

# State Forest Management Agency

## Erastvere Forest District

### About the history

Erastvere Forest District was established in 1920 on the basis of Russian state forests and forests belonged to the manors ( Erastvere and Karaski ).

The forest inventory in 1856 was one of the first in Estonia at all. In 1880 there was built forestry office in the Erastvere manor. New office was built in 1939 , the typical project for forest districts was used.

### Forests

Forest district is situated on the territory of 8 parishes of Põlva, Võru and Valga counties. Total area of the district is 11778 ha, 10757 is forest land. Forest district distributes about 40 km from North to South and 45 km from West to East. Forest district is divided to 6 forester districts.

About 47% of the total area covered by pine stands, 37% by spruce stands, 13% birch stands, 2% poplar stands and 1% alder stands. Larch stands are less than 1% of the total area. The total volume of stands is 1,6 milj. m<sup>3</sup>, 400 ha of forests are more than 100 years old.

Among forest site types the wood (Oxalis) site type prevails ( 62% of the total area). About 1000 ha of the forests are under protection.

### Forest management

Forest management is sustainable. Two months during the birds nesting 15.04 – 15.06 are silent in the forest. There are 21 key habitats in the management forest.

The annual timber use is about 50 000 m<sup>3</sup>, about 40 000 m<sup>3</sup> ( 140 ha ) is regeneration felling and 10 000 tm harvesting and sanitary cuttings. About 25% we sell as growing forest 75% we cut as sawing timber, pulpwood or heating wood. The area of new forest plantation is 140 ha, thinning of young stands 140 ha, 10 ha is the task of limbing growing young stands. 115 km forest roads and 2500 ha ditch network are yearly under care.

### Nature protection

There are Ahja, Võhandu and Leevi rivers ,more than 30 lakes on the territory of forest district and Truuta - Kooraste valley. Five areas are established for nature protection.

Landscape protection area (190 ha) Tilleorg established in 1957 for protection of the borders of Ahja river and surrounding forests. Interesting objects there are old pine, old oak and Devonian sandstone outcrop with spring.

The park and oak stand on the border of Erastvere lake is established by manor owner Paul Adolph von Ungern Sternberg. There is a beach, camping and Gerhard chapel in the park

Nature protection areas Maruoru and Veski are established recently for protecting Black Stork. Nature protection area Häätare established for protection of the Woodland Key Habitat.

## Kiidjärve - Taevaskoja

The middle part of the Ahja river with its ancient valley full of beautiful sandstone cliffs (rising like giant walls from the river) and mysterious forests have attracted people for centuries. The total territory around the winding river covers about 35 km<sup>2</sup>. It is noted for its natural biodiversity and archaeological, historical and cultural values. The region was given the name "HUVIMETS" (the wonderwoods) in 1993 by the official management plan of forests.

The AHJA river is still one of the least polluted rivers in Estonia, with clear water from swamps and springs and the fish in it. The middle part of it flows along the river-valley formed about a million years ago. That's where you can find the beautiful many-coloured devonian sandstone cliffs. This part of the river is protected by the state as a nature reserve.

The sad example of the "power" of man is the hydro-electric power plant at Saesaare that was used from 1952 to 1970. The dam built for it destroyed the most beautiful rapids in Estonia - you can get an idea what it was like if you look down the dam to the narrow part of the river. Fortunately the artificial lake has its good sides as well - for those who like to go boating, for example.

The power plant was given new life in 1991 as an example of alternative energy supply.

TAEVASKOJAD have been sacred places for our ancestors. These are the places to realise the beauty and mystery of nature - the sandstone "wall" and the heaven as a roof or a ceiling, surrounded by the walls of woods. The best-known and the highest is Suur Taevaskoda (Great Heaven's Hall) - a reddish-brown striped sandstonecliff. The Väike Taevaskoda (Small Heaven's Hall) is more yellow and grey and there is a cave called the Virgin's Cave in it. Nearby you will find a spring called Mother Spring, valued for the purity and freshness of its water that comes from between the devonian layers of sandstone that are over 400 million years old.

The AKSTE Ant Colony covers only 200 ha of land, but its population is over 3000 millions - more than the population of China and India together! There are more than 1500 ant hills. About ten of them are "skyscrapers" of about 2m of height that may "house" almost 4 million inhabitants (data by J. Martin).

VALGESOO is the smallest protected swamp area in Estonia. The characteristic landscape is worth experiencing! The healthy atmosphere concentrates into the red "drops of health" you can find there on the moss in autumn.

