations from disturbances and increase stability of the inherently fragile ecosystems (Forman, 1995). As follows, the impacts carry over. Accordingly, construction work in high altitudes will change volumes and courses of fundamental water and nutrient flows. The increased velocity of runoff causes erosion and nitrification in lower altitudes. There are implications of such development in the region. Kangas (2009) presumed, based on evidence, that the removal of slope vegetation and top layer of soils and slope management have eutrophicated some lakes. Erosion and nitrification may affect nature experiences, e.g., hiking and fishing, especially in snowless seasons.



The findings suggest that the present planning approach is not effective enough in supporting the sustainable development of summer tourism. Furthermore, they propose that the existing land-use strategies more or less ignore the role of landform as the driver of ecological and hydrological processes. Consequently, the approaches to landscape ecology in resorts' land-use planning appear to be too narrow. In the long run, it may lead to failing to protect the fragile ecosystems and the habitats of wilderness wildlife in the northern latitude where ecosystems have weak buffering capacity and adaptability to fragmentation-triggered changes. Hence, destination management supporting significant economic growth may unintentionally reduce landscape quality and the potential for nature experiences.

When a ski resort is locked on the pro-growth mode, the bed places and other services consuming resources are readily scaled based on the peak demands of the wintertime visitors. This scaling principle easily triggers the ecologically unsustainable rise of accommodation capacity, while the annual occupancy rate stays low. The rate is now approximately 40 percent in the Finnish Lapland due to the low seasons (Official Statistics of Finland, 2014), but the tourism regional strategy is designed to increase the occupation rate of the existing accommodation capacity up to 50 % by 2040 (Regional Council of Lapland, 2015).

Hunter (1997) and Hall, Müller and Saarinen (2008) noticed that the dependency of regional development on tourism in peripheral areas often feeds pro-growth strategies. The dependency is obvious in the studied resorts. For example, the tourism business of Ylläs created 48 % percent of the direct revenues of the Kolari municipality and provided 39.5 % of employment in 2011 (Satokangas, 2013). The rates are significant in particular because tourism has additionally indirect financial implications for the related business sectors, such as construction, retail, and transportation.

The pro-growth mode is also driven by the intrinsic belief of the whole tourism sector in global economic growth (Butler, 2006; KPMG, 2008; Yeoman, Munro, & McMahan-Beattie, 2006). Saarinen (2006) noted that this belief is fed by the assumption that carrying capacity is adjustable. It is based on the understandings that different tourist sectors perceive the landscape quality differently, and tourism activities and products have different limits of growth. Therefore, it follows that carrying capacity can be increased through environmental enhancements and product development. This belief further motivates the idea to reflect the different tourists' perceptions of landscape quality.

## **4.2 Perceived quality of resorts' environment**

According to the landscape preference study, tourists may find the present surroundings of the tourism resorts rather uniformly satisfying (Article II). The findings showed that eco-efficient land use is likely to reduce the contentment and identified the presence of

green consumers who prefer comfort over environmentally friendliness when they are subjected to a trade-off situation. The cognitive cartography revealed that legibility of the frontcountry may need improving especially for the sake of newcomers (Article III).

### **Nearness of nature**

Altogether 1054 tourists (70 % foreign, 30 % domestic) representing 33 countries participated the landscape preference study, which took place in Levi and Ylläs (Article II). The results confirmed that nature and natural landscapes are important to tourists. The respondents regarded the opportunities to experience peace, quiet, privacy and nature as the most relevant factors that contribute to their choices of accommodation. The direct access to nature at the doorstep was the most important factor when making choices. The tourists' perceptions of different building patterns also revealed that different tourist sectors perceive resorts' landscape quality rather similarly. Their responses to the building alternatives showed only a small variation.

The findings further implied that tourists are rather insensitive to the location of buildings in high altitudes, but instead are quite sensitive to the amount of nature on-site as well as in far-view (Article II). The respondents considered small-scale accommodations of decentralized single chalets the best choice, whereas multi-story buildings were not a favored option. Almost all tourists regardless of their geographical backgrounds thought that the window view of nature areas is better than of other buildings. The outcome shows that tourists almost universally perceive the scattered building pattern of a nature-based tourism resort as attractive. The scattered housing is able to provide more opportunities to experience privacy and peacefulness in natural settings and allows visitors to get connected with nature also in accommodation sites. On the contrary, neighboring buildings in the centralized and compact build-up areas can prevent the natural views from the room of a holiday apartment or hotel.

The sub-study also indicated that paving may further decrease the perceived naturalness of the site. Tourists found preserved forest vegetation and flower gardens more likable than stone, asphalt or gravel yard paving, which is the typical site hardening practice in Lapland, since it is a simple way to prevent uncontrolled erosion of ground vegetation and to ease snow-ploughing. The majority of the foreign tourists were not accustomed to Finnish nature, but they did seem capable of interpreting the essence of naturalness featured by the local flora. The South Europeans were the exception when they regarded the flower gardens as the best landscaping practice of the yards.

These findings highlight that tourists need to enjoy not only far-views of nature, but also to sense nature within the built-up area. The importance of the landscape quality of near-views has been previously reported in the studies related to forest management (Silvennoinen, Pukkala, & Tahvanainen, 2002; Tyrväinen et al., 2016). Hence this thesis argues that the land-use intensification that strives for more compact districts in the frontcountry neglects landscape preferences of most tourists. One

possible cause, referring to Tuan's (1974) topophilia framework, is that eco-efficient land use may obstruct bonding with nature. With more overall naturalness, a stronger sense of belonging and comfort can develop and lead to place attachment, based on Relph's (1976) arguments. The outcome seems to apply especially to tourism during snowless seasons. Domestic tourists were shown to be more sensitive to compact building patterns when visiting the resorts in the autumn season compared to other times (Tyrväinen et al., 2011).

The importance of nature is highlighted in many tourism studies, which have revealed that pristine Nordic nature, beautiful sceneries, outdoor recreation opportunities and diversity of the environment function as pull factors of nature-based tourism (e.g., Haukeland, Grue, & Veisten, 2010; Tyrväinen et al., 2016; Wall-Reinius & Bäck, 2011; Wall-Reinius & Fredman, 2007). However, they have not stressed the importance of constant nearness to nature. The preferences of accommodation sites indicated the wish to be surrounded by nature nearly continually. Even though people generally see a high degree of naturalness as desirable, it does not necessarily mean that human elements in the landscape are disturbing. Instead, well-designed built-up areas can contribute to heterogeneity of landscapes and the sense of place (e.g., Antrop, 2005; Buijs et al., 2006).

### **Roads and buildings as anchors**

Altogether 22 tourists and 14 locals attended the interviews that yielded 36 mental maps (Article III). The cognitive cartography produced knowledge that is somewhat counter to the findings of the landscape preference study, which suggested that tourists pay a lot of attention to the nature areas of tourism resorts. The contents and structures of tourists' mental maps implied that many tourists primarily recognize buildings and make only few connections between different areas in nature-based tourism resorts. Even though the Ylläs terrain is dominated by large natural areas, the tourists most often sketched the symbols of main roads and distinctive buildings that provide tourism services. This was the case in particular when tourists had limited knowledge of the resort.

The sub-study further indicated that there are differences in people's perceptions of the resorts' environment. The tourists' maps were in general less structured (mosaic) and included more omissions and distortions compared to the locals' larger maps, which had more interconnected elements. Moreover, the local residents' distortion parameter was smaller compared to the tourists on average. The long history with the resort seems to produce more holistic and realistic images containing plenty of natural elements. The findings are in line with the previous tourism studies about spatial legibility of unfamiliar environments (Walmsley & Jenkins, 1991; Young, 1999). The perception of nature is the outcome of a recalling process and becomes more accurate through spatial learning (e.g., Golledge & Stimson, 1997; Lynch, 1960). Based on the theory, the findings suggest that the focus on natural elements increases when tourists gain experience with the resort.

The differences between people are often explained by perceiver-related factors. Kitchin and Blades (2002) pointed out that these factors produce different cognition systems through which the physical environment is perceived. Socio-demographic factors, personality traits, holiday motivations and cultural background have been identified as impacting how tourists comprehend and interact with familiar and unfamiliar environments (Hart & More, 1973; Kianicka, Buchecker, Hunziker, & Müller-Böker, 2006; Plog, 2001; Pouta et al., 2014; Tveit et al., 2006; Walmsley & Jenkins, 1991; Young, 1999). However, the differences in the content and structure of people's mental maps of Ylläs could not be explained by socio-demographic factors or cultural background in this study. Since some local residents and tourists sketched similar maps, it seemed that there were other personal factors that defined how the mental constructions of environment were created in people's minds and what role nature played in the process.

When maps were classified based on the structure, four groups of people were identified. The typology was based on the different spatial anchors and system of reference (Hart & More, 1973) that the people seemed to use in coding of the resort and its scale. Road mappers were typically domestic tourists who had little previous knowledge of the resort. They perceived the resort as a village or a core area where their hotel, key service facilities and few connecting roads were located and functioned as anchors. There were also survey mappers, who were mainly foreign tourists exploring the resort within guided tours for their first visit. They used distinctive buildings (points) instead of roads (lines) as anchors. These two novice groups use an egocentric system of reference when perceiving the environment. Other survey mappers were local residents and domestic tourists who visited the resort frequently. This heterogenic third group uses a fixed system of reference focusing more on natural elements. Most of the local residents were classified in the fourth type of survey mappers who utilize an abstract system of reference. They illustrated the most complex, accurate and largest maps of Ylläs including large parts of the Ounasselkä ridge.

To conclude, based on the findings of the perceptual studies, the understanding that carrying capacity can be modified (Saarinen, 2006) is seen as an unsuitable approach to the development of nature-based tourism resorts. The perception of the environment may differ between tourists due to the spatial learning (Article III), but not because the perception of landscape quality would vary significantly between tourists. Instead, the desired quality appears to be quite universal (Article II). The interpretation integrates both the evolutionary and cultural theories (Gifford, 2014).

