Project LIFE 08NAT/LV/000449

„Restoration of Raised Bog Habitats in the Especially Protected Nature Areas of Latