

GLOBE Regional Learning Expedition

**Land Cover and Microclimate on Käsmu Peninsula,  
Estonia  
August 2022**

Tuuli Hanson (Kalamaja Põhikool, Estonia)  
Anti Tohva (Põlva Kool, Estonia)  
Helin Maria Unt (Pärnu Sütevaka Humanitaargümnaasium, Estonia)  
Joosep Trolla (Antsla Gümnaasium, Estonia)  
Ketrin Poolma (Estonia)  
Sabina Fraňková (Czech Republic)  
Migle Juozaityte (Lithuania)  
Vilte Mockeviciute (Lithuania)  
Titas Smetona (Lithuania)  
Polina Petrusenko (Ukraine)  
Polina Yegorova (Ukraine)  
Hugo Pucelj (Slovenia)  
Tian Vesel (Slovenia)

Supervisors: Marie Johanna Univer, Johanna Raudsepp

Estonia

2023

## **Table of contents**

Abstract	<b>3</b>
1. Introduction	<b>4</b>
2. Research Methods and Materials	<b>6</b>
2.1. Site no. 1 - Pine Forest	<b>8</b>
2.2. Site no.2 - Peatland	<b>9</b>
3. Results	<b>11</b>
4. Conclusion	<b>12</b>
References	<b>14</b>

## Abstract

Our study focused on land cover in Käsnu peninsula, located in the north coast of Estonia in Lahemaa National Park. We wanted to find out what kinds of land covers can be found along the way and whether Käsnu peninsula is a homogenous site regarding MUC code and land cover or not. In addition, we were interested in how different kinds of vegetation alter the temperature change along the journey and how does the temperature/humidity change related to the elevation and land cover (e.g. peatland VS sandy pine forest; developed VS natural sites).

In our expedition on August 3rd 2022, we investigated two study areas (sized 30 times 30 meters) that were at two different spots. First site was located in a sparse pine forest, on dry sandy soil, under the pine trees and covered with blueberries. Second spot was on a humid peatland, which was covered with peat moss and marsh Labrador tea (*Rhododendron tomentosum*).

We used different methods to examine tree heights, temperature, humidity and other figures. Work was divided between the expedition team members. In conclusion, we were not too surprised with the results as the areas examined were not very far away from each other and differences in land covering plants was not major. We hope that our data will be useful to other people such as locals for knowing their area better and scientists to get a better and more precise overview of Käsnu peninsula.