### **Green consumers and newcomers**

The generic preference of scattered building patterns (Article II) seems somewhat contrary to Weaver's (2006) belief. He assumed that green consumerism had established itself as an integral part of the consumer market in postmodern society. He believed

that the active environmentalist segment was soon to become the majority of the clientele in tourism destinations. Thus, the issues related to impacts on the environment, such as resource usage, pollution, and animal rights, would change tourists' behavior. Hence one would expect that tourists holding these values would approve urban-like sites produced by land-use intensification.

According to the findings, the visitors held values that reflected environmental friendliness when they expressed practices that they found important to sustainable tourism. They considered protection of native flora and fauna, sustaining green corridors within the built environment and minimizing erosion of natural areas as the most important practices. They were, however, less eager to implement them. They were most willing to follow signposted trails to protect nature, but did not want to avoid private motoring. This was the case especially with the domestic tourists and visitors from East Europe who travelled to Lapland mainly by private cars. The preference study also showed that East and Atlantic Europeans were only somewhat more permissive about urban-like sites. The British, who preferred hotel accommodations more than others, often travel by air and with children when visiting Lapland. Hence, they need to have facilities within walking distance. The compact pattern of tourism service buildings that provides the possibility to travel without private cars can better fulfill this need.

The findings show that eco-efficient land use is a complex issue, which needs more attention in tourism planning. The findings indicate that tourists' environmental attitudes and behavior may not necessarily be consistent. A tourist who expresses environmental concern may also request amenities and easy access to services and wilderness areas. This kind of inconsistency has been shown to be a common phenomenon in consumers' behavior (e.g., Allwit & Berger, 1993; Lindenberg & Steg, 2007; Schwartz & Bilsky, 1990; Scott & Willits, 1994). Weaver (2006, p. 64) admitted that there are also "vener environmentalists" among tourists. These tourists express environmental and social concern while expecting a high level of comfort during their holidays. Therefore, they purchase green products only sporadically and selectively, when the products do not threaten their standard of living or lifestyle. Similar arguments have been made, e.g., by Kompola (2006), Haukeland et al. (2010) and Wall-Reinius and Bäck (2011).

The behavior can be explained by the goal-frame theory (Lindenberg & Steg, 2007). Pro-environmental behavior may not be personally beneficial when a tourist seeks convenience in traveling. For example, using a private car and having accommodations in an isolated chalet surrounded by nature can be comfortable and pleasurable choices, which can override commitments to pro-environmental behavior, such as using public transport and choosing a hotel room in a densely built resort where land use is eco-efficient. The behavior can be alternatively explained by a tourist's belief in the right methods. It has been disputed lately whether compact building patterns can improve resource efficiency in urban growth (e.g., Mindali, Raveh, & Salomon, 2004; Ottelin, Heinonen, & Junnila, 2015). A person who shares this understanding may not believe

that nature and habitats can be protected and that private motoring can be reduced by intensification of land use. In any case, the environmentally aware tourists who could support eco-efficient land use in nature-based tourism resorts seem to still represent the minority of the customers.

Novice tourists are other puzzling group when we think of naturalness. The foreign newcomers, who are focused on resorts' growth strategies and product development, left out the prevailing natural elements from their mental maps (Article III). Approximately one in ten maps that were sketched by the foreign tourists and half of the domestic tourists' maps included symbols of fells. In comparison, the locals illustrated fells in nine out of ten maps. Lakes were sketched more often compared to the fells even though the Ounasselkä fell chain is the most prominent landmark in Ylläs. When the fells closest to the center were illustrated, they appeared to function as linear barriers that separate different areas or as borders of the resort. According to Lynch (1960), the tourists may regard them as impenetrable boundaries that he called edges. The lack of fell symbols may suggest that tourists are not drawn to wilderness-like areas and that they may have found them inaccessible, non-appealing, or even scary.

When we consider the landscape preferences, it is not likely that tourists find the nature areas repulsive. Instead, it seems that there are not enough entrances, openings and access sites in the built-up areas that would guide people to the nature areas. The maps drawn by most of the experienced travelers support this explanation (Article III). They also illustrated the fells as edges even though they are likely to know that the areas are designated for outdoor activities and that nature trails lead across them. This explanation and the outcome of the trail network assessment, which indicated some limits of accessibility to the appealing nature areas in the frontcountry (Article IV), lead us to next topic dealing with the management of resorts' naturalness.

### **4.3 Maintaining resorts' naturalness**

The sub-studies of this thesis highlighted the need for landscape planning that fosters opportunities for nature experiences. The approach is essential to resorts, which aim at sustainable growth through development of year-round tourism products. High altitudes and nature of the frontcountry while sustaining the landscape ecosystem are the focal factors of landscape planning. They are key areas also in regular monitoring of landscape quality.

