GLOBE Regional Learning Expedition

AMAZING LIFE UNDER THE TREES

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Estonia 2022

ABSTRACT

Climate change is happening and it is affecting the biodiversity in the world. This motivates our research into how the climate influences the forest environment in this area. With close observation, we can monitor change over time in landcover.

Our research recorded the current state of the forests and woodlands in Käsmu, Estonia by looking at the canopy cover and ground cover to determine: What kind of differences in land cover can be found in three close locations with the same MUC code?

Data was collected using the Canopy Cover and Ground Cover protocol, MUC code, soil temperature and species identification. We observed soil pits dug by other researchers. We calculated percentages of the ground cover and canopy cover and graphed the data.
The canopy cover (70%) and dominant species (spruce) of all three locations are similar.

Due to microclimate and soil type differences, the understory was different in all three locations. Beaver Site 2 has more biodiversity than site 1 in the ground cover species. Soil in Site 2 was very wet with thick humus and peat approximately 50cm. Due to the soil structure, such as more clay, and moisture content and small depressions, there is more biodiversity in Site 2 than 1. Site 3 has the most biodiversity because it is near the edge of the forest with humus and peat layers of 20cm. Different species of other ecosystems are moving into the forest such as *Tussilago farfara, Ribes sp.,* and *Aegopodium podagraria*.
The temperature profile of the soil was the same at all three locations.

In future, with the influence of climate change on these sites, the composition of the ecosystem, both the canopy and ground cover and the species diversity, may change. We have a record of this time to compare to and we suggest returning to these locations with the same researchers to monitor possible differences.

key words in the paper: MUC, land cover, biodiversity

RESEARCH QUESTIONS

Our team is worried about climate change that is happening and how it is affecting the biodiversity of our individual countries and the world. This motivates our research into how the climate influences the state of the environment. With close observation, we can monitor change over time in landcover. With this, we can try to predict the consequences of these changes and take measures to minimize, mitigate and improve the impacts on the environment.
Our research is to record the current state of the forests and woodlands in Käsmu, Estonia by looking at the canopy cover and ground cover to determine: What kind of differences in land cover can be found in three close locations with the same MUC code?

RESEARCH METHODS

Our study sites were located in Käsmu, Estonia in Lahemaa National Park on the northern coast of Estonia (see map).

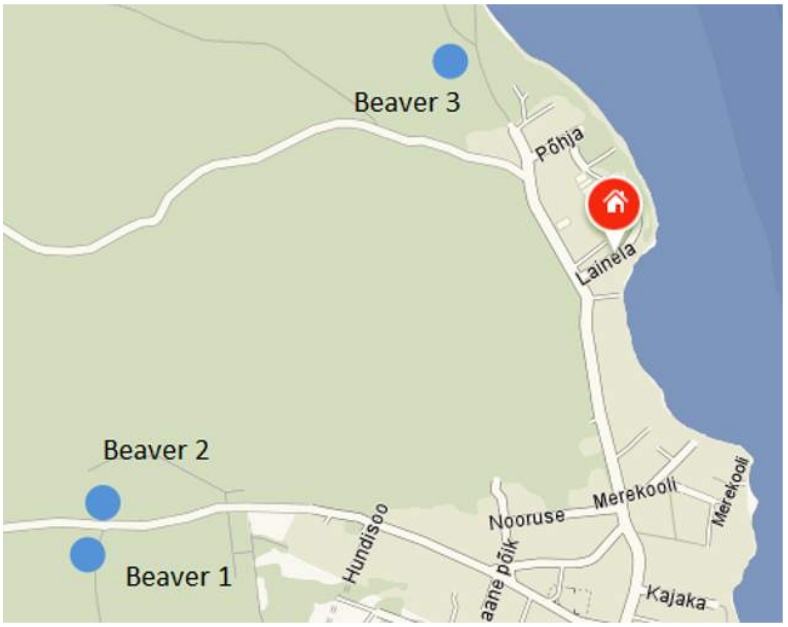

Figure 1. Map of Study Sites.

The climate is a warm summer and cold winter, with temperatures ranging from -30 C to +30 C. Precipitation averages 700mm per year. The National Park is a natural forest with many walking trails.

Figure 2. Pictures of the study sites.