METS - the woods - is the main attraction of the area, framing the sights. Mainly there are pine forests and some of them are nature reserves. The best pine trees (the so-called plus-trees) are more than 39 m high.

The speciality of the river valley is the kingfisher - a flying diamond on the river.

## The Virgin Forest Nature Reserve at Järvelja

The Virgin Forest Nature Reserve was set up on Section 226 at the initiative of Professor A. Mathiesen in 1924. Felling of trees, removal of dead or fallen trees, grazing of cattle, hunting or other human activities are not permitted here. At present time the total area of this Section contains 19,3 ha. The absolute heights of the area under the virgin forest range between 33,9 and 36,4 m. This region became free from the continental ice of the last glaciation on the Estonian territory approximately 12400 years ago, but remained still under the water of ice - dammed lake for 3...4 thousand years.

The predominant topographic form of the Nature Reserve is a mire plain running slightly from south-east to north-west. The Forest Reserve is clearly divided into two type classes: forest on mineral soil (27% of the area) and mire forest (73% of the area). The forests on mineral soil belong to the following forest site types: *Aegopodium*, drained *Dryopteris*, *Oxalis*. The mire forests belong to the following forest site types: *Oxalis* drained swamp, transition bog, alder fen. The main tree species of the Forest Reserve are pine, spruce, black alder, aspen, lime; fewer are growing birch, ash, maple, rowan.

The stands growing in the Forest Reserve are in their majority very old. They have often suffered from windbreakage and leave a strong impression of a virgin forest.

The present list of flora contains 211 species. 13 plant species have been discovered in the forest reserve which have been taken under nature protection in the meantime. 10 of them belong to the orchideaceae such as *Cypripedium calceolus*, *Epipactis heleborine*, *Orchis fuchsii*, in addition *Daphne mezereum*, *Huperzia selago*, *Diphysium complanatum*. A list of mosses contains 70 species. At present 109 species of agarics (*Agaricales* s. l.) are known in the Järvelja Forest Reserve.

During the inventory investigation 484 terrestrial invertebrate species have been established, among them 357 insect species. A list of bark beetles (*Ipidae*) contains 14 species. Thirty four bird species with 192 breeding pairs were established in the Forest Reserve, which makes up 1032 breeding pairs per square kilometre. Eight species of small mammals have been found in this area.

Maximum dimensions (height and breast height diameter) of tree species in virgin forest:

<i>Picea abies</i>	43 m	90 cm
<i>Betula sp.</i>	38 m	80 cm
<i>Populus tremula</i>	38 m	110 cm
<i>Alnus glutinosa</i>	35 m	63 cm
<i>Tilia cordata</i>	35 m	58 cm
<i>Acer platanoides</i>	30 m	53 cm
<i>Fraxinus excelsior</i>	30 m	54 cm

## Private forest in Roela (Lembit Laks)

07.06.2003.

	Subcom- partment	Legend	Year	Composition	Average volume per hectare	Planting per hectare	Cutting volume per hectare
1.	17	Field of forest Fälder des holzes	1964	96KU2RE1LV1KS	330		47
2.	15	Incapability of human Unfähigkeit des Menschen	1962	30KU20KS20RE10HB10LV10TL	67		63
3.		Cultivated forest of birch Der Kulturwald die Birke	1998	80KS10HB10RE		2700	197
4.		Cultivated forest of spruce Der Kulturwald die Fichte	1997	100KU		2500	200
5.	14	Future virgin forest Der zukünftige Urwald	110	90KU10MÄ	259		86
6.		The thickest spruce of Metsatalu Die dickste Fichte von Metsatalu					
7.	13	The limited management of forest Der beschränkte Bewirtschaftung des Waldes	80	69KS20KU10HB1LV	189		132
8.		Wildlife and the human Natur und der Mensch	2003	TA		500	171
		Discussion Diskussion					
9.	16	Economical forest Der Wirtschaftswald	75	50KU40KS10RE	301		128
10.		Coffee breake Caffeepause					
11.	6	Future oak park woodland Der zukünftige Eiche Parkwald	40	60KU35TA5LV	193		30
12.	1	The greatest loss Der grösste Verlust	50	85LV5KS9TL1TA	199		44
13.	8	The record of current increment Der Rekord von der laufender jährlicher Zuwachs	1981	78LV14KU8TA	248		74
14.	5	The party in yourself Der Fest in dir selber	50	22LV20HB18KS15KU15TA10TL	192		14
15.		The tree as a monument Der Baum als ein Gedenkmal					
		Discussion Diskussion					