#### **High altitudes and built-up areas**

The stability of ecosystems in the northern latitudes requires, referring to Forman (1995), large natural areas with many links and loops between ecosystems. Hence, greenspaces in built-up areas are easily left too small or monotonic to keep ecological

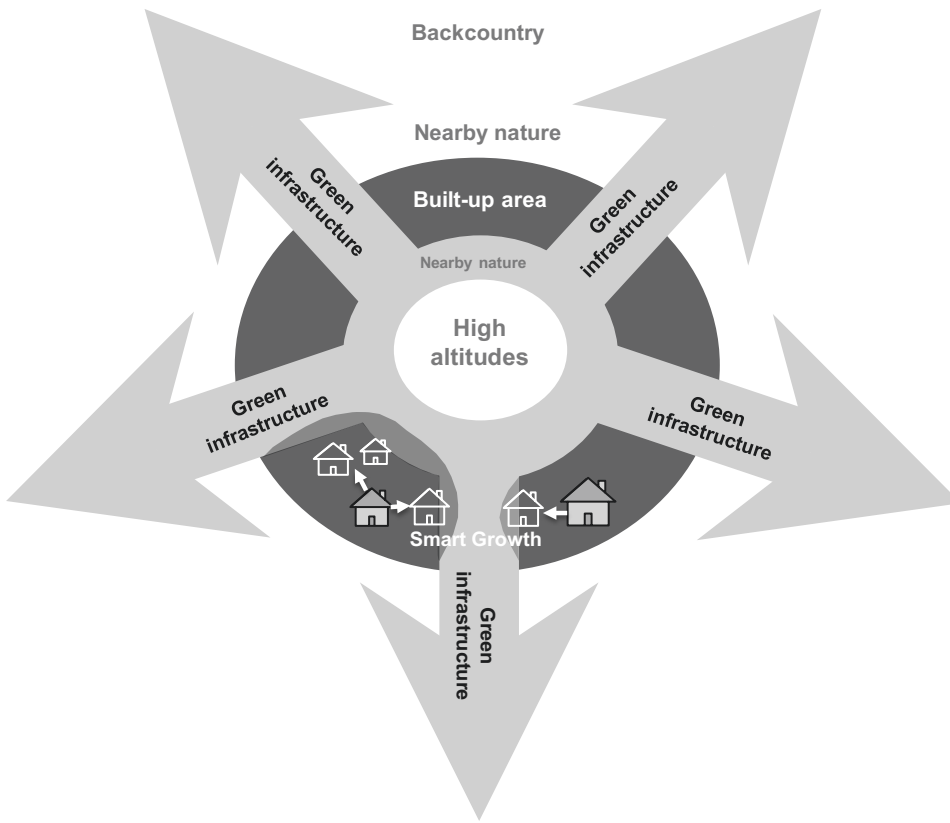


functions going, especially when eco-efficient land use is applied mechanically without local adjustments. If they are too small, greenspaces cannot take the pressure of growing numbers of summer tourists. Wearing of nature will increase the costs of landscape management. Saarinen (2006) noted that growth strategies, which rely on adjustable carrying capacity, often cause high expenses of site management. The strategies concentrate merely on product development even if redefining of the land-use planning approach would bring the best result economically in the long run.

This thesis recommends redefining of the planning approach. The outcomes of ecological studies (Article I, IV) highlighted fostering functional connectivity on a broad scale and suggested better integration of landscape ecology into spatial planning. Referring to Forman's (1995) and Randolph's (2004) ideas, smart growth, which emphasizes green infrastructure (GI) as the skeleton of the tourism resort and the limit of land-use intensification and sprawl, offers a possible format. The GI of resorts aims to maintain the high altitudes in their natural state and connectivity of ecosystems between landscape zones (Figure 10). It involves networks of protected areas, wildlife habitats and corridors, transition areas in-between, and recreational greenways. For example, buffer zones, setback greenspaces, trails, ski runs, and golf courses belong to the green network.

The GI prescribes the building density and pattern in the frontcountry. The growth is based on the existing built-up areas of lower altitudes that are filled with a new infrastructure up to the limit set by the GI. High landscape quality of nearby nature, including the closeness of nature in accommodation areas (Article II), is enhanced by the landscape ecological planning. According to Forman (1995), fine-scale designs focus on connectivity as well. A siting of new lots in the ecological greenspace design preserves habitat patches, stepping stones and corridors for wildlife. In addition, it provides room for a trail network and natural drainage to minimize runoff. For this purpose, a building pattern leaves coherent greenspaces between new buildings, which are constructed as small clusters just outside of existing built-up areas (Figure 10). Despite its good intentions, the present greenspace design usually concentrates too much on "cosmetic improvements". It means that the landscaping of new lots and their setbacks involves mechanistic visual preservation of natural vegetation or replanting.





**Figure 10.** Scheme of Green Infrastructure.

Adapting the principle makes the new buildings appear as an integral part of the surrounding nature, i.e., the green infrastructure. The compatibility with nature brings many advantages, e.g. complexity, coherence, and legibility. Referring to previous knowledge (e.g., Bell, 1999, 2008; Dupuis, 2004; Kaplan & Kaplan, 1989; Lynch, 1960), the nature of built-up areas has a role in creating a big picture of a whole resort, which is associated with coherence. The initial fragments of the landscape, which a novice perceives and picks for building a mental map, should represent the larger terrain (Article III). In other words, nearby nature gives some cues of what kinds of opportunities for nature experiences the resort can provide in its entirety. Nearby nature can deliver more intimate and comprehensible spaces compared to the vast wilderness areas in the backcountry that can sometimes generate fearfulness. The fragments of wilderness nature already in the built-up areas accelerate the spatial learning and ability to become accustomed to the new environment. As a result, the tourist may be encouraged to enter into the backcountry as well.

In order to not only increase the predictability of the forthcoming environment, but also to invite on-trail behavior, this thesis suggests some improvements in accessibility

(Article IV) and legibility (Article III) of nearby nature. These suggestions support the regional tourism strategy, which relies in part on the design and construction of trail networks to promote sustainable tourism (Regional Council of Lapland, 2015). These suggestions will be introduced next.

### **Trail network in frontcountry**

The findings showed that all tourists committing to sustainable tourism in a ski resort are too ideal (Article II). Hence, it is recommended to use sustainable tourism practices that support environmentally friendly choices, which are easy to be engaged. There were indications that tourists support GI and are willing to follow marked trails in order to protect wildlife habitats. The indications further emphasize the smart growth approach that focuses on GI as an implementation of ecological sustainability, including sustainable trail planning (Article IV).

The principles of sustainable trail planning involve providing access to varied natural attractions, e.g. water resources, while avoiding dangerous or sensitive areas, such as habitats for endangered species (Department of Conservation and Recreation, 2014). Additionally, the range of trails should appeal to a variety of visitors' age and skill levels. These targets can be achieved if trail design is integrated in the planning of GI in resorts. When GI involves a variety of landscapes, a trail network can make the foundation of a good year-round tourism product that enhances nature experiences. It provides themed trails for different activities and thus serves different types of tourists. A functional route network can be built within a compact building pattern but people are forced to move around in a non-diverse environment, as Kytä (2004) noted. With more intense building density, less greenspaces remain for wildlife corridors, greenways and setbacks that increase naturalness, visual diversity, and biodiversity in built-up areas, i.e., the landscape qualities relating to complexity (Kaplan & Kaplan, 1989).

A well-designed trail network also displays biodiversity of the resort for environmental education and encourages tourists to follow trails. Hence, it evokes pro-environmental behavior and a commitment to sustainable tourism without leaning too largely on tourists' efforts alone. The successful integration of trail networks and GI involves many principles. First, sustainable trail planning favors siting of trails in the built-up areas (Department of Conservation and Recreation, 2014) and fosters balance between providing possibilities to nature experiences and protecting habitats. The maintenance of naturalness and wilderness quality requires that there is green space for trails, which provide access to appealing landscapes year-round in the frontcountry, especially to lakes, rivers, and wetlands. According to the LCP models, the new frontcountry trails significantly increased the summertime accessibility of attractive areas in Levi (Article IV). The new trails did not only increase visual diversity, but also brought more opportunities to experience biodiversity through encounters with the local wilderness and alpine-oriented wildlife.

Second, trail planning highlights transition zones of resorts, which visually bind together two distinctive areas (Lynch, 1960). These natural edges are borders between landscape features or between ecosystems. Since the transition zones are often visually diverse, complex and attractive, they can offer rich opportunities for trails (Department of Conservation and Recreation, 2014). Popular trails often follow shorelines that are the borders between water and land. When trails follow the transition zones, landscape edges become a pull factor instead of being perceived as barriers (Article III).

Third, the results support the construction of ‘doors’ in the built-up areas in order to invite tourists to enter nature areas. Manmade elements, such as a gate and a bridge, or an opening up of a vista, can function as the gateways. Their purpose is to encourage people to move from the familiar place to the new environment (Gibson, 1986; Norberg-Schulz, 1971). The most suitable gateways are natural sites that have visual or physical qualities of spaces that lie ahead. There, people can become accustomed to unfamiliar things. One can choose a location for the gateway in a built-up area according to the features the site involves. Its distinctive flora or other natural features should signal what is beyond in the trail network, i.e., some new elements to be expected. If such places are not available in the built-up areas, the site can be managed by enriching it with those features, e.g. by opening up a vista or by planting. A constructed gate accents the function of the site. In other words, it matters how a gateway is managed. In addition, the management that upgrades the site would signal stewardship that is a favored quality in cultural landscapes according to Tveit et al. (2006).

The quality of a trail network is important not only to independent travelers; it is also a relevant issue for program services. This was mentioned by Rantala (2011) who studied the practices of guides. She called for forest planning involving trail infrastructure that should help tour guides in providing atmospheric and leisurely moments and safe and diverse wilderness experiences in the forests of resorts in Lapland. The high quality of a trail network, which promotes nature experiences, entails green infrastructure and trail network to be official (legalized). Otherwise, greenways have no power to direct the growth, and trails are readily replaced by new built-up areas in the name of land-use intensification.

### **Regular monitoring of resorts’ growth**

The dual growth strategy evoked some concerns regarding ecological carrying capacity of the resorts (Article I). The health of ecosystems and commitments made to sustainable practices matter to the increasing number of eco-aware tourists due to their environmental interest (Holden, 2008). Newsome et al. (2012) stated that regular monitoring is crucial for accountability of sustainable practices from the standpoint of these customers, since it shows how destinations are performing. Also Monz, Cole, Leung and Marion (2010) proposed spatial models to assess broad-scale ecological processes and to predict ecosystem responses to visitation in protected areas.

Despite the suggested importance of monitoring, Mason (2013) pointed out that only few destinations have committed to regular and efficient monitoring programs for tourism-related land use and even fewer of them responded to the monitoring with use-limit policies. The Whistler resort is a rare example. It has carried out a monitoring program and reported the performance annually since the middle of the 1990's (Gill & Williams, 2011). This kind of systematic monitoring of environmental quality with annual reports has not yet been adopted in the studied resorts. Mandatory impact assessments that take place in land-use planning projects in Finland (Ministry of the Environment, 2013) are not quite suitable for the job. They are not carried out repeatedly to evaluate the potential impacts of land-use zoning scenarios. Besides, the land use of these scenarios not necessarily become a reality.

For example, Butler (1993) argued that as sustainable development of tourism is the goal, indicators are needed to measure the impacts of tourism. Hence, a landscape indicator that combines some of the earlier suggestions for good indicators was tested in the thesis (Article I). Manente and Pechlamer (2006) recommended summarizing physical indicators, which detect land-use trends and increase awareness of the risk of declining visits. Newsome et al. (2012) suggested indicators for nature tourism that reflect whether zoning and development standards have been effective in enhancing sustainable land use. Additionally, the earlier recommendation of the thesis for better integration of landscape ecology into planning places emphasis on the broad-scale monitoring of landscape quality. Consequently, the indicator was to reflect the ecology of the resorts and the performance of land-use zoning and to be representative of the ecological dimension of sustainability. It was to function as one simple indicator among a set of indicators.

The indicator was based on four hydrologically interdependent landscape zones, which reflect different vulnerabilities to human-induced habitat loss and erosion. The indicator focused on the volumes of built-up hectares in the summit and upper-slope zones, even though the volumes were counted in each zone. Increasing volumes of clear-cutting on tree line ecotone can predict some large erosion problems in the future. The volumes additionally indicate visual changes and predict impairment of perceived quality. Goonan et al. (2010) noticed that in particularly damaged soils and vegetation at high altitudes irritate tourists that visit mountain areas. Open felling sites of forest management have been shown to decrease international tourists' contentment of the quality of the forest in the nature-based tourism resorts of Finnish Lapland especially in summer (Tyrväinen et al., 2016). The visual dimension makes the summarizing biophysical indicator a more comprehensive tool for monitoring the landscape quality in the resorts (Article I).

Convenience and costs determine whether or not a monitoring program is implemented in resorts. It is not only cost efficiency, but also using updated data that is important criteria for identifying good indicators (Torres-Delgado & Saarinen, 2014).

The monitoring becomes easier with open access and updates of environmental and land-use data across the European Union (e.g., Copernicus, 2016; Finnish Environment Institute, 2016). This would make it inexpensive and easy for managers to choose indicators and use them to monitor the resort growth. The developed indicator provides a handy, illustrative and rather simple landscape-scale GIS-tool for monitoring purposes (Article I). Since resorts' naturalness is important to tourists (Article II), the use of a naturalness index could be also considered. The index takes the range of ecosystems that vary between highly natural to highly intervened into account (Machado, 2004). Hence, it may better reflect the degree of manmade elements that affect naturalness of the system. The index does not hold only data on the relocation or loss of natural elements, e.g., removing of vegetation cover, but also fragmentation and the input of additional energy and matter are integrated into it.

Choosing either of the approaches is supported, e.g., by Haywood's arguments. He (2006, p. 32) saw that ecosystems function as catalysts of ecological constraints for models of tourism sustainability and stated that "tourism organizations and destinations that identify their constraints and costs, and feed the information back as quickly and efficiently as possible, should be better able to adapt the limits." However, neither of these ecological indicators can tell how much infrastructure ecosystems can hold before they lose their original qualities, i.e. naturalness or wilderness quality, in tourists' eyes. Another approach is needed to fulfil this goal.

A monitoring program can be based on choosing indicators in a participatory process (Saarinen, 2006; Torres-Delgado & Saarinen, 2014), for example, by setting limits of acceptable changes (LAC). The limit is the extent of the changes from natural conditions that are accepted by users of the area (Pigram & Jenkins, 1999; Stankey, Cole, Lucas, Petersen, & Frissell, 1985). The limit can mean maximum acceptable levels or range of conditions before tourists' perceptions of visual quality are altered. Levels of ecological and visual changes caused by tourism growth are set based on the negotiated values of users instead of using scientific or numerical thresholds. A participatory planning process concerning growth strategies and development proposals involves discussions on acceptable changes with different interest groups (e.g., Appleton & Lowett, 2005), not only with local stakeholders but also with tourists. The discussions may involve setting thresholds to be used in a monitoring program and the biophysical indicators can assist in the negotiations.

There are also other possibilities to collect information on perceived quality (Article II, III) and to execute monitoring (Article I) through involving tourists in the process. Mobile phones and computing devices are handy, since they allow the public to access digital maps in which GIS platforms can be integrated (Hall, 2012). A device enables collection of user-generated geographic information (e.g. Chhetri, 2006; Elwood, 2009; Flanagan & Metzger, 2008; Goodchild, 2007; Landré, 2009) and could allow a tourist to report voluntarily on-site how the place pleases or irritates him or her. The

tourist could pick place attributes like “beautiful,” “peaceful,” “rich fauna,” “weary” or “overcrowded” and send this information as a message from the mobile phone. The tourists could give additional feedback on acceptability of visual or ecological impacts via a note like “urgent need for care.” Therefore, the perceiver-based data would assist in the identification of critical sites and pathways, where upgrading is essential. The message would be recorded as geo-referred information of the site. This kind of software could also be used in monitoring visitor flows in order to indicate the most popular places, edges with low intensity of visits and off-trail behavior for trail planning. In order to make this become available, new GIS platforms for the perceptual studies need to be developed.

#### **4.4 Reliability and validity**

Due to the multiple data sources and spatial approaches, this thesis heavily relied on GIS-based methods in producing landscape models to study the natural-manmade relationship. Despite the advantages of the methods, some issues influence the reliability and validity of the models and hence restrict the interpretations.

First, summit and upper-slope zones were considered vulnerable to human-induced changes in the model of four predetermined landscape zones (Article I). However, the accuracy of the geological and vegetation data and the experts’ reading of ecology affect the widths of the landscape zones. The model also neglects the fact that wetlands within the valley zone are sensitive as well and have an important ecological function as drainage basins. Wetlands can also occur in hollows and spring areas in higher altitudes. In this case, this gap was not that critical. The wetlands are generally avoided as building sites in the resort, since they have weak constructability. In addition, part of the wetlands belongs to natural reserves.

Second, the use of bird species as representatives of local wildlife in studying functional connectivity could be questioned, since their behavior may differ from other fauna (Article IV). Moreover, one could argue that the functional connectivity tool overemphasizes the significance of the configuration of vegetation types for species’ dispersal. There is relatively little information available on how dispersal behavior of species relates to vegetation patchiness. The dispersal may be more dependent on other factors than physical connectivity of plant communities. Hilty et al. (2006) argued that ecology of corridors is a complex matter, since a phase of lifespan, season, time of day and other species influence how animals move between their habitat patches. For example, scent trails affect dispersal behavior of mammals. Movements of birds, pollen or seeds often depend on airways (Baguette, Blanchet, Legrand, Stevens, & Turlure, 2013). Hence wind strength and direction, topography and temperature can direct the fluxes.



In addition, the data representativeness of the on-site questionnaire survey (Article II) could be questioned. Such surveys capture groups of people only at one time and place where the research is carried out (Veal, 1992). The use of mind maps is even a more selective method. Guided ski or hiking tours preceded the sketching of Ylläs maps (Article III). This influenced the number of respondents and more likely attracted cross-country skiers and hikers. They are likely to have more experience with the environment and to be mainly survey mappers. People's drawing abilities vary (Mark, Freksa, Hirtle, Lloyd, & Tversky, 1999; Soini, 2001) and, therefore, their skills have presumably affected the complexity of the maps. People may have added place names and other descriptive words to the maps in order to compensate for their weak drawing skills. Also the wording of the map assignment many have influenced the content of the maps. The instructions that asked the respondents to sketch a map for first-time visitors may have influenced what the drawers recalled and sketched, according to Downs and Stea (1977).

As follows, first, the landscape model (Article I) can function as an early warning indicator that implies if a land-use trend is changing and threatens the ecological and visual quality of a resort. However, the model cannot tell when and where the impacts of growth will extend or if carrying capacity is exceeded. Other procedures are needed for that purpose. Second, the functional connectivity model provides a generalization about how differently the local wildlife perceives and utilizes the landscape (Article IV) and can predict the likely places for wildlife encounters. Hence, the model can be only suggestive about where to locate new trails to enhance natural experiences or to avoid them in order to protect disturbance-sensitive species. Field studies about soil conditions, gradients and occurrences of local species, for example, are essential to a sustainable trail design. Third, comparative studies are proposed to test tourists' preferences for compact building design (Article II) in other Nordic nature-based tourism resorts. Resort-related factors, such as size, biophysical conditions, volumes of visits, structure of clientele, and stages of development, are likely to influence in perceptions. Fourth, a more comprehensive study concerning tourists' cognition of the spatial structure of nature-based tourism resorts would be valuable. In this study, the sample of the mental maps was small and, therefore, the results are preliminary (Article III).

The methods were able to produce parallel results and complement each other rather well despite each method having some weaknesses and even though the sub-studies had different geographical scope, i.e., whole resort, accommodation district, and trail network. Parallel results increased the validity of the research study and widened the applicability of the findings. For example, the issue of accessibility of lakes and rivers was brought out by cognitive cartography (Article III), as well as by the LCT method (Article IV). Moreover, both ecological assessments (Article I, IV) portrayed the negative effects of the fragmentation of high altitudes.