Data was collected using the Canopy Cover and Ground Cover protocol, MUC code, soil temperature and species identification. We observed soil pits dug by other researchers.

We calculated percentages of the ground cover and canopy cover and graphed the data.

RESULTS

The deep horizon subsoil of all study sites is mainly sand. The humus and peat layers are slightly different. Organic components, humus and peat reached 20 cm in Site 1 and 3. Site 2 had a clay component and the soil was very wet.

Figure 3. Soil horizons in the three sites.

In the three sites comparing the ground cover, there were more shrubs and Other Green than forbs and grass. Beaver Site 2 had more Other Green, in this case, moss. Beaver Site 1 had more shrubs than other sites.

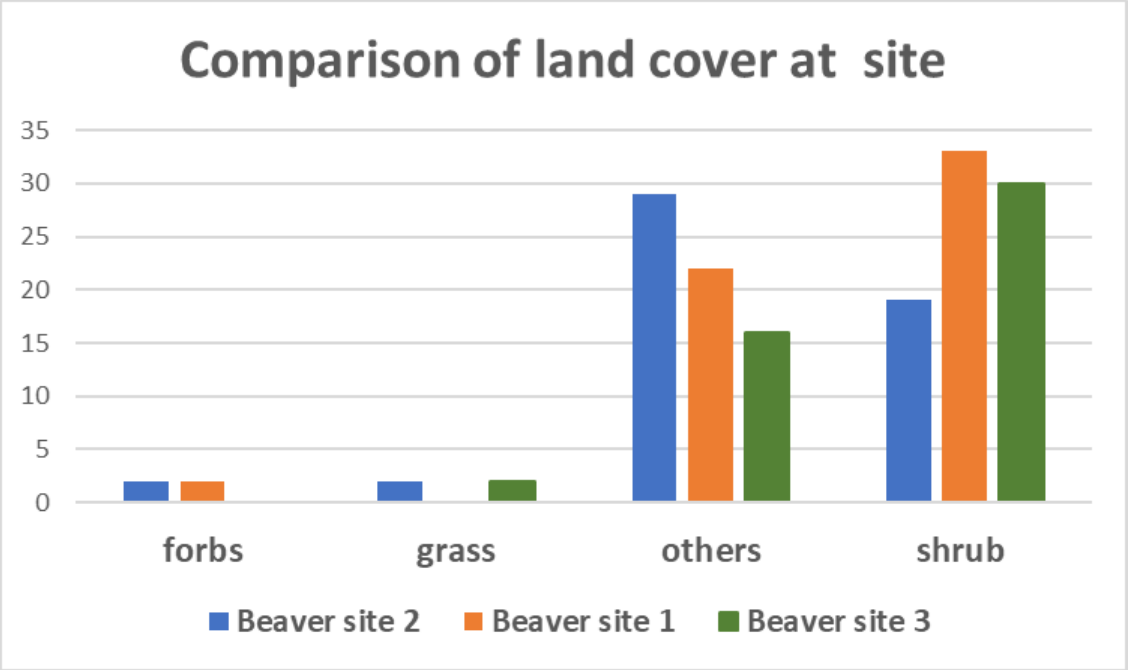

Figure 4. Ground Cover at the three sites.

All three sites had the same MUC code of 0192 which is Closed Forest, Mainly Evergreen, with Conical Crowns and 70% canopy cover. The soil temperature at 30cm below the surface ranged from 13C to 15C.

	Beaver 1	Beaver 2	Location 3
MUC Field Guide	0192	0192	0192
Canopy	70,00%	70,00%	69,00%
Temperature in shade at 30 cm depth	14^{0} C	15^{0} C	13^{0} C

Figure 5. MUC code, canopy cover and soil temperature at the three sites.

The dominant plant species in the canopy we found in each site were the same. The understory species differ according to their microclimate. Site 3 was the richest in biodiversity.

	Beaver 1	Beaver 2	Beaver 3
Dominant tree species	*Picea abies*	*Picea abies*	*Picea abies*
Dominant understorey species	*Vaccinium myrtillus*	*Dryopteris filix-mas* *Equisetum sylvaticum* *Sphagnum sp.*	*Vaccinium myrtillus*
Other species	*Pinus sylvestris* *Sorbus aucuparia* *Maianthemum bifolium* *Melampyrum pratense* *Oxalis acetosella* *mosses (e.g. Hylocomium sp.)* *Dryopteris sp.*	*Pinus sylvestris* *Sorbus aucuparia* *Maianthemum bifolium* *Polytrichum commune* *Melampyrum pratense* *Oxalis acetosella* *mosses (e.g. Hylocomium sp.)*	*Acer platanoides* *Pinus sylvestris* *Sorbus aucuparia* *Maianthemum bifolium* *Melampyrum pratense* *Oxalis acetosella* *mosses* *Dryopteris sp.* *Tussilago farfara* *Ribes sp.* *Aegopodium podagraria* *Linnaea borealis*

Figure 6. Table of plant species in each study site.

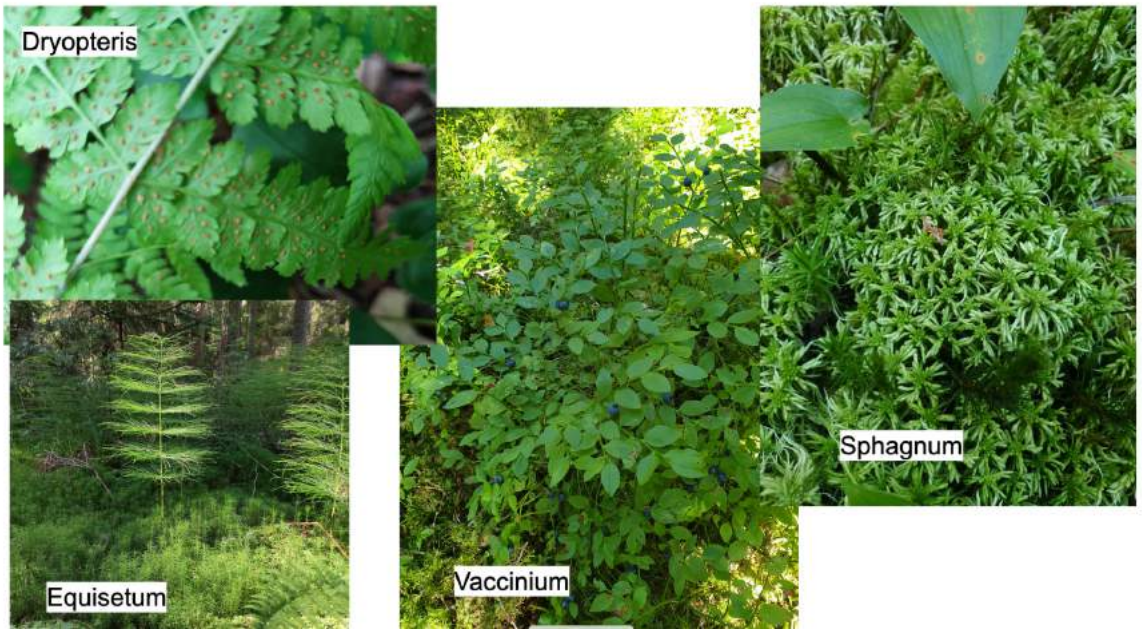

Figure 7. Examples of dominant understory and ground cover species.

CONCLUSION

What kind of differences in land cover can be found in three close locations with the same MUC code?

The canopy cover (70%) and dominant species (spruce) of all three locations are similar. Due to microclimate and soil type differences, the understory was different in all three locations. Beaver Site 2 has more biodiversity than site 1 in the ground cover species. Soil in

Site 2 was very wet with thick humus and peat approximately 50 cm. Due to the soil structure, such as more clay, and moisture content and small depressions, there is more biodiversity in Site 2 than 1. Site 3 has the most biodiversity because it is near the edge of the forest with humus and peat layers of 20cm. The temperature profile of the soil was the same at all three locations.

In future decades, with the influence of climate change on these sites, the composition of the ecosystem, both the canopy and ground cover and the species diversity, may change. We have a record of this time to compare to and we suggest returning to these locations with the same researchers to monitor possible differences.

Adding in soil protocols, ecosystem analysis, organized biodiversity survey, and measurements of abiotic parameters would help to enrich our knowledge about the sites.

BIBLIOGRAPHY/CITATIONS

Thank you to the GLOBE EESTI team for the equipment, MUC Field Guide, GLOBE Program protocols.

Figure 8. Thank you from the Beaver Team.