KU Spruce / Fichte  
MÄ Pine / Kiefer

KS Birch / Birke  
TA Oak / Eiche

RE Willow / Weide  
LV White alder / Weisslerle

HB Aspen / Aspe  
TL Other deciduous trees / Andere Laubbäume

# Oandu Primeval Forest Trail

The forest has been growing at the foot of the Oandu terrace for a long time. Here have never been fields or meadows. Since 1971 the area has been a nature reserve of the Lahemaa National Park and closed for the visitors. Now a forest trail has been laid out in this area, so that we have a chance to visit a primeval forest. The length of the trail is 4.7 km. It takes about two hours to cover the trail. The broadwalk in damp areas protects the fragile forest plants and makes your trip safe and comfortable.

Our trip begins in a dry lichen pine forest. It is growing on a plain sandstone terrace covered by gravely sands. In summer the pine forest is usually very dry and therefore forest fires are likely to occur in this forest type. The last fire was in 1949, when Oandu village was in danger. The young pine forest to the left from the trail has been planted after the fire.

## **Location 1. Lichen (*Cladina*) pine forest**

Pine is well adapted to dry soil, which is poor in nutrients, but its growth rate is very slow. The height of 90-140-year-old trees is below 20m. Under the trees sparsely growing bushes of heather (*Calluna vulgaris*), bearberry (*Arcostaphylos uva-ursi*) and black crowberry (*Empetrum nigrum*) can be found. In wet hollow microhabitats bilberry (*Vaccinium myrtillus*) occurs. In drier areas lichens prevail, such as the reindeer lichens (*Cladina stellaris*, *C. rangiferina*) and Iceland moss (*Cetraria islandica*). Smaller crusty reindeer lichens, *Cladina arbuscula* and *Cladina mitis*, could be identified using the same method as the moose does -- by tasting it. *Cladina mitis* tastes milder than *Cladina arbuscula*. In times of famine people used to add this lichen to bread flour. Some old people of Oandu still remember the disastrous winters, when grey lichen was picked and added to the fodder. Lichens grow very slowly and once damaged, need decades to recover. It is very important not to sidestep the trail in such a dry lichen pine forest.

## **Location 2. Topography of Oandu and its genesis**

A level plateau ends abruptly and we are standing as if on the second step of a huge staircase descending from the inland towards the coast.

The highest step of this staircase is the North Estonian Glint, which reaches the height of up to 68 m a. s. l. close to Sagadi. Eastwards from here, at Ontika, the glint forms a high opened escarpment close to the sea, which is depicted on the Estonian 100-kroon banknote. In the vicinity of Sagadi the glint is buried under thick deposits and forms a gentle slope. After the slope there comes a 1-2 kilometre-wide more or less plain sandy terrace. At Oandu this "step of the staircase" is followed by the last "step" -- the coastal plain.

The height of the terrace is about 10 m and it consists of sandstone covered by coarse

sand and gravel. During the last Ice Age, about 10 000 years ago, the edge of the continental ice sheet with the thickness of few kilometres remained here for some time. After the ice melted, the area at the foot of the terrace was covered by water. We walk down the slope. The recessions and regressions of the sea created the old coastlines that are nowadays clearly observable in the form of dunes and coastal barriers. The height of these "steps" varies from fractions of metres to ten metres. Today the coastal line has retreated to about 2 km from here. The diversity of ancient coastal formations results in a variety of soil moisture and fertility conditions, thus creating a small-scale patchiness of forest ecosystems.

### **Location 3. Development of an old-growth forest, Norway spruce**

At the foot of the terrace one can notice more and more traces of wild animal activities. On the slope, to the right of the trail, there is a spruce, where a brown bear has marked its territory. The bear has gnawed and scratched the tree. Usually it rolls about in its own urine puddle and then chafes itself against a tree, leaving hairs and scent on the resinous bark of a tree.

The terrace, formed by the edge of continental ice, is a borderline between the two entirely different forest types. There are sparse dry boreal health forests on one side and paludified forests and peatland forests on the other. Succession series of these forests are different. In lichen and heath pine forests a series of changes occur after a forest fire has disturbed it. Here, in a wet 150-year-old drained peatland spruce forest at the foot of the terrace, the changes could be triggered by a storm damage, pests or diseases. Consequently, the area will be colonised by the pioneer species: alder, birch, aspen and in drier places also by pine.

Next the shade-tolerant spruce will appear and in the struggle for light spruce will outcompete the light-demanding pioneer species. Finally it will be a spruce forest or a mixed forest where spruce prevails.

### **Location 4. Forest and soil**

The trail crosses a hundred-year-old dry pine forest, rich in cowberries (*Vaccinium vitis-idaea*). Bushy blueberries (*Vaccinium myrtillus*) and mosses cover the ground.

Here you can see the profile of podzol, the most common soil in Estonia. In our cool maritime climate the decomposition of the organic debris is slow. Accumulation of forest litter and peat are caused by incomplete litter decomposition. The soil profile here is very simple - under the debris there is a light humus layer (O<sub>h</sub> horizon), followed by darker illuvial horizon (B-horizon) and the parent material (sand). The rainwater infiltrates through the acid forest litter, dissolving the nutrients and leaching the soluble compounds. Floodwater causes plaudification. If the peat layer exceeds 30 cm, we can speak of peaty soil.

In this area dry sandy patches alternate with marshy strips of various peat thickness.

### **Location 5. *Vaccinium myrtillus* - type pine forest**

At the edge of the dry lichen pine forest and at the moist foot of the terrace a strip of a hundred-year-old *Vaccinium*-type pine forest is growing.

The *Vaccinium myrtillus* pine forest is the most common forest site type in Estonia. Whereas the dominant understorey species may vary - bilberry can be replaced by cowberry in some places. There are few other flowering plants here, however, a pine forest is a kingdom of mosses. There are no rare mosses here, the most common species like stair-step moss, red-stemmed feather moss, species of fork mosses (*Dicranum sp.*) ostrich-plume feather moss and the common hair moss cover the ground, stumps and the stones.

### **Location 6. Springs**

Before reaching the spring walk over a small hillock where you find 150-160 - year-old pines. Some of them are infested by the tinder fungi (*Phellinus pini*). It is a sign that these pines have been growing here for a long time. The height of these trees is 30-31 m.

There are 15 major springs at the foot of the terrace. Smaller springs disappear by summer, however, they can be spotted by paludified soil and changed vegetation.

These springs are unique to Estonia since their water contains only 0.04-0.06 g/l of dissolved ions. In Western Estonia the springs are rich in calcium and therefore they are surrounded by characteristic and rich in species plant communities. Differently from these ecosystems, springwater does not affect ground vegetation here.

### **Location 7. Drained peatland spruce forest**

Usually drained peatland forest develops after the drainage of a swamp forest. After drainage peat decomposition accelerates and the roots at the trunk base start to protrude from the soil. Here, however, the forest has never been drained. The species characteristic of these forests are wood sorrel (*Oxalis acetocella*), may flower (*Maianthemum bifolium*), chickweed (*Trientalis europea*) and clubmoss (*Lycopodium annotinum*). There are plenty of ferns growing around the springs and in the hollows. The drained peatland forest is the most common forest site type at the foot of the terrace.

### **Location 8. Moose and the forest**

Here, on the border of coniferous and deciduous forest is one of the favourite places where the moose often gather. The moose is the biggest game in our forests. Old bucks may weight 500 kg. At its peak population density they have caused severe damage to the Estonian forests. The moose's ration in winter contains of willow twigs, pine shoots, bushes of blueberries, and heather. During a winter day a moose needs about 20 kg of food, during the whole winter they can eat up about 8 tons of plant material. In old forests there are few willows and young deciduous trees. In some winters bilberries and heather are covered with thick snow and therefore the moose is

forced to strip spruces. It has been suggested that there will be no significant moose damage if there are about two individuals per 1000 ha of forest land. In 1980-s the moose population was peaking in Lahemaa, exceeding the above-recommended value by more than tenfold. The very high moose population density resulted in severe damage to spruce, and most of the pine regeneration has been totally destroyed.

#### **Location 9. Aspen and the microhabitats for birds**

The aspens have been growing here since the logging in 1900. Some of the tallest trees exceed 30 m in height, the girth of some trees is up to 2m. At a closer look one can notice dark grey hoof-shaped fungi on the aspen trunks. This bracket fungus is *Phellinus tremulae*. At that age usually nine trees out of ten are heavily infested with fungus, which brings about heartwood decay.

In natural forests aspens have a specific role creating habitats for numerous animal species. Over 200 species of insects have been found here. Therefore woodpeckers like the aspen forest. Tree hollows are used for nesting by owls, stock doves, wrynecks, tree creepers, flycatchers etc.