**Keywords:** peatland, pine forest, MUC 0192, MUC 62, temperature, humidity

# 1. Introduction

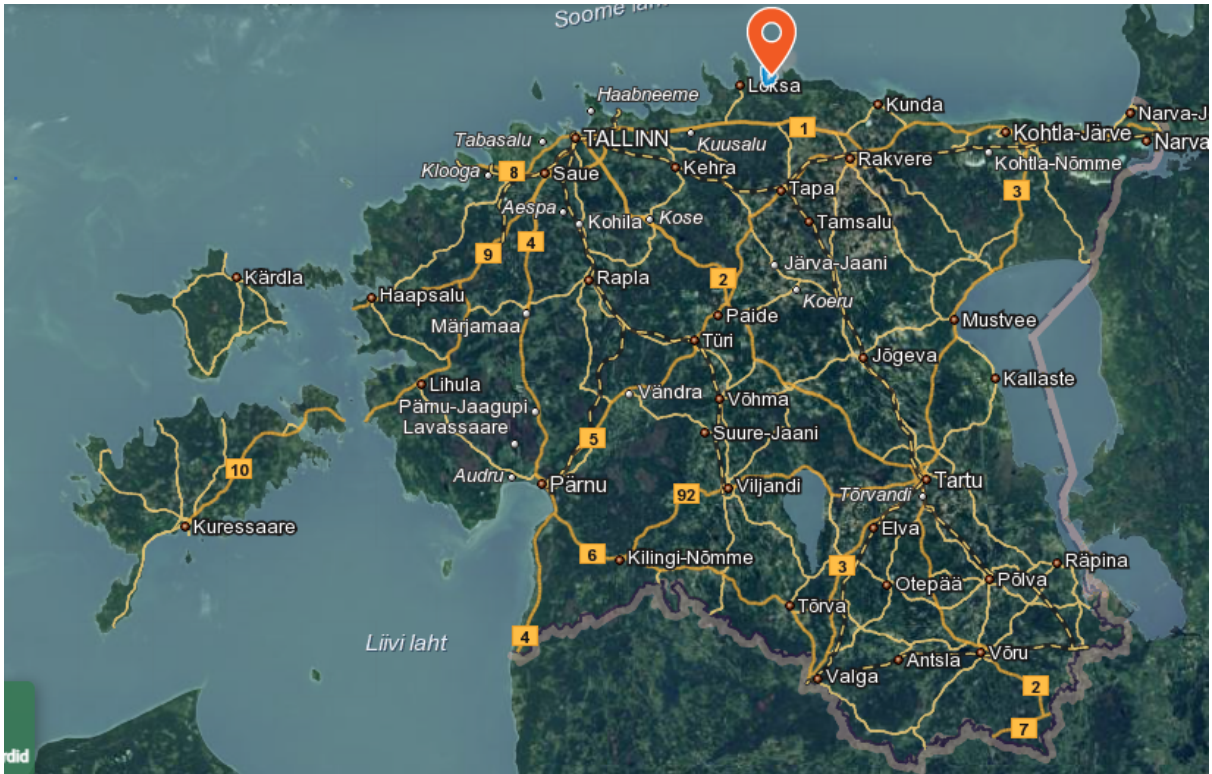
Our expedition started in Lainela Holiday resort, which is located in Lahemaa National Park, the biggest National Park in Estonia. When looking at the satellite images of the Estonian Land Board website (maaamet.ee), there were no visible differences in landscape types (Figures 1 and 2). We wanted to find out whether this visual image was associated with reality.

Our aim was to study soil and temperature caused differences in our study area. More specifically, our questions were:

- What kind of land cover can be found along the way?
- Is Käsnu peninsula a homogeneous site regarding MUC code/land cover?
- How does the temperature/humidity change related to the land cover?

We supposed that there are significant differences between two study areas. Our hypotheses were:

- Käsnu peninsula is a homogeneous site which means it is dominated by MUC0192.
- Temperature changes related to the differences between ground covers.



**Figure 1.** Satellite image of Käsme peninsula's location (Source: Estonian Land Board)



**Figure 2.** Satellite image of our research area. (Source: Estonian Land Board)

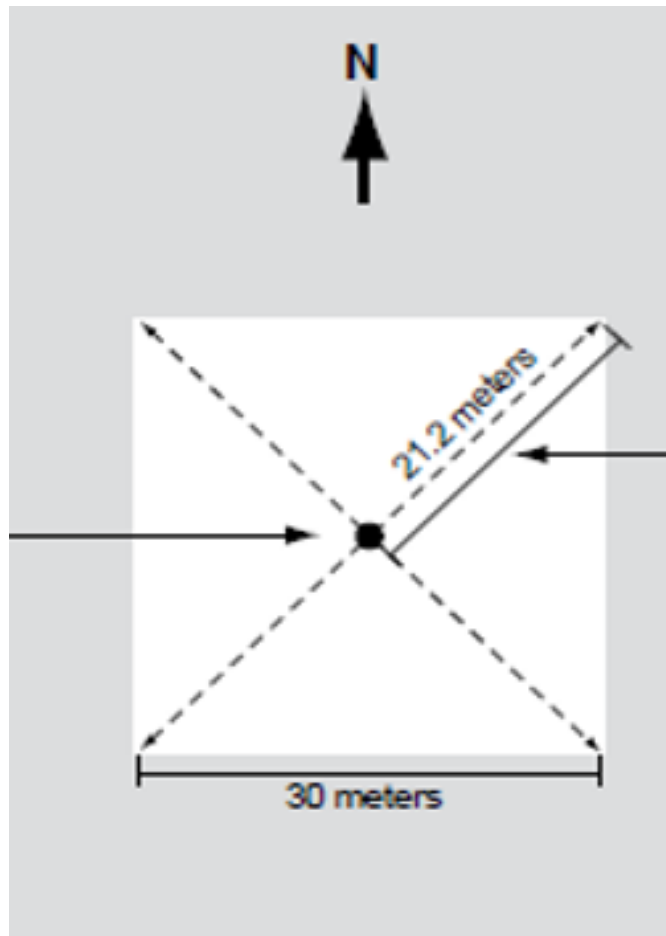
## 2. Research Methods and Materials

For data collection, two 30x30 meter squares were measured in two different locations marking the size of one pixel of a standard satellite image. Both selected sites are near Käsmu, Lääne-Virumaa county, the first being in the pine forest and the second one in the peatland. When we had been walking in the pine forest for quite some time, we randomly went off-rode and chose a place to collect data. Same mechanism for site picking was used for the wetland. A 100-meter long measuring tape was used for this marking action.

In both areas, we used the MUC field guide to find and determine the ground cover's MUC code to find out the answer to our research question whether the peninsula was a homogeneous site or not. In addition, other measurements were made: canopy and ground coverage survey and temperature measuring for comparing land cover changes related to temperature changes. Canopy coverage was calculated, using a densiometer on 21.2m long diagonal transects (see Figure 3, below) and clinometer for estimating tree height. For measuring humidity to see land cover differences between two sites influenced by this, a psychrometer was used (see Figure 4). Work was equally distributed between all the expedition team members, some measured the data and others wrote it down.

For making our study, we needed a variety of tools. We used:

- measuring tape (100m long)
- rope for marking the study area
- flags for marking study area corners
- thermometer Vernier LabQuest 2
- infrared laser thermometer
- densiometer
- plant identifier
- datasheets
- pens
- GLOBE data entry app
- clinometer
- MUC field guide



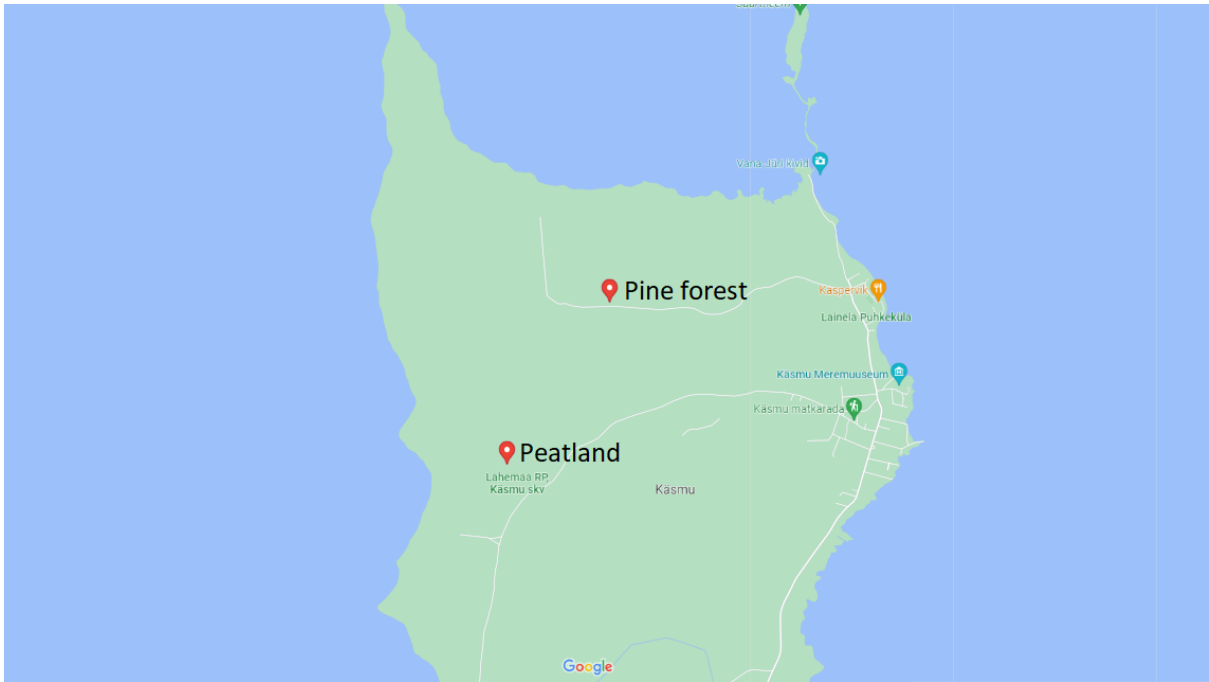
**Figure 3.** Scheme of a 30x30m area with 21.2m diagonals used for canopy cover measurements. (Source: globe.gov)





**Figure 4.** Measuring humidity with a psychrometer.





**Figure 5.** The research sites. (Source: Google Maps)

### 2.1. Site no. 1 - Pine Forest

The first site for exploring and studying was located in Käsnu peninsula, in the middle of pine forest and on the following coordinates : N 59.609095, E 25.890523 (location shown on Figure 5). It had a MUC code 0192 which describes the site as Closed Forest, Mainly Evergreen, Temperate and Subpolar Needle-Leaved with Irregularly Rounded Crowns (Figure 6).



**Figure 6.** Site 1.

## 2.2. Site no.2 - Peatland

The second site (see Figure 7) was located on coordinates N 59.600279, E 25.879429 (location seen on Figure 5). It was a peatland with MUC code 62, described as wetland dominated by trees, shrubs, persistent emergents (plants), mosses, lichens, etc.



**Figure 7.** Site 2.

### 3. Results

As we were the only team doing this research in exactly those two areas, we couldn't compare the results with anything else. One thing we were really surprised by was that even though both sites seemed very sparse, they were closed forests with over 50% of coverage. The second aspect is that the peatland didn't look as closed as pine forest, but it was almost as dense. One more interesting aspect was that the surface temperatures of two sites were almost the same, but the inside temperatures in peat were almost 4 degrees Celsius higher than in the pine forest moss. Our results with the data are shown below.

#### Pine forest

- MUC: 0192
- mainly evergreen
- closed forest 54%
- irregularly rounded crowns
- other green and shrubs 86%
- temperature inside moss: 18°C
- temperature in the surface of lichens: 22°C
- humidity: 76%

#### Peatland

- MUC: 62
- palustrine wetland
- closed forest 51%
- cylindrical crowns
- other green and shrubs 78%
- temperature inside peat: 21,8°C
- surface temperature of peat: 21,7°C
- humidity: 69%

Notable features in this area were the big boulder fields spread out all over the peninsula (Figure 8)





**Figure 8.** Boulder field in the pine forest in Käsmu.

## 4. Conclusion

In conclusion, we found answers to all our investigating questions as well as proved one and refuted the other hypotheses. We were surprised that the temperatures didn't vary as much and that the humidity was lower in the peatland. Other discoveries were more minor and not our first priorities.

- *What kind of land cover can be found along the way?*

We found mostly moss, evergreen forests and big boulder fields spread out all over the peninsula. We used the book to determine the exact codes. We weren't really surprised as evergreen forests are common in seaside areas and moss goes with these forest types.

- *Is Käsmu peninsula a homogeneous site regarding MUC code/land cover?*

No it's not, we encountered different types of flora and 2 different types of land cover. (MUC: 0192; 62) Even though it might seem homogeneous, it has different areas of land covers.

- *How does the temperature/humidity change related to the land cover?*

We found out that it really does not. Surface temperatures were nearly the same (21.7 and 22 degrees), but in-ground temperatures varied. It may be due to the fact that moss usually grows in shade, which means that it gets less sunlight and warmth therefore the in-ground temperature doesn't get as high as in peat. It was interesting that the humidity was lower in the peatland as it should be more humid. We think that it is associated with the lack of rain.

## References

Estonian Land Board. Satellite Image Depository. <https://geoportaal.ee/> (4.08.2022)

Google Maps <https://www.google.com/maps> (4.08.2022)

The GLOBE Program. [www.globe.gov](http://www.globe.gov) (4.08.2022)