## 5 Conclusions

The purpose of this thesis was to assess how land use affects the landscape quality of nature-based tourism resorts. The thesis addressed three questions for the task. Two of them covered ecological and visual aspects of landscape quality. The last question focused on how naturalness is to be implemented in the sustainable growth of the resorts, which involved the execution of eco-efficient land use. A lot of attention was paid to tourists' perceptions of landscape quality. The task was carried out with the help of a multi-scientific approach in two case study areas, the Levi and Ylläs tourism resorts in Finnish Lapland.

The findings showed that land-use strategies take ecological functions into consideration, but do not go far enough in promoting sustainability. The approach needs to be more proactive, long-term and broad-scale. The results also implied that land-use eco-efficiency is a complex issue, which does not necessarily address tourists' landscape preferences. The resource-efficient land use is nowadays integrated into community planning and smart growth of urban cities. This rather new concept in destination management serves the purposes of protecting wilderness and natural landscapes, which are important assets of nature-based tourism in Nordic countries. There has been hardly any discussion on compact land-use patterns, even though they may change the perceived quality of nature in built-up areas of nature-based tourism resorts.

The thesis claims that the Nordic tourism resorts should not focus on the level of resource efficiency of urban communities for two main reasons. The first reason is harsh conditions of the environment. More and wider connections between ecosystems are needed in the northern latitudes to maintain resilience. In order to create as many links and loops between ecosystems as possible, land-use planning should take place on the landscape scale. Preferably, planning of a resort should be addressed on a regional scale. The findings of the ecological assessment further highlighted the importance of protecting nature in high altitudes of the fell landscape, since they drive ecological and hydrological processes of the whole landscape ecosystem. Additionally, regular monitoring of land use is needed in order to proactively pursue anticipated ecological and visual changes.

The second reason is tourists' expectations. The majority of tourists desire more or less continuous contact with nature during their holidays and they perceive landscape quality of a resort as a whole. Viewing attractive far-view scene of wilderness-like back-

country does not necessarily fulfill tourists' needs to experience nature. Hence, they seek immanent contact with nature in the frontcountry and wish that buildings are surrounded by local vegetation. When nature elements in the frontcountry reduce in number, more and more visitors may perceive nature areas as unreachable.

Hence, the thesis suggests that the frontcountry of a resort is not just a base camp, i.e., a supplier of equipment, food, guide services and accommodation, which prepares tourists for wilderness tours and expeditions to the backcountry of the resort. Nearby nature should be considered as an important part of natural servicescapes where outdoor activities and landscape viewing could take place. Nature experiences of families with young members, seniors and first-time visitors, in particular, may depend on the nature of built-up areas, which stresses the role of the frontcountry.

Consequently, the thesis suggests that the development of year-round activities to promote growth of nature-based tourism goes hand in hand with landscape planning and green infrastructure. When preparing designs of building patterns, not only ecological but also visual issues should be given significant attention. Connectivity of habitats needs to be addressed, instead of beautification or winter maintenance, and natural window views should be favored. As follows, promotion of growth through centralized multi-story buildings cannot be the regular practice, but merely an exception given thorough consideration. The suggestions include also year-round use of a trail network in the frontcountry. The thesis proposes that special attention be given to how the network displays biodiversity and visual diversity, i.e., complexity. It is equally important how landmarks, edges and gateways are used to improve legibility and to encourage tourists to enter nature areas of the backcountry.

Finally, landscape ecologists' and landscape architects' participation in local master and detailed planning of resorts should be emphasized. Their ecological and visual expertise is needed particularly to carry out spatial landscape assessments. The findings showed that the perceiver-related factors, like values, preferences and spatial learning, can affect tourists' landscape perceptions. It means that nature-based tourism resorts can also attract tourists for reasons other than nature. Moreover, a number of environmentally aware and senior tourists are expected to increase rapidly. Thus, user perception-based approaches should be integrated with the technical assessments to provide valuable place-related information for future-oriented planning and re-evaluation of growth strategies.

Since the case study was limited to Finland, it constrains the generalizability of the findings. Therefore, similar studies are encouraged in other Nordic countries. Future studies are needed to verify the assumptions regarding the role of the frontcountry. The study could focus on visitors who spend substantial time there, e.g., due to restrictions of mobility, and on how they perceive infill development and landscaping practices. Future studies could also search for more specific criteria and indicators for the green infrastructure of nature-based tourism resorts to promote and monitor smart growth.

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## Original articles

- I Uusitalo, M., & Sarala, P. (2015). Indicators for impact management of subarctic mountain resorts: Monitoring built-up areas at high altitudes in Northern Finland. *Scandinavian Journal of Hospitality and Tourism*, 16(1), 1–23. doi:10.1080/15022250.2015.1046483
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- IV Uusitalo, M., Huhta, E., & Nivala, V. (2015). Trail network as a mediator of nature experiences in nature-based tourism: A case study of the Levi resort in Finland. Manuscript submitted to *Tourism Management*.

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