Chest of senses
Methodical instruction

The project is being implemented with support of the Central Baltic Programme 2014-2020. Project CB786 “Nature Access to All (NatAc)”, European Regional Development Fund.

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Funding: The Central Baltic Programme 2014-2020 of the European Regional Development Fund (www.centralbaltic.eu) and the Environmental Investment Centre (www.kik.ee)

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European Regional Development Fund

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The chest is a kit designed to talk about nature and introduce children and adults alike to the biotic communities of forests, bogs and coastal areas.

The study aid is prepared using the examples of Riisa bog, Puhtu fresh boreo-nemoral forest and Matsalu coastal landscapes. It supports instructors and teachers as they attempt to introduce these places or biotic communities in general.

Thanks to realistic sample materials, tactile picture cards and models, the study aid can target several senses. The chest of senses is suitable for people with impaired vision and hearing.

Educational trail
Preparation of educational trail

Before the start of the study visit, it is recommended that the children's instructors cover:

- the size of the group, the number of accompanying persons, activities and assignments
- a description of the special needs of the children participating in the educational trail (vision, hearing, mobility disability, particular behavioural characteristics, etc.)
- the intellectual capabilities and/or study programmes of the children coming on the educational trail
- the language (complexity of vocabulary and terminology; to what extent they will require explanations for the main terms; whether there is a need for a sign language interpreter) of the children participating in the educational trail
- the length of the hiking trail and any particular features that the children and accompanying persons should take into account
- aids
- the structure of the conversations and the lesson, particular features and goals

Introducing the study aid

The chest of senses can be introduced before it is used by the teacher or the children. It is best if the group leader introduces the chest to everyone simultaneously. The accompanying persons of the children can subsequently provide more detailed information.

Upon introducing the chest of senses:

• start by introducing the shape of the study aid (semi-sphere) and the general division (upper part and lower part)

• talk about the construction of the study aid and the specific division (five compartments and pockets each with specific contents)

• describe the marking on the study aid and its elements

• guide the tactile examination of the model, help find the resources, draw attention to the written information (in Braille, large text, audible information and information in sign language, images)

• if possible, involve the children in the introduction process. For example: a child facing a compartment can choose from the objects contained therein and explain to others what they are

The resources used in the chest of senses are lifelike in order to feel as real as possible to children with special needs.

Objects establish a general link but also enable so-called subtopics to be learned.

Elements of the study aid

• **Picture cards.** The image on the picture cards is both visual and has raised contours. The Estonian and Latin name of the object depicted on the picture is written in ordinary letters and in Braille in the top left corner of the card. The back of the picture card contains simplified facts (in ordinary letters) about the image depicted on the picture. It also includes a QR-code with information in sign language as well as information relating to nature sounds.

• **Scent jars.** Scent jars are marked with a sticker.

• **Pelt fragments.** Pelts are marked with a sticker.

• **Tracks.** Life-size tracks are marked with a sticker.

• **Replicas of bird eggs.** Replicas are marked with a sticker.

• **Model depicting the development of mires.** The model is marked with a sticker.

• **Beach findings.** The model is marked with a sticker.

• **Device for playing sounds.** To use the device, connect the speaker to a phone and scan the QR-code on the picture card to play the sound.

Educational trail

Enjoy your time together and in nature!

Treat a child with a disability the same as you would any other child who is simply gaining knowledge through other senses. Instructors act as mediators and the children are the ones acquiring experience. It is important to give them knowledge and experience. Allow them practicable independence and encourage them to try new activities.

The instructor of the study visit will carry out the nature hike according to the objective and the abilities of the group. The instructor will plan the activities for the lesson and if necessary also discuss the suitability thereof and any required modifications thereto with the teachers/accompanying persons. The positioning of the children during movements and study activities depends on the environment and the specific needs of every child (accompanying persons or children themselves can address this where required).

The introduction of the chest of senses should take place in a calm environment. It is convenient to use the chest without assistance provided that it is positioned on a stable surface such as a camping desk or the ground. It would be good if the children could sit or stand around the chest of senses. You should also take into account that some children may find sitting on the ground extremely uncomfortable or delimiting, whereas children may drop objects on the ground when forced to stand up.

An educational trail coupled with a chest of senses can be a mind-broadening activity even for children without disabilities.

What to keep in mind when teaching children with visual disabilities?

Make sure that any oral information given to the children is audible and that partially sighted persons can find a comfortable place and position (e.g. in a semi-circle in front of the instructor) to acquaint themselves with the resources.

It is best to sit at a desk to read Braille and view raised pictures. The chest of senses can also be used in natural science classes at schools to make them more varied and offer a more thorough take on the subject matter.

Blind people need time to acquaint themselves with the resources. A more detailed description should be provided of what exactly the hands of the blind person are examining. For this reason, it is more convenient to have several pieces of the same resource being examined or use a specific rhythm in group activities. If necessary, each person can be given the chance to examine the objects more thoroughly and calmly once the joint activities are over.

Since the intake of information and new experiences in unknown environments may be tiring for blind persons, it is recommended to take breaks or, for example, organise two hikes on the same subject – the first to provide an overall introduction and the second to cover the topic more thoroughly and reinforce the knowledge gained (where children are allowed to be more independent). It is important to make sure that not too much new information is delivered, as this would put a lot of strain on the memory function of blind children and they may confuse

different pieces of information if there are different impressions.

Attention. Nature education and immediate experience with nature places attentional demands on children with visual disabilities and requires a lot of focus. Listening to/hearing instructions in an unfamiliar environment or during movement may be impracticable. It is important to describe to the children exactly what they are experiencing (examining by hand, listening, smelling, tasting, etc.). Give them time to listen to, understand and analyse their surroundings.

Use of hands. Blind children use their other senses to collect information and can distinguish between the exact properties of objects by touch. Readiness to use hands or examine new things by touch may sometimes prove to be a complicated experience (due to touch sensitivity). Some people are afraid to experience new materials so encourage them to use their hands for exploration because developing sensory sensitivity helps blind people get a more versatile experience of the world. Describe what the child is currently touching.

Use of terms such as 'see' and 'look'. Feel free to use these words. They simply have a somewhat different meaning for people with visual disabilities.

Observable (visual) information. Children with residual vision are very limited in their ability to receive information through vision and it is also highly individual. It is primarily related to the size of their field of vision and their ability to use visibility. Children must be guided to pay attention to the characteristics of objects. Drawings should have contrasts and simplifications and place emphasis on important characteristics. In unknown environments, bright sunlight (light-sensitivity), shadows (trees, people, etc.), reflections (water surface, waves, laminated study materials, etc.) may all have an impact on children's vision. Allow children with visual disabilities to choose the distance and position from which they prefer to get acquainted with the object being examined.

Colours. In your descriptions, you can also use names of colours as this helps establish a general common information space. This allows blind people to develop an understanding of the usual colours of certain natural elements. At the same time, keep in mind that different partially sighted people may have different perceptions of colours.

Hearing and sounds. Take into consideration that we are surrounded by general background noise and specific sounds. Introduce new sounds and teach children to notice them. Unexpected sounds can sometimes be scary so warn them or point it out in advance, where possible. Make sure that the child gains the audio knowledge being shared. Save lengthier descriptions for when the group is standing and not walking. Choose an appropriate volume. Weather conditions (the wind, the rustle of trees, stormy sea) may also cause oral instructions to get lost. The number of accompanying people may also contribute as a noise factor. Give the children time to listen to, understand and analyse their surroundings or simply let them enjoy the silence and take a break.

Ground. Both hands and feet provide information through touch. Describe different types of soil and the materials you are walking over, e.g. moss, peat, pebbles, roots of trees, stumps, puddles, ice.

Pace and time management. Pick a suitable movement speed for the study visit. Safe movement across different surfaces sometimes requires a lot more time. Descriptions and the examination of objects also takes time.

Scents. Children with visual disabilities learn to recognise things and phenomena through their sense of smell, among other things. Describe new scents. If possible, establish a link between a specific aroma and its source (e.g. a plant and its scent, picture and uses).

Words to describe direction. Avoid using unclear expressions *here, there, this, that, come here, put it there,* etc. Instead, use specific concepts of direction such as *to the right, to the left, up, down, hip-level,* etc. Use these terms from the perspective of a blind person. Instruct and guide the finding of objects by talking or with a slight touch of the hand.

Terminology. People with visual disabilities can use terms whose actual meaning is unknown to them. Try to understand whether they comprehend the substance of the terminology used. Be brief, simple and precise when explaining new terms. When providing descriptions, it is preferable to establish connections with the child or a room or an object they are familiar with using measurements they understand.

Visual memory. People who have lost their sight or whose vision has declined during their lifetime may remember the shape and properties of items, meaning that they need less or different descriptions than those who were born blind.

Addressing. If possible, use name tags for children as this will help instructors or new teachers address children with visual disabilities. Blind persons may not understand an impersonal form of address. If there are no name tags, gently touch the child's hand or shoulder to let them know

that they are being talked to as well as the direction of the person who is talking to them. Be sure to introduce yourself before the hike to establish a connection between the person and the voice.

Select your **objectives and preferences** for descriptions and explanations: what is important, what is less important, what to focus on for longer and what to draw attention to next time. Your descriptions help broaden the world and life experience of the children.

Feedback. Ask control questions to understand whether and how children with visual disabilities understood the subject.

Work ability. Children with visual disabilities may tire more easily as they use all their senses to process information. Take small breaks during the hike, offer the children a variety of things to do or divide the topics between several hikes. Drawing attention, focusing on a subject, memory and new emotions all take their toll on children with visual disabilities.

Do not leave a blind person **alone in an unfamiliar environment** – let them know who they can expect to come to continue the activities.

What to keep in mind when teaching children with hearing disabilities?

General recommendations

• Before the hike, be sure to familiarise yourself with the level of hearing loss of the pupils, their ways and means of communication (whether/to what extent they are able to hear speech, how well they know sign language and Estonian, what their level of speech is) and try to find the best way to communicate to ensure mutual understanding.

• Make sure that children with hearing aids have the best possible environment for using them: eliminate any background noise and/or choose the least noisy environment to speak if possible, speak with a loud and clear voice and avoid talking to several people at once.

• In the case of hearing loss, it is always important to see the face/mouth of the person you are talking to in order to get as much information as possible. It is recommended to seat or stand the pupils in a semicircle to allow them to see the instructor as well as other pupils and ensure they have an unobstructed view of the speaker, the sign language interpreter and everything happening.

• Be visible to all pupils at all times:

– make sure there is enough light and avoid reflections and light from behind you

– when addressing the whole group, always position yourself right in front of them (do not walk around while talking and do not talk while behind them) to make sure everyone has a good view of you (especially your face and mouth)

– keep enough distance from the pupils (being too far away or too close makes it difficult to receive visual information)

– avoid colourful clothes if possible (to reduce irritating factors)

• Before passing on your message/work order, make sure that you have the pupils' attention, less they fail to get the message (do not speak when you have asked them to do something or when the pupils are busy reading/watching/doing something).

• You can use a visible cue or a sign that can be felt through the body to get their attention (e.g. switching the light on and off, waving your hand, slamming your foot hard on the ground, knocking on a hard surface or patting on a pupil's shoulder).

• Before passing on the main message, it is recommended that you give a prior order (e.g. 'Look here! Pay attention!').

• If you plan on having the pupils take turns to talk, make sure the entire group can understand who is about to speak or use sign language. If necessary, direct other pupils' attention to the speaker (otherwise it is likely that the information they are sharing will go unnoticed). The easiest way to put the speaker in the spotlight is to point at them. However, depending on the situation and ways of communication, you might also say their name or use sign

language to say their name (this option is better when the instructor is responsible for introducing the speakers).

• Remember that pupils' background knowledge may be very limited due to their hearing disability and the black-out it entails. As a result, you may have to explain even basic everyday things.

• People with hearing disabilities mostly or largely rely on their eyesight to get information. They learn through vision and need as much visual material as possible to facilitate understanding/receive information.

• The mind of a deaf person works in a very specific way so be as straight forward, precise and direct in your expressions as possible (do not use euphemisms, be frank about what you mean).

• If you are using visual examples give them time to examine the materials and avoid speaking at the same time (in order to keep up with what is being said, people with hearing disabilities need to be able to see the speaker's mouth or the sign language interpreter – they cannot look at the example material at the same time).

• Remember that Estonian is a foreign language for deaf persons who use sign language and it is very difficult for them to learn it. This also means that the level with which deaf persons use and understand Estonian is much lower compared with their peers who can hear well.

When using oral speech:

- face the pupil when you speak
- speak in a natural and clear way (there is no need to exaggerate the movement of your mouth in an attempt to seem more pronounced, this will likely make it harder for the pupil to understand you)
- speak calmly, do not rush and do not slow down your speech too much
- use your normal tone of voice (there is no need to shout)
- make sure your face can be seen well – avoid lighting sources from behind you that reflect in the pupils' eyes and keep hair, moustache/beard, scarves, etc. from blocking the view
- be clear and specific when expressing your ideas
- you should speak for a limited amount of time and your sentences/ideas should have a clear outline – avoid gushing over the topic (i.e. do not talk too much) and long sentences that are difficult to understand
- avoid overusing certain words and formulaic language (e.g. *right... you see... if you please...*)
- do not change the subject unexpectedly
- consider the age and language skills of the target group, use vocabulary and syntax that the children can understand
- be expressive when talking, feel free to use facial expressions, gestures and body language as this will help the children better understand the message
- try to rephrase things when the pupils are unable to understand you

Tips for using the services of a sign language interpreter:

- speak directly to the pupils, not to the interpreter
- provide the interpreter with written materials on the topics/assignments to be covered well before the hike/class to ensure mutual understanding and optimal cooperation. This will allow the interpreter to prepare and pass on the information to the pupils in the best way possible
- let the interpreter know what you plan to do, when and how so that they can prepare
- to avoid any misunderstandings with the interpreter, read about the general working principles and specific features of interpreters
- remember that the interpreter only acts as a mediator of information, they are not assistant teachers, support persons or other help

Activities to support the use of the study aid

The objective of these assignments is to help pupils attribute meaning to what they have learned and associate their gained knowledge with the real world. The assignments put children in a situation where they are forced to speak up, act, listen and think along. Activities, discussions and games planned by the instructor are adapted based on the needs of group members. For example, you can use just one type of study element (picture cards) or you can use different elements (picture cards, pelts, scents, sounds, etc.). The assignments can be given before the start of the hiking trail, while on the trail or after completing the hike. Learning activities and descriptions of nature should be complemented with various assignments, activities and games.

1. Assignment No. 1 (what is it?): the person conducting the lesson introduces an object from nature or the chest of senses while on the hiking trail. The children will examine the object and each of them will describe it with a suitable adjective. The person conducting the lesson will highlight special features that have gone unnoticed. The goal of this assignment is to introduce different species and specify terms.

2. Assignment No. 2 (treasure hunt): children are asked to collect 3-5 interesting objects in small personal treasure bags. At the end of the hike, they examine their findings and share information. The goal of this assignment is to introduce different species and imprint the items in their mind.

3. Assignment No. 3 (notice the moment): the hiking group stops to feel and sense nature for 1-5 minutes. This is followed by a discussion (about the things they heard, felt, noticed) and an introduction of study elements from the chest of senses, where possible. The goal of this assignment is to sense the natural environment and introduce different species.

4. Assignment No. 4 (quiz): the person conducting the lesson presents questions corresponding to the level of the group. For example, about the descriptions of species. The questions may be presented with study elements (picture cards, scents, pelts, etc.). The addition of a competitive element can make this assignment more exciting: children who know the most correct answers get awarded with the title of the Forest Sage, for example. The assignment can be given before or after the lesson. The goal of this assignment is to introduce different species and biodiversity and reinforce the knowledge gained.

5. Assignment No. 5 (odd one out): the person conducting the lesson puts together a food chain in the pockets of the study aid by adding 1-2 species to the chain that do not fit in. The children must put the species in the food chain in the correct order and leave out any species that do not fit in. This assignment can be done in teams. The goal of this assignment is to introduce the ecosystem, its importance and connections between species.

6. Assignment No. 6 (grouping): the person conducting the lesson places different species in the pockets of the study aid. The children have to distribute the species based on the characteristics of the species, such as feeding: plants, herbivores, omnivores, etc. Species can also be grouped based on other characteristics. This assignment can also be done in teams. The goal of this assignment is to introduce different species.

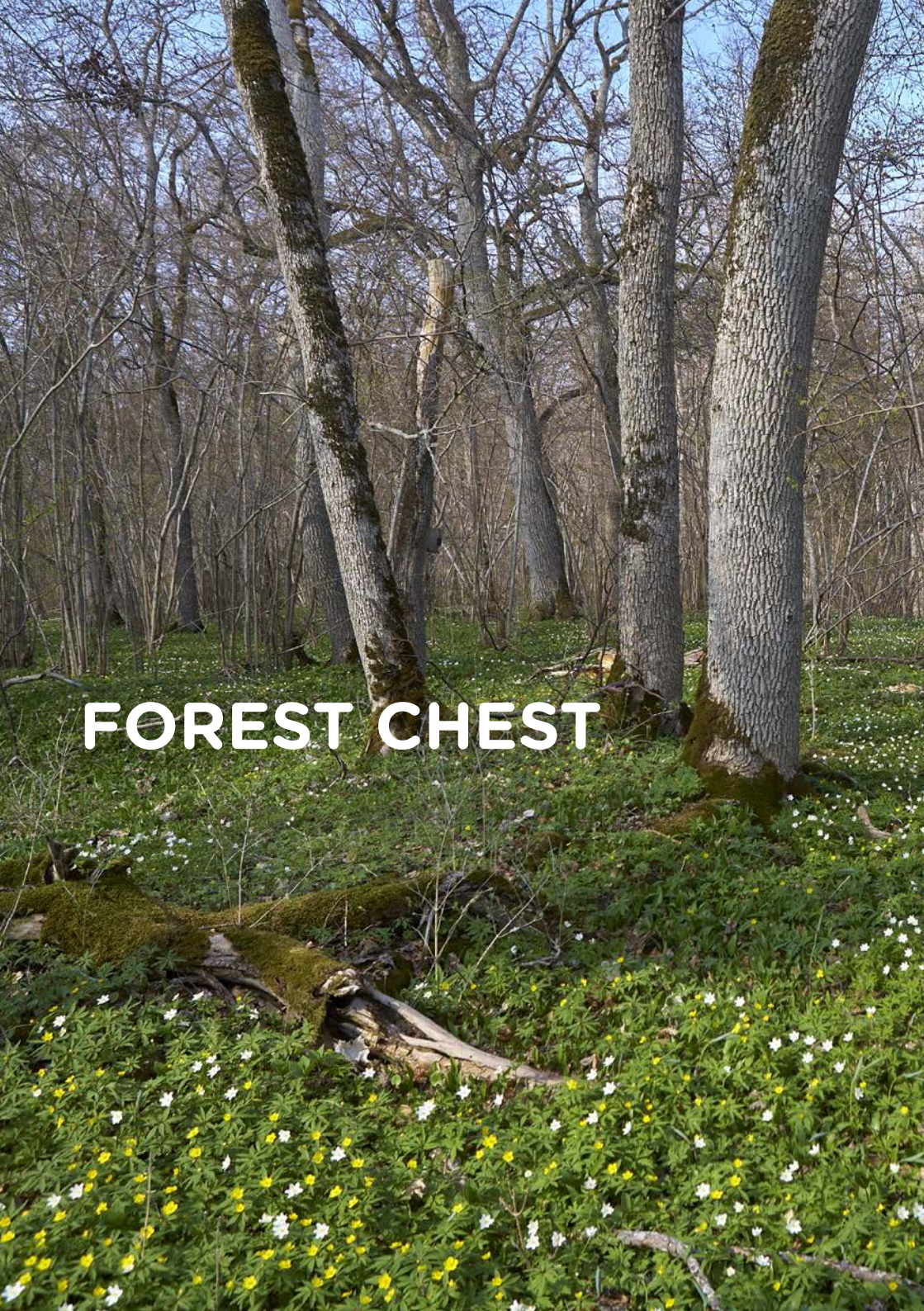
7. Assignment No. 7 (finding pairs): the person conducting the lesson selects suitable pairs based on the characteristics of the species and then mixes all the species together. The children have to find suitable pairs from the collection of species. This assignment can be done in teams. The goal of this assignment is to introduce different species and the connections between species.

8. Assignment No. 8 (essence): children have to find something interesting or important about the nature of the place before the hike and then introduce it to others.

9. Assignment No. 9 (environment exploitation): children have to find 3-5 elements in the study aid that people may need for life. This is followed by a discussion on why people might need those things specifically, what they use them for and what happens when they fail to find any. Children may also bring other examples of the relationship between humans and nature. This assignment can be done in groups. The goal of the assignment is to show how people depend on the environment, introduce the benefits of the ecosystem and the need for nature conservation.

10. Assignment No. 10 (tree): children join hands and form a circle around the tree to measure its circumference. A fun assignment.

11. Assignment No. 11 (poisonous and edible): children will look for edible and poisonous plants from the forest. In the case of edible plants, it is a good idea to compare them with poisonous plants (e.g. ramson and lily of the valley, bird-cherry and alder buckthorn). The goal of this assignment is to introduce different species and provide practical information.


FOREST CHEST

Important species in Puhtu boreo-nemoral forest

Forests as ecosystems

Relation to the study assignments:

Assignment No. 7 (finding pairs)

Forests are biodiverse ecosystems which revolve around trees of different ages. The ecological network of a forest usually comprises thousands of species.

A forest cannot be planted. You can plant trees which help create the necessary conditions for forest growth. From an ecological standpoint, a forest is never over-mature – dying old trees will soon be replaced by new ones on the same spot.

The media, different publications and legislation often present differing approaches on the concept of a forest. Managers of forests also include the biotic community of young trees and shrubs growing in large clear-cut sites in the definition of a forest. However, such combinations manifest major disturbance and bear little resemblance to the forest that once grew in the same place. The biodiversity of the forest has taken a big hit in such areas and they now host species more common to meadows.

According to the current Forest Act (2020) of Estonia, forests are even defined based on a database: “A forest is an ecosystem consisting of forest land and the flora and fauna thereof.” Forest land, in turn, is referred to as a forest land parcel entered in the cadastral register. However, the cadastral register is nothing but a database and this results in the following absurdity: that a database is effectively an element of the ecosystem. For this reason, it is important to take into account that the forest definition in the Forest Act differs from the definition that an average person would have of a forest.

Depending on the type of terrain and soil, different forests grow in different places. Estonians’ good knowledge of forests is evident in the names we have for different types of forests. For example, we have *salumets* – fresh boreo-nemoral forests; *sürjamets* – dry boreo-nemoral forests; *laanemets* – fresh boreal forests; *palumets* – dry boreal forests; *nõmmemets* – boreal heath forests; *loomets* – alvar forests; *lodumets* – marshland site type forests; and *lammimets* – flood-plain forests.

Puhtu fresh boreo-nemoral forest

Relation to the study assignments:

Assignment No. 8 (essence)

We will take a closer look at forests as ecosystems in the Puhtu broad-leaved fresh boreo-nemoral forest. The condition of this forest is very much in line with the forest definition provided above: here we can notice biodiversity as well as trees of different ages.

Puhtu forest, growing in calcareous soil in maritime climate, is probably some 400-500 years old. The oldest oak tree (circumference 4.8 m) and pine tree (circumference 3.8) of this forest are around 400 years old – almost as old as the forest itself.

However, Puhtu is not an old-growth forest. Over the years, Puhtu has seen at least two major disturbances. At the end of the 18th century, Carl Thure von Helwig, the county administrator to the landlord of Vana-Virtsu, turned the natural forest into a Dutch style wild garden. The second important disturbance dates back to the start of the 20th century – the forest was cut down during World War I to build a base for Russian seaplanes.

It is certainly correct to describe Puhtu as being reminiscent of an old-growth forest. It is home to many broad-leaved tree species of different ages: oaks, lindens, elms, ashes and maples. There are also plenty of pines, hazels and honeysuckles to name a few common trees and shrubs. Species like horse-chestnut, lilac, mock-orange, false spiraea and martagon lily that were once planted in the wild garden also help boost the biodiversity of Puhtu forest.

Puhtu is particularly intriguing from spring to autumn. There is no other place in Estonia to put up such a breath-taking display of flowering wood anemones and ramsons. Autumn nights wrap Puhtu forest in darkness before the leaves start to fall, and should the forest see a strong autumn storm around the same time as the leaves start to fall, the ground is covered with a spectacularly thick carpet of leaves.

Oaks as a key species in a fresh boreo-nemoral forest

Relation to the study assignments:

Assignment No. 10 (tree)

Trees are the key species in forests. The common oak is one such species in Puhtu broad-leaved fresh boreo-nemoral forest. The importance of oak trees in the development of fresh boreo-nemoral forests is displayed in the numerous connections it has with other species.

Oaks are an important food source for many species: the chaffinch likes to feast on its blossoms and buds, its leaves provide a home for gall wasp larvae and decaying oaks supply nutrients for chicken-of-the-woods (*Laetiporus sulphureus*). Acorns are an important source of food for forest animals, primarily in the winter when Eurasian jays and yellow-necked mice go looking for acorns they stored in advance and wild boar and roe deer dig them out under the snow.

The cavities and cracks in the bark of old oak trees are important nesting places, storage areas for winter reserves and wintering places. They are of particular importance to many birds, bats, rodents and insects. Figuratively speaking, tree cavities host many merry forest dwellers from owls to fleas.

As a biodiversity enhancer, oaks help keep the ecosystem in balance. Together with other broad-leaved species of trees, oaks protect the forest floor from the scorching sun thus preventing forest fires. Oaks also dictate the lighting conditions in the forest for much of the year: grasses, shrubs and trees on the forest floor are all subjected to light-filled springs but have to manage in rather shadowy conditions during the summer.

New growth of oak trees is not very good in Puhtu forest. There are more examples of linden trees of different ages.

Examples of connections between species

Relation to the study assignments:

Assignment No. 5 (odd one out)

Assignment No. 7 (finding pairs)

Ramsons can grow in large clusters in broad-leaved fresh boreo-nemoral forests. This is made possible by the humid microclimate and fertile soil, both vegetative and seed-based reproduction and the ability to inhibit the growth of other species through soil chemistry. Once the plants turn three years old, they also start coping well with drought because they grow contractile roots that can pull the bulbs deeper into the soil. Squirrels and badgers eat ramson bulbs. In recent years, the vitamin-rich leaves of the plant have become a popular spring-time food item for people as well.

The **yellow-necked mouse** is a characteristic species of broad-leaved fresh boreo-nemoral forests. Tree roots provide excellent opportunities for building burrows and numerous tree cavities serve as storage areas. Yellow-necked mice collect acorns, hazelnuts and linden seeds for the winter. They are omnivores. In addition to plants, the yellow-necked mouse also eats insects and small animals and birds. They can even prey on neighbouring bank voles. The yellow-necked mouse itself is prey to owls, falcons, foxes and mustelids.

The **tawny owl** needs a spacious cavity for nesting and old oak trees are the perfect candidates. The formation of cavities is related to stem decay, meaning that successful owl nesting is also reliant on fungi that break down the wood. The chicken-of-the-woods is one such fungi species for oaks. Tawny owls primarily feed on rodents, with yellow-necked mice and bank voles being most prominent in these parts. The owl itself is threatened by martens, primarily because they eat its eggs.

The **chicken-of-the-woods** is a fungus that decomposes wood and also infects living trees. The common oak is one of its host plants and the activity of the fungus causes large cavities in the tree trunks. Such cavities do not cause the tree to die immediately. Instead, it functions as a nesting place for numerous forest species for decades to come.

Earthworms, of which there are at least 13 species in Estonia, have an essential role in soil formation, next to bacteria, fungi and springtails. One hectare of deciduous forest is home to around 2 million earthworms with around 10 million metres of tunnels between them. These tunnels facilitate the decomposition of plant remains and enrich the soil with air and water – this combination helps make the soil more fertile. Furthermore, the roots of plants use the tunnels made by earthworms to move deeper into the ground. Earthworms are also an important foodstuff for hedgehogs, moles, badgers, true thrushes, snipes and many other animals.

A list of potential food chains

Relation to the study assignments:

Assignment No. 5 (odd one out)

oak (acorns) -> yellow-necked mouse -> tawny own -> European pine marten

oak (wood) -> chicken-of-the-woods -> earthworm -> common hedgehog -> badger

hazelnut tree -> roe deer -> lynx

ramson -> squirrel -> European pine marten

The importance of forests
Material values

Relation to the study assignments:

Assignment No. 9 (environment exploitation)

Wood is the most important forest resource for people. Pine and spruce wood are in high demand for construction purposes. Oak has also found use in areas that require exceptional strength, e.g. the construction of ships and windmills. Aspen is irreplaceable for making sauna bench boards. It can also be used to make dugout canoes. Ash, elm and alder wood have also been valuable resources for making furniture. When it comes to musical instruments, however, we have to remember spruce and maple wood. Keep in mind that willow whistles are indeed made of willow and the herder's trumpet, for example, is made of alder. Birch trees have also played a special role for Estonians. Its bark was used to weave birch-bark wallets and bast shoes and its blocks are used today to produce plywood and paper. Our ancestors even had uses for wood from shrubs. Honeysuckle wood, for example, is good for making rake tines.

Natural produce plays an important part in the lives of Estonians. People living in rural as well as urban areas go foraging for berries, mushrooms, nuts and herbs. Maple and birch sap, linden flowers, European blueberries, cowberries, chanterelles and porcinis are among the basic forest produce gathered in Estonia. Old traditions are slowly reinforced by new ones, such as ramson, which has lately gained popularity as a spring-time health booster. There are hundreds of plant and fungi species growing in our forests that are either edible of have medicinal properties.

Ecological values

The forest is the most biodiverse of all the habitants found in Estonian nature. There is not much biodiversity among the trees that create the conditions for biodiverse forests – there are around twenty species of trees and shrubs. Meanwhile, the biodiversity of fungi in a forest can be measured in the thousands. Few among them form lovely caps on the forest floor as most fungi live in the soil. Lichen, bryophytes and insects are the most biodiverse among the groups that are visible throughout the forest. The ecological network of the forest comprises thousands of species that support one another, whereas the sustaining effect of the forest can also be felt in other habitats.

It is said that forests are the lungs of our planet. This is indeed true because the oxygen we breathe is released through the photosynthesis of green plants. The essential role that forests play in producing oxygen is evidenced by the number of green leaves and needles. In addition to oxygen, trees and shrubs also release antimicrobial substances or phytocides into the air. For this reason, we sometimes talk of the healing effect of pine forests.

In recent times, as the planet's climate is warming, it is vital that we bind the carbon in carbon dioxide in large sinks to keep it from creating a greenhouse effect. Forests are one such carbon sink. If we look at the forest as a place that binds carbon, it is important to know that next to the trees growing in the forest, a large portion of the carbon is actually contained in the forest soil.

Spiritual values

Relation to the study assignments:

Assignment No. 3 (notice the moment)

The forest is full of power and by going to the forest, we share this. People find old and biodiverse forests thrilling. This is where we experience the peace and quiet of the forest that can be considered tranquillity of the mind – a break for our senses to focus more on realisation, inspiration and capturing beauty.

Our ancestors believed that contact with trees that are considered powerful at the time also gives life force to people. The forest hosts such displays of power all year round: catkins appearing on willows in March, birches growing leaves in May, lindens flowering in July, maple leaves changing colour in October and spruce's in winter coats in December. All of these mark a kind of shift in power as the seasons change.

Over time, the trees our community considers most important became sacred trees and our most valuable forests became sacred sites known as *hiis*. Oaks, lindens and pines are the most common among the trees Estonians have considered sacred. Sacred *hiis* sites can be found all over Estonia. You can think of them as our ancient nature conservation areas.

Intact forests that are swarming with life also helps us stay healthy. Clear-cut areas are unsuited for health tracks even though people would like to walk, run and cycle there.

Forest exploitation must be sustainable

Forests are a renewable resource. However, forests that have been cut down do not grow back overnight. It is not right to calculate logging volumes based on increment; it should be done based on biodiversity assessments. It takes 2-3 generations for forests regenerating on clear-cut sites to achieve biodiversity.

When managing forests, it is important to take the wishes of the entire community into consideration. The spiritual value of community forests exceeds their material value by a wide margin.

Important species in Puhtu fresh boreo-nemoral forest

Relation to the study assignments:

Assignment No. 1 (what is it?)

Assignment No. 2 (treasure hunt)

Assignment No. 4 (quiz)

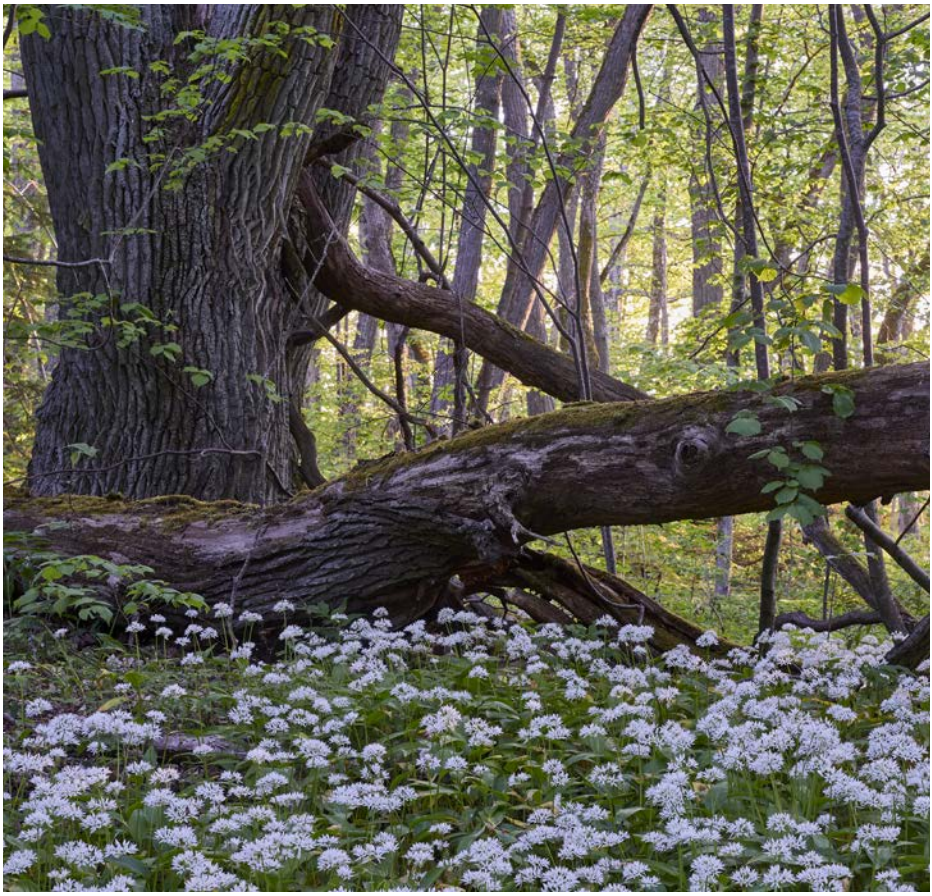
Assignment No. 6 (grouping)

Assignment No. 7 (finding pairs)

Assignment No. 11 (poisonous and edible)

Forest chest

Important species in Puhtu boreo-nemoral forest



Common oak
Quercus robur

The oak is the key species (one of the most important species) in broad-leaved fresh boreo-nemoral forests. The leaves, acorns, buds and flowers of oaks are eaten by numerous animal species. For example, Eurasian jays, squirrels, wild boar, yellow-necked mice and roe deer like to eat acorns.

[Wiki] en.wikipedia.org/wiki/Quercus_robur

[eE] elurikkus.ee/bie-hub/species/6698?lang=en

Common ash
Fraxinus excelsior

Ash fruits are ripe in autumn but remain on the tree for an extended period. The fruits are winged (have wings) little nuts. Bullfinch eat ash fruits. Once its fruits fall off the tree, they are eaten by mice.

[Wiki] en.wikipedia.org/wiki/Fraxinus_excelsior

[eE] elurikkus.ee/bie-hub/species/4800?lang=en

Littleleaf linden
Tilia cordata

Flowering lindens attract many insects looking for nectar (sweet liquid generated inside blossoms). Bees use the nectar collected from one linden tree to prepare several kilos of honey.

[Wiki] en.wikipedia.org/wiki/Tilia_cordata

[eE] elurikkus.ee/bie-hub/species/7940?lang=en

Wych elm
Ulmus glabra

It is always cool under wych elms in the summer (it is shady and chilly). Its canopy is like a green parasol as its leaves are packed together on the branches.

In the summer of 2018, sawflies (larvae of insects that eat leaves) ate the leaves of many wych elms. The damaged trees now have trunks that have burst into leaf (the trunks have very short branches with many leaves on them).

[Wiki] en.wikipedia.org/wiki/Ulmus_glabra

[eE] elurikkus.ee/bie-hub/species/8064#overview?lang=en

Norway maple
Acer platanoides

Maple sap contains a lot of sugar. Squirrels and woodpeckers, for example, enjoy the sweet sap.

[Wiki] en.wikipedia.org/wiki/Acer_platanoides

[eE] elurikkus.ee/bie-hub/species/2496#overview?lang=en

Common aspen
Populus tremula

Woodpeckers, most often black woodpeckers, build their nests inside aspen trees. If a black woodpecker happens to abandon its nest, it is taken up by owls, common golden-eyes or rare (not common) Siberian flying squirrels.

[Wiki] en.wikipedia.org/wiki/Populus_tremula

[eE] elurikkus.ee/bie-hub/species/6504#overview?lang=en

Silver birch
Betula pendula

Birch buds are the primary (most important) food source for black grouse (bird) in the winter. Black grouse grow pectinations on their toes to prevent them from slipping. These pectinations allow them to walk on ice-covered branches.

[Wiki] en.wikipedia.org/wiki/Betula_pendula

[eE] elurikkus.ee/bie-hub/species/3102?lang=en

Scots pine
Pinus sylvestris

The pine is the most common tree in Estonian forests. The air in larger pine forests is good (healthy) for people because it contains many substances that protect us from microbes that cause illnesses. Pine forests that grow next to mires (mire) help wood grouse in the winter. Wood grouse eat pine needles.

[Wiki] en.wikipedia.org/wiki/Scots_pine

[eE] elurikkus.ee/bie-hub/species/6318?lang=en

Norway spruce
Picea abies

Many rodents and woodpeckers eat spruce cones and buds in the winter. The red crossbill nests in early spring when spruce seeds are plentiful.

[Wiki] en.wikipedia.org/wiki/Picea_abies

[eE] elurikkus.ee/bie-hub/species/6223?lang=en

Rowan
Sorbus aucuparia

Many birds enjoy eating rowan berries. Woodpeckers and Bohemian waxwings eat the pulp of the rowan berries while chaffinches eat the seeds. Woodpeckers and Bohemian waxwings help rowan trees spread with their droppings – the seeds in the droppings can germinate.

[Wiki] en.wikipedia.org/wiki/Sorbus_aucuparia

[eE] elurikkus.ee/bie-hub/species/7317#overview?lang=en

Common hazel
Corylus avellana

Nut weevils lay their eggs inside a growing nut. The eggs hatch into larvae that are called nut worms. Hazelnuts are also eaten by Eurasian nutcrackers, Eurasian jays, Eurasian nuthatches, squirrels, yellow-necked mice, wild boar and humans.

[Wiki] en.wikipedia.org/wiki/Corylus_avellana

[eE] elurikkus.ee/bie-hub/species/3939#overview?lang=en

Bird cherry
Prunus padus

Bird cherry flowers have a pleasant smell, but you should not keep them in a vase in the bedroom. The flowers release poisonous substances that may cause a headache. Bird cherry berries are edible, but they should not be confused with alder buckthorn berries.

[Wiki] en.wikipedia.org/wiki/Prunus_padus

[eE] elurikkus.ee/bie-hub/species/6066?lang=en

Honeysuckle
Lonicera xylosteum

Honeysuckle berries contain a poisonous bitter substance. Eating a couple (1-2) berries works as a laxative (causes diarrhoea). Eating more berries than that can be lethal.

[Wiki] en.wikipedia.org/wiki/Lonicera_xylosteum

[eE] elurikkus.ee/bie-hub/species/5547#overview?lang=en

Mezereum
Daphne mezereum

Mezereum berries attach onto a woodlike (hard) stem. Mezereum berries are stone fruit (they have a stone inside). The plant is highly poisonous. 1-2 red berries can kill a child and around 10 berries are enough to kill an adult.

[Wiki] en.wikipedia.org/wiki/Daphne_mezereum

[eE] elurikkus.ee/bie-hub/species/4243#overview?lang=en

Ramson
Allium ursinum

Ramson is culinary herb rich in vitamins that is available in early spring. Its garlic-scented leaves are tasty until the plant starts flowering. Bears know this and look for ramson after hibernating.

[Wiki] en.wikipedia.org/wiki/Allium_ursinum

Wood anemone
Anemone nemorosa

Wood anemone flowers do not contain nectar (sweet liquid generated inside blossoms). Anemones tend to be pollinated by insects in the order Diptera (insects with two wings) – mosquitoes and flies. Anemones have oil-rich (contain a lot of oil) seeds and ants help distribute them.

[Wiki] en.wikipedia.org/wiki/Anemonoides_nemorosa

[eE] elurikkus.ee/bie-hub/species/2769#overview?lang=en

Lily of the valley
Convallaria majalis

The lily of the valley spreads through rhizomes (underground stems). This way, they form fields that can be hundreds of years old. All parts of lily of the valley are poisonous. Its berries and seeds are extra (very) poisonous.

[Wiki] en.wikipedia.org/wiki/Lily_of_the_valley

[eE] elurikkus.ee/bie-hub/species/3901#overview?lang=en

Sweet-scented bedstraw
Galium odoratum

Sweet-scented bedstraw flowers retain their aroma when they dry. For this reason, the plant is used in different aroma mixtures and for flavouring drinks.

[Wiki] en.wikipedia.org/wiki/Galium_odoratum

[eE] elurikkus.ee/bie-hub/species/4838#overview?lang=en

Roe deer
Capreolus capreolus

Where is the roe deer's tail located? Its tail is so short that it is hidden under the fur. Its winter fur is twice as long as the tail (the tail is shorter, the hair is longer).

[Wiki] en.wikipedia.org/wiki/Roe_deer

Common chaffinch
Fringilla coelebs

The common chaffinch is the most numerous bird in Estonia. There are around two million pairs nesting here. The common chaffinch tends to be more herbivorous (eat plants). It likes to peck seeds and berries on the ground.

[Wiki] en.wikipedia.org/wiki/Common_chaffinch

[eE] elurikkus.ee/bie-hub/species/60814?lang=en

Wild boar
Sus scrofa

In the winter, wild boars prepare a cosy nest in the snow in the forest thicket using branches. Wild boar like to use honeysuckle branches for constructing nests.

[Wiki] en.wikipedia.org/wiki/Sus_scrofa

[eE] elurikkus.ee/bie-hub/species/102273?lang=en

Eurasian badger
Meles meles

Eurasian badgers are the most prolific burrowers (animals who dig underground tunnels) in Estonian forests. They use the same burrows (underground tunnels) for decades and build extensive (large) setts – badger dens. Raccoon dogs and foxes also sometimes live in badger setts.

[Wiki] en.wikipedia.org/wiki/meles_meles

[eE] elurikkus.ee/bie-hub/species/74859#overview?lang=en

Raccoon dog
Nyctereutes procyonoides

The raccoon dog is the only canid to hibernate. The male and female animal usually hibernate together.

[Wiki] en.wikipedia.org/wiki/Nyctereutes_procyonoides

[eE] elurikkus.ee/bie-hub/species/80974#overview?lang=en

Red squirrel
Sciurus vulgaris

Squirrels have to eat a lot during the day. They need around 100 spruce or 200 pine cones to get enough seeds. If cones are few, squirrels also eat spruce buds.

[Wiki] en.wikipedia.org/wiki/Sciurus_vulgaris

[eE] elurikkus.ee/bie-hub/species/98429?lang=en

Yellow-necked mouse
Apodemus flavicollis

If the baby mice in the nest of a yellow-necked mouse get hungry, they make ultrasonic (very high-pitched) squeaks. The human ear is unable to hear this sound, but their mother or another mouse who has recently given birth to a litter will rush to the baby mice when they hear it.

[eE] elurikkus.ee/bie-hub/species/36094?lang=en

Eurasian jay
Garrulus glandarius

The Eurasian jay has an excellent memory for locations. It can find the acorns or nuts it hid away in the moss in the autumn even from underneath a thick coat of snow in the winter.

[Wiki] en.wikipedia.org/wiki/Garrulus_glandarius

[eE] elurikkus.ee/bie-hub/species/61046?lang=en

Eurasian nuthatch
Sitta europaea

The Eurasian nuthatch alters the entry hole to the nest (nesting hole) to match its size. They use mud and clay to make the entry smaller.

[Wiki] en.wikipedia.org/wiki/Sitta_europaea

[eE] elurikkus.ee/bie-hub/species/99855?lang=en

Lynx
Lynx lynx

Lynxes are expert climbers, but never attack their prey (other animals) from on top of a tree. They sneak (walk silently) on the ground and attack with a sprint.

[Wiki] en.wikipedia.org/wiki/Lynx_lynx

[eE] elurikkus.ee/bie-hub/species/72518?lang=en

European pine marten
Martes martes

The European pine marten is a skilled predator. It can catch animals that are much larger than itself. European pine martens have even been known to hunt wood grouse.

[Wiki] en.wikipedia.org/wiki/Martes_martes

Common hedgehog
Erinaceus europaeus

Hedgehogs are covered with spines. They have about 5000-6000 spines. When a baby hedgehog is born, they have no visible spines. But hedgehogs who are three days old already have spines. The spines stay on (remain on the skin) for about 18 months and change irregularly (not at a specific time).

[Wiki] en.wikipedia.org/wiki/Erinaceus_europaeus

[eE] elurikkus.ee/bie-hub/species/57790?lang=en

Eurasian blue tit
Parus caeruleus

The tiny Eurasian blue tit has large clutches (many eggs). Most often they will lay 11 eggs. One Eurasian blue tit specimen also holds the world record for most eggs for a small bird with 18 eggs in total.

[Wiki] en.wikipedia.org/wiki/Parus_caeruleus

[eE] elurikkus.ee/bie-hub/species/86555?lang=en

Goosander
Mergus merganser

The goosander nests in cavities (hollow spaces inside trees) as well as nesting boxes constructed by humans. Sometimes several females will lay their eggs in one nest. For example, there is a nest on record with 52 eggs laid by three female goosanders.

[Wiki] en.wikipedia.org/wiki/Mergus_merganser

[eE] elurikkus.ee/bie-hub/species/75237#overview?lang=en

Eurasian wren
Troglodytes troglodytes

When the weather gets cold, Eurasian wrens can spend the nights in parties (many birds together) – 61 Eurasian wrens have been found on top of one another in layers to pass the night in one nesting box.

[Wiki] en.wikipedia.org/wiki/Troglodytes_troglodytes

Brown long-eared bat
Plecotus auritus

The brown long-eared bat differs from other bats in Estonia because its echolocation sounds are very quiet. The bat has large ears to help it sense (feel) echo. Brown long-eared bats also use vision (eyes) to catch prey (food).

[Wiki] en.wikipedia.org/wiki/Plecotus_auritus

[eE] elurikkus.ee/bie-hub/species/91181#overview?lang=en

Tawny owl
Strix aluco

The tawny owl often nests in close proximity to humans, for example, inside cavities (hollow space inside a tree) of trees outside human dwellings. They are nocturnal and that is why we only learn of their nesting places once their offspring climb out of the cavity (nest).

[Wiki] en.wikipedia.org/wiki/Strix_aluco

Chicken-of-the-woods
Laetiporus sulphureus

The chicken-of-the-woods (fungi that grows on trees) growing on oaks and white willows is a sign that the core of the tree is infected with brown rot. Brown rot causes the trunks of trees to become hollow (empty inside).

https://elurikkus.ee/bie-hub/species/125085?lang=en

Common earthworm
Lumbricus terrestris

Earthworms move through the soil and help stir its layers. Oxygen and water can access loosened and ground soil more easily. The work of earthworms facilitates (makes easier) for the penetration (movement) of plant roots.

[Wiki] en.wikipedia.org/wiki/Lumbricus_terrestris

Common oak				
Common ash				
Littleleaf linden				
Wych elm				
Norway maple				
Common aspen				
Iver birch				
Scots pine				
Norway spruce				
Rowan				
Common hazel				
Bird cherry				
Honeysuckle				
Mezereum				
Ramson				
Wood anemone				
Lily of the valley				
Sweet-scented bedstraw				
Roe deer				
Common chaffinch				

Wild boar				
Eurasian badger				
Raccoon dog				
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Yellow-necked mouse				
Eurasian jay				
Eurasian nuthatch				
Lynx				
European pine marten				
Common hedgehog				
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