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# Health Forest activities in the promotion of human wellbeing

**Maija Lipponen, Elina Vehmasto, Jenni Simkin,  
Katja Keränen, Anu Rätty and Paula Pursiainen**

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## Abstract

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Nature environments are important leisure and hobby places for Finns. Finns' favourite places are found in forests and on the shores of lakes. Nature soothes, encourages exercise and can be a place for meetings between people. Self-motivated leisure activities in nature support health and well-being, which is important in terms of public health. In promoting well-being and health, the amount of contact with nature can be increased, for example, by planning everyday living and recreational environments. It is also possible to increase the use of nature-based solutions in many social and health services according to clients' rehabilitation and treatment plans. The publication presents information and practical tips for increasing nature contacts and professionally guided nature-assisted activities.

Health Forests have been established in different parts of the world. In Finland too, special Health Forest areas and routes have recently been established near hospitals. This publication contains both compiled research data and experiential information learned in the project of Health Forest Models in Promoting Work and Functional Abilities on the planning and implementation of Health Forest activities. The publication presents the Health Forest of Sairaalanrinne in Jyväskylä city centre. As another example of suitable site for Health Forest activities, Metsähallitus' site in Kuhmo is described. Health Forest concepts have also been implemented elsewhere in Finland at the same time, of which the Lahti Health Forest (opened in September 2023) and the Kouvola Health Forest (opened in October 2023) are presented in this publication. Health Forests can increase awareness and interest in the health effects of forest nature.

The publication is intended for everyone interested in nature-based health promotion. It can be used, for example, by municipal welfare coordinators and planners, professionals in sports and youth services, education and teaching, as well as experts in employment services. In wellbeing services counties, the information provided by the publication can be applied, for example, in primary health care, therapy services and rehabilitation, psychiatric units, family work and social work. There are also application possibilities, for example, in the integration of immigrants, day activities for the mentally disabled and the elderly, and in mental health and substance abuse services. The information can also be applied by, for example, private or public operators in the nature sector, occupational health care professionals, and employees and volunteers of organizations and associations.

**Keywords:** health effects of nature, Nature Based Solutions (NBS), nature-assisted intervention, Health Forest, Health Forest activities, promotion of health and wellbeing, healthcare and social welfare services



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## Foreword

The increase in the costs of healthcare and social welfare services needs to be controlled in society which means that special attention has been paid to promoting wellbeing and preventing illnesses resulting from the lack of physical exercise, for example. Using the impacts of local nature on wellbeing in various services and everyday environments has been proposed as a measure to support people's health. Research has shown that natural environments are best in preventing illnesses, maintaining the ability to work and providing help in rehabilitation. Nature-based solutions that promote health often call for cross-sectoral and multi-professional cooperation. When planning services, merging local expertise in the sectors of health and the environment could play an even greater role in the future when seeking to keep healthcare costs under control. While contacts with nature are useful for everyone, its benefits are underlined in the daily lives and services of people in a vulnerable position.

The development of Health Forest activities started in Finland in the Kolme terveyst Metsän mallia (Three Health Forest models) network project (2014–2016) funded by the Ministry of Forestry and Agriculture. The project built a new type of cooperation between wellbeing providers in the health and nature resources sectors through various trials. One of these was the Sipoo health centre trial to assess the health benefits of visits to nature as part of the treatment of mental health rehabilitees and clients with type 2 diabetes. The good results provided encouragement to continue the activities, which were also expanded after the project as part of healthcare and social welfare services in Sipoo. The Sipoo model has been demonstrated at various events, in media services and in training programmes, and peer-reviewed research of the impact of the activities on clients' wellbeing was published in 2023.

The Sipoo model provided inspiration for the Health Forest models in promoting work and functional abilities project of the Natural Resources Institute Finland (Luke) and Kajaani University of Applied Sciences, which developed Health Forest activities in the region of Kainuu in 2021–2023. The actors of the Kainuu project identified nature sites suitable for use as Health Forests, provided healthcare and social welfare service providers with the use of research data and natural methods in customer activities, and organised trips to Health Forests for various client groups in multi-professional cooperation. Examples of concrete project results included the planning and implementation of the accessible route in the Sairaalanrinne Health Forest in Kajaani in cooperation with the City of Kajaani and the wellbeing services county of Kainuu as well as the hiking equipment kits put together for lending to various users. In addition, a digital Health Forest map and an assessment table of the health properties of different sites were prepared to identify forests suitable for use in Health Forest activities. Experiences related to these are presented in this publication alongside research data.

The project was funded by the Centre for Economic Development, Transport and the Environment for Northern Ostrobothnia from the European Social Fund (ESF) and by different project parties. We would like to warmly thank the funding provider and all the people and organisations that participated in the project.

We wish you an enjoyable read and successful visits to Health Forests!

March 2024 *Authors*



## Introduction

Nature environments are important leisure and hobby places for Finns. Finns' favourite places are found in forests and on the shores of lakes. Nature soothes, encourages exercise and can be a place for meetings between people. Self-motivated leisure activities in nature support health and well-being, which is important in terms of public health. In addition, nature has started to attract interest as part of the work done to promote public wellbeing, social rehabilitation and healthcare. In promoting well-being and health, the amount of contact with nature can be increased, for example, by planning everyday living and recreational environments. It is also possible to increase the use of nature-assisted intervention in many healthcare and social welfare services according to clients' rehabilitation and treatment plans. This publication presents information and practical tips for nature-assisted activities and services that support wellbeing and health.

The publication is intended for everyone interested in nature-based health and wellbeing promotion. The publication can be used, for example, by municipal welfare coordinators and planners, professionals in sports and youth services, education and teaching, as well as experts in employment services. In wellbeing services counties, the information provided by the publication can be applied in primary healthcare, therapy services and rehabilitation, psychiatric units, and family and social work. There are also application possibilities, for example, in the integration of immigrants, day activities for the mentally disabled and the elderly, and in mental health and substance abuse services. The information can also be used by private and public service providers in the nature-related sector, occupational healthcare professionals, and employees and volunteers of organisations and associations.

The descriptions of the Health Forests in the example locations were written by Katja Keränen, Anu Rätty and Maija Lipponen regarding Kajaani and Kuhmo, Taru Suutari for Lahti, and Elina Vehmasto and Tarja Alamattila for Kouvola. In the first chapter, Maija Lipponen and Elina Vehmasto present the background of Health Forests and the activities related to them. The health and wellbeing benefits of nature contact in the second chapter were written by Jenni Simkin, Elina Vehmasto and Maija Lipponen. In the third chapter, the texts describing the applications of nature-based models were written by Elina Vehmasto, Paula Pursiainen and Maija Lipponen. Jenni Simkin, Elina Vehmasto and Maija Lipponen wrote about the features of forest environments that promote health and wellbeing and the planning of Health Forest areas and routes in the fourth chapter. The content of the fifth chapter regarding the guidance and planning principles of Health Forest trips and the example content of thematic visits was written in cooperation between Luke and Kajaani University of Applied Sciences.



# 1. Health Forests and related activities

## What is a Health Forest?

Health Forests have been established in different parts of the world. In Asia, Health Forest visits have been used to help people recover from work fatigue. In Finland, special Health Forest areas and routes have also been established and named near hospitals, for example. People recovering from various illnesses and rehabilitees can use Health Forests independently or as guided by healthcare and social welfare service professionals. However, Finnish Health Forests can be freely used by anyone. They are also suitable as learning environments for schools, day-care centres and educational institutions. Health Forests increase awareness of and interest in the health effects of forest nature. Accessible routes can be built in Health Forests to improve accessibility. Free access to a forest promotes equality and allows everyone to benefit from nature.

Health benefits can also be obtained from natural environments other than designated Health Forests. In addition to forests, shores of waterbodies, public parks, gardens and rural environments have health-promoting effects. Restorative experiences can be obtained from the sounds and scents of nature, changes in weather, as well as by touching plants, observing wildlife and watching the scenery offered by nature. Other elements that promote health include volatile organic compounds from trees and microbes living in soil. The selection of Health Forest locations and the planning of visits to them are based on research data about the health-promoting characteristics and elements of forests and the wellbeing mechanisms of nature. The size and location of the forest and variation in the landscape also have an impact on wellbeing benefits.

## What are Health Forest activities?

Health Forest activities refer to guided visits to forests aimed to support nature connectedness and enable experiences of the wellbeing benefits offered by nature. The content of visits is planned based on the needs of each client group. Supporting comprehensive wellbeing is often the starting point of guided Health Forest activities. Visits to Health Forests serve to experience nature with all senses, learn more about it, familiarise oneself with nearby nature sites and strengthen the sense of connectedness with the inner self, the environment and other people. The goal of a visit to a Health Forest can be to reduce stress, increase the amount of physical exercise or support interaction between participants. Visits are led by a trained Health Forest guide who can be a professional who works with the participating clients or an external guide who supports the professional during the visit.

In addition to the natural environment, wellbeing benefits come from meaningful activities and social interaction. Health Forest locations have been designated for Health Forest activities in certain municipalities, but nature-assisted activities can also be provided at other nature sites available and suitable for client groups.



## 2. Wellbeing benefits obtained from nature

### Significance of nearby nature on public health

Health problems caused by physical inactiveness are among the most significant public health challenges (e.g. Husu et al. 2022). In addition to physical inactiveness, various mental health problems are becoming more common. Combined, these are the most common causes of work disability in Finland (Hynninen et al. 2023) and therefore contribute to worsening the public health burden of noncommunicable diseases. Urbanisation is proceeding quickly across the world, and the denser urban structure reduces local nature sites. It is estimated that, by 2050, some 68% of the global population will live in urban areas (UN 2018). Urbanisation also takes place in Finland, albeit more slowly than in other parts of Europe.

The World Health Organization (WHO) has stressed the importance of preserving natural environments close to residential areas (WHO 2017; Barboza et al. 2021; Nieuwenhuijsen et al. 2022). Nature sites act as buffers for the negative health impact of noise and particulate emissions that are typical to urban areas (Marušáková & Sallmannshoferet 2019; Hartig et al. 2014) and even out any harm caused by heat (van den Bosch & Ode Sang 2017). Access to nature close to residential areas has been found to increase outdoor activities (Neuvonen et al. 2007), whereas the larger size of a green area increases motivation to exercise in nature (Pyky et al. 2019).

Various public health studies based on population monitoring data have increased in recent years, in which health data have been compared side-by-side with various environmental data, including soil cover (e.g. Barboza et al. 2021; Zhou et al. 2021; Nurminen et al. 2021; Gonzales-Inca et al. 2022). This has provided more evidence that green areas in living environments have a positive impact on our health. The study (Barboza et al. 2021) published in the *Lancet* journal stated that more than 43,000 premature deaths

could be avoided in European cities if access to nature sites was at the level of WHO recommendations (at least 0.5 hectares within the distance of at most 300 metres).

Signs of the association between a lower body mass index in children and access to green areas were found in Germany in which health data obtained from 22,000 new schoolchildren were compared over a four-year period to a vegetation index, which represents the amount of vegetation (Zhou et al. 2021).

According to a Finnish longitudinal study, the risk of suffering from depression was lower in residential areas with more green areas. This was determined by examining health data obtained from more than 14,400 people with the vegetation index and the CORINE Land Cover (CLC) data (Gonzales-Inca et al. 2022). In another Finnish study in which land cover data in residential areas was used and more than 10,600 babies were monitored up to the age of 12 months, it was discovered that children who grew their first year close to agricultural areas were at a lower risk of being diagnosed with type 1 diabetes than children who lived in urban environments (Nurminen et al. 2021). In a North American study, it was found that the abundance of vegetation in residential areas reduced aggressive behaviour in young people (Younan et al. 2016). The positive link remained even when sociodemographic and economic factors and current air temperatures were taken into account. Furthermore, the 17-item estimate of the enjoyment of the neighbourhood requested from parents did not change the results. More than 1,200 young people living in California participated in the study through short- and long-term monitoring.

In New Zealand, it was discovered that in children who were exposed to more diverse vegetation during their first five years, their risk of being diagnosed with leukaemia was as much as 35% lower. The data used was based on geospatial vegetation data. The study covered all the

almost 900,000 children born in the country during the five-year period (Donovan et al. 2021). In addition, a study conducted in Denmark showed that living the childhood close to a more natural environment seemed to protect children from various mental illnesses, including schizophrenia, later in life (Engemann et al. 2019 and 2020).

## Field studies of the nature-based wellbeing benefits

Field studies of the wellbeing effects of nature have usually compared green areas with built environments in urban surroundings. Participants in these studies have independently recorded their feelings and experiences while walking around using, for example, mobile apps developed for this purpose (see Hoffmann et al. 2018). Fewer controlled field experiments have been conducted, mainly in Asia. However, the wellbeing effects of different environments have been compared in a few European field studies: a Finnish study in which a built environment was compared with a park and forest environment (Tyrväinen et al. 2014; Ojala et al. 2019), and a Swedish study in which several forest types were compared with each other (Sonntag-Öström et al. 2015). Field studies have also been conducted to identify whether certain forest management practices have an impact on how people's wellbeing is affected. These studies compared the impact of forests in as natural state as possible with the impact of tended forests (Martens et al. 2011; Takayama et al. 2017; Simkin et al. 2020).

In addition, Finnish studies have examined the impact of natural environments as part of various nature-assisted interventions (Lipponen et al. 2022; Salonen et al. 2022; Kolster et al. 2023). A study (Lipponen et al. 2022) investigated the impact of group-based and nature-assisted interventions in occupational healthcare on stress experienced by the participants (n=11). The cortisol content in saliva used to represent stress was lower during days spent in nature compared to other days of the week. In contrast, the alpha-amylase content in saliva, another indicator of stress, increased during days spent in nature

which may have resulted from the excitement caused by the group situation. This deduction was made because the increase in the alpha-amylase content regularly decreased each time, until no noticeable increase was identified during the visit to nature at the end of the period. Some indicators showed no statistically significant change in the small group of participants, but signs of an increase in recovery measured by heart rate monitoring were seen. In addition, the pain and exhaustion experienced by the participants decreased during the study period, but the change was not statistically significant (Lipponen et al. 2022).

## Results from a Finnish Health Forest activity research

A Finnish study (Kolster et al. 2023) identified what effects guided visits to Health Forests had on the wellbeing of clients of basic municipal healthcare services in Sipoo compared to a group that participated in indoor exercise intervention. A total of 79 people participated in the forest or exercise group which had seven visits or interventions in 2018 and 2019. Both groups provided a diverse programme at the same level of duration and physical activity. The study assessed psychological wellbeing and the participants' experiences of health and sleep. The amount and quality of sleep was also measured using heart rate monitors. The assessments were conducted before and after eight-week interventions (Kolster et al. 2023).

The psychological wellbeing of the members of the forest group increased significantly in clinical terms. Their experiences of health and functional capacity also increased. In terms of factors conducive to psychological wellbeing, notable improvements were observed in relaxation, energy levels, problem-solving abilities, self-perception, and overall positivity. In addition, participation in the Health Forest group increased the feeling of intimacy with other people and reduced the feeling of loneliness. The age, gender and time of year were not found to have an impact on experiencing psychological health benefits. In the

exercise group, psychological wellbeing only improved in those participants who originally considered themselves to be in a good state of health. The duration of sleep extended in the exercise group, whereas the participants in the forest group indicated improvements in the quality of sleep. Experiences of health and functional capacity improved in both groups. Neither group showed any changes in physical activity. Most participants already considered nature to be very important before the study, but participation in the forest group reinforced these experiences (Kolster et al. 2023).

## What creates wellbeing benefits?

Spending time in natural environments has an impact on wellbeing as the sum of various factors, with experiences gained through multiple senses being significant. Experiences of wellbeing are affected not only by what nature looks, smells and sounds like but possibly also by all the factors we cannot sense, including various volatile organic compounds from trees and microbes living in soil. When the impact of staying in natural environments is more positive than negative, and this impact can be measured, we can talk about the health benefits of nature (Tyrväinen et al. 2018). Experiences of perceived wellbeing are affected by the person's cultural background, preferences, state of health and previous experiences. Many innate fears of humans (biophobia) such as the fear of snakes and large carnivores

are useful for people because they keep us away from certain threats (Ulrich 1993). Various – and often irrational – fears of natural creatures or elements have become more common (Correia & Mammola 2023). Not only fears but also possible allergies must be taken into account when spending time in nature.

Currently, the impact of nature-assisted interventions on mental health is backed by the strongest research evidence so far (e.g. Rosa et al. 2021; Stier-Jarmer et al. 2021). The impact of nature exposure on mental wellbeing can be perceived by spending more than five hours a month in nearby green areas or visiting other more remote nature sites two or three times a month (Tyrväinen et al. 2007).

The health and wellbeing benefits of nature contact have been explained using five mechanisms (Hartig et al. 2014; Tyrväinen et al. 2018). According to the first mechanism, nature offers fewer adverse environmental exposures than the urban environment, including noise and air pollution. The second mechanism is related to recovery from stress through being in nature. When time is spent in nature, people experience physiological changes – for example, a decrease in blood pressure, stress hormone level and heart rate (Beil & Hanes 2013; Tyrväinen et al. 2014). Even a short stay in nature has been found to improve the state of mind and the feeling of recovery as well as increasing the energy levels of participants (Tyrväinen et al. 2014; Simkin et al. 2020).



Studies are largely based on two separate explanatory background theories: the Attention Restoration Theory (ART) and the psychological and physiological Stress Reduction Theory (SRT). According to the former theory, attention does not need to be consciously focused on natural environments, unlike when staying in built man-made surroundings (Kaplan & Kaplan 1989). Staying in nature helps one rest and their brain to recover from cognitive stress. According to the latter theory, recovery takes place through the body's automatic physiological and emotional changes, as the secretion of stress hormones decreases, the heart rate drops, and as a result, one experiences fewer negative emotions (Ulrich et al. 1991). According to these theories, stress decreases in environments to which we have adapted through long-term evolution.

More comprehensive theories highlight human relationship with and connectedness to nature and emphasise the importance of a conscious and accepting presence for the creation of wellbeing along with deeper awareness. It has been found that, when one uses the environment in psychological self-regulation, this regulation improves health when one is in their favourite place in nature (Korpela et al. 2001; Korpela & Ylen 2007; Salonen et al. 2016). A holistic nature experience is key for psychological wellbeing (Salonen 2020; Hakoköngäs & Puhakka 2021). The accessibility of nature is linked to the establishment of nature connectedness, which in turn has an impact on environmentally positive behaviour (Puhakka et al. 2019; Rantala & Puhakka 2020).

The third mechanism, namely increased physical activity in nature, can prevent various illnesses and disorders caused by the lack of exercise such as diabetes, osteoporosis and cardiovascular diseases (Baumann 2016; Lee 2012; WHO 2010). Increased physical activity can support the treatment of various health issues, including obesity, sleep disorders and back pain (Stier-Jamer et al. 2021). When improving health requires to increase physical activity, exercise in nature can be used as part of treatment. Nature draws attention which makes one not think about exercise as exercise and makes it feel lighter. Exercise in nature has been used, for example, as part of

treatment for type 2 diabetes. In addition, exercise in nature can be used as part of the treatment of high blood pressure, back problem and the coronary artery disease and to offer support in life management issues. Exercise in nature has shown promising results as part of the treatment of obesity, as well (see Coombes et al. 2010; Korpela et al. 2016). As discussed above, a natural environment which is close to one's residential area and attracts one to stay outdoors improves physical activity in people living in the area and motivates one to exercise more.