In an old-growth forest nearly a third of all the bird species nest in hollows. In the daytime bats use hollows for hiding. A rare flying squirrel also prefers aspens.

#### **Location 10. Storm damage**

The trail crosses the forest damaged by storm. Since the spruce roots are superficial it can be overthrown quite easily by heavy winds especially on moist soil. As pine roots go deep heavy storms do not throw them over, instead their trunks can be broken. Insect communities are rich in species in this ecosystem.

#### **Location 11. Dune ridge if the Litorina sea**

The height of the ridge reaches up to 10m. In places of poor drainage, the ridge is covered with strips of peat bog. If the drainage is adequate, communities of peatland mires resemble minerotrophic fens. At the foot of the slope the common bog plants grow: sphagnum mosses, marsh rosemary (*Ledum palustre*) and bog whortleberry (*Vaccinium uliginosum*). A small hillock is also of special interest because here the moose bucks scratch their antlers against the pines. The pines have lost the bark up to 1.5-2 m.

#### **Location 12. Resin extraction from trees**

On the top of the dune there has been an animal trail. The animals prefer high places, since it is good to observe the surroundings. Here traces of resin collection can be seen. The resin was used in chemical industry, e.g. for producing turpentine, lacquers etc. Nowadays resin extraction has been abandoned.

#### **Location 13. The wild boar**

The dune ridge becomes lower. This area with its young spruces is favoured by wild boars. The trees are muddy and some have no bark at all. Usually the trees for scratching are close to the mud baths. A small brook between black alders is a good place for the boars to take a mud bath on a warm summer day.

#### **Location 14. Tree generations in a primeval forest**

In a 140-year-old drained peatland forest one can see many spruces and pines which are older than 200 years. The pine with the girth of 2.5 m and the height of 33 m took root at the end of the 18<sup>th</sup> century.

Many plant, fungus or animal species are endangered due to human impact on the ecosystems. In old primeval forests there are over a hundred endangered species, among them the fungi and the insects characteristic of the microhabitats of the fallen trees. An old-growth forest has a multi-storey canopy and includes all the tree generations, including seedlings, very old trees as well as the dead and decomposing tree trunks.

#### **Location 15. Forest regeneration**

Here the forest has grown for many centuries. Storms, fungal diseases or pests can damage single trees or bigger patches in the forest. Fallen trees open areas for forest regrowth, which receives more sunlight and a new tree generation occupies the opened space. Usually spruce takes up smaller openings, deciduous trees and pine need more light, e.g. the bigger openings. Under the old forest there are always slowly growing spruces waiting for their turn; when light becomes more available, they will be able to grow fast.

#### **Location 16. Black alder**

There are two alder species in Estonia: the grey alder (*Alnus incana*) is more common and not much valued, whereas the black alder (*A. glutinosa*) is a valuable timber tree. It can grow 35 m high and live for more than 100 years.

Here, in a drained peatland area the forest irrigated by springs, has never been logged. According to forest inventory estimates in 1920 these trees were over 100 years old. Today the girth of the oldest trees is 56-58 cm and the height -- approximately 30 m. These trees have no commercial value any more, since they are infested with fungi. Similarly to the old aspens these old alders are habitats for many species of fungi, insects and birds.

#### **Location 17. Death and the decay in the forest**

Tree death and decomposition is part of the natural cycle in a forest. About 2-7 tons of dead plant material (leaves, needles, branches, trunks etc.) per hectare falls to the

forest floor each year. Fungi play the vital role in decomposition, they are able to degrade almost all organic materials, including lignin, one of the basic components of wood.

#### **Location 18. Peatland forest and the drained peatland forest**

Here different forest site types can be seen. On the left there is a forty-year-old black alder wood on a gentle slope. The peat layer in this forest is very thin, almost decomposed. The area is flooded for a long time. Several species of sedges are growing here, also the marsh marigold (*Caltha palustris*), marsh fern (*Thelypteris palustris*) and the marsh horsetail (*Equisetum palustre*). The peatland forest grows on hollow sites with poor aeration. It takes hundreds of years to form a layer of peat. Stunted pines and typical mire species like the marsh rosemary, whortleberry (*Rubus chamaemorus*), cranberry (*Vaccinium oxycoccus*) and sphagnum mosses grow here. The height of 180-year-old pines is barely 14-18m.

#### **Location 19. Coastal formations of the Ancylus lake**

We are on the coast barriers of ancient *Ancylus* lake. Here is a hundred-year-old pine forest rich in cowberries. Our trip in the coastal plains is coming to an end and we are back at Oandu.