



FROM FOREST BATHING TO GREEN ROOFS

Guide for productised environments
in summer and wellness tourism

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NATURE OFFERS WELLBEING TO TRAVELLERS

Nature tourism accounts for roughly 25% of all tourism in Finland. Nature offers various material and immaterial ecosystem services, such as fish, mushrooms, berries, logs for construction and the fell landscape of Lapland. Tourism businesses make use of these, for example, in programme and restaurant services.

Wellness services speed up summer tourism

Large parts of the turnover of holiday resorts in Lapland come from winter tourism. Only a quarter of all overnight stays are registered during seasons without any snow. Even though Lapland is known for its winter tourism, the region's opportunities for summer tourism have also been developed extensively.

In summer, travellers can hike in Lapland's nature on their own or on guided tours. You can meet other hikers, joggers, cyclists, golfers, recreational fishermen, canoers, landscape admirers, nature spotters or photographers in different parts of nature.

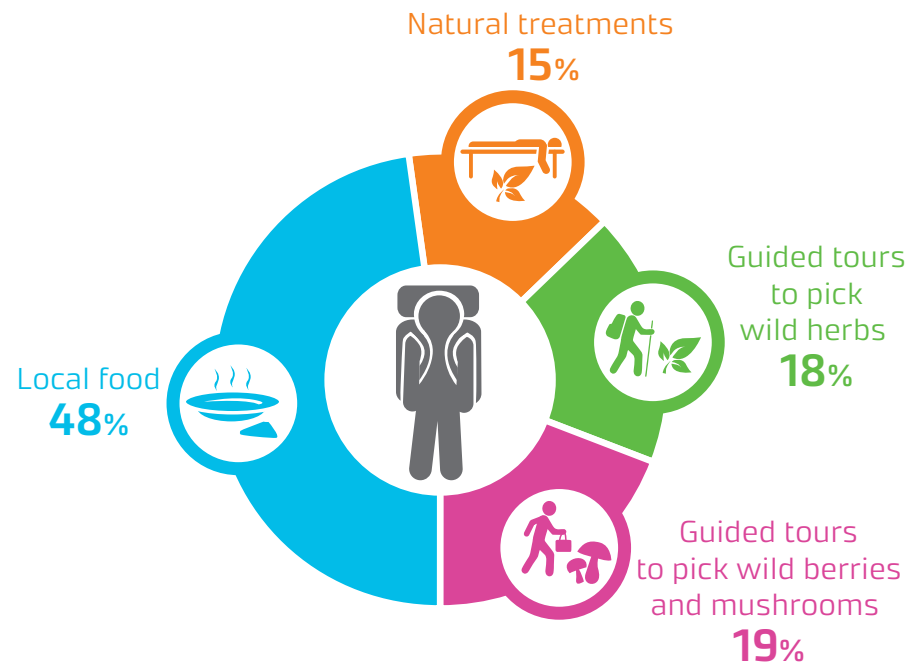
Summer in Lapland offers a magnificent setting not only for moving outdoors, but also for relaxation and experiencing solitude and peace. Lapland's strengths

include its clean nature and natural products, rich culture and its tradition of the use of nature. These attract travellers to tourism resorts during low seasons to enjoy nature and seek genuine experiences in the local community.

Lapland has plenty to offer to everyone who takes good care of their health and wellbeing and appreciate sustainable tourism. The goal of wellness tourism is to make you feel well both physically and mentally and to downshift. A wellness trip may easily kick-start a real change in your lifestyle.



LOCAL FOOD WAS CONSIDERED AS THE MOST POPULAR WELLNESS SERVICE IN THE LEVI RESORT



“Forest bathing” network as a solution in Levi

We have supported the development of summer tourism in the Levi region by means of pilot schemes carried out under the “From forest bathing to green roofs” project. The project has also boosted the development of wellness tourism in Levi.

We planned and carried out the pilot schemes together with tourism companies and development agencies in the region. Examples of this productive cooperation include the pilots at the Village Elves’ Hideaway and the Levi Ski Resort. We would like to warmly thank

the local companies that bravely offered platforms for our experiments.

The themes of the pilot schemes also addressed the interests of international travellers in the local ways of using nature, such as picking berries, mushrooms and wild herbs. Our choices were also affected by travellers’ awareness of the environmental impact of tourism, including concerns over the carbon footprint left by travelling.

We used methods of landscape research and environmental psychology to identify environments that attract tourists and support their wellbeing.

The result is the Levi’s “forest bathing” network, presented on page 11.

We applied the data collected by means of soil surveys about the properties of biochar in binding carbon and nutrients. We set up four pilots in which biochar was used: The meadow on the front slopes of the Levi centre (p. 13), the green roof of the Wise Elf’s House at the Village Elves’ Hideaway (p. 15), the wild herb garden at the Village Elves’ Hideaway (p. 17) and the boosted pollination areas on the gondola and south slopes of Levi (p. 19).

We put the research data produced in the natural product studies into practice through the pilots of mushroom (p. 23) and lingonberry cultivations (p. 21) around

the forest trail at the Village Elves’ Hideaway. The use of natural plants in landscaping practices (p. 17) is also demonstrated along the forest trail.

The “forest bathing” network is an example of how a municipality can enhance summer and wellness tourism in a tourism resort’s land use and trail planning. Other pilots presented in this guide offer various solutions for companies to develop their service environments for summer and wellness tourism as part of a product development and service design. These solutions have been divided into two groups: “Landscaping in a tourism resort” and “Tourism resort cultivates.”

We hope that this guide is used extensively by tourism companies and these pilots help to get new business ideas and put them into practice
- Katja Kaunismaa ja Marja Uusitalo





Natural environments revitalise. Even a short stay outdoors makes you feel better and more energetic and reduces the amount of stress hormones. Longer stays in nature cause other beneficial physiological changes in the body. Cells that kill harmful microbes are activated.

Based on global trends, people in western countries are becoming more attracted by health and wellness services, as the population is aging. This is also reflected in tourists demands.

Nature-based tourism attracts roughly 2.9 million registered travellers to Lapland every year. Nature-based tourism

Overall wellbeing as the goal

Nature-based tourism could strive more determinedly for the health and wellness benefits that nature offers. Northern Finland is one of the largest areas of wild organic collection in the world. Its organic grown berries, mushrooms and herbs are used to make products that tourism resorts have mainly sold as souvenirs.

Only through the local and wild food trends have natural products been used in more diverse ways, for example, at restaurant meals. There, natural products have offered a pinch of the exotic and a label of sustainably produced and healthy food. Slowly, local wild products are also finding their ways to wellness treatments.

Tourism companies should work closely together with providers of wellness services and natural products to build service packages, particularly for the low seasons. These service packages could include healthy local food customised for personal needs, natural product-based treatments, gentle sleep coaching and hiking outdoors. This would improve the overall wellbeing of tourists.

Trails bring nature close

For the wellbeing of customers, it is important that they can be close to nature during their trip. This is why it is vital that nature is within easy reach.



A good trail network presents diverse nature types in the area round the year. The closest routes must be accessible so that customers with limited mobility can enjoy the health and wellbeing effects of nature on their own.

Proper trail planning steers customers towards the most resistant areas against wearing and improves the hardness of the trails by using covering material and other structures. In this way, the negative impacts of recreational use can be minimised, such as damages and disturbances to the most sensitive wildlife. Good hiking trails protect nature and promote sustainable tourism.

Each municipality is responsible for planning hiking trails in their area. Entrepreneurs can propose new trails to the municipality.

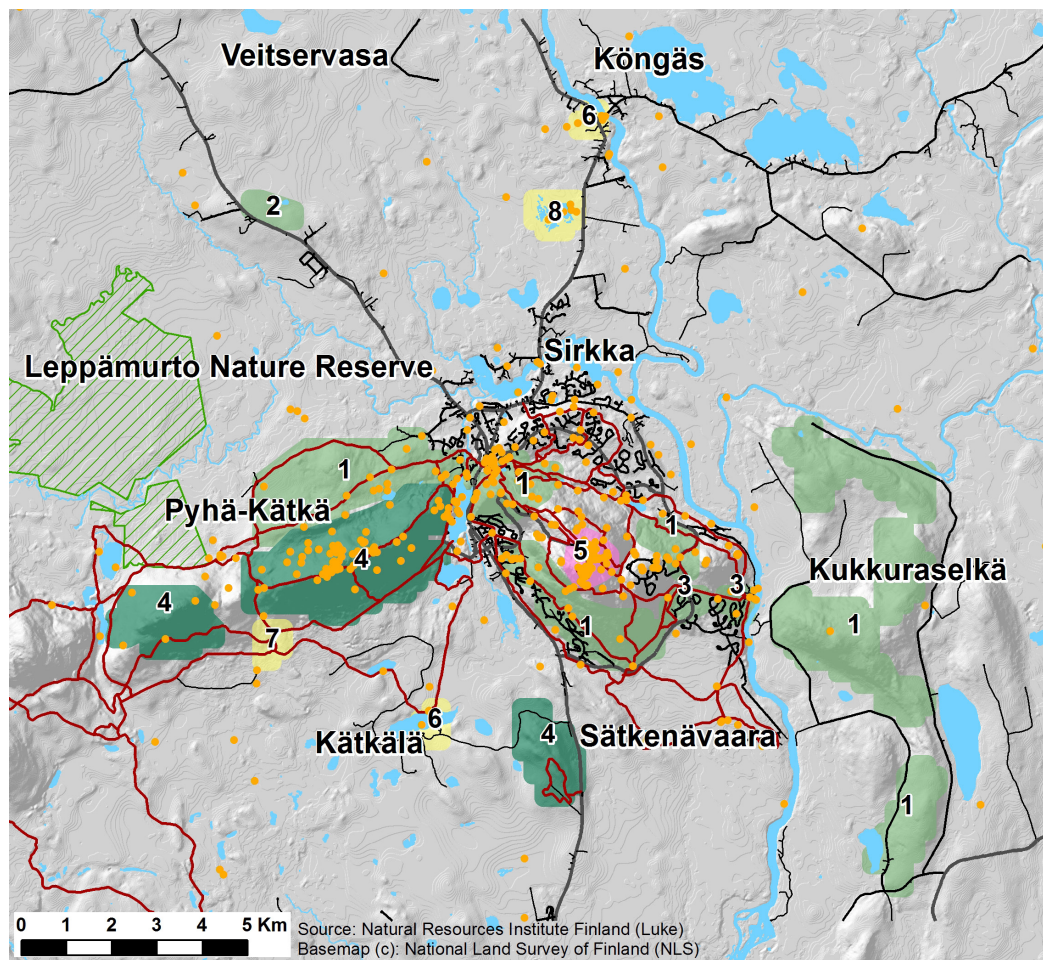
PLANNING BASED ON WELLBEING BENEFITS OF NATURE

To support land use and trail planning in the Levi region, Luke developed a new method: the “forest bathing” network. For the network, Luke identified areas that are particularly ideal for summer and wellness tourism.

First diverse information about habitat types and trail network in the Levi resort was collected. Areas that were considered important to nature experiences include habitats that produce high yields of wild berries and mushrooms, scenic viewpoints and forests, meadows and bogs with high biodiversity.

In addition, Luke identified the tourists' favourite places and activities through an online survey which included map-based questions. Based on the findings, Luke used geographic information system to identify areas that are rich in emotional and ecological values.

In total, there were 20 value-rich areas or hot spots in the Levi area which are expected to have significant wellbeing benefits. The “forest bathing” network also includes shore, bog and field areas outside the reach of the official summer trails. These environments would diversify nature experiences and the wellbeing benefits presently offered by the trail network.



Forest bathing network

- 1 - Old-growth forest with opportunities for berry and mushroom picking and scenic views
- 2 - Old-growth forest with opportunities for berry and mushroom picking
- 3 - Stream / river with berry and mushroom picking opportunities nearby
- 4 - Old-growth forest with good scenic viewpoints
- 5 - Top of the Levi fell
- 6 - Old agricultural meadow and/or field
- 7 - Old-growth deciduous forest
- 8 - Lake and mire with abundant birdlife
- Summer hiking trails
- Tourists' favourite places



LANDSCAPING IN A TOURISM RESORT

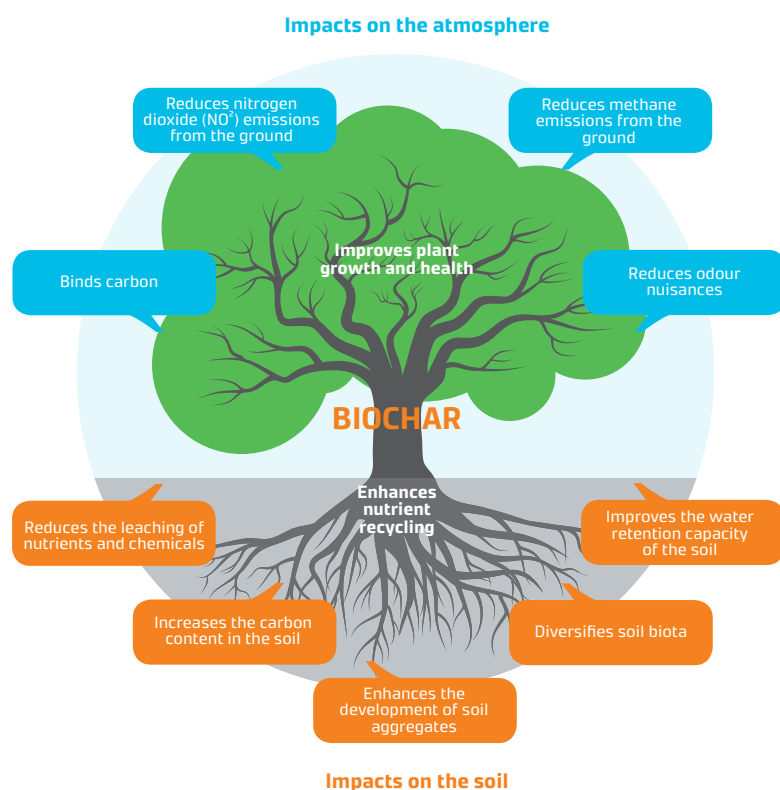
BIOCHAR
IMPROVES
BARREN LAND

Biochar is charred organic matter that improves soil properties, while acting as a carbon sink. When mixed in the substrate, biochar binds water and nutrients, improving to water retaining capacity, texture and nutrient economy of the soil, which reduces the nutrients leaching to the surroundings.

Biochar is made through pyrolysis, a process where the raw material is heated at a high temperature (> 350°C) in an oxygen-free environment. Typical raw materials for biochar include different plant-based materials, such as hardwood, softwood and straw. The temperature and raw material used in the manufacturing process have a significant impact on the properties of biochar.

Biochar is used, for example, in composting processes, landscaping and cultivation practices, as well as in nutrient filtering of erosion prevention practices.

BIOCHAR TO BOOST ECOSYSTEM SERVICES



MEADOW ON THE FRONT SLOPE

Constructing and maintaining ski slopes and their melt water erode the slope surface.

A meadow was established on the front slope of the Levi tourism resort, close to the summer bobsled track and a big hotel, together with the Levi Ski Resort. Peat with a low nutrient content was used as a growing media and the area was fertilised using composted matter. Birch-based biochar was also added to the substrate. The aim is to monitor whether biochar helps plants to thrive in the harsh conditions of a ski slope. It is expected that the meadow not only pleases visitors, but also restrains erosion and nutrient leaching of the slope.

Plants that do not require a high volume of nutrients were planted in the area, including *Viola tricolor*, *Silene dioica* and *Dianthus deltoides*. Plants with extended roots were also planted, such as *Centaurea jacea* and *Succisa pratensis*, to reduce erosion by binding surface matter.

More effect using
biochar filters

Biochar filters can be installed at the bottom of the vegetated area of the slope. The band of filters stops any soil running down the slope and absorbs nutrients contained in run-off. Later, these filters can be landscaped by adding plants that use the nutrients bound in the filters.



LANDSCAPING IN A TOURISM RESORT



GREEN ROOF OF THE WISE ELF'S HOUSE

LEVI PILOT

A green roof was built on the Wise Elf's House in the Village Elves' Hideaway in Kõngäs village in Kittilä, together with the Crazy Reindeer Company. The substrate consists of recycled and crushed lightweight concrete gravel, composted matter and coniferous bark chips. Biochar was added to the other half of the roof to monitor whether it improves the growth of the plants.

In total, approximately 1,500 seedlings of 18 northern perennial species that thrive in low nutritional and dry conditions were planted: *Antennaria dioica*, *Fragaria vesca*, *Saxifraga paniculata*, *Saxifraga hostii*, *Thymus serpyllum*, *Thymus serpyllum* var. *ericoides*, *Argentina anserina*, *Campanula rotundifolia*, *Festuca ovina*, *Aquilegia* "Olympia", *Dianthus x courtoisii* 'Malla', *Silene viscaria*, *Silene suecica*, *Rhodiola rosea*, *Vaccinium vitis-idaea* 'Otson Karkki', *Leucanthemum vulgare*, *Arctostaphylos uva-ursi*, *Thymus serpyllum* ssp. *tanaensis* and *Alchemilla alpina*.

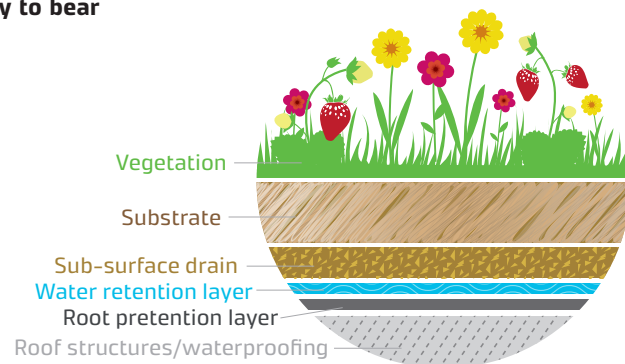
GREEN ROOFS INCREASE BIODIVERSITY

Roofs of buildings can also be full of life. The peat roofs of ancient Stone Age huts are the oldest green roofs known today. A modern building can be safely provided by a green roof if the roof is waterproof and has capacity to bear snow load.

Using a green roof, a building fits easily in its surrounding nature, while increasing biodiversity. A green roof reduces noise, removes dust and absorbs rainwater, and acts as addi-

tional insulation in winter. When selecting plants, natural species typical to the area and nectar-producing species that feed pollinators should be favoured (see p. 18). It is inevitable that seed dispersal plants from the surroundings will appear in green roofs and the vegetation changes through time. This phenomenon is called succession.

THE SECRET OF A GREEN ROOF LIES IN LAYERS



How is a green roof maintained?

Irrigation

After planting, irrigation needs to be arranged to help the plants to root properly. A sprinkler is an efficient solution.

A green roof must be checked at least twice a year

- Tree and bush seedlings must be removed from a thin layer of growing medium.
- It must be decided on what species spread from the surroundings can remain.
- Any large fallen branches must be removed. Leaves and needles can be removed using a leaf blower.
- Raised structures and inlets must be checked carefully.
- Any roof drains must be cleaned and their performance must be checked.
- Rain gutters must be cleaned.

LANDSCAPING IN A TOURISM RESORT



VITALITY AND BEAUTY FROM NATURAL PLANTS

There are roughly 1,200 vascular plants in Finland, one third of which are edible or medicinal plants. Nearly 90 species are used as wild vegetables and herbs and 10 species have a commercial demand in the natural product and food industries. In addition, many natural species are used in green spaces.



Wild vegetables and herbs are referred to as superfood. They have a high nutritional density, meaning that they contain more vital protective nutrients and necessary fatty and amino acids per energy unit than typical industrial food products. This is why they are parts of a healthy diet. Plants are usually collected from nature, but some are also cultivated.

A biotope-based design should be favoured in green spaces at tourism resorts. There, plant species, either local or alien (excluding invasive species), that survive in similar habitat types are selected. The existing natural vegetation is enriched by using plant species that have similar competitiveness and is easy to maintain.

LEVI PILOT

RAISED PLANTING BEDS FOR WILD HERBS AND MAGICAL FOREST AT THE VILLAGE ELVES' HIDEAWAY

In total, 16 raised planting beds were built on the old field at the Village Elves' Hideaway, in which 25 perennial wild herbs were planted:

Centaurea jacea, *Fragaria vesca*, *Rumex acetosella*, *Oxyria digyna*, *Thymus serpyllum*, *Viola tricolor*, *Primula veris*, *Viola biflora*, *Carum carvi*, *Polemonium caeruleum*, *Glechoma hederacea*, *Hierochloë hirta*, *Plantago major*, *Rhodiola rosea*, *Empetrum nigrum* subsp. *hermaphroditum*, *Alchemilla vulgaris*, *Mentha arvensis*, *Valeriana officinalis*, *Achillea millefolium*, *Arctostaphylos uva-ursi*, *Alchemilla alpina*, *Allium victorialis*, *Aegopodium podagraria*, *Bergenia cordifolia* and *Angelica archangelica*.

Some of the containers were dedicated to annual vegetables and herbs. The products of the raised planting beds are used at the Village Elves' Hideaway to prepare local food and herbal baths in sauna. Guided tours usually start from the herbal garden, from where a path leads to the magical forest. Special forms (f.) of Finnish tree species that are rare in nature were planted as eye-catchers along the path. These include *Betula pubescens* f. *rubra*, *Picea abies* f. *tabulaeformis*, *Picea abies* f. *pendula*, *Sorbus aucuparia* f. *astigiata* and *Alnus incana* f. *gibberosa* which, together with pieces of environmental artwork, make the forest a magical place of elves.





MORE POLLINATING POWER, MORE BERRIES IN THE FOREST

Nearly all of our forest berry plants require insect pollination in order to produce berries. Vital populations of pollinators require nests and sufficient nutrition. Increasing their availability is simple.

More than 150 cavity-nesting bees (*Hymenoptera*) have been identified in Finland. These are referred to as solitary bees to distinguish them from communal bees that include the honey bee, bumblebee and wasp.

A female solitary bee lays eggs in a suitable cavity, such as a broken stem, a tunnel dug in sand or a hole or crack in

a dead tree. After this, the female leaves nectar and pollen for her offspring and closes the mouth of the hole. Depending on the species, the new generation starts to pollinate plants after a few months or the next spring.

Artificial nests and nectar-producing plants

Solitary bees nesting in dead wood, in particular, have fewer places to reproduce, as dead wood is usually scarce in managed forests. This situation can be improved by providing them with artificial nests. An artificial nest can be a hardwood block with many drilled holes.

Unless there are natural meadows nearby, it is beneficial to collect and spread seeds of nectar-producing plants of natural plants, i.e. seeds of wild relatives of such genus as *Thymus*, *Calluna* and *Geranium*, close to artificial nests in an open area. As a result, pollinators have access to enough nutrition throughout the summer.

BOOSTED POLLINATION ON THE SLOPES OF LEVI

The forests of the lower slopes of Levi are rich in bilberries (*Vaccinium myrtillus*). If there are enough pollinators, these areas can produce large berry harvests. Boosted pollination ensures that every year there are berries to pick, and wild berry picking may attract new tourists to the area.

Artificial nests were tied on trees on the forest edge of the southern slopes of Levi and meadows were established next to them on the ski slopes. The aim is to monitor how boosted pollination increases the production of bilberries.

UP TO 50 PER CENT HIGHER PRODUCTION WITH USING ARTIFICIAL NESTS





LINGONBERRY HARVEST EVEN 100 TIMES HIGHER THROUGH CULTIVATION

Lingonberry (*Vaccinium vitis-idaea*) gives the biggest and most reliable natural yield among our wild berry species. Cultivation significantly increases

the lingonberry yield. The big berries of cultivars make dishes more attractive.

In a forest, lingonberry vegetation produces roughly 20-40 kilos of berries per hectare. When cultivated in an open land, it can be as high as several thousands of kilos per hectare. Productive cultivars should be selected for cultivation, such as 'Otson Karkki' with big deep red berries.

Several lingonberry cultivars are in the market. Of these, 'Splendor' and 'Regal' are of a Finnish origin, in addition to 'Otson Karkki'. The first lingonberry cultivations were established in Vången, Sweden, in the 1970s. Currently, the largest cultivations are located in the US.

LINGONBERRY FIELD AT THE VILLAGE ELVES' HIDEAWAY

A lingonberry cultivation was established in an old field close to the hut at the Village Elves' Hideaway. Cultivar 'Otson Karkki' was selected. First, perennial weeds were removed from the area. Next, sand-containing peat was spread and formed into beds. With garden bed planting it is aimed that rainwater does not remain in the cultivation area. Artificial nests were tied on trees growing in the edge of the nearby forest.



North American berry picking machine.



What lingonberries need to grow?

Lingonberries require a location that is exposed to plenty of sunlight and has an acidic and well-drained soil. As bark chips are spread over the planting area, weeds can be better controlled. Lingonberries spread evenly over the cultivation area in approximately five years.

Proper planting and maintenance practices make the lingonberry cultivation a long-lived one, without any replanting needed. Providing artificial nests for natural pollinators gives certainly to the production (p. 18).

MUSHROOM CULTIVATION BY THE FOREST TRAIL OF THE VILLAGE ELVES' HIDEAWAY

The old forest at the Village Elves' Hideaway close to river Ounasjoki is an ideal location for growing forest mushrooms. The shady and humid microclimate of the forest is perfect for mushrooms.

Spores of several mushroom species were inoculated in dead wood and living trees in the forest. During the next decade, the area will produce *Inonotus obliquus*, *Hypholoma capnoides*, *Ganoderma lucidum*, *Pleurotus pulmonarius*, *Flammulina velutipes* and *Fomitopsis betulina*. These species are edible when cooked or they can be used as food supplements.

TOURISM RESORT CULTIVATES



Ganoderma lucidum in the photo.

MUSHROOM CULTIVATION IS EASY

A large array of wild forest mushrooms grow in Finland. They are used in Japan and South Korea in health and wellness products, such as food, food supplements, and cosmetic products.

Mushrooms are healthy and low-caloric diet. They contain as much proteins as milk and peas and large amounts of protective nutrients (essential vitamins and minerals), while barely containing any fat. Compounds that prevent infections and the formation of cancerous cells have been identified in several mushroom species.

Cultivating mushrooms is fairly easy. The most typical way to cultivate mushrooms is inoculation. This method entails soaking wooden pegs with the liquid filled with mushroom spores and then inserting them into holes drilled into a tree or stump.

Cultivation ensures that mushrooms are also produced during years when natural production is low. Programme service providers can take their customers to a cultivation to pick mushrooms and use them to make fresh food or to conserve them for selling as souvenirs.

How are mushrooms cultivated?

Fresh hardwood and stumps and logs of spruces of all sizes are ideal for growing mushrooms. Bigger stumps can produce more fruiting bodies of mushrooms and for the longer period of time. A forest owner can inoculate spores in woods without the permission. All he needs is a drill, wooden pegs having mushroom spores and beeswax. The first fruiting bodies will appear some five to ten years after the inoculation.

- Select the mushroom species for cultivation based on the tree species available in the site. For example, *Ganoderma lucidum* grows on spruce, birch and alder trees, while *Fomitopsis betulina* and *Pleurotus pulmonarius* only grow on birches.
- Drill holes into a stump or log based on the diameter of the wooden peg. Drill holes every 20 centimetres.
- Insert the wooden pegs into the holes and coat them using beeswax or other non-toxic wax.



Inonotus obliquus inoculated on a birch.

SUMMER AND WELLNESS SERVICE COMPANIES IN LEVI

Environmental-friendly Logistics (ELog)

Nature-based products; cloudberry picking, fishing and hunting.

matti.tikkanen@elog.fi

www.elog.fi

Hyvinvointipalvelut Aurinkokallio

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jaana.aurinkokallio@gmail.com

www.aurinkokallio.fi

Lapin Herkkutupa

Café, lunch restaurant and bakery in Kittilä.

susanna.hiltunen@lapinherkkutupa.fi

www.lapinherkkutupa.fi

Lapin Luontoelämys

Successful nature experiences in Lapland.

raiski@levi.fi

www.lapinluontoelamys.fi

Levin Tourist Office Ltd

Sells, develops and markets the Levi region, offers tourist information in the municipality of Kittilä and provides tourists with the broadest programme and accommodation service range in the region.

levi.info@levi.fi

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Polar Lights Tours Oy

Welcome to experience-filled Lapland!

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www.polarlightstours.fi

Polar Star Travel

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sales@polarstartravel.fi

www.polarstartravel.fi

Särestöniemi Museum

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www.sarestoniemimuseum.com

Village Elves' Hideaway (the Crazy Elf)

An unforgettable place where people and nature are one and time has lost its meaning.

sales@hulluporo.fi

www.lapintonttula.fi

All of the companies listed above have participated in the "From forest bathing to green roofs" project.

Name of project: From forest bathing to green roofs - added value for tourism from ecosystem services and landscaping

Project partners: Natural Resources Institute Finland (Luke), municipality of Kittilä - Kideve Kittilä Development

Project period: 1 January 2015 - 30 June 2018

Total project budget: EUR 253,890

Project goals: The project provides examples how to use and develop nature areas and services of nature-based tourism resorts for summer seasons by companies that sell programme, wellness, food and landscaping services, as well as producers of non-wood products, farmers and nurseries.

Project financier: ERDF



Leverage from
the EU
2014–2020



How to build a green roof? How to produce wild food? What is the resort's forest bathing network?

The “From forest bathing to green roofs” guide responds to these questions, and many more. The solutions presented in this practical guide help companies to productise environments and landscapes for summer and wellness tourism. The guide also offers tips to support land-use and trail planning.

The solutions were created by researchers from Luke and representatives of the municipality and entrepreneurs of Kittilä, and they were tested at the Levi tourism resort. The solutions were mainly based on Luke's previous bioeconomy studies.

To make the guide easier to read, its content is presented under the “Landscaping in a tourism resort” and “Tourism resort cultivates” headers.



www.luke.fi/touristsforestbathing