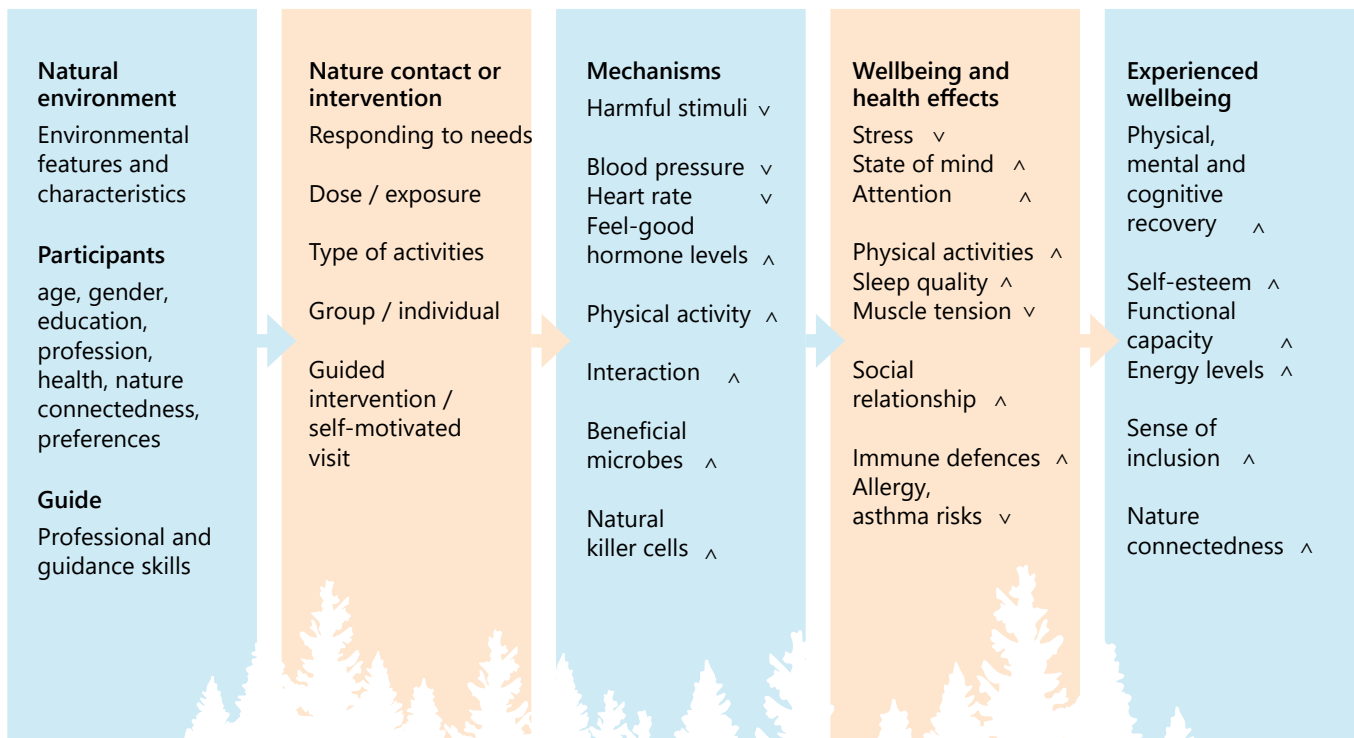
The fourth mechanism for promotion relies on the premise that nature visits enhance social interaction and foster a sense of belonging. (Maas et al. 2009). In addition, psychological wellbeing is affected by outdoor exercise boosting one's self-esteem (Barton et al. 2012) and improving one's experiences of their abilities and achievement potential (Johansson et al. 2022). Exercise at enjoyable nature sites has been found to increase regular social contact and therefore promote social wellbeing (Wheeler et al. 2012; Eskelinen et al. 2018). Supporting nature connectedness may increase the experience of inclusion in surrounding nature and society, and therefore has an impact on social wellbeing (e.g. Vehmasto et al. 2021; Lipponen et al. 2023). In addition, nature contact and access to nature areas close the health and wellbeing gap between population groups, as access to local nature produces the most benefits for groups in the weakest socioeconomic position (Gascon et al. 2017; Völker & Kistemann 2011; Grellier et al. 2017; Rigolon et al. 2021).

The fifth health-promoting mechanism is a stronger immune defence capacity (Tyrväinen et al. 2018). Allergies, asthma, diabetes, inflammatory bowel diseases, various cancers and Alzheimer's disease are common diseases in the current age. What these all have in common are changes in the microbiome of the bowel system, the skin and respiratory tracts, an imbalance in the bowel system and its susceptibility to infections. Nature contact can be one efficient way to diversify microbial strains and therefore improve resistance (see Haahtela et al. 2017; Haahtela 2019; Roslund et al. 2020). A Finnish study showed that when

forest undergrowth was added to the outdoor area of a day-care centre, microbes in children’s skin and mucous membranes diversified and the regulation of their immune system improved in only four weeks (Roslund et al. 2020, 2021). Staying in a forest environment has a significant impact on the antibody content of blood. The body’s defences may increase already after a week’s stay in a forest (Li et al. 2007). Additionally, it has been found that the volatile terpenes

produced by the trees can stimulate natural killer cells in the bloodstream, potentially preventing tumor formation. (Zielińska-Błajet et al. 2021).

The physiological, psychological, cognitive and social mechanisms of nature contact and nature-assisted interventions were discussed above, through which holistic experiential and measurable wellbeing impact is possibly generated (Figure 1).



**Figure 1.** A potential impact chain of nature contacts and nature-assisted interventions. It should be noted that different interventions and different clients have different key effects in the chain of impact. (Prepared and edited by Vehmasto and Lipponen using the following sources: Beute et al. 2023; Haveri & Simkin 2023; Kolster et al. 2023; Tyrväinen et al. 2018; Hartig et al. 2014.)

The next sections of this publication focus more closely on key factors in the chain of impact of nature-based activities (see Figure 1), including the potential applications of nature-assisted interventions in services provided for various client groups, the characteristics of a health-promoting natural environment, and other factors affecting the selection of Health Forest sites, the basic principles of guidance during trips to Health Forests, and the factors affecting the planning of their content and implementation. Natural environments are important places of leisure and recreation for Finnish people.

## HEALTH FOREST 1

## Sairaanrinne Health Forest in Kajaani



## HISTORY OF THE FOREST AREA

The Sairaanrinne Health Forest is between Kainuu Central Hospital and the Vimpelinlaakso Sports Centre. The forest is partly located on land owned by the wellbeing services county of Kainuu and largely on land owned by the City of Kajaani. The southern part of the forest is a local recreational area kept in its natural state.

The aerial photo taken in 1956 shows farmland around the forest. Due to its rocky and steep slope, the area has been managed as a forest. People have walked through the forest and made trails in it. The first Kainuu Central Hospital was built in 1968. A ski trail of roughly a kilometre of the Vimpelinlaakso Sports Centre, which acts as a running trail in summer, circles the area. The Health Forest was opened in 2022, in which an accessible sensory stimulation path and lean-to shelter were built in it. The Sairaanrinne Health Forest has been planned and developed from 2021 as part of the Health Forest models in promoting work and functional abilities project. The City of Kajaani and the wellbeing services county of Kainuu are responsible for constructing and maintaining the Health Forest.



## LANDSCAPE AND NATURE

The rocky slope gives a rugged feel to the Health Forest in terms of its landscape. The forest area is roughly ten hectares in total, while the varying landscape makes it feel larger. The hilly terrain features marks of the ice age, including the rocky slope, smooth rocks and boulders. The forest is broken by a bedrock line from north to south. In the east-to-west direction, the rocky slope falls steeply towards Vimpelinlaakso. A level rocky platform is in the middle of the slope. There is a lookout spot at the top of the hill. A pine mire is located on the southern side of the forest, to

which water flows from the east via bedrock surfaces. The trail network travels from southeast to southwest and from east to west.

The area consists of a fresh pine-dominated heath forest, in which typical plant species include bilberry, lingonberry and mosses. There are several common junipers in places. To the south of the forest, the terrain becomes a level mire with only a few trees, with interesting plant species. The area is in its natural state. Users of the area can pick berries, hunt mushrooms and observe animals, including rabbits, squirrels and birds. The forest features decaying stems that are useful for small insects and species nesting in holes in trees. Birdsong in the Sairaanrinne forest in spring is very impressive.

Elevations, trees, views, bare bedrock, marks of the ice age and the small mire offer diverse landscapes. The diversity of the forest may attract interest and strengthen the experience of recovery. The forest also includes shelters offered by spruce branches, in which visitors can immerse themselves in the forest. Sheltered places by the bedrock wall can be felt to provide protection and security. At the same time, the elevations dampen the noise of traffic and therefore enable a peaceful soundscape in the middle of an urban environment. Birdsong and fresh air offer reviving sensory experiences. Decayed trees increase species diversity. Picking and eating edible berries growing in the area supports the strengthening of the immune defence system.

Sensory exercises completed independently on the accessible route help activate the senses and strengthen the feeling of a large uninterrupted area. The accessible lean-to shelter, completed with seating and campfire spots, beckons visitors to linger longer in the forest, amplifying the rejuvenating impact of visits. The limited area eliminates the risk of getting lost and increases the

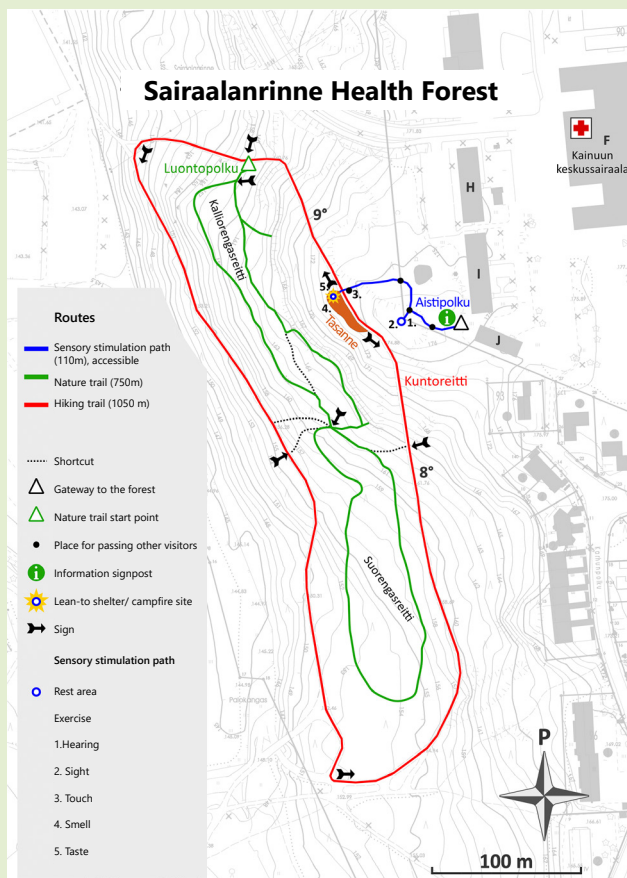
sense of security. The proximity of the hospital reduces vandalism in the lean-to shelter.

The built environment is limited outside the forest and does not disturb the nature experience. The forest offers a beautiful landscape, enabling the feeling of enchantment which increases well-being effects. As the Sairaalanrinne Health Forest is located in the middle of an urban residential area, it is within easy reach by people living in the centre of Kajaani. The Health Forest being open to everyone gives different groups an equal access to nature.

## LOCATION AND ACCESSIBILITY

The Sairaalanrinne Health Forest is located next to Kainuu Central Hospital (Figure 1). The hospital's address is Sotkamontie 13, 87300 Kajaani. Cars can be parked in the hospital paid parking

**Image 1.** Routes in the Sairaalanrinne Health Forest. *Image by: Keränen & Jaako 2023, including data obtained from the National Land Survey of Finland's base map c 2021.*



area, from which the distance to the route is roughly 200 metres via a pavement. Free parking spaces for people with disabilities are available close to the hospital's main entrance and in front of buildings I and J, from which the route to the forest starts. More free parking spaces are available behind the Vimpelinlaakso Sports Centre on the other side of the forest (Kuntokatu 6). From there, the distance to the lean-to shelter is 0.5 kilometres, but the route is not accessible and there is a steep climb. An accessible toilet is available at Kainuu Central Hospital.

## ROUTE DESCRIPTION

The starting point is between Kainuu Central Hospital's buildings I and J, 200 metres from the parking area. The starting point includes a map of the Health Forest and an information point (Image 2). The Health Forest offers an accessible 120-metre route made of wood with handrails. The route leads to an accessible lean-to shelter with a campfire site and seats at three different levels. Firewood is provided at the campfire site. A wooden rest area is available along the accessible route. It also includes seats at three different levels and signposts for sensory exercises (Image 3). The accessible route is not maintained during winter. In addition, a hiking trail (a ski trail in winter) of roughly one kilometre with steep climbs circles the forest. A trail travels through the forest. The hiking and forest trails do not meet accessibility requirements.

## SUITABLE USER GROUPS

The Health Forest is intended for everyone. It supports the wellbeing of people living close to it and those working in the municipality by offering an environment for outdoor activities. People recovering from various illnesses and rehabilitees can use the Health Forest independently, with their friends or with family members, or as guided by healthcare and social welfare service professionals. The Health Forest can be used as a rehabilitation environment in occupational therapy and physiotherapy. In addition, the forest environment supports mental health rehabilitation and acts as a place of calming down for child clients before therapy assessments, which

require concentration and attentiveness. The area can also be used by patients' friends and family members who can take a breather in the forest. The Health Forest is also an ideal learning environment for schools, day-care centres and

educational institutions. Hospital employees can use the Health Forest to support their wellbeing at work and hold meetings and performance appraisals in it.



**Image 2.** The signs of the accessible sensory stimulation path in the Sairaalanrinne Health Forest are also suitable for visitors with visual impairments. *Image by: Jari Lindeman/Luke.*



**Image 3.** Nature is inside an accessible route in the Sairaalanrinne Health Forest. *Image by: Jari Lindeman/Luke.*



Spaas

### 3. Nature-based activities in health and social services and in well-being promotion

#### Nature-based activities call for a multivocationality approach

Nature-based solutions that support health and wellbeing, including Health Forest activities, are developed in broad cooperation with forestland managers, municipalities and associations, with the healthcare and social welfare sector, as well as with nature guidance professionals. Health Forest areas and the nature-based activities carried out in them serve to communicate the health benefits of nature to residents and nature-assisted methods to professionals. Municipalities and wellbeing services counties can use the wellbeing impact of nature-based methods and Health Forest activities to improve people’s health and wellbeing, as well as in healthcare and social welfare services (Figure 2).

Nature-based methods enable professionals and clients to meet on equal terms, increase clients’

**Figure 2.** Municipalities and wellbeing services counties might utilise nature-based methods and wellbeing effects of Health Forest activities in social and health services, in the promotion of health and wellbeing of residents, as well as in consideration of the importance of nature sites in residents’ daily surroundings.

motivation to rehabilitate, and provide comprehensive support for clients’ physical and mental functional capacity. Guidance enables visits to nature especially for special groups that could not otherwise visit nature or that are unaccustomed to move around in nature (Mansikkaviita 2019). Infobox 1 summarises the importance of nature-based activities for children and young people.

Nature-assisted models developed by various parties for healthcare and social welfare services and the promotion of health and wellbeing are discussed next. The models have been published in the Innokylä (Innovation Village) e-service, which is an open publishing and co-creation platform.

Innokylä is managed by the Association of Finnish Municipalities, the Finnish Federation for Social Affairs and Health (SOSTE), and the Finnish Institute for Health and Welfare (THL). The Ministry of Social Affairs and Health guides its activities. The e-service is intended especially for municipalities, associations and central government organisations that are interested in the development of wellbeing services, processes and structures on a large scale (Innokylä 2023).



Some of the nature-based practices presented below were assessed by the Coordination Project for Social Inclusion (Sokra, 2014–2023) on the grounds of documentation of the development projects, and according to the principles and criteria of THL about social inclusion and promising novel practices.

## Nature-based activity and service models for various client groups

### Family work

The Luonnollisesti (Naturally) coaching model, which includes usage of nature-based methods, has been developed by family services. Positive experiences of it have been received from families that are in a challenging situation and in a weak socioeconomic position (THL/Sokra & Posio 2022). Nature-based group activities for families strengthen nature connectedness, add refreshing variation to daily routines, and enable interaction between families and family mem-

bers. The aim of using nature-based methods is to strengthen families' wellbeing and social inclusion, offer support for daily life, and enable peer support. In these activities, a professional guides participant families to gain new experiences and learn more about the ways of staying and wandering in nearby nature, which they are also hoped to use later. A group can consist of one or more families, and activities and their targets are planned together with each family. When working with children, playing and games strengthen the feeling of success and may also attract adults to participate. Being together in nature supports families' mental resources in various ways (e.g. the quality of sleep, daily rhythm, and the refreshing wellbeing impact of nature), presents new kinds of strengths, and improves interaction. The Sokra project regarded the model as a new promising practice (THL/Sokra 2022b).

### Youth work

Nature has been used in preventive youth work in the Luontoseteli (Nature Voucher) model of action (THL/Sokra & Kotilainen 2021). Luontoseteli

## The importance of nature contacts in children's lives, early childhood education and primary school

### INFOBOX 1

Nature contacts have a special significance for children and young people. These groups also consider nature to be an enjoyable leisure environment (Puhakka et al. 2019). Even small children are able to describe their contact with nature in highly detailed way (Arola et al. 2023). When being with their family members in nature, children and young people can build their connectedness to nature (Cameron-Faulkner et al. 2018; Rantala & Puhakka 2020), to which they have a fundamental right (Itla 2022; Children & Nature Network 2022). Regular access to nature is an investment in the wellbeing of children and therefore in society at large, as visits to nature during childhood have a significant impact on mental health (Harvey et al. 2020), the building of identity (Snell et al. 2020), the frequency of visiting nature as an adult (Ward Thompson et al. 2008) and the sustainability of choices made later in life (Ojala 2012). Given present-day challenges, it's good to acknowledge that children raised in areas with the least access to green spaces face a 55% higher likelihood of experiencing mental health issues in adulthood (Engelmann et al. 2019). In children with attention deficit disorders, a stay of only 20 minutes in nature significantly improves their ability to concentrate (Taylor & Kuo 2009). Playing in nature increases creativity, problem-solving ability, motor and exercise skills, as well as self-restraint (Arola et al. 2023; Children & Nature Network 2022). Evidence has been obtained of the significance of exposure to beneficial microbes from nature at an early age for children's developing immune systems (Lehtimäki et al. 2017; Leppänen & Pajunen 2017).



is a course of action for everyone working with children and young people. It helps professionals and clients access nature with a guide specialising in nature-based methods or animal-assisted activities as paid for by municipalities. Multi-professional cooperation is used to find new ways to promote young people's mental health, functional capacity and social inclusion. The purpose of meetings is not only to identify individual needs but also to develop emotional and interactive skills and engage young people in the support provided and therefore to reduce the need for services of heavier treatment. Positive experiences of the model have been obtained from all parties involved, and the Sokra project has regarded it as a new promising practice (THL/Sokra 2021a).

### **Adult social work**

The Yhteisölliset ja luontolähtöiset menetelmät aikuissosiaalityössä - tuletko toimistolle vai mennäänkö metsään? (Community- and nature-based methods in adult social work – will you come to the office or shall we walk in the forest?) model has been developed for adult social work. Its goal is to integrate community-based and nature-based methods into adult social work in as easily applicable format as possible (THL/Kuorikoski 2022). The perspective is based on research-based evidence of the effectiveness of the methods not only in strengthening individual social inclusion, wellbeing and functional capacity but also in targeting the social cohesion of communities and experienced in them. The model offers small straightforward

steps that can be taken in individual or group work or in other social fieldwork. In addition, it presents the joint impact of different factors that is required for community-based and nature-based methods to help achieve the goals of adult social work. Professionals' views of any obstacles and requirements for the use of such methods are presented in the description of the model. The employee's connectedness to nature, an increase in knowledge, the supervisor's support, and the requirement to change ways of social work are key factors for success in using this model. Seeing adult social work only as individual work carried out at the office does not support the use client-driven ecosocial working methods that address overall wellbeing (THL/Kuorikoski 2022; THL/Eskola 2021).

### **Integration services**

The instruction cards for integration-based nature activities (THL/Sokra; Uusitalo & Jokela 2022) have been developed for use in planning and implementing the content of nature workshops that increase community-based interaction with immigrants. The cards present ideas and instructions for various workshops intended to learn more about the Finnish way of staying outdoors and Finnish nature. The goal is to strengthen immigrants' work ability and functional capacity and promote their integration, social inclusion, sense of community and their earning opportunities. Natural environments may reduce stress in interactive situations, while increasing self-confidence and facilitating attachment and sense of inclusion to a new set-

ting. The instruction cards help the use of nature-based methods in integration activities. The cards can be used freely by anyone and are also applicable to adult and youth social and rehabilitative work, child protection activities, as well as care services of people with disabilities and the elderly. The model is regarded as a promising novel practice from the perspective of social inclusion (THL/Sokra 2022b).

### **Mental care and substance abuse rehabilitation**

In psychic and substance abuse rehabilitation, natural environments have been used to alleviate anxiety, restlessness and depression and to help identify and express emotions. The nature-based rehabilitation model (THL/Sokra & Vänttinen 2021; THL/Sokra 2021c) is targeted at working-age people outside of working life. The model has benefited participants who have challenges in their social, psychic and/or physical functional capacity. The wall-less nature workshop (THL/Sokra & Jääskeläinen 2020; THL/Sokra 2017) is intended for participants who do not have access to suitable rehabilitation services that support social inclusion and for those who use services due to substance abuse, psychic health issues or other challenges in their daily life. First of all, the description of the model is intended for the use of professionals, public or private, who work with this target group. The workshops can be used in activities that promote inclusion in municipalities and regions and offers potential to combine public and private service providers

### **Employment services**

Nature- and animal-assisted methods in employment services were tested in the *Tilalta tietoon ja työelämään* (From farms to knowledge and working life) project implemented by Kajaani University of Applied Sciences, Luke and Kainuu Vocational College (Luke 2023). The trial used Health Forest activities and farm- and animal-assisted activities to support clients of employment services. In addition to physical health impact, the activities aimed to experience

the sense of community and social inclusion in groups. The goal was to strengthen the mental and cognitive resources of employment service clients and help them find a direction for their study or career path. In the model, employment service professionals learned to use nature- and animal-assisted working methods. At the same time, a cooperation network with private enterprises providing nature-based wellbeing services was formed. The model of action is being assessed by THL as a practice for the promotion of health and wellbeing (THL 2023).

In the *Luontolähtöinen työpaja* (Nature-based workshop) (THL/Sokra & Puhakka 2022; THL/Sokra 2022a) and *Luonnonhoitotöissä voi tehdä hyvää luonnolle ja muille ihmisille* (Nature management can do good for nature and other people) (THL/Sokra, Puhakka & Kytö 2023; THL/Sokra 2023) models of action, participants are outside working life and education and accordingly lack such communities. The wellbeing effects of workshops is based on people's automatic relaxation in nature, on pleasure of seeing the results of the work, and on meaningful activities for the common good. Outdoor activities increase the participants' appetite and offer positive physical tiredness, improve the management of the daily rhythm as well as the quality of sleep and overall life. These factors increase the participants' engagement in the activities and accelerate rehabilitation results (see THL 2014).

### **Care services for the elderly and people with disabilities**

The goal of the *Nautitaan luonnosta!* (Let's enjoy nature!) model of action developed for families and others involved in family care is that the wellbeing of elderly families providing family care improves through health-promoting nature-based activities. Those working with family care may apply the model in a way that best suits them. The model is based on group activities focused on visits to nature and the virtual *Luontosivusto* (Nature site) service (THL/Launiainen 2020; Luontosivusto 2023). The goal of the nature-based group activities for people with disabilities was to promote the interactive and emotional skills of the participants (THL/Karhu 2020).

## HEALTH FOREST 2

## Lahti Health Forest

**HISTORY OF THE FOREST AREA**

The Lahti Health Forest is located close to Päijät-Häme Central Hospital, some six kilometres from the centre of Lahti. The area is part of the larger forest covered Salpausselkä recreational area, in which several frequently used trails cross. Most of the Health Forest is limited to the Kintterö nature conservation area established in 2018. The idea to use the area as a Health Forest came up when establishing the nature conservation area.

The Lahti Health Forest consists of two routes of different difficulty levels: the forest trail which mainly travels in a nature conservation area, and the accessible Likolampi trail. The accessible Likolampi nature route was built in 2019 when the Lahti Artists' Association also erected wooden sculptures around the Likolampi pond. From 2020, the Lahti Health Forest has been planned and developed as part of the GoGreenRoutes project funded by Horizon Europe. The Health Forest was opened in autumn 2023. The City of Lahti is responsible for constructing and maintaining the Health Forest and its structures.

**LANDSCAPE AND NATURE**

The forest trail meanders in varying terrain with so-called kettleholes, deep holes formed during the ice age, which are typical landforms in the Salpausselkä ridge system. These deep holes alternate with higher hills in the area. The hilly terrain offers an interesting hike in varying landscapes.

A valley generated by meltwater during the ice age, with the Kintterö peatland area at its bottom, is in the western part of the nature conservation area. In terms of landscapes, one of the most remarkable places along the trail is Kint-

terönlampi, a kettle pond surrounded by a bog.

The Health Forest area mainly consists of a pine- or spruce-dominated heath forest. A large part of the area has previously been used for wood production, the effect of which can still be seen in the tree structure in places. In addition to Kintterönsuo, the area also features a few other peatlands formed at the bottom of kettles. Vegetation largely consists of species typical to heath forests and peatlands, but there are also some rarer species. The older forests of Kintterönlampi, especially the forests located within the protected area, are vital habitats for numerous bird species.

In addition to the favourable location, the Health Forest area is sufficiently large for its users to feel that they are really inside a forest. The forest trail travelling in the nature conservation area is long enough for hikers to relax and recover. The forest features diverse beautiful places that increase the sense of pleasure and integrity. Even though some parts are formerly managed commercial forests, the area's internal features are highly varying. Alongside the route, the forest type changes from an open pine forest into dense spruce and birch forests. Biodiversity and the versatility of the area enable different people to find their favourite spots to support their recovery. Even though the forest is close to residential areas, it can be experienced as a peaceful and noiseless natural environment.

**LOCATION AND ACCESSIBILITY**

The Lahti Health Forest is easy to access. There are two starting points, both of which include information boards and maps of the area: one is at the end of Koneharjankatu (Koneharjukatu 10) and the other is near the parking area of the Likolampi beach (Hoitajankatu 2).

The Lahti Health Forest can also be reached easily by bus. The Reunakatu bus stop includes signs to the starting point. Parking spaces are available at the end of Koneharjankatu and on Hoitajankatu near Likolampi. However, the number of parking spaces is limited, and people are recommended to arrive using other modes of transport.



## ROUTE DESCRIPTION

The Health Forest route is 3.4 kilometres long and mainly travels in the Kintterö nature conservation area. There are a few steep hills and other varying terrain along the route. In addition, there is a shelter intended for resting, benches near

Kintterönlampi and a platform for yoga (Image 1). Instruction boards for sensory exercises have also been placed along the route to guide visitors to sense and observe nature around them. The Health Forest route joins other hiking trails in places. They are used by mountain bikers, for example, which requires each user to consider other users.

The Likolampi trail is an accessible route of roughly a kilometre (Image 2), which travels around the Likolampi pond next to the Päijät-Häme Central Hospital. Wooden sculptures made by members of the Lahti Artists' Association have been erected along the trail.



**Image 1.** The forest trail mainly travels in the Kintterö nature conservation area. The route features a platform for yoga, for example.  
*Image by: Maija Lipponen/Luke.*



**Image 2.** An accessible route of roughly a kilometre circles the Likolampi pond.  
*Image by: Maija Lipponen/Luke.*

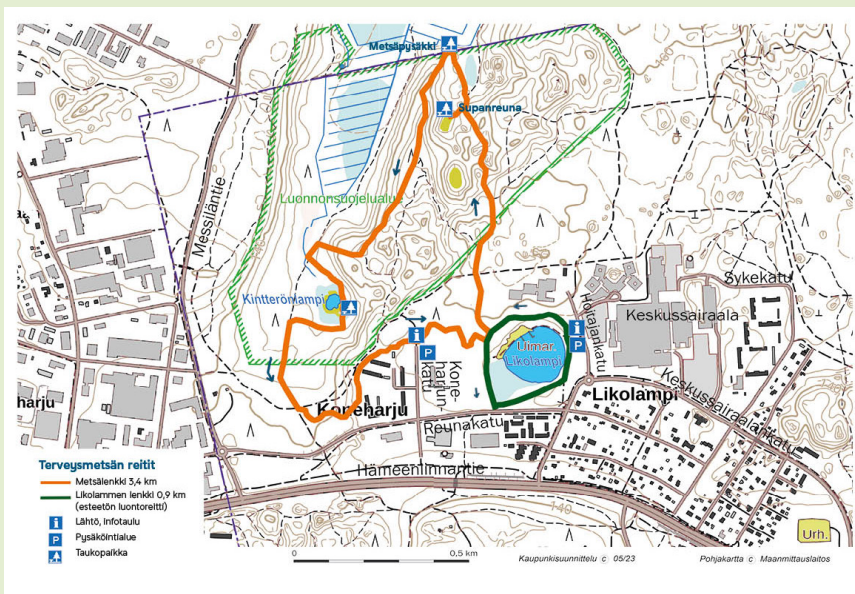
## SUITABLE USER GROUPS

The Health Forest is available to everyone. People can come independently to the Health Forest to relax, or wellbeing trips guided by professionals can also be arranged there. Day-care centres, schools and educational institutions in the area can also use the Health Forest in their activities.

The Lahti Health Forest is specifically intended for employees and clients of the Wellbeing ser-

vices county of Päijät-Häme. The area can be used to support occupational wellbeing by organising walking meetings, for example. It can also support the treatment of clients of the hospital, and their family members can refresh themselves in the forest. Before the Health Forest was established, the area was already utilised, for example, to support mental health rehabilitees with positive experiences.

*Text by Taru Suutari, project manager, City of Lahti*



**Image 3.** The longer forest trail and the shorter Likolampi trail in the Lahti Health Forest.

*Image by: City of Lahti, including data obtained from the National Land Survey of Finland's base map c 2023.*



## 4. Forest environments that promote wellbeing

### Significance of visits to forests for wellbeing

Even though Finns have always spent significant amounts of time outdoors, the coronavirus pandemic showed clearly how important outdoor recreational areas are. No wonder that among natural environments, precisely forests are significant for Finns, as forests cover 77% of Finland's land area (Peltola et al. 2020). Citizens mainly visit forests for recreational purposes (Lankia et al. 2020). When the restorative effects of a forest and park were compared, the forest was found to have a slightly higher restorative effect than the park (Tyrväinen et al. 2014).

Therefore, forest environments significantly maintain public health, even though there seem to be differences in how well different forest environments are restorative. For this reason, it is worth to direct the Health Forest activities to the sites that have been studied to have health-promoting characteristics. In addition, when choosing forest management measures, needs for promoting visitors' health and wellbeing could also be taken better into account.

### The forest age and management affect experiences of wellbeing

The quality of nature seems to have an impact on people's wellbeing. Diverse nature has been seen to have a positive association with wellbeing (Donovan et al. 2021; Engemann et al. 2019 and 2020; Marselle et al. 2021), although the connection between natural forest species and human health has not been studied to any significant extent. Even though forests are usually regarded as fairly natural and diverse environments, significantly different species may live in a commercial forest than in a forest in its natural state. This is important because more than 80% of Finland's forests are available for commercial forestry (Peltola et al. 2020). Intensive forestry is known to reduce the recreational value of forests, at least in the short term (Silvennoinen et al. 2017).

The impact of forest management on people's wellbeing has been studied in field experiments in Switzerland and Japan, among other countries. In a Swiss study, a visit to a tended forest increased positive emotions more than a visit to a forest in a natural state (Martens et al. 2011). In Japan, a non-thinned forest provided the same restorative effects as a thinned forest, whereas blood pressure and the cortisol content in saliva decreased more in a thinned forest (Takayama et al. 2017). When conducting further studies, the Japanese group of researchers noticed, however, that the participants who showed tendencies of depression restored more effectively in a non-thinned forest (Saito et al. 2019). However, the forests used in both studies were planted and therefore were not in a real natural state. In the study conducted by Marten et al. (2011), the forest they mentioned to be in a natural state had only been outside the scope of forest management for six years.

A Finnish field experiment compared four different spruce-dominated forest sites. One of them was a mature commercial forest ready for harvesting which had, however, been managed so that decayed trees had been left on the ground and the forest had already reached the age of 100 years. The second forest was an old-growth forest aged more than 120 years which was part of the Natura conservation area network for old-growth forests and in which no forest management practices had been carried out at least in decades. The forest structure consisted of trees of different ages, which is typical to a naturally grown forest, with small bright open spaces and shadowing canopy layers. In addition, the experiment included an urban forest of quite a similar age and appearance as a mature commercial forest, which had been managed concurrently considering recreational values. The fourth site was a young (aged 40 years) and fairly monotonous commercially managed forest. All these forest sites resulted to have statistically restorative effects, but the young commercial forest site fell significantly behind the other three forest sites in terms of restorative effects. The mature commercial forest ready for harvesting and the

## Maps to help find health-promoting nature sites

The Health Forest models in promoting work and functional abilities project piloted a browser-based map to identify health-supporting nature sites in the region of Kainuu. [The map link](#) is available on Luke's project pages. A similar map was originally created in the Nordic Nature Health Hub project for the regions of Ostrobothnia and Västerbotten, and it is available on Luke's project pages.

Sites have been selected for the maps based on their reviving effects: old trees, proximity to water-bodies and an open landscape are among the criteria the map uses to identify potential health-promoting sites. Quiet areas can also be searched for separately on the map of Kainuu. The map includes hiking services, such as rest areas and lean-to shelters.

It can be used by anyone to search for health-promoting nature sites in the areas. The map can be used by employees of municipalities and wellbeing services counties when arranging interventions for their clients and working groups as well as coordinators for the promotion of health and wellbeing when planning measures to support the wellbeing of residents. In the planning processes of municipalities and cities, the map can be used to identify the recreational values of local nature sites and plan the use of forests. Furthermore, the map can support the preparation of various strategies.

protected old-growth forest had equal restorative effects and these forest sites restored more than the urban recreational forest site (Simkin et al. 2020). The sense of diversity and beauty of the forest sites seemed to be especially important for the restorative experience (Simkin et al. 2021). Even though the old-growth forest sites featured a substantial amount of dead standing trees and decayed wood on the ground, the circumstances did not reduce the restorative experience.

Based on research literature, it appears that highly different types of forest environments offer restorative effects. A Swedish research study, which was carried out on different forest types, found no significant difference in how effectively different forest sites offered perceived restoration (Sonntag-Öström et al. 2014), whereas the sense of protection, peacefulness and brightness offered by forest sites was found important (Sonntag-Öström et al. 2015). Even though preference studies indicate that people prefer managed forests (Karjalainen 2006; Silvennoinen et al. 2001; Tyrväinen et al. 2003), a forest in its natural state, despite its numerous dead standing trees and decayed wood on the ground, seems to offer the same restorative effects as a mature commercially managed forest in which it is eas-

ier to wander. Similarly, people are known to prefer old trees (e.g. Gundersen & Frivold 2008; Silvennoinen 2017). Research evidence has also shown that a younger forest does not have as high restorative effects as an old-growth forest (Simkin et al. 2020). A research study of urban trees conducted in Brussels showed that sales of antidepressants and pharmaceuticals for cardiovascular disorders were lower in residential areas with more large trees, while considering the population's age and socioeconomic structure (Chi et al. 2022).

The absolute key factor when choosing a site for Health Forest activities is that the usage of the site is permitted for these type activities, while no damage is caused for the nature values of the environment. An older forest in its natural state, or sensed as a natural forest, seems to be the most effective as a Health Forest. Accordingly, a mature commercially managed forest with diversity values may also be suitable for Health Forest activities. The nature values of public recreational forest sites do not usually suffer, even if they were used in Health Forest activities. Suitable sites can be found using topographic maps or the [luontoon.fi](#) website which presents the hiking sites of Metsähallitus, and different online map services (see Infobox 2).

## Perceived sensory dimensions of natural environment

Grahn & Stigsdotter (2010) have identified eight Perceived Sensory Dimensions (PSD) to describe the health-promoting characteristics of natural environments. For example, it has been perceived regarding the “serene / social” dimensions that stressed individuals consider a peaceful serene environment in which the amount of social

contact has been minimised to restore them the most. With regard to the “sheltered versus open” dimension, sheltered natural environments can also offer psychological security, whereas open landscapes may also be sensed to introduce new psychological perspectives. In turn, environments in their natural state can be regarded as psychologically serene and undamaged places, and diverse nature may symbolise freedom and integrity (Stoltz & Grahn 2021).

**Table 1.** Perceived Sensory Dimensions (PSD) of green space designed for wellbeing activities according to Grahn & Stigsdotter (2010), Stoltz & Grahn 2021, and Stoltz (2022) using modified expressions. The dimensions are presented in the same order as in Figure 3 (top-down). The forementioned researchers have further illustrated these eight dimensions as four pairs of opposing points on axes: natural versus cultural; cohesive versus diverse; sheltered versus open; and serene versus social.

## Perceived Sensory Dimensions of green space (PSD)

**Social dimension** perceptions of activity, mobility and surrounding people. Places with plenty of social activity and interaction.

**Cultural dimension:** perceptions of human activity, creativity, culture and history.

**Open dimension:** perceptions of openness and physical accessibility. Open landscapes with plenty of space to wander around freely and good opportunities to see far.

**Diverse dimension:** perceptions of multiple layers, and structural and diverse species. Multi-layered and structural diverse plant life and waterbodies.

**Cohesive dimension:** perceptions of spatial and structural cohesion. A spacious and uninterrupted area in which we are free to roam and explore.

**Natural dimension:** perceptions of natural environments, their specific shape, pattern and power. Freely growing plants, large trees, timelessness without human intervention.

**Sheltered dimension:** perceptions of protection and safety. Small shelters offered by trees and other plants, while offering sufficient visibility over the surrounding area.

**Serene dimension:** perceptions of calm, peace and serenity. Freedom from noise and disruptions, possibility to hear natural sounds. Absence of other people, signals and threatening or intrusive stimuli.

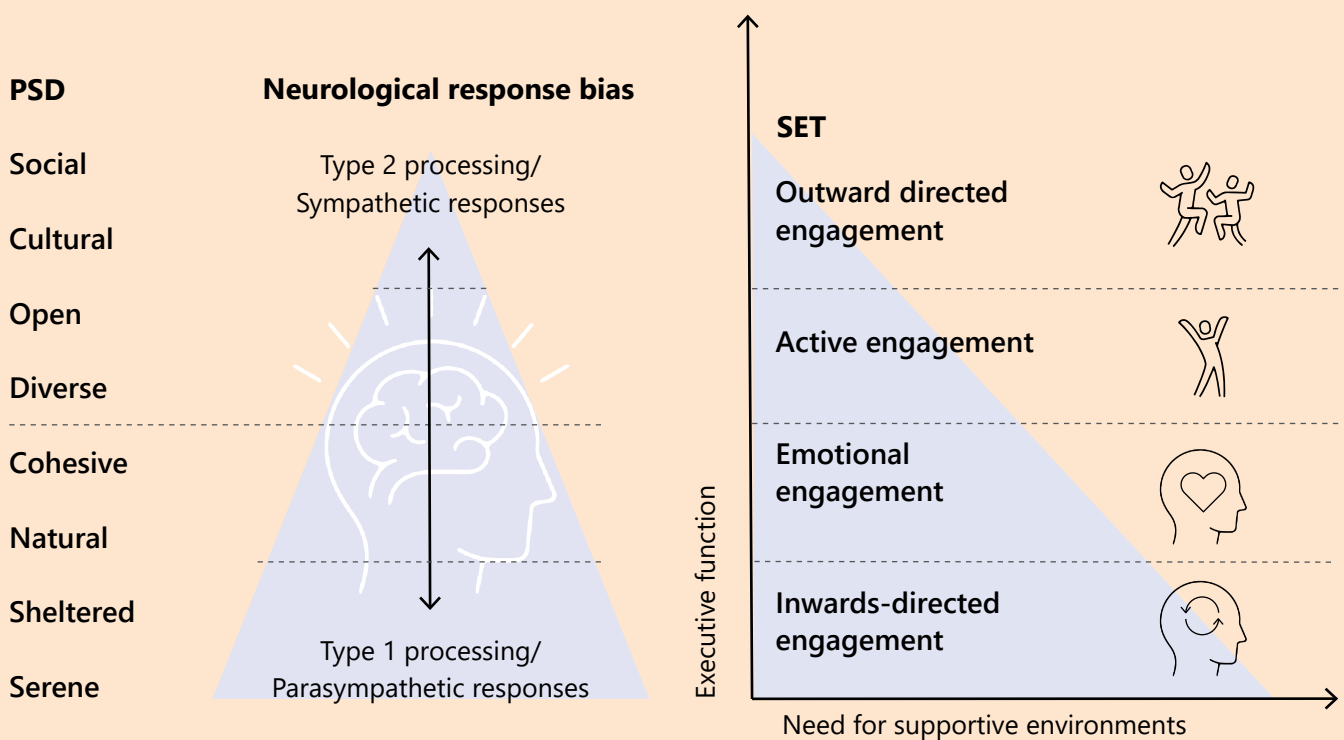
Sources: Grahn & Stigsdotter (2010); Stoltz & Grahn (2021); and Stoltz (2022).

Individuals' different starting points and needs also have an impact on what kinds of forest sites are perceived as restorative (e.g. Saito et al. 2019; Stoltz & Grahn 2021; Sonntag-Öström et al. 2015; Ojala et al. 2019). According to the PSD theory (Stoltz 2022), a natural, sheltered and serene environment supports the activation of the parasympathetic nervous system and is therefore an ideal reviving environment for stressed, exhausted or depressed individuals (Figure 3). Diverse and coherent nature sites support active and emotional engagement. In contrast, a social, cultural and open environment produces responses that increase the alertness of the sympathetic nervous system, being applicable to outward-directed activities and engagement (Stoltz 2022). Figure 3 presents side-by-side the

pyramid of the Supportive Environment Theory (SET) according to Sidenius (2017) and the PSD model for green space according to Stoltz (2022).

In addition to the psychological functional capacity, our physical functional capacity sets different needs for environments. A person with limited mobility or an older person may require a more passable terrain than what forests in their natural state offer. If a forest is designated as a Health Forest, it is important that it is safe to wander around. In addition, if an important characteristic affecting sense of wellbeing is missing, another forest characteristic may replace it (Simkin et al. 2021). For example, a varying landscape may compensate for the small size of space, making the forest site feel larger than what it actually is.

**Figure 3.** The pyramid of the Supportive Environment Theory (SET) according to the doctoral dissertation of Sidenius (2017) presented side-by-side with the Perceived Sensory Dimensions (PSD) model for green space according to the article of Stoltz (2022), in which the PSDs were examined through our evolutionary development. The SET and the PSD illustrations are based on the following sources: Grahn & Stigsdotter (2010); and Stigsdotter & Randrup (2008).



Researchers agree fairly unanimously that contact with nature improves psychic health, wellbeing and the quality of life in increasingly urbanised surroundings. However, the impact of natural environments has often been studied without identifying certain visually perceived physical and regional landscape features. The scale-based landscape features presented in the Contemplative Landscape Model (CLM) can be used to assess the therapeutic value of urban nature sites (Olszewska et al. 2016; Olszewska-Guizzo et al. 2022). The CLM assesses urban landscapes based on seven visually perceived features: layers of the landscape; landform; vegetation; colour and light; compatibility; archetypal elements; and character of peace and silence.

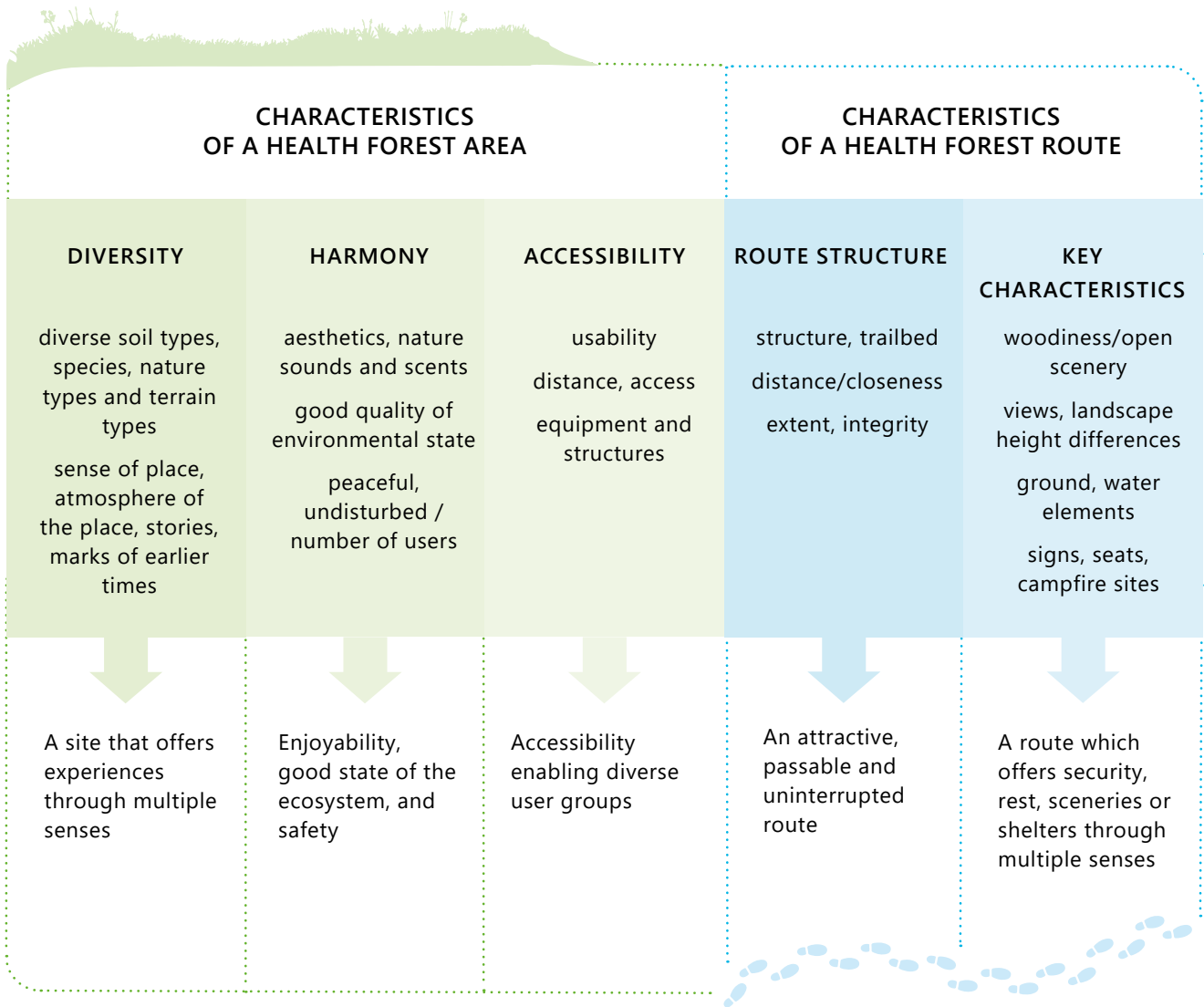
The visual quality of different landscapes has been studied by Olszewska-Guizzo et al. (2022). In the research study, 74 healthy adults were exposed to various urban natural perceptions in either laboratory conditions using virtual nature via videos or in naturalistic outdoor settings. The study examined positive emotions in the participants and their descriptions of the visual quality of urban landscapes using the CLM indicators and measured lengths of brainwaves (theta waves of mindfulness, alpha waves of relaxation, and beta waves of attention restoration). For example, the wavelengths of relaxation and mindfulness were

measured in natural spaces in which the strongest associations perceived by the participants were the character of peace and silence, layers of the landscape, and archetypal elements. The study findings can help guide the planning and design of urban green spaces with consideration to mental health and wellbeing of visitors and residents (Olszewska-Guizzo et al. 2022).

## Characteristics of Health Forest sites and routes

In their research study, Gobster et al. (2023) identified the key characteristics of forest sites and routes ideal for use in forest therapy. The goal of the study was to build a conceptual and evidence-based background for assessment procedures which the US Forest Service (cf. Metsähallitus in Finland) can use to identify existing routes and design new ones to respond to the growing needs of forest planners, forest workers, guides or therapists and participants for forest therapy practices. Leppänen and Pajunen (2017) also identified significant features of Health Forests based on experience and research data. Figure 4 summarises essential characteristics associated with Health Forests by Gobster et al. (2023) and Leppänen and Pajunen (2017).





**Figure 4.** Characteristics of Health Forest areas and routes.

Figure: Elina Vehmasto based on Gobster et al. 2023 and Leppänen & Pajunen 2017.

## Practical perspectives to the planning of Health Forests

While no certification system for Health Forests is used in Finland, quality criteria for health-promoting forests can be considered based on the research data described above. In addition to the health-promoting forest characteristics above, various practical matters should be addressed in planning Health Forests. Health Forest activities can be carried out at various nearby nature sites that offer characteristics that support wellbeing.

The Kohti suomalaista Terveysmetsän mallia (Towards a Finnish model of a Health Forest) publication (Tyrväinen et al. 2017) describes the plan-

ning principles applied to Health Forests. When selecting a Health Forest site, it must be considered that the forest is easily accessible and preferably as close to the people for whom it is intended as possible. If the area needs to be accessed by car, a sufficient number of parking spaces must be provided. The nature area planned as a Health Forest site should offer trails or other routes are clearly and obviously signposted. A Health Forest can be part of different kinds of forested areas, such as a commercial, multiple-use or protected forest. When planning forest management measures, their impact on recreational values and the landscape must however be addressed. Nature types and the size of the area determine the experiences of wellbeing obtained

by visitors. If the area is sufficiently large, it will be easier to step away from routines and focus on nature. Experiences of wellbeing are supported by possibly available waterbodies, including streams and ponds (Tyrväinen et al. 2017).

### A tool to identify the characteristics of Health Forests

The Health Forest models in promoting work and functional abilities project developed a tool

to assess the health-promoting characteristics of forests (Table 2). The table is based on the studies and theories presented above and aims to act as a practical tool to identify suitable Health Forest sites. The Health Forest characteristics presented in the table are indicative, and assessments are based on findings made by users of the table. In addition to health-promoting characteristics, site selections can emphasise easy accessibility or the suitability of the location for a specific target group.

**Table 2.** Assessment table for Health Forest characteristics *Prepared by the authors based on Gobster, Kruger, Schultz & Henderson (2023); and Leppänen & Pajunen (2017, 296–297).*

Health forest characteristics	Experiences and emotions
<b>Usability and accessibility of the location</b>	<b>Accessibility enabling the diversity of users</b>
Sufficient proximity and access	Equality in accessing nature
Passability and trails (accessibility)	Feeling of smooth access and safety
Suitable equipment and structures	Experience of comfort
<b>Harmony in the location</b>	<b>Enjoyability, good state of the ecosystem, and safety</b>
Aesthetics, natural scents	Experiences of pleasure, integrity and beauty
Possibility to hear natural sounds	Recovery of attentiveness
No litter or wear	Willingness to protect and foster
Peacefulness, no distractions	Experiences of recovery and immersion
Safety, low risks	Sense of security
<b>Diversity in the location</b>	<b>Opportunities of experiences and feelings with multiple senses</b>
Sufficiently natural state, waterbodies	Experience of recovery
Diverse nature and forest types	Attraction of interest
Availability of natural picking products	Access to beneficial microbes
Impressive natural elements	Sense of timelessness, symbolism and an elevating atmosphere
Opportunity to see animals	Experiences of meaningfulness and interaction
Stories tied to the place, marks of the past	Sense of belonging and inclusion
<b>Route characteristics</b>	<b>An attractive uninterrupted route, which offers security, rest, views or shelter</b>
Sufficient size, suitable elevations	Integrity of route, sufficiently challenging
Views, clearings	Sense of space, elevating atmosphere, enchantment
Trees	Sense of immersion and shelter
Route signs, rest areas and campsites	Experiences of security and rest

## Considerations in the planning of the Health Forest in Kajaani

In the *Health Forest models in promoting work and functional abilities* project, a scheme was prepared for the use of the forest next to Kainuu Central Hospital from the perspectives of health and wellbeing promotion in cooperation with the wellbeing services county of Kainuu and the City of Kajaani (Keränen 2022). The Sairaalanrinne forest area partly consists of a recreational forest owned by the City of Kajaani and land belonging to the hospital of the wellbeing service county of Kainuu. Nature of Kainuu is the theme of the new Kainuu Central Hospital completed in 2021. As the new hospital underlines the significance of the interior that support rehabilitation, the forest next to the hospital was considered an ideal location to extend the nature and rehabilitation themes in the environs of the hospital. The multi-professional working group stated that accessible structures would increase the use of the forest, allowing all residents and hospital clients to access the forest, regardless of their physical condition. In addition to taking advantage of the forest area, a rehabilitation park was built on the other side of the hospital buildings. It is a park-like green area that is available to everyone and supports the wellbeing of the mind and body. The Health Forest and rehabilitation park constitute a nature-based area outside the hospital.

The Sairaalanrinne Health Forest was designed for the residents of the City of Kajaani, tourists and the hospital's staff, clients and their family members. Patients may in some cases spend months in certain hospital wards, when having a nature site next to the hospital can be especial-

ly important. The Health Forest can also support employees' wellbeing and their coping at work.

In terms of size, the area is quite small, but the sense of space was achieved by designing the paths in such a way that it is possible to form a longer route from them by connecting paths. When people wander around and spend enough time in the forest, they may receive a greater amount of health effects. Information signposts were put up in the Health Forest to help visitors to observe and experience nature. The signs and the lean-to shelter built in the area may increase the amount of time spent in nature. The signs offer the same texts using regular letters and braille, thus making them usable for visitors with visual impairments (Keränen 2022).

The accessible Sairaalanrinne nature trail can be entered with a wheelchair or other mobility aid. The accessible nature trail has appropriate signs in each crossing. The surface of this trail is made of wood. It is wide enough for wheelchairs and includes places to go past other wheelchair users. Handrails and seats available at different levels in rest areas increase security and comfort. Accessible parking spaces are provided in the immediate vicinity of the Health Forest, and the route from the parking area to the forest is accessible. The start location includes a tactile map, which is also usable for visitors with visual impairments (Keränen 2022; Finnish Association of People with Physical Disabilities 2023).

The Health Forest was designed in cooperation with managers of public forest land and the route system's maintenance provider. For example, the use of the forest in the winter season was considered from the perspectives of maintenance and liabilities in case of any potential hazards. The routes were planned according to the terrain and the existing routes. The time and resources required for maintenance, the wear of the terrain and safety were addressed thoroughly in the design process. Any unfavourable places, including slippery rocks, were left outside the route system. The Health Forest's terrain is only reconditions as required: the forest undergrowth can be replaced and any trailside trees with a fall risk and invasive alien species can be removed.



## HEALTH FOREST 3

## Ratamo Health Forest in Kouvola



### HISTORY OF THE FOREST AREA

The Health Forest, built on the western side of Ratamo centre in the Kotiharju district, was opened in October 2023. The Health Forest serves to support visitors' recovery and various special groups' access to nature. The accessibility of culture in the form of art can also be increased by integrating artworks along the routes (City of Kouvola 2023).

The Health Forest was planned and built based on the principles of sustainable environmental construction. It is a significant area in the management of urban runoff in the centre of Kouvola before rainwater flows into the Kymijoki river. The significance of the area in urban runoff water management is highlighted and used as a landscape element. Peatland and water areas largely determine where the routes travel and add diversity to the forest experience (Hiltunen 2021).

The Ratamo Health Forest was built in cooperation between technology and environmental services and welfare and culture services of the City of Kouvola. Members of the regional committee in the city centre and representatives of the wellbeing services county also participated in the planning of the Health Forest (City of Kouvola 2023).



### NATURE AND LANDSCAPE

The Ratamo Health Forest includes different types of areas in terms of their atmosphere and vegetation. The integration of changing artworks along the routes of the Health Forest attracts people to visit the area regularly. Both temporary and permanent artworks are designed to surprise, arouse interest and add to the charm of the area, thereby enriching the visitor experience. The artworks and resting areas tempt visitors

to have a break and intentionally interact with nature. In the artworks, nature's material of the area is used when possible. Changing artworks enable the diverse engagement of people living in the city. Temporary art exhibitions can represent natural art created by schoolchildren, art created by art students for their final exhibition or, for example, light art to illuminate dark autumn nights (Hiltunen 2021). When the Health Forest was completed, there were two permanent artworks: "Valon tunne" (Sense of light, Heini Nieminen & Sandra Nyberg) and "Suoja" (Shelter, Tiina Karimaa).



### LOCATION AND ACCESSIBILITY

The Ratamo Health Forest and its accessible health-promoting routes are in the forested area between the old Savonrata railway and the Ratamokeskus health centre in conjunction with



**Image 1.** An accessible route in the Kouvola Health Forest.

*Image by: Tarja Alamattila/City of Kouvola.*

the new Ratamo hospital (Image 1). The forested area and its routes were planned based on research results of the health- and wellbeing-promoting properties of green areas. Resting areas and changing and permanent environmental art have been placed along the route (City of Kouvola 2023).



## ROUTE DESCRIPTION

The open area of the Ratamo Health Forest acts as the route's start and end point. It is located by the Ruskeasuonraitti pedestrian route travelling in front of Ratamo hospital. The purpose of the open area is to act as an inviting and social space, in which people can spend time and which guides visitors towards the forest trail. The Ratamo Health Forest features different types of areas in terms of their atmosphere and vegetation, through which the accessible main route passes via the open area and the resting place (Image 2). The resting place is an open moss-covered area in the middle of the forest with peaceful nature's sounds. It includes a swing for watching the forest or other trail users and a spruce thicket, which is intended as a quiet place and which offers views towards the forest and sky. The part of the route that follows the ditch, which has been

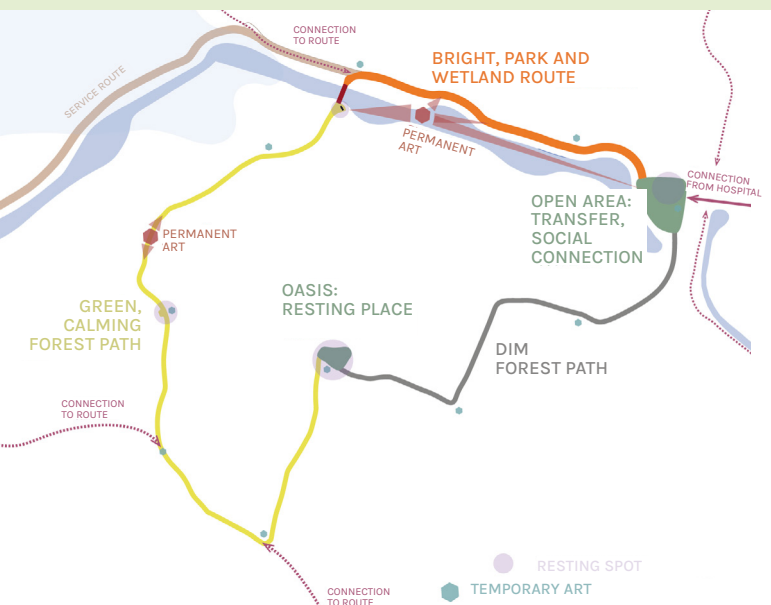
widened into a pond, is an open and park-like area filled with light (Image 3). The resting place in the middle of the area acts as a quiet area. The middle part of the route offers a fairly open forest landscape. The final part of the route travels to the starting point through a hazy spruce forest where visitors can rest after completing the route (Hiltunen 2021).



## SUITABLE USER GROUPS

The Ratamo Health Forest in Kouvola combines culture in the form of art with nature and comprehensive wellbeing. The Health Forest serves people living in Kouvola and professional providers of services for townspeople, including early childhood care and other education, elderly care. In addition, the area can be utilised for the occupational wellbeing of employees of the Ratamo Healthcare Centre.

**Sources:** Hiltunen, E. 2021. *Ratamon terveystetsä – esteetön ja palauttava metsäkokemus (Ratamo Health Forest – an accessible and recovering forest experience). General plan, 10 June 2021. City of Kouvola 2023. Website. Tarja Alamattila, coordinator for promotion of wellbeing, City of Kouvola*



**Image 2.** Ratamo Health Forest in Kouvola  
*Image by: Emilia Hiltunen.*



**Image 3.** A bridge leading from the open area to the sheltered forest in the Kouvola Health Forest.  
*Image by: Tarja Alamattila/City of Kouvola.*

## 5. Guided Health Forest visits

The content of this chapter was prepared on the basis of forest trip trials guided by members of the *Health Forest models in promoting work and functional abilities* project for various target groups. The ideas for the exercises came from and were applied based on the *Terveysmetsäopas (Health Forest guide)* training by Adela Pajunen and Marko Leppänen and the *Metsämieli (Forest mind)* training by Erja Järvelä, which were held in 2021–2023 with the *KantriKestävä (Country-Sustainability)* project of Kainuu Vocational College (KAO) and the *Tilalta tietoon ja työelämään (From farms to knowledge and working life)* project of Luke, Kainuu University of Applied Sciences and KAO. Persons who had completed the *Terveysmetsäopas (Health Forest guide)* training and Health Forest guide Katja Manninen provided guidance for the trip content.

Because the content of this chapter is largely based on experiential knowledge, it differs from the other chapters that are mostly based on research results published by various parties. In addition to experiential and educational knowledge, the chapter on guidance for Health Forest activities, including its tips and checklists, has also been influenced by several literary sources regarding nature guidance (e.g. Leppänen & Pa-

junen 2017 and 2022; Uusitalo et al. 2019; Jokela et al. 2022; Arvonen 2018 and 2022; Kahilaniemi & Löf 2018a and 2018b; Eskelinen et al. 2018; Vehmasto et al. 2021).

### Aims of Health Forest visits

The aim of guided Health Forest visits is to experience nature with multiple senses in a way that increases wellbeing. The wellbeing effects offered by forests are found through personal experiences and the body. Exercises for which a skilled guide provides guidance help examine personal physical and psychological feelings and the positive impact of a stay in a forest on the self. The group proceeds slowly while observing nature. Under the guidance of a skilled guide, the participants carry out various individual, pair or group exercises based on the visit's wellbeing goals. The exercises can engage all senses, emphasizing either breathing exercises and motor skills or fostering a deeper connection with nature, while also nurturing creativity, relaxation, and mindfulness. The exercises can offer the sense of enchantment, immersion, timelessness and sublimity. The guide's guidance skills are vital for the success of the trip.

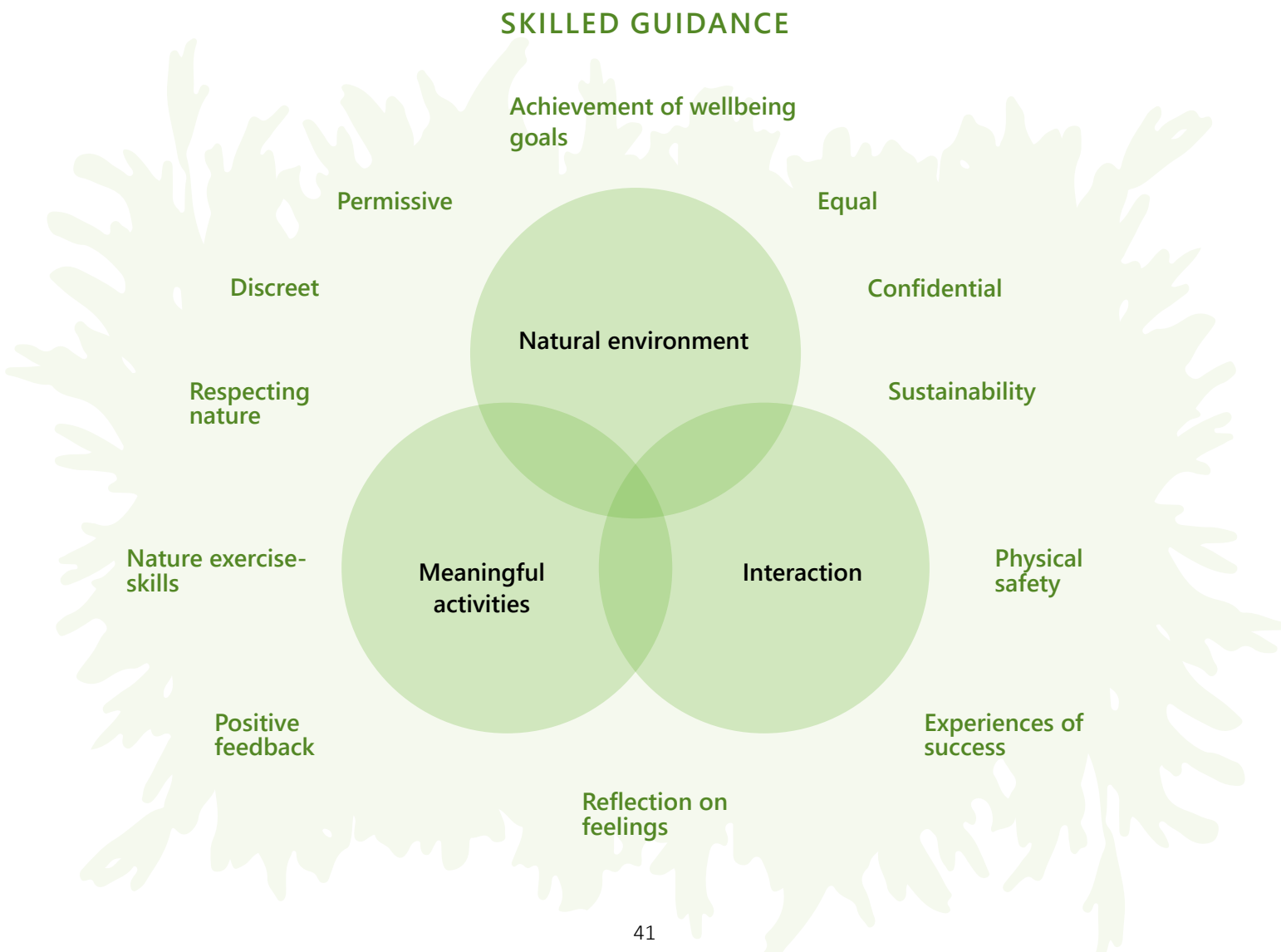


## Guiding a Health Forest visit

The effectiveness of a nature-assisted intervention is based on three key elements: wellbeing benefits offered by the natural environment, meaningful activities, and interaction between people and between people and their surroundings (Figure 5). Skilled guidance takes the pre-defined wellbeing goals into account. Key factors include the guide’s understanding of each situation and ability to react to those observations, including changes in weather or the participants’ energy levels during the trip. The guide must treat the participants as equal outdoor enthusiasts and take other people into account in the activities. Furthermore, the guide must select the

route and exercises to enable suitable challenges and experiences of success. The guide must address equal respect and environmental sustainability when planning and implementing the trip, including the selection of food and drink and their containers and the handling of waste. Skilfully using nature exercises that support the wellbeing goals, addressing all group members, giving positive feedback and discreetly supporting the reflection of the emotions raised by the exercises and the trip are key elements of guidance. Permissibility is part of skilled guidance – no excessive talking, rules and instructions, but subtle guidance while giving the leading role to nature (Johansson et al. 2022; Vehmasto et al. 2021; Leppänen & Pajunen 2017).

**Figure 5.** Three key elements of nature-based intervention (NBI) – natural environment, meaningful activities, and interaction – as well as characteristics of skilled guidance. *Prepared by Vehmasto based on the following sources: Johansson et al. 2022; Vehmasto et al. 2021; and Leppänen & Pajunen 2017.*



## Preparing a Health Forest visit

### Thorough planning

The thorough planning of a Health Forest trip ensures that the selected routes and the content of the trip support the participants' wellbeing goals. The guide must visit the area beforehand to ensure that it is suitable for the target group. Providing the participants with comprehensive information about the area, programme and the equipment required beforehand in the form of a letter, for example, is key to a successful trip. The guide must carry appropriate equipment, acquire the equipment to be lent to the participants or request the participants to bring their own equipment. The letter should also include information about appropriate clothes and shoes. Key factors to be considered during the preparation stage are presented in Checklist 1.

### Ensuring physical, psychological and social safety

It must be clear for the participants in a group intervention that all personal health and other information and experiences exchanges within the group are confidential. In addition to the psychological safety of the group, the guide is responsible for ensuring its physical safety. A safety plan must be prepared for the trip beforehand (see Tips 1). The trip must be planned at an optimally impressive and refreshing nature site considering the accessibility of the site, and the age, physical condition and prior outdoor experiences of the participants (see Table 1). Fixed signs along the route increase the feeling of safety and security among the participants. Basic safety factors are presented in Checklist 2.

### CHECKLIST 1

#### When preparing a Health Forest visit, the guide:

- prepares a plan for the trip and an information letter for the participants, which indicates what will be done during the trip and what equipment is required.
- addresses the target group's wishes, goals and functional capacity and the characteristics of the natural environment when selecting the location.
- visits the location beforehand, plans the route and exercises, and sets schedules.
- identifies campfire sites and the availability of firewood.
- prepares a safety plan.
- ensures that first aid skills and the hygiene passport, if required, are up to date.
- plans, acquires and prepares the food and drink to be enjoyed during the trip, addressing different diets, or requests the participants to bring their own food and drink.
- sets up any camping equipment required.
- arranges any equipment and clothes to be lent to the participants.
- considers, depending on the target group and the number of participants, whether a separate guide for the target group, another Health Forest guide or interpreter is required.



## TIPS 1



### More information for planning the safety of Health Forest activities

Clear information for planning the safety of a Health Forest trip is available on the websites of the nature services of Metsähallitus, Suomen Latu – the Outdoor Association of Finland, rescue departments, and the Finnish Safety and Chemicals Agency (Tukes):

Planning a safe trip – [Luontoon.fi](https://www.luontoon.fi)

Safety plan template – [Suomenlatu.fi](https://www.suomenlatu.fi)

Safety plan template for public events – [Pelastuslaitokset.fi](https://www.pelastuslaitokset.fi)

Instructions for drawing up and using a safety document – [Tukes.fi](https://www.tukes.fi)

### Acquiring equipment for Health Forest visits

Hiking equipment kits available for borrowing can be acquired for workplaces, including hospitals and libraries, which the employees can use with their clients. In the Health Forest models in promoting work and functional abilities project, such kits were acquired for the personnel of Kainuu Central Hospital and Sotkamo youth work services. Tips 2 offer an example of the content of a hiking equipment kit. In addition to the equipment required, the participants must be instructed to wear appropriate and sufficiently warm clothes and shoes and, if required, carry their own sleeping mats and bags. As people proceed slowly while admiring their surroundings during Health Forest trips, warm clothes are often necessary. The guide must arrange suitable food and drink or request the participants to bring their own. Equipment can be divided to be carried by different participants so that each participant carries a suitable amount.





## Physical, psychological and social safety in guidance

### CHECKLIST 2

The guide must ensure the psychological and social safety of the group, including a positive and confidential atmosphere and an equal opportunity to participate:

- The guide helps the participants reflect on the thoughts raised by each exercise.
- If the guide requests the participants to reflect or discuss in pairs or groups, they must ask to reflect confidentially and discreetly.
- The guide directs group discussions so that a constructive approach is maintained.
- The guide ensures that each participant receives positive feedback and experiences of success.
- The guide ensures that, after very relaxing exercises, the participants can restore their attentiveness and functional capacity before ending the trip.

The guide must ensure the physical safety of the participants, without setting too many restrictions:

- The guide keeps the group members together and within hearing distance.
- The guide knows what plants and berries are edible.
- The guide ensures that only appropriate food is fed to animals.
- The guide ensures that the location is not too inhabited by snakes and ticks.
- The guide ensures safe routes and a sufficient amount of space.
- The guide ensures that the terrain is suitable for the planned exercises.
- The guide identifies any hazards such as slippery rocks and cliffs.
- The guide addresses the group's position on the route considering other users such as cyclists.
- The guide selects suitable motions for all in movement exercises.
- The guide requests the participants to check their skin for ticks at the end of the trip, if required.



## TIPS 2

### Example of equipment for setting up a hiking equipment kit available for borrowing:

#### Carrying equipment:

- Hiking backpack
- Smaller backpack
- Bag for sitting pads

#### Eating equipment:

- Telescopic roasting sticks
- Washable plastic cups
- Vacuum flasks for water and coffee
- Toilet paper
- Matches
- Rubbish bag

#### Equipment handed out to participants:

- Sitting pads
- Loupes
- Hammocks + fastening rope

#### Equipment for the guide:

- First aid kit
- Compass and map, if required
- A pack of cards or a booklet including exercise instructions
- Whistle or other signalling equipment
- Sufficiently charged mobile phone

## Contents of Health Forest visits

Various functional exercises are carried out during Health Forest trips. They must be selected based on the participating group's wellbeing goals. The exercises help the participants to have a break, focus on nature and step away from everyday routines. For example, the exercises serve to activate the senses, observe nature and learn from it, as well as practise camping skills. The goal is to deepen the participants' connectedness with nature, increase awareness of the health impact of exposure to nature, strengthen the significance of nature as a resource in personal life and familiarise the participants with nature sites in their neighbourhood. Each group may

also have special goals. These include relieving stress, increasing the sense of presence, developing motor skills, improving concentration skills, improving the mood, calming down, regulating emotions, clarifying the self-image, increasing courage or vitality, or developing social skills.

Tips 3 present five different Health Forest visits with different themes and the content of exercises that support their goals. While the goals of trips must always be defined for each group, the tips present examples of the goals and content of a Health Forest trip. Visits can be applied to support personal wellbeing or when working with clients.

### TIPS 3



## Health Forest visits with different themes and goals

### AN EXPLORATORY FOREST VISIT

#### Goals:

- Increasing knowledge of nature
- Observing nature
- Respecting nature and taking care of it
- Building nature connectedness
- Interacting with nature and the group

#### Example content of exercises:

- Examining the details of nature using a loupe or magnifying glass
- Looking for edible natural plants for tasting or smelling
- Allowing the eyes to look far away
- Focusing on natural sounds near and far "Listening to" the self
- Observing birds or animals
- Discussing interaction through nature and animals

### A PHYSICAL EXERCISE-BASED FOREST VISIT

#### Goals:

- Encouraging the participants to be active
- Strengthening motor skills, the imagination and a positive self-image
- Increasing positive emotions such as joy

#### Example content of exercises:

- Planning and creating a work of art together using natural material obtained from the forest
- Doing breathing exercises and stretches
- Creating and building activity-based agility routes using rocks, tree trunks and paths or using the varying terrain to find suitable challenges
- Allowing the participants to select the route and discussing the topics they raise during the trip
- Allowing the participants to do climbing and balancing exercises
-

## **AN ACTIVATING FOREST VISIT**

### **Goals:**

- Encouraging those who are rarely active to move around in nature
- Stepping away from everyday routines
- Improving the sleep rhythm
- Increasing awareness, learning to identify the body's signs

### **Example content of exercises:**

- Walking backwards to activate rarely used muscles and give the brain a challenge
- Picking up a fallen branch to do muscle and stretching exercises
- Feeling different aspects nature, focusing on what they feel like in the fingers or against the cheek
- Walking exaggeratingly slowly while feeling any changes in the terrain underneath the feet, observing the activation of muscles at the bottom of the feet and listening to the sounds of steps

## **AN ENGAGING FOREST VISIT**

### **Goals:**

- Supporting interaction and the sense of community
- Building a connection to others and placing oneself in the position of others
- Strengthening constructive interaction and inclusion
- Highlighting successes and positive actions
- Experiencing the joy of giving and the significance of caring
- Reflecting on personal wellbeing

### **Example content of exercises:**

- Everyone seeks a place in nature they believe their pair enjoys and presents it to them.
- Walking side-by-side, pairs ask each other "How do you feel?" and answer each

other confidentially one after the other. When one speaks, the other listens.

- Taking a moment to consider personal concerns and collecting a matching number of sticks that are then thrown into a fire one by one.
- Building a pile of natural material to represent each group member's recent successes or causes of joy at work or in other parts of life.
- Any concerns are grouped in a circle on the ground individually or in pairs using natural material according to how much each participant can affect them.

## **A CALMING FOREST VISIT**

### **Goals:**

- Supporting recovery from stress
- Taking a break and relaxing
- Having time for oneself
- Feelings of being together with nature
- Being thankful regardless of workloads
- Relieving anxiety and improving the mood

### **Example content of exercises:**

- Selecting an enjoyable and inviting place in the forest to focus on being alone in nature and sensing what one can hear, see, feel and smell in their surroundings.
- Placing a sleeping mat in a comfortable place and lying down to be supported by the ground, watch the sky or closing the eyes to listen to the sounds of nature. Hammocks and blankets can also be used.
- Finding a natural element with which the participants can experience the feeling of togetherness and which represents their current situation or emotions
- Imagining everyone's concerns on a tussock and considering their dimensions when they are viewed from farther away or from the sky.
- Thinking about what one can be thankful for in their life and imagining them on tree branches.

## Collecting feedback of Health Forest activities

Guides of forest visits should collect feedback in order to identify any development areas and obtain evaluation and monitoring information about the wellbeing effects of Health Forest activities on the participants (see Tips 4). However, the evaluation of activities can-not be the main purpose of the trip. The feedback form can be edited for each group of participants by changing the number scale into emoticons or by making the texts shorter. Guides can help complete the form. Feedback should be collected immediately after the trip, as it is often challenging to receive feedback later when the experiences gained are no longer fresh in the participants' minds. Feedback must be collected anonymously while ensuring data protection.



### TIPS 4



### Example of a feedback form for participants in a health forest trip

Consider the following statements related to the Health Forest trip and the feelings it raised. Select the option that best describes your feelings.

1 = I strongly disagree    2 = I disagree    3 = I agree    4 = I strongly agree

#### The content and guidance of the Health Forest trip

matched my needs and functional capacity	1	2	3	4
built a positive atmosphere in our group	1	2	3	4
made it safe to participate	1	2	3	4
were equal and suitable for everyone	1	2	3	4
offered interesting individual exercises	1	2	3	4
made pair discussions confidential	1	2	3	4
made group discussions constructive	1	2	3	4

#### Participation in the Health Forest trip

made me observe nature with multiple senses	1	2	3	4
---------------------------------------------	---	---	---	---

revived my ability to concentrate	1	2	3	4
helped me step away from routines	1	2	3	4
relaxed me and relieved my stress	1	2	3	4
improved my mood	1	2	3	4
gave me a bodily wellbeing experience	1	2	3	4

**The Health Forest area was**

interesting and diverse	1	2	3	4
aesthetically beautiful	1	2	3	4
filled with natural sounds	1	2	3	4
filled with natural scents	1	2	3	4
peaceful without any distractions	1	2	3	4
sufficiently equipped	1	2	3	4
sufficiently close	1	2	3	4

**The Health Forest route**

was suitably passable	1	2	3	4
was suitably long	1	2	3	4
was suitably whole	1	2	3	4
included a suitable number of views	1	2	3	4
included a suitable number of trees and plants	1	2	3	4
included a suitable number of signs, rest areas and campfire sites	1	2	3	4

**Describe in your own words what you benefited from participating in Health Forest activities:**

---

---

**How could the Health Forest activities be developed?**

---

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**Any other comments for the guide:**

---

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**THANK YOU FOR YOUR FEEDBACK!**

## Additional information and material for nature guidance

Nature guidance skills can be studied in secondary degree programmes (e.g. nature or wilderness guide) or through continuing education provided by secondary educational institutions, universities of applied sciences, universities and

companies. Basic information about the well-being effects of nature and nature-based services can be obtained from various nature- and animal-assisted training courses. Various information, material and training have been developed to support nature guidance. Examples of these are presented in Tips 5 below.

### TIPS 5



## Tips of nature exercises and nature guidance

The *Hyvinvointia luonnosta (Wellbeing from nature)* programme of Health Village's MentalHub.fi is a digital self-care programme. It is a public online service developed by Finland's university hospitals.

<https://www.mielenterveystalo.fi/fi/omahoito/hyvinvointia-luonnosta>

The website of the nature services of Metsähallitus includes diverse information about nature guidance, which all nature guides should check:

[www.luontoon.fi/luontoonoppimaan](http://www.luontoon.fi/luontoonoppimaan),

*Outdoor guide* [www.luontoon.fi/retkeilynabc](http://www.luontoon.fi/retkeilynabc) and

*Outdoor etiquette* [www.luontoon.fi/retkietiketti](http://www.luontoon.fi/retkietiketti)

*Luontosivusto (Nature site)* offers nature videos and images, information and exercises. It is a free online service created in the *Kuu kiurusta kesään (One month from the lark to the summer)* project of the Miina Sillanpää Foundation. The site has been developed with families engaged in family care and volunteers. The project's partners were Carers Finland, the Finnish Association for Nature Conservation, and Green Care of Finnish Blue Ribbon. The Ministry of Social Affairs and Health supported the project. <https://www.luontosivusto.fi/>

The Finnish Association of Nature and Environment Schools (LYKE) maintains, develops and updates the MAPPA material bank for environmental education <https://mappa.fi/fi/etusivu>.

More information and material are available on the LYKE Network's website at <https://www.luontokoulut.fi>

Many other organisations offer excellent material to support nature guidance on their websites:

Environmental School of Finland SYKLI <http://ulkoluokka.fi/>

Suomen Latu – the Outdoor Association of Finland, *Luokasta luontoon (From the class-room to nature)*, <https://mappa.fi/materiaalit/luokasta-luontoon/>

Finnish Association for Nature Conservation (FANC), *Koulumetsäopas (Forest education guide)*  
[www.sll.fi/koulumetsa](http://www.sll.fi/koulumetsa)

## Training tips

Health Forest guide training, Luonnontie. Training based on entrepreneurs' publications, training material and vast experience. [www.luonnontie.fi](http://www.luonnontie.fi)

The nature-based wellbeing study period provided in cooperation with the Sote Academy of the University of Turku and Luke, open study material of open university, available until 30 August 2024  
<https://digicampus.fi/login/index.php>

Green Care Finland publishes notifications of training providers on its website [www.gcfinland.fi](http://www.gcfinland.fi)

## Tips about books, guides and method cards

*Ideoita ja ohjeita ympäri vuoden järjestettäviin luontotyöpajoihin: PoLut-hankkeessa kehitettyjä luontotyöpajoja maahanmuuttajille, (Ideas and instructions for round-the-year nature workshops: nature workshops developed for immigrants in the PoLut project)* information cards (Uusitalo et al. 2019)

*LUMOT-käsikirja monikulttuuriseen luontotoimintaan (LUMOT manual for multicultural nature activities)* (Jokela et al. 2022)

*Terveysmetsä – tunnista ja koe elvyttävä luonto (Health Forest – identify and experience reviving nature)* (Leppänen & Pajunen 2017)

*Suomalainen metsäkylpy (Finnish forest immersion)* (Leppänen & Pajunen 2019)

*Metsämieli – mielen ja kehon maastokirja (Forest mind – outdoor manual for the mind and body)* (Arvonen 2018)

*Metsämieli – mielen ja kehon viikkopolut (Forest mind – weekly trails for the mind and body)* (Arvonen 2022)

*Green Care method guide* (Kahilaniemi & Löf 2018a)

*Green Care method cards* (Kahilaniemi & Löf 2018b)

**Please find the full references in the list of literature.**

## Lauttavaara Nature Study Forest in Kuhmo

The Lauttavaara Nature Study Forest in Kuhmo is not a designated Health Forest, but its suitability for Health Forest activities is described here.



### HISTORY OF THE FOREST AREA

The Lauttavaara nature trail represents biodiversity in the Kainuu region. The nature trail and nature educational activities were developed in the Paluu lähteille – luonto-opastusta perinteitä vaalien (Back to Nature – environmental education cherishing traditions) project which ended in 2004 and was funded by Interreg III A Karelia. The Nature Study Forest is especially intended for use in environmental education, but it is suitable for all types of hiking activities. The features of the Lauttavaara forest offer things to do and explore at all times of the year. The area and the nature trail are maintained by Metsähallitus. The surface area of the forest is roughly 0.5 km<sup>2</sup>.

Lauttavaara features forests in their natural state and forests used previously for commercial purposes. It displays the marks of human activities during various periods. The forest has been used for various purposes, including farming, tar burning, wood production, gathering and hunting. The area features old paths which led from one estate to another, to the lakeshore, meadows and hunting and berry picking areas. The Kivelä estate built in the 1930s is located by the trail. The estate later became unoccupied, and its buildings have been demolished, but its field was still sown in the 1980s.



### LANDSCAPE AND NATURE

The Lauttavaara forest area is rather small, but it offers a wide range of biodiversity. The forest landscape varies from managed forests to natural state forests and from open rocks to lush woodlands by the Kuikkapuro stream. Marshy habitats

include small pine mires and a few spruce mires.

Nowadays, forest management is prohibited in part of the area, while part of it is managed as forestry land. The highest point in the bedrock area offers a beautiful view towards the Lammasjärvi lake located farther down. This peak point is 210 metres above sea level (some 50 metres above the level of the Lammasjärvi lake). The lowest point of the area is by the Kuikkapuro stream, around 180 metres above sea level.

A small barren pine bog is located by the trail on the western side of the abandoned Kivelä estate. A larger pine bog is found farther from the trail in the south-western part of the area. The Kuikkapuro stream starts from the Iso Kuikkalampi pond and flows into the Porolahti bay in the Lammasjärvi lake. The bedrock consists of gneissic granite. It dates back 2,700–2,800 million years which means that it is part of the oldest geological formation on Earth. The layer on top of the bedrock consists of sandy moraine.

Forests in the area are varying mixed forests. Other forest types can be seen to a smaller extent. Only some individual trees have been felled in the part of the forest that is nearly in its natural state. Trees grow densely and represent various species and ages. The average age of the trees is around 140 years. There are many dead trees, both standing and fallen on the ground, of different species and in different stages of decay (Image 1).

Lingonberry, bog bilberry, bilberry and crowberry grow in abundance in the forest. When accessing the Kuikkapuro stream, the trail leads through a spruce- and birch-dominated forest. The ground is covered by various species of plants and mosses.

A broad range of bird species live in the area.

Mammals can rarely be seen, but their tracks and droppings can be found. At least wild forest reindeer, elk and fox, as well as hares and squirrels move about in the area. There are also smaller mammals, like shrews and voles.

In Lanttavaara, the old living surroundings, the meadows and paths tell stories of human activities during different periods. Such cultural heritage can increase the sense of belonging and inclusion. The bedrock area at the highest spot on the route offers a very impressive scenery (Image 2). The distant scene from the lookout spot increases reviving effects.

There are various biotopes and habitats, and it increases biodiversity in the area. Nature sites rich in species are considered attractive with reviving effects. The various trees aged more than a hundred years in the area can symbolise the

continuity of life, the smallness of humans and the grandness of nature. In Lanttavaara, the marks of the ice age, bare rocks and boulders can strengthen the sense of very long natural history timelines and can symbolically express visitors' own mental resources. The small stream offers a reviving water element. The campfire site outside the lean-to shelter can generate the sense of belonging to a community. The possibility to sit down around a campfire increases the length of time spent in the area and its reviving effects.



## LOCATION AND ACCESSIBILITY

The Lanttavaara nature education forest is some ten kilometres from the centre of Kuhmo. To access Lanttavaara, visitors need to drive 8.3 kilometres along Lentiirantie (912) and then turn left to Lentuankoskentie. After 300 metres, there are



**Image 1.** Trees in Lanttavaara are densely packed and represent various species and ages.  
*Image by: Eeva Pulkkinen*



**Image 2.** The distant lake can be seen from Lanttavaara. *Image by: Anu Rätty*

signs to the parking area on the left-hand side of the road. There is a toilet in the parking area.



## ROUTE DESCRIPTION

The nature trail routes are 1.7–2.5 kilometres long, depending on the selected route (Image 3). The trail forms a circle with a side path. The Kuikkapuro stream is at the end of the side path starting from the circular trail. A visit to the stream extends the trail by 800 metres. Visitors are allowed to walk the nature route in both directions, and also step away from it. There are duckboards, small bridges and stairways. The lean-to shelter and campfire site are in the middle of the circular route. There are numbered nature sites along the trail. The exercise spots along the trail can be checked beforehand by visiting <http://www.luontoon.fi/lauttavaara>. The area and the exercise spots are also presented in the information signposts in the parking area.

The right of access is followed in the Lauttavaara

Nature School Forest. Visitors can wander in the area on foot or using skis or snowshoes, pick berries and hunt mushrooms. Taking small samples and observing nature are also permitted in conjunction with guidance and education. People can also camp temporarily in the lean-to shelter. Fire making is only permitted at the campfire site outside the lean-to shelter.



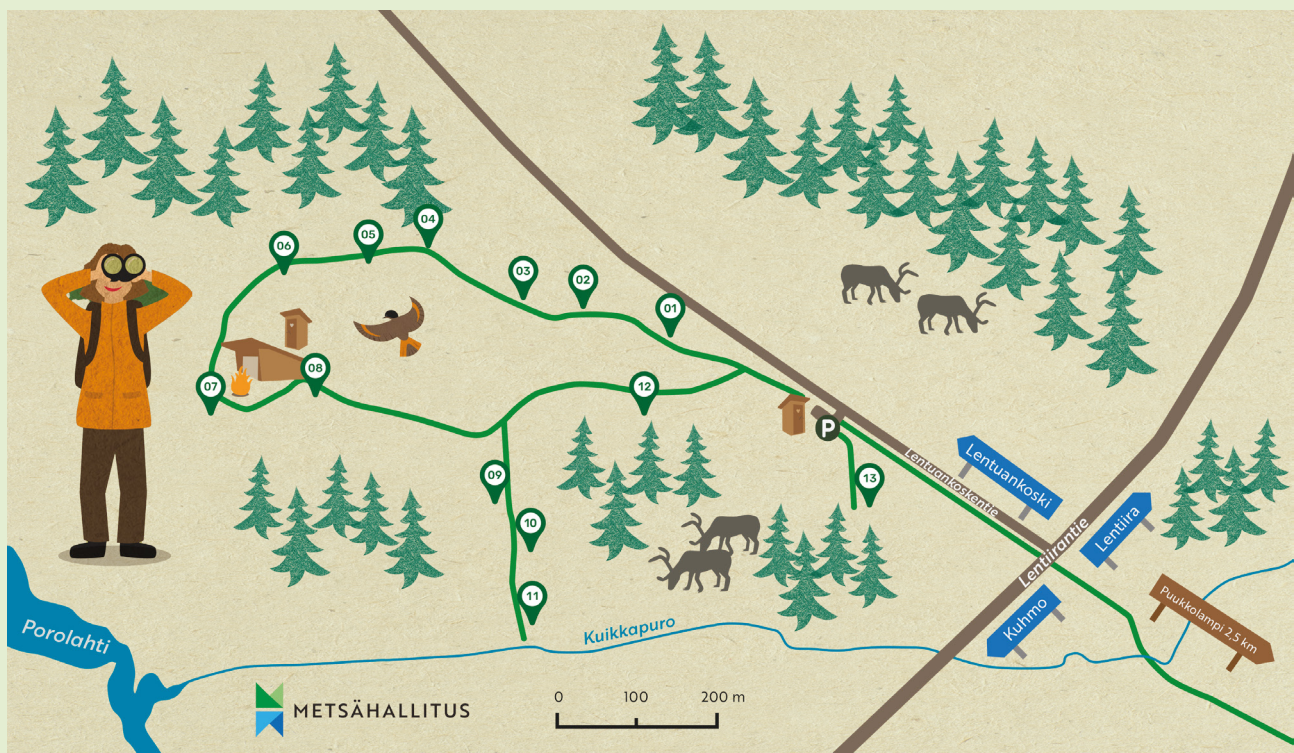
## SUITABLE USER GROUPS

The Lauttavaara nature trail is ideal for people new to hiking, groups of schoolchildren and everyone who arrives in the area by sharing a car. The route does not meet requirements of accessibility.

*Text by: Katja Keränen, Anu Rätty and Maija Lipponen*

*Sources: Luontoon.fi website  
Eeva Pulkkinen, Senior Advisor, Nature Services,  
Metsähallitus*

**Image 3.** Numbered poles have been placed along the Lauttavaara trail, the themes of which are presented in the information signpost at the starting point, in the paper brochure and on the Luontoon.fi website. *Metsähallitus 2023, the National Land Survey of Finland's base map 1/MYY/2007.*





## Literature

- Arola, T., Aulake, M., Ott, A., Lindholm, M., Kouvonen, P., Virtanen, P. & Paloniemi, R. (2023) The impacts of nature connectedness on children's well-being: Systematic literature review. *Journal of Environmental Psychology* 85, 101913. <https://doi.org/10.1016/j.jenvp.2022.101913>
- Arvonen, S. (2018). *Metsämieli – mielen ja kehon maastokirja*. Karttakeskus. ISBN: 978-952-338-055-4.
- Arvonen, S. (2022). *Metsämieli – mielen ja kehon viikkopolut*. Karttakeskus. ISBN: 978-952-226-723-6.
- Barboza, E. P., Cirach, M., Khomenko, S., lungman, T., Mueller, N., Barrera-Gómez, J., Rojas-Rueda, D., Kondo, M., & Nieuwenhuijsen, M. (2021). Green space and mortality in European cities: a health impact assessment study. *The Lancet. Planetary health*, 5(10), 718–730. [https://doi.org/10.1016/S2542-5196\(21\)00229-1](https://doi.org/10.1016/S2542-5196(21)00229-1)
- Barton, J., Griffin, M., & Pretty, J. (2012). Exercise-, nature- and socially interactive-based initiatives improve mood and self-esteem in the clinical population. *Perspectives in Public Health*, 132(2), 89–96. <https://doi.org/10.1177/1757913910393862>
- Bauman, A., Merom, D., Bull, F.C., Buchner, D.M. & Fiatarone Singh, M.A. (2016). Updating the evidence for physical activity: Summative reviews of the epidemiological evidence, prevalence, and interventions to promote "active aging". *Gerontologist* 56, 268–S280. <https://10.1093/geront/gnw031>
- Beil, K. & Hanes, D. (2013). The influence of urban natural and built environments on physiological and psychological measures of stress- A pilot study. *International Journal of Environmental Research and Public Health* 10, 1250–1267. <https://doi.org/10.3390/ijerph10041250>
- Beute, F., Marselle, M., Guizzo, A. O., Andreucci, M. B., Lammel, A., Davies, Z. G., J. Glanville, H. Keune, L. O'Brien, R. Remmen, A. & Russo, de Vries, S. (2023). How do different types and characteristics of green space impact mental health? A scoping review. *People and Nature*. <https://doi.org/10.17605/OSF.IO/2CEAH>
- Cameron-Faulkner, T., Melville, J. & Gattis, M. (2018). Responding to nature: Natural environments improve parent-child communication. *Journal of Environmental Psychology* 59, 9–15. <https://doi.org/10.1016/j.jenvp.2018.08.008>
- Chi, D., Aerts, R., Van Nieuwenhuysse, A., Bauwelinck, M., Demoury, C., Plusquin, M., Nawrot, T.S., Casas, L. & Somers, B. (2022). Residential Exposure to Urban Trees and Medication Sales for Mood Disorders and Cardiovascular Disease in Brussels, Belgium: An Ecological Study. *Environ Health Perspect* 130(5):57003. <https://doi.org/10.1289/EHP9924>
- Children & Nature Network (2022). Annual Report 2022. Children & Nature Network. Haettu 28.9.2023 osoitteesta: [https://eadn-wc04-796033.nxedge.io/wp-content/uploads/CNN\\_AR22\\_print\\_23-6-9F-1.pdf](https://eadn-wc04-796033.nxedge.io/wp-content/uploads/CNN_AR22_print_23-6-9F-1.pdf)
- Coombes, E., Jones, A. P., & Hillsdon, M. (2010). The relationship of physical activity and overweight to objectively measured green space accessibility and use. *Social science & medicine* (1982), 70(6), 816–822. <https://doi.org/10.1016/j.socscimed.2009.11.020>
- Correia, R. A., & Mammola, S. (2023). The searchscape of fear: A global analysis of internet search trends for biophobias. *People and Nature*, 1-15. <https://doi.org/10.1002/pan3.10497>

- Donovan, G. H., Gatzliolis, D., 't Mannetje, A., Weinkove, R., Fyfe, C., & Douwes, J. (2021). An empirical test of the biodiversity hypothesis: Exposure to plant diversity is associated with a reduced risk of childhood acute lymphoblastic leukemia. *Science of the Total Environment*, 768. <https://doi.org/10.1016/j.scitotenv.2020.144627>
- Engemann, K., Pedersen, C. B., Arge, L., Tsirogiannis, C., Mortensen, P. B. & Svenning, J. C. (2019). Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood. *Proceedings of the National Academy of Sciences of the United States of America*, 116(11), 5188–5193. <https://doi.org/10.1073/pnas.1807504116>
- Engemann, K., Svenning, J. C., Arge, L., Brandt, J., Erikstrup, C., Geels, C., Hertel, O., Mortensen, P. B., Plana-Ripoll, O., Tsirogiannis, C., Sabel, C. E., Sigsgaard, T., & Pedersen, C. B. (2020). Associations between growing up in natural environments and subsequent psychiatric disorders in Denmark. *Environmental Research*, 188. <https://doi.org/10.1016/j.envres.2020.109788>
- Eskelinen, P., Smeds, P., Soini, K. Tuohimetsä, S. & Vehmasto, E. (2018). Hyvinvointia luonnonvesistä: Vesiympäristöistä palveluja arkeen, matkailuun, opetukseen sekä sosiaali- ja terveyssektorille. Luonnonvarakeskus. <http://urn.fi/URN:ISBN:978-952-326-664-3>
- Gagliardi, C., & Piccinini, F. (2019). The use of nature - based activities for the well-being of older people: An integrative literature review. *Archives of gerontology and geriatrics*, 83, 315–327. <https://doi.org/10.1016/j.archger.2019.05.012>
- Gascon, M., Zijlemaa, W., Verta, C., White, M.P. & Nieuwenhuijsena, M.J. (2017). Outdoor blue spaces, human health and well-being: A systematic review of quantitative studies. *Review. International Journal of Hygiene and Environmental Health*, 220(8), 1207–1221. <https://doi.org/10.1016/j.ijheh.2017.08.004>
- Gobster, P.H., Kruger, L.E., Schultz, C.L. & Henderson, J.R. (2023). Key Characteristics of Forest Therapy Trails: A Guided, Integrative Approach. *Forests*, 14(2), 186. <http://dx.doi.org/10.3390/f14020186>
- Gonzales-Inca, C., Pentti, J., Stenholm, S., Suominen, S., Vahtera, J., & Käyhkö, N. (2022). Residential greenness and risks of depression: Longitudinal associations with different greenness indicators and spatial scales in a Finnish population cohort. *Health & place*, 74, 102760. <https://doi.org/10.1016/j.healthplace.2022.102760>
- Grahn, P. & Stigsdotter, U. (2010) The Relation between Perceived Sensory Dimensions of Urban Green Space and Stress Restoration. *Landscape and Urban Planning*, 94, 264–275. <https://doi.org/10.1016/j.landurbplan.2009.10.012>
- Grellier, J., White, M.P., Albin, M., Bell, S., Elliott, L.R, Gascón, M. Gualdi, S., Mancini, L., Nieuwenhuijsen, M.J. Sarigiannis, D. A., van den Bosch, M., Wolf, T., Wuijts, S. & Fleming, L.E. (2017). Blue Health: a study programme protocol for mapping and quantifying the potential benefits to public health and well-being from Europe's blue spaces. *BMJ open*, 7(6), e016188. <https://doi.org/10.1136/bmjopen-2017-016188>
- Gundersen, V. S. & Frivold, L. H. (2008). Public preferences for forest structures: A review of quantitative surveys from Finland, Norway and Sweden. *Urban Forestry & Urban Greening*, 7(4), 241–258. <https://doi.org/10.1016/J.UFUG.2008.05.001>

- Haahtela, T., Hanski, I., von Hertzen, L., Jousilahti, P., Laatikainen, T., Mäkelä, M., Puska, P., Reijula, K., Saarinen, K., Vartiainen, E., Vasankari, T. & Virtanen, S. (2017). Luontoaskel tarttumattomien tulehdustautien torjumiseksi. *Lääketieteellinen aikakauskirja Duodecim*, 133(1):19–26. <https://www.duodecimlehti.fi/duo13480>
- Haahtela, T. (2019). A Biodiversity Hypothesis. *Allergy*, 74(8), 1445–1456. <https://doi.org/10.1111/all.13763>
- Hakoköngäs, E. & Puhakka, R. (2021) Happiness from Nature? Adolescents' Conceptions of the Relation between Happiness and Nature in Finland. *Leisure Sciences*. <https://doi.org/10.1080/01490400.2021.1877584>
- Hartig, T., Mitchell, R., de Vries, S. & Frumkin, H. (2014). Nature and health. *Annual review of public health*, 35, 207–228. <https://doi.org/10.1146/annurev-publhealth-032013-182443>
- Harvey, D. J., Montgomery, L. N., Harvey, H., Hall, F., Gange, A. C., & Watling, D. (2020). Psychological benefits of a biodiversity-focussed outdoor learning program for primary school children. *Journal of Environmental Psychology*, 67, 8. <https://doi.org/10.1016/j.jenvp.2019.101381>
- Haveri, H. & Simkin, J. (2023). Luontoympäristöjen mahdollisuudet terveyden edistämässä. *Lääketieteellinen aikakauskirja Duodecim*, 139(10), 851–9.
- Hoffmann, E., Campelo, D., Hooper, P., Barros, H. & Ribeiro, A.I. (2018). Development of a smartphone app to evaluate the quality of public open space for physical activity. An instrument for health researchers and urban planners. *Landscape and Urban Planning*, 177, 191–195. <https://doi.org/10.1016/j.landurbplan.2018.05.005>
- Husu, P., Tokola, K., Vähä-Ypyä, H. & Vasankari, T. (2022). Liikuntaraportti: Suomalaisten mitattu liikkuminen, paikallaanolo ja fyysinen kunto 2018–2022. Helsinki: Opetus- ja kulttuuriministeriön julkaisuja 33. <http://urn.fi/URN:ISBN:978-952-263-808-3>
- Hynninen Y, Lahelma M, Rissanen A, Voltti, S., Patja, K., Posa, M., Torkki, P., Reijula, K. & Leskelä, R.-L. (2023). TULE (Tuki- ja liikuntaelin) -sairaudet ja mielenterveyden häiriöt aiheuttavat valtaosan työterveyshuollon kustannuksista. *Suomen Lääkärilehti* 78(3–4), e34248. <https://www.laakarilehti.fi/pdf/2023/SLL3-4-2023-114.pdf>
- Hyvönen, K., Törnroos, K., Salonen, K., Korpela, K., Feldt, T. & Kinnunen, U. (2018). Profiles of Nature Exposure and Outdoor Activities Associated with Occupational Well-Being Among Employees. *Frontiers in psychology*, 9, 754. <https://doi.org/10.3389/fpsyg.2018.00754>
- Innokylä (2023). Innokylän julkaisu- ja kehittämislusta. Verkkosivusto. Suomen Kuntaliitto, Suomen sosiaali- ja terveys ry (SOSTE) sekä Terveyden ja hyvinvoinnin laitos (THL). Haettu 12.10.2023 osoitteesta: <https://innokyla.fi/fi>
- Invalidiliitto (2023). Luonto-ESKEH – opas kartoittajille. Invalidiliiton Esteettömyyskeskus ESKE. Invalidiliiton verkkosivusto. Haettu 6.9.23. lähteestä: <https://www.invalidiliitto.fi/sites/default/files/2021-10/Luonto-ESKEH%2C%20opas%20kartoittajalle.pdf>
- Itla (2022). Lapsille pitää turvata mahdollisuudet vahvistaa luontosuhdettaan – Luontosuhteella on huomattava vaikutus lasten hyvinvointiin. Virtanen, P. & Kouvonen, P. *Tienviitta* 2022:1, Itlan Poliitikkasuositukses. Haettu 12.10.2023 osoitteesta: <https://itla.fi/aineistot/>
- Johansson, G., Juuso, P., & Engström, Å. (2022). Nature-based interventions to promote health for people with stress-related illness: An integrative review. *Scandinavian journal of caring sciences*, 36(4), 910–925. <https://doi.org/10.1111/scs.13089>

- Jokela, L., Seppälä, L., Santala, K. & Uusitalo, M. (2022). LUMOT-käsikirja monikulttuuriseen luontotoimintaan. Lapin ammattikorkeakoulun julkaisu, D 7. <https://urn.fi/URN:ISBN:978-952-316-441-3>
- Kahilaniemi, E. & Löf, L. (2018a). Green Care -menetelmäopas. Julkaisija Voimatassu Ky.
- Kahilaniemi, E. & Löf, L. (2018b). Green Care -menetelmäkortit. Julkaisija Voimatassu Ky.
- Kaplan R. & Kaplan S. (1989). The Experience of Nature: A Psychological Perspective. Cambridge Univ. Press. Cambridge. 35. <https://doi.org/10.1037/030621>
- Karjalainen, E. (2006). The visual preferences for forest regeneration and field afforestation - four case studies in Finland. University of Helsinki, Faculty of Biosciences, Department of Biological and Environmental Sciences. Dissertations Forestales. <http://urn.fi/URN:ISBN:951-651-150-3>
- Keränen, K. (2022). Sairaalarinteen Terveysmetsäreitistön suunnitelma Kainuun keskussairaalan lähimetsään. AMK-opinnäytetyö. Hämeen ammattikorkeakoulu. <https://urn.fi/URN:NBN:fi:amk-202201101133>
- Kolster, A., Heikkinen, M., Pajunen, A., Mickos, A., Wennman, H. & Partonen, T. (2023). Targeted health promotion with guided nature walks or group exercise: a controlled trial in primary care. *Frontiers in Public Health*, 11. <https://doi.org/10.3389/fpubh.2023.1208858>
- Korpela, K., Hartig, T., Kaiser, F. & Fuhrer, U. (2001). Restorative Experience and Self-Regulation in Favorite Places. *Environment and Behaviour* 33(4). <https://doi.org/10.1006/jevp.2002.0277>
- Korpela, K. & Ylén, M. (2007). Perceived health is associated with visiting natural favourite places in the vicinity. *Health & Place*, 13, 138–151. <https://doi.org/10.1016/j.healthplace.2005.11.002>
- Korpela, K., Stengård, E. & Jussila, P. (2016). Nature Walks as a Part of Therapeutic Intervention for Depression. *Ecopsychology*. <http://doi.org/10.1089/eco.2015.0070>
- Lankia, T., Neuvonen, M., Pouta, E., Sievänen, T. & Torvelainen, J. (2020). Outdoor recreation in ecosystem service accounting: pilot accounts from Finland. *Scandinavian Journal of Forest Research* 35 (3-4): 186–197. <https://doi.org/10.1080/002827581.2020.1760342>
- Lee, I.M., Shiroma, E.J., Lobelo, F., Puska, P., Blair, S.N. & Katzmarzyk, P.T. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet* 380, 9838, 219–229. [https://doi.org/10.1016/S0140-6736\(12\)61031-9](https://doi.org/10.1016/S0140-6736(12)61031-9)
- Lehtimäki, J., Karkman, A., Laatikainen, T., Paalanen, L., von Hertzen, L., Haahtela, T., Hanski, I. & Ruokolainen, L. (2017). Patterns in the skin microbiota differ in children and teenagers between rural and urban environments. *Scientific Reports*, 7(1), 45651. <https://doi.org/10.1038/srep45651>
- Leppänen, A. & Pajunen, M. (2017). Terveysmetsä – tunnista ja koe elvyttävä luonto. Otavan Kirjapaino Oy. ISBN: 978-951-24-0717-0
- Leppänen, A. & Pajunen, M. (2019). Suomalainen metsäkylpy. Gummerus Kustannus Oy. ISBN: 978-951-20-9901-6.
- Li, Q., Morimoto, K., Nakadai, A., Inagaki, H., Katsumata, M., Shimizu, T., Hirata, Y., Hirata, K., Suzuki, H., Miyazaki, Y., Kagawa, T., Koyama, Y., Ohira, T., Takayama, N., Krensky, A. M., & Kawada, T. (2007). Forest bathing enhances human natural killer activity and expression of anti-cancer proteins. *International journal of immunopathology and pharmacology*, 20(2 Suppl 2), 3–8. <https://doi.org/10.1177/03946320070200S202>

- Lipponen M., Hallikainen V. & Kilpeläinen P. (2022). Effects of Nature-Based Intervention in Occupational Health Care on Stress – A Finnish Pilot Study Comparing Stress Evaluation Methods. *Journal of Multidisciplinary Healthcare*, 15, 577-593 <https://doi.org/10.2147/JMDH.S353168>
- Lipponen, M., Vehmasto, E., Salonen, A. & Mäki-Opas, T. (2023). Ohjaajien käsityksiä sosiaalipedagogiseen hevostoimintaan osallistuvan hyvinvointiin vaikuttavista tekijöistä ja hevosen roolista asiakastyössä. *Sosiaalipedagogiikka*. (Hyväksytty julkaistavaksi).
- Luke/ Terveysmetsä (2023). Terveysmetsämallit työ- ja toimintakyvyn edistämässä -hankkeen verkkosivu, Luonnonvarakeskuksen verkkosivusto. Haettu 12.10.2013 osoitteesta: <https://www.luke.fi/fi/projektit/terveysmetsa-01>
- Luke/ TiTiTy (2023). Tilalta tietoon ja työelämään -hankkeen verkkosivu, Luonnonvarakeskuksen verkkosivuilla. Haettu 12.10.2013 osoitteesta: <https://www.luke.fi/fi/projektit/titity-01>
- Luke/ Hubben (2023). Nordic Nature Health Hub -hankkeen verkkosivu, Luonnonvarakeskuksen verkkosivuilla. Haettu 12.10.2013 osoitteesta: <https://projects.luke.fi/hubben/>
- Luque-García, L., Corrales, A., Lertxundi, A., Díaz, S., & Ibarluzea, J. (2022). Does exposure to greenness improve children’s neuropsychological development and mental health? A Navigation Guide systematic review of observational evidence for associations. *Environmental research*, 206, 112599. <https://doi.org/10.1016/j.envres.2021.112599>
- Maas, J., Verheij, R.A., de Vries, S., Spreeuwenberg, P., Schellevis, F.G. & Groenewegen, P.P. (2009). Morbidity is related to a green living environment. *Journal of Epidemiol Community Health*, 63(12), 967–973. <https://10.1136/jech.2008.079038>
- Mansikkaviita, R. toim. (2019) Polku luontoon! Näkökulmia yhdenvertaisen luontoliikunnan edistämiseen. ISBN: 978-952-295-241-7 (pdf). Haettu 12.10.2023 osoitteesta: <https://julkaisut.metsa.fi/assets/pdf/lp/Muut/polkuluontoon.pdf>
- Marselle, M. R., Hartig, T., Cox, D. T. C., de Bell, S., Knapp, S., Lindley, S., Triguero-Mas, M., Böhning-Gaese, K., Braubach, M., Cook, P. A., de Vries, S., Heintz-Buschart, A., Hofmann, M., Irvine, K. N., Kabisch, N., Kolek, F., Kraemer, R., Markevych, I., Martens, D., Müller, R., Nieuwenhuijsen, M., Potts, J.M., Stadler, J., Walton, S., Warber, S.L. & Bonn, A. (2021). Pathways linking biodiversity to human health: A conceptual framework. *Environment international*, 150, 106420. <https://doi.org/10.1016/j.envint.2021.106420>
- Marselle, M.R., Stader, J., Korn, H., Irvine, K.N. & Bonn, A. (2019). *Biodiversity and Health in the Face of Climate Change*. Springer Cham. eBook ISBN: 978-3-030-02318-8.
- Martens, D., Gutscher, H. & Bauer, N. (2011). Walking in “wild” and “tended” urban forests: The impact on psychological well-being. *Journal of Environmental Psychology*, 31(1), 36–44. <https://doi.org/10.1016/j.jenvp.2010.11.001>
- Marušáková, L. & Sallmannshoferet, M. eds. (2019). *Human Health and Sustainable Forest Management*. FOREST EUROPE Liaison Unit Study. ISBN: 978-80-8093-266-4. Haettu 12.10.2023 lähteestä: [https://foresteurope.org/wp-content/uploads/2017/08/Forest\\_book\\_final\\_WEBpdf.pdf](https://foresteurope.org/wp-content/uploads/2017/08/Forest_book_final_WEBpdf.pdf)
- Neuvonen, M., T. Sievänen, S. Tönnés & T. Koskela (2007). Access to green areas and the frequency of visits – a case study in Helsinki. *Urban Forestry & Urban Greening*, 6(4), 235–247. <https://doi.org/10.1016/j.ufug.2007.05.003>

- Nieuwenhuijsen, M. J., Dadvand, P., Márquez, S., Bartoll, X., Barboza, E. P., Cirach, M., Borrell, C., & Zijlema, W. L. (2022). The evaluation of the 3-30-300 green space rule and mental health. *Environmental research*, 215(2), 114387. <https://doi.org/10.1016/j.envres.2022.114387>
- Nurminen, N., Cerrone, D., Lehtonen, J., Parajuli, A., Roslund, M., Lönnrot, M., Ilonen, J., Toppari, J., Veijola, R., Knip, M., Rajaniemi, J., Laitinen, O. H., Sinkkonen, A. & Hyöty, H. (2021). Land cover of early-life environment modulates the risk of type 1 diabetes. *Diabetes Care*, 44(7), 1506–1514. <https://doi.org/10.2337/dc20-1719>
- Olszewska-Guizzo, A., Sia, A., Fogel, A., & Ho, R. (2022). Features of urban green spaces associated with positive emotions, mindfulness and relaxation. *Scientific reports*, 12(1), 20695. <https://doi.org/10.1038/s41598-022-24637-0>
- Olszewska, A., Marques, P. F., Ryan, R. L. & Barbosa, F. (2016). What makes a landscape contemplative? *Environment and Planning B: Urban Analytics and City Science*, 45, 7–25. <https://doi.org/10.1177/0265813516660716>
- Ojala, A. (2012). What Makes Us Environmentally Friendly? *Social Psychological Studies on Environmental Concern, Components of Morality and Emotional Connectedness to Nature*. Väitöskirja, Helsingin yliopisto, Sosiaalipsykologia. <http://urn.fi/URN:ISBN:978-952-10-7644-2>
- Ojala, A., Korpela, K., Tyrväinen, L., Tiittanen, P., & Lanki, T. (2019). Restorative effects of urban green environments and the role of urban–nature orientedness and noise sensitivity: A field experiment. *Health and Place*, 55, 59–70. <https://doi.org/10.1016/j.healthplace.2018.11.004>
- Ojala, A., Neuvonen, M., Kurkilahti, M., Leinikka, M., Huotilainen, M., Tyrväinen, L. (2022). Short virtual nature breaks in the office environment can restore stress: An experimental study. *Journal of Environmental Psychology*, 84, 101909. <https://doi.org/10.1016/j.jenvp.2022.101909>
- Peltola, A. (toim.) Rätty, M., Sauvula-Seppälä, T., Torvelainen, J., Uotila, E., Vaahtera, E. & Ylitalo, E. (2020). *Finnish Forest Statistics 2020*. Suomen Metsätilastot. <http://urn.fi/URN:ISBN:978-952-380-107-3>
- Puhakka, R., Ojala, A., Neuvonen, M. & Harjunen, H. (2023). Lasten ja nuorten luonnossa virkistäytyminen ja yhteys luontoon, s. 141–159. Teoksessa: Aapola-Kari, S. (toim.) *Vaihteleva vapaa-aika. Lasten ja nuorten vapaa-aikatutkimus 2022*. ISBN 978-952-372-050-3 (PDF)
- Puhakka, R., Rantala, O., Roslund, M.I., Rajaniemi, J., Laitinen, O.H. & Sinkkonen, A. & the ADELE research group (2019) *Greening of Daycare Yards with Biodiverse Materials Affords Well-Being, Play and Environmental Relationships*. *International Journal of Environmental Research and Public Health*, 16(16), 2948. <https://doi.org/10.3390/ijerph16162948>
- Pyky, R., Neuvonen, M., Kangas, K., Ojala, A., Lanki, T., Borodulin, K., & Tyrväinen, L. (2019). Individual and environmental factors associated with green exercise in urban and suburban areas. *Health & Place*, 55, 20–28. <https://doi.org/10.1016/j.healthplace.2018.11.001>
- Rantala, O. & Puhakka, R. (2020). Engaging with Nature: Nature Affords Well-Being for Families and Young People in Finland. *Children’s Geographies*, 18(4), 490–503. <https://doi.org/10.1080/14733285.2019.1685076>
- Rigolon, A., Browning, M.H.E.M., McAnirlin, O. & Yoon, H. (2021). Green Space and Health Equity: A Systematic Review on the Potential of Green Space to Reduce Health Disparities. *International Journal of Environmental Research and Public Health*, 18(5), 2563. <https://doi.org/10.3390/ijerph18052563>

