

Friday, 6th September 2013

Today we made a full day excursion. At first we stopped at “Meenikunno” bog. This bog is in the Nature Park “Meenikunno”. More than 8000 years ago the bog was built as a result of swamping of dry and sandy land. Underneath the water saturated peats of the bog is a dry layer, and even deeper is the groundwater – typical for a high land bog. It is fed by precipitation (= ombrotrophic) which is absorbed by mosses. The peat mosses form a thick vegetation carpet so that precipitation gathers on top of the mosses and builds lakes. The bog is poor in minerals, soil and water are acidic. Acidity and brown colour derive from decomposed organic matter. Its pH is 4 because organic acids are washed out into the lake.



Fig. 1: Testing the pH value with universal indicator.

This means that in a bog like this extreme conditions of living are dominating.

There are a lot of species of peat mosses with different colours: green, yellow and reddish.

We saw the red *Sphagnum rubellum* and the green *Sphagnum dusenii*.



Fig.2: *Sphagnum dusenii*



Fig. 3: *Sphagnum rubellum*

In “Meenikunno” bog grow many pines that are very small because of continuously growing peat mosses. Due to this fact a big part of the trunks are buried under *Sphagnum* mosses.

Carnivorous plants trap insects. As the soil is poor in minerals and proteins carnivorous plants obtain proteins from digested insects. We could see many individuals of *Drosera rotundifolia*.



Fig. 4 + 5: *Drosera rotundifolia*

In this bog are three lakes. A wooden path leads to the shore of the biggest lake where we tested pH value. The lake covers an area of 4.7 hectares and it is 2 to 3 metres deep.



Fig. 6: The bright blue colour is an optical deceit – it's a reflection of the blue sky, the water actually is brown from humic acids.

Many plants have adapted to the extreme conditions in a bog. We found a lot of them:

- *Calluna vulgaris*
- *Chamaedaphne calyculata*
- *Rhododentron tonnentasum*
- *Drosera rotundifolia*
- *Vaccinum macrocarpun*
- *Pinus sylvestris*
- *Calla palustris*
- *Ramalina pollinaria*
- *Cladonia stellaris*
- *Scheuchzeria palustris*
- *Sphagnum rubellum*
- *Sphagnum dusenii*
- *Sphagnum fuscum*
- *Sphagnum palustre*
- *Sphagnum magellanicum*



Fig 7: *Calla palustris*



Fig.8: Meenikunno Nature Park with typical lichen *Cladonia stellaris* .

Second stop at 13.30 – arrival to the Nature Reserve of Piusa Caves (nutrient-poor sandy soils, main tree species - pine)

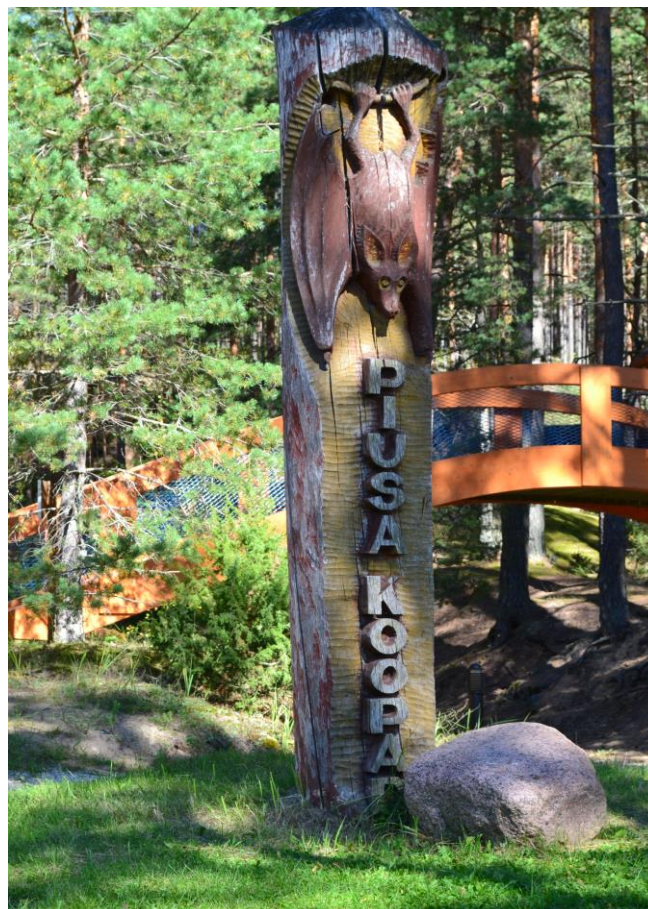


Fig. 9

- Here we met our local guide Kaire.

First she introduced us the Piusa Caves Visitor Centre

- It has been opened since 2010.
- The purpose of the visitor centre is to contribute to the protection of the Piusa caves and protected species by the year-round coordination and planned developing of tourism, also to provide the safety of the tourists visiting Piusa caves.
- Piusa Caves Visitor Center has a interesting shape, it is designed like a bat.



Fig. 10: The colour of glass depends on utilized kind of sand.

Next we moved to the Piusa Caves

- Which have emerged as a result of manual mining of glass during 1922-1970.
- Deeper layers of sand are better for glass manufacturing, because of their mineral composition.
- All the cave systems together are about 20 kilometers long.
- Temperature in the caves is about 8°C all year round.
- The Nature Reserve of Piusa Caves was formed to protect the sandstone caves in Piusa, which are the largest hibernating area for bats not only in Estonia, but also anywhere in the Baltics.
- The caves become a protected area in 1981.

- In addition to bats, this territory contains habitats suitable also for other protected species, such as the great crested newt (*Triturus cristatus*) inhabiting the quarry ponds next to the caves.



Fig. 11: Inside Piusa caves.

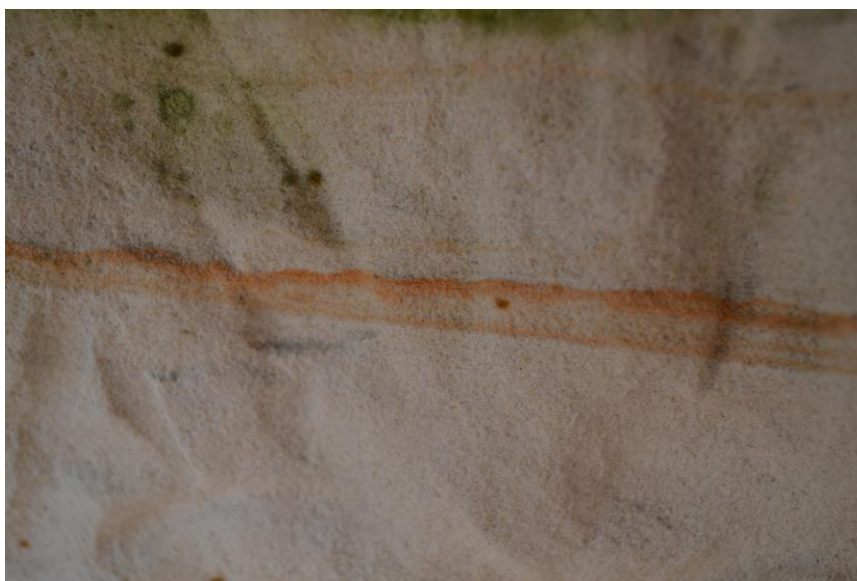
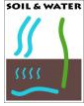


Fig. 12: Red layer in the sandstone indicates iron; white sand was exploited for glass production.



14.45 – lunch – place called “Kolme Sõsara Hõrgutised” (The Tree Sisters Delicatessen)

- We were served zucchini soup, homemade bread and pear cake. It was very delicious.

After the lunch, there was a short movie about Nature Reserve of Piusa Cave habitats and its species

Cave-hibernating: five species of bats and some species of butterflies:

- Pond bat (*Myotis dasycneme*)
- Daubenton's bat (*Myotis daubentonii*)
- Brandt's bat (*Myotis brandtii*)
- Brown long-eared bat (*Plecotus auritus*)
- Northern bat (*Eptesicus nilssonii*)
- The Herald (*Scoliopteryx libatrix*)
- The European Peacock (*Inachis io*)
- Tissue moths (genus *Triphosa*)
- Mosquitoes

Inhabiting the quarry ponds:

- Great crested newt (*Triturus cristatus*)
- Smooth newt (*Lissotriton vulgaris*)
- Pool Frog (*Pelophylax lessonae*)

Walk to the Piusa quarry where Dr. Muhle gave us a short speech about plants that are characteristic to nutrient-poor sandy soils and its ponds. Some of the species we saw:

- *Corynephorus canescens*
- *Cyperus esculentus*
- *Lycopodiella inundata*
- *Centaureum*



Fig. 13:Piusa quarry.

16.15 – back in bus, departure from Nature Reserve of Piusa Caves

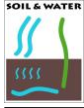
Our last stop was the “Ahja river valley landscape” in southeast Estonia. The Ahja river ancient valley nature park is located in one of the oldest landscape protection areas and was formed in 1957. The river has its source in Lake Erastvere and leads into Lake Emajõgi. It has a downhill gradient of about 87 kilometres and in its lower part the Ahja river is navigable. It is one of the richest rivers in fish and other species in Estonia. Among many others you can find rainbow trouts (*Oncorhynchus mykiss*), grayling (*Thymallus thymallus*) and northern pikes (*Esox Lucius*). 34 plant species have been attested. Towering sandstone outcrops can be seen along the river, the forest growing on the sides of the valley.



Fig. 14: The most famous of the outcrops is Suur-Taevaskoja, which is 150 meters long and 24 meters high. Dark coniferous forest grows on the backdrop of the cliff.



Fig. 15: Nest holes in the sandstone. Many bird species feel at home in this valley like brightly kingfishers (*Alcedo atthis*) which are an indicator species for a good water quality and white-throated dippers (*Cinclus cinclus*).



Due to the water capacity of the valley grow specific plants there. Some of them we've seen:

- *Maianthemum*
- *Betula*
- *Pteridium aquilinum*
- *Corylus avellana*

In the nature park different soils can be found thus plant communities change in their assortment and common plants as the following can also be found:

- *Pinus sylvestris*
- *Urtica sp.*
- *Impatiens parviflora*