- Rosa, C.D., Larson, L.R., Collado, S. & Profice, C.C. (2021). Forest therapy can prevent and treat depression: Evidence from meta-analyses. *Urban Forestry & Urban Greening*, 57, 126943. <https://doi.org/10.1016/j.ufug.2020.126943>
- Roslund, M.I., Puhakka, R., Grönroos, M., Nurminen, N., Oikarinen, S., Gazali, A.M., Cinek, O., Kramna, L., Siter, N., Vari, H.K., Soininen, L., Parajuli, A., Rajaniemi, J., Kinnunen, T., Laitinen, O.H., Hyöty, H. & Sinkkonen, A. (2020). Biodiversity intervention enhances immune regulation and health-associated commensal microbiota among daycare children. *Science Advances*, 6. <https://doi.org/10.1126/sciadv.aba2578>
- Roslund, M.I., Puhakka, R., Nurminen, N., Oikarinen, S., Siter, N., Grönroos, M., Cinek, O., Kramná, L., Jumpponen, A., Olli H. Laitinen, O.H., Juho Rajaniemi, J., Heikki Hyöty, H., Aki Sinkkonen, A., Cerrone, D., Grönroos, M., Hui, N., Mäkelä, I., Nurminen, N., Oikarinen, S., Parajuli, A., Puhakka, R., Roslund, M.I., Saarenpää, M., Soininen, L., Sun, Y., Vari, H.K., Laitinen, O.H., JuRajaniemi, J., Hyöty, H. & Sinkkonen, A. (2021). Long-term biodiversity intervention shapes health-associated commensal microbiota among urban day-care children. *Environment International*, 157, 106811. <https://urn.fi/URN:NBN:fi:tuni-202108316887>
- Saito, H., Horiuchi, M., Takayama, N. & Fujiwara, A. (2019). Effects of managed forest versus unmanaged forest on physiological restoration from a stress stimulus, and the relationship with individual traits. *Journal of Forest Research*, 24(2), 77–85. <https://doi.org/10.1080/13416979.2019.1586300>
- Salonen, K. (2020). Kokonaisvaltainen luontokokemus hyvinvoinnin tukena. Akateeminen väitöskirja, Tampereen yliopisto, Yhteiskuntatieteellinen tiedekunta, Jyväskylän yliopisto, Psykologian laitos. <https://urn.fi/URN:ISBN:978-952-03-1563-4>
- Salonen, K., Hyvönen, K., Paakkolanvaara, J. V., & Korpela, K. (2022). Flow With Nature Treatment for Depression: Participants' Experiences. *Frontiers in psychology*, 12, 768372. <https://doi.org/10.3389/fpsyg.2021.768372>
- Salonen, K., Kirves, K. & Korpela, K. (2016). Kohti kokonaisvaltaisen luontokokemuksen mittaamista. *Suomen psykologinen seura. Psykologia*, 51(5), 324–342. Väitöskirjassa Salonen 2020 sivut: 103–124. <https://urn.fi/URN:ISBN:978-952-03-1563-4>
- Shuda, Q., Bougoulas, M. E., & Kass, R. (2020). Effect of nature exposure on perceived and physiologic stress: A systematic review. *Complementary Therapies in Medicine*, 53. <https://doi.org/10.1016/j.ctim.2020.102514>
- Sidenius, U. (2017). The Therapy Garden Nacadia® – The interplay between evidence-based health design in landscape architecture, nature-based therapy and the individual. IGN PhD Thesis. Department of Geosciences and Natural Resource Management, University of Copenhagen, Frederiksberg.
- Silvennoinen, H., Alho, J., Kolehmainen, O. & Pukkala T. (2001). Prediction models of landscape preferences at forest stand level. *Landscape and Urban planning*, 56, 11–20. [https://doi.org/10.1016/S0169-2046\(01\)00163-3](https://doi.org/10.1016/S0169-2046(01)00163-3)
- Silvennoinen, H. (2017). Metsämaiseman kauneus ja metsänhoidon vaikutus koettuun maisemaan metsikkötasolla. *Dissertationes Forestales*, 242. <https://doi.org/10.14214/df.242>
- Simkin, J., Ojala, A., & Tyrväinen, L. (2020). Restorative effects of mature and young commercial forests, pristine old-growth forest and urban recreation forest - A field experiment. *Urban Forestry and Urban Greening*, 48, 126567. <https://doi.org/10.1016/j.ufug.2019.126567>

- Simkin, J., Ojala, A. & Tyrväinen, L. (2021). The Perceived Restorativeness of Differently Managed Forests and Its Association with Forest Qualities and Individual Variables: A Field Experiment. *International Journal of Environmental Research and Public Health*, 18(2). <https://doi.org/10.3390/ijerph18020422>
- Snell, T. L., Simmonds, J. G. & Klein, L. M. (2020). Exploring the impact of contact with nature in childhood on adult personality. *Urban Forestry and Urban Greening*, 55, 1–9. <https://doi.org/10.7721/chilyoutenvi.26.1.0125>
- Sokra 2023. Sosiaalisen osallisuuden koordinaatiohanke, (Sokra 2014–2023). Hankesivu, Terveiden ja hyvinvoinnin laitoksen verkkosivusto. Haettu 12.10.23 osoitteesta: <https://thl.fi/fi/tutkimus-ja-kehittaminen/tutkimukset-ja-hankkeet/sokra>
- Sonntag-Öström, E., Nordin, M., Lundell, Y., Dolling, A., Wiklund, U., Karlsson, M., Carlberg, B. & Slunga Järholm, L. (2014). Restorative effects of visits to urban and forest environments in patients with exhaustion disorder. *Urban Forestry & Urban Greening*, 13(2), 344–354. <https://doi.org/10.1016/j.ufug.2013.12.007>
- Sonntag-Öström, E., Stenlund, T., Nordin, M., Lundell, Y., Ahlgren, C., Fjellman-Wiklund, A., Järholm, L.S., Dolling, A. (2015). "Nature's effect on my mind" - Patients' qualitative experiences of a forest-based rehabilitation programme. *Urban Forestry & Urban Greening*, 14, 607–614. <https://doi.org/10.1016/j.ufug.2015.06.002>
- Sote-akatemia & Luonnonvarakeskus (2023). Luontoperustainen hyvinvointi. Turun yliopiston Sote-akatemia ja Luonnonvarakeskus. Avoimen korkeakoulun MOOC-kurssin oppimateriaalit. Saatavissa 30.8.2024 asti: <https://digicampus.fi/login/index.php>
- Stier-Jarmer, M., Throner, V., Kirschneck, M., Immich, G., Frisch, D., & Schuh, A. (2021). The Psychological and Physical Effects of Forests on Human Health: A Systematic Review of Systematic Reviews and Meta-Analyses. *International journal of environmental research and public health*, 18(4), 1770. <https://doi.org/10.3390/ijerph18041770>
- Stigsdotter, U. K., & Randrup, Th. B. (2008). Konceptmodel Terapihaven Nacadia : en model for terapihaver og haveterapi for stressramte i Danmark. Design. Frederikberg.
- Stoltz J. (2022). Layered habitats: An evolutionary model for present-day recreational needs. *Frontiers in psychology*, 13, 914294. <https://doi.org/10.3389/fpsyg.2022.914294>
- Stoltz, J. & Grahn, P. (2021). Perceived sensory dimensions: An evidence-based approach to greenspace aesthetics. *Urban Forestry & Urban Greening* 59, 126989. <https://doi.org/10.1016/j.ufug.2021.126989>
- Takayama, N., Fujiwara, A., Saito, H., & Horiuchi, M. (2017). Management Effectiveness of a Secondary Coniferous Forest for Landscape Appreciation and Psychological Restoration. *International journal of environmental research and public health*, 14(7), 800. <https://doi.org/10.3390/ijerph14070800>
- Taylor, A. F. & Kuo, F. E. (2009). Children with attention deficits concentrate better after walk in the park. *Journal of attention disorders*, 12(5), 402–409. <https://doi.org/10.1177/1087054708323000>
- THL (2014). Green Care – Työhön kuntouttava toiminta luonnossa. Terveiden ja hyvinvoinninlaitos, Forssan, Mäntsälän ja Sipoon kunnat sekä Sininauhaliitto ry. Opas (pdf). Haettu 12.10.2023 osoitteesta: <https://thl.fi/documents/10531/623661/GC+opas+nettiin+241114.pdf/43b98be9-3ee7-4480-89ab-ad5b0a67906c>

- THL (2023). HYTE-toimintamallinen arviointi. Terveyden ja hyvinvoinnin laitoksen, THL:n verkkosivu. Haettu 12.10.2023 osoitteesta: <https://thl.fi/fi/web/hyvinvoinnin-ja-terveyden-edistamisen-johtaminen/tieto-ja-toimintamallit/hyte-toimintamallien-arviointi>
- THL, SOSTE & Kuntaliitto (2022). Toimintamallit Innokylään! Mikä on Innokylä ja miten se toimii? Toimintamallinen kuvaaminen Innokylässä. Power Point (pdf). Terveyden ja hyvinvoinninlaitos, Suomen sosiaali- ja terveys ry sekä Kuntaliitto. Haettu 12.10.2023 osoitteesta: [https://innokyla.fi/sites/default/files/2022-12/20221208\\_Toimintamallit\\_Innokyla%C3%A4.pdf](https://innokyla.fi/sites/default/files/2022-12/20221208_Toimintamallit_Innokyla%C3%A4.pdf)
- Tyrväinen, T., Lanki, T., Sipilä, R. & Komulainen, J. (2018). Mitä tiedetään metsän terveyshyödyistä? *Lääketieteellinen aikakauskirja Duodecim*, 134(13), 1396–1403. <https://www.duodecimlehti.fi/lehti/2018/13/duo14421>
- Tyrväinen, L., Ojala, A., Korpela, K., Lanki, T., Tsunetsugu, Y. & Kagawa, T. (2014). The influence of urban green environments on stress relief measures: a field experiment. *Journal of Environmental Psychology*, 38, 1–9. <https://doi.org/10.1016/j.jenvp.2013.12.005>
- Tyrväinen, L., Silvennoinen, H. & Kolehmainen, O. (2003). Ecological and aesthetic values in urban forest management. *Urban Forestry & Urban Greening*, 1(3), 135–149. <https://doi.org/10.1078/1618-8667-00014>
- Tyrväinen, L., Silvennoinen, H., Korpela, K. & Ylen, M. (2007). Luonnon merkitys kaupunkilaisille ja vaikutus psyykkiseen hyvinvointiin. Julkaisussa: Tyrväinen & Tuulentie (toim.) *Luontomatkoilu, metsät ja hyvinvointi. Metlan työraportteja* 52, 57–77. ISBN 978-951-40-2045-2 (PDF)
- Tyrväinen, L., Savonen, E.-M. & Simkin, J. (2017). Kohti suomalaista Terveysmetsän mallia. Luonnonvara- ja biotalouden tutkimus 11. Luonnonvarakeskus. <http://urn.fi/URN:ISBN:978-952-326-366-6>
- Ulrich R.S. (1993). Biophilia, biophobia, and natural landscapes. In: Kellert S.A., Wilson E.O., editors. *The Biophilia Hypothesis*. Island Press; Washington, DC, USA. s. 73–137.
- Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, 11(3), 201–230. [https://doi.org/10.1016/S0272-4944\(05\)80184-7](https://doi.org/10.1016/S0272-4944(05)80184-7)
- UN (2018). *World Urbanization Prospects; United Nations UN; Department of Economic and Social Affairs; Population Division*. United Nations: Rome, Italy, pp. 1–38.
- Uusitalo, M., Välimaa, L., Kelloniemi, K. & Jokela, L. (2019). Ideoita ja ohjeita ympäri vuoden järjestettäviin luontotyöpajoihin: PoLut-hankkeessa kehitettyjä luontotyöpajoja maahanmuuttajille. Opaskortit luontopajojen järjestämiseen. Lapin ammattikorkeakoulun julkaisuja, D 10. <https://urn.fi/URN:ISBN:978-952-316-304-1>
- van den Bosch, M., & Ode Sang, Å. (2017). Urban natural environments as nature-based solutions for improved public health - A systematic review of reviews. *Environmental research*, 158, 373–384. <https://doi.org/10.1016/j.envres.2017.05.040>
- Vehmasto, E., Salonen, K., Ilmarinen, K., Hirvonen, J., Saarinen, S., Peuraniemi, T., Paakkolanvaara, J.-V., Aho, M. & Lipponen, M. (2021). *Suomalainen Green Care: Green Care -toimintatavan käsikirja & LuontoVoiman ja LuontoHoivan laatutyökirja*. Luonnonvarakeskus ja Green Care Finland ry. <http://urn.fi/URN:ISBN:978-952-380-189-9>

- Völker, S., & Kistemann, T. (2011). The impact of blue space on human health and well-being - Salutogenetic health effects of inland surface waters: a review. *International journal of hygiene and environmental health*, 214(6), 449–460. <https://doi.org/10.1016/j.ijheh.2011.05.001>
- Ward Thompson, C., Aspinall, P. & Montarzino, A. (2008). The childhood factor: Adult visits to green places and the significance of childhood experience. *Environment and Behavior*, 40(1), 111–143. <https://doi.org/10.1177/0013916507300119>
- Wheeler, B. W., White, M., Stahl-Timmins, W., & Depledge, M. H. (2012). Does living by the coast improve health and wellbeing?. *Health & Place*, 18(5), 1198–1201. <https://doi.org/10.1016/j.healthplace.2012.06.015>
- White, M. P., Pahl, S., Ashbullby, K., Herbert, S. & Depledge, M. H. (2013). Feelings of restoration from recent nature visits. *Journal of Environmental Psychology*, 35, 40–51. <https://doi.org/10.1016/j.jenvp.2013.04.002>
- WHO (2010). *Global Recommendations on Physical Activity for Health*. World Health Organization, WHO. ISBN: 9789241599979. Haettu 12.10.2023 lähteestä: <https://www.who.int/publications/i/item/9789241599979>
- WHO (2017).<sup>†</sup> *Urban green spaces: a brief for action*. World Health Organization. Regional Office for Europe. ISBN: 9789289052498 Haettu 12.10.2023 lähteestä: <https://iris.who.int/handle/10665/344116>
- Younan, D., Tuvblad, C., Li, L., Wu, J., Lurmann, F., Franklin, M., Berhane, K., McConnell, R., Wu, A. H., Baker, L. A. & Chen, J. C. (2016). Environmental Determinants of Aggression in Adolescents: Role of Urban Neighborhood Greenspace. *Journal of the American Academy of Child and Adolescent Psychiatry*, 55(7), 591–601. <https://doi.org/10.1016/j.jaac.2016.05.002>
- Zhou, Y., von Lengerke, T. & Dreier, M. (2021). Comparing different data sources by examining the associations between surrounding greenspace and children's weight status. *International journal of health geographics*, 20(1), 24. <https://doi.org/10.1186/s12942-021-00278-w>
- Zielińska-Błajet, M., Pietrusiak, P. & Feder-Kubis, J. (2021). Selected Monocyclic Monoterpenes and Their Derivatives as Effective Anticancer Therapeutic Agents. *International journal of molecular sciences*, 22(9), 4763. <https://doi.org/10.3390/ijms22094763>

### **Descriptions of Innokylä's nature-based models**

- THL/Kuorikoski, T. (2022). Yhteisölliset ja luontolähtöiset menetelmät aikuissosiaalityössä - tuletko toimistolle vai mennäänkö metsään? -toimintamallin kuvaus. Innokylän toimintamallit, Terveiden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/yhteisolliset-ja-luontolahtoiset-menetelmat-aikuissosiaalityossa-tuletko-toimistolle>
- THL/Eskola, J. (2020). TOLPPA-toimintakyvyn ja osallisuuden parantaminen luonnon parissa -toimintamallin kuvaus. Innokylän toimintamallit, Terveiden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/tolppa-toimintakyvyn-ja-osallisuuden-parantaminen-luonnon-parissa-luontolahtoiset>
- THL/Launiainen, H. (2020). Nautitaan luonnosta! -toimintamallin kuvaus. Innokylän toimintamallit, Terveiden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/nautitaan-luonnosta>
- THL/Karhu, S. (2020). ELLU - eläin- ja luontoavusteinen valmennus mielenterveyskuntoutujille ja kehitysvammaisille -toimintamallin kuvaus. Innokylän toimintamallit, Terveiden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/ellu-elain-ja-luontoavusteinen-valmennus-mielenterveyskuntoutujille-ja>

- THL/Sokra & Jääskeläinen, A. (2020). Seinätön luontopaja -toimintamallin kuvaus. Innokylän toimintamallit, Terveyden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/seinaton-luontopaja>
- THL/Sokra & Kotilainen H. (2021). Luontoseteli mielenterveyden edistämisen tukena -toimintamallikuvaus. Innokylän toimintamallit, Terveyden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/luontoseteli-mielenterveyden-edistamisen-tukena>
- THL/Sokra & Vanttinen, L. (2021). Luontolähtöinen kuntoutus -toimintamallin kuvaus. Innokylän toimintamallit, Terveyden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/luontolahtoinen-kuntoutus>
- THL/Sokra & Posio, A. (2022). Perheiden luontolähtöinen ryhmätoiminta -toimintamallin kuvaus. Innokylän toimintamallit, Terveyden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/perheiden-luontolahtoinen-ryhmatoiminta>
- THL/Sokra & Puhakka, A.M. (2022). Luontolähtöinen työpajatoiminta -toimintamallin kuvaus. Innokylän toimintamallit, Terveyden ja hyvinvoinninlaitos. Luontolähtöinen työpajatoiminta. <https://innokyla.fi/fi/toimintamalli/luontolahtoinen-tyopajatoiminta>
- THL/Sokra, Uusitalo, M. & Jokela, L. (2022). Opaskortit kotouttavaan luontotoimintaan -toimintamallin kuvaus. Innokylän toimintamallit, Terveyden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/opaskortit-kotouttavaan-luontotoimintaan>
- THL/Sokra, Puhakka, A. & Kytö, H. (2023). Luonnonhoitotöissä voi tehdä hyvää luonnolle ja muille ihmisille -toimintamallin kuvaus. Innokylän toimintamallit, Terveyden ja hyvinvoinninlaitos. <https://innokyla.fi/fi/toimintamalli/luonnonhoitototissa-voi-tehda-hyvaa-luonnolle-ja-muille-ihmisille>
- Evaluations of Innokylä's nature-based models**
- THL/Sokra (2017). Arvio toimintamallista: Seinätön luontopaja. Innokylä toimintamalliarviointi, Terveyden ja hyvinvoinninlaitos, Sosiaalisen osallisuuden edistämisen koordinaatiohanke, Sokra 8.12.2017.
- THL/Sokra (2021a). Arvio toimintamallista: Luontoseteli mielenterveyden edistämisen tukena. Innokylä toimintamalliarviointi, Terveyden ja hyvinvoinninlaitos, Sosiaalisen osallisuuden edistämisen koordinaatiohanke, Sokra 25.2.2021.
- THL/Sokra (2021b). Arvio toimintamallista: Luontolähtöinen kuntoutus. Innokylä toimintamalliarviointi, Terveyden ja hyvinvoinninlaitos, Sosiaalisen osallisuuden edistämisen koordinaatiohanke, Sokra 30.8.2021.
- THL/Sokra (2022a). Arvio toimintamallista: Luontolähtöinen työpajatoiminta. Innokylä toimintamalliarviointi, Terveyden ja hyvinvoinninlaitos, Sosiaalisen osallisuuden edistämisen koordinaatiohanke, Sokra 9.3.2022.\_
- THL/Sokra (2022b). Arvio toimintamallista: Perheiden luontolähtöinen ryhmätoiminta. Innokylä toimintamalliarviointi, Terveyden ja hyvinvoinninlaitos Sosiaalisen osallisuuden edistämisen koordinaatiohanke, Sokra 16.3.2022.
- THL/Sokra (2022c). Arvio toimintamallista: Opaskortit kotouttavaan luontotoimintaan. Innokylä toimintamalliarviointi, Terveyden ja hyvinvoinninlaitos, Sosiaalisen osallisuuden edistämisen koordinaatiohanke, Sokra 29.9.2022.
- THL/Sokra (2023). Arvio toimintamallista: Luonnonhoitotöissä voi tehdä hyvää luonnolle ja muille ihmisille. Innokylä toimintamalliarviointi, Terveyden ja hyvinvoinninlaitos Sosiaalisen osallisuuden edistämisen koordinaatiohanke, Sokra 20.4.2023.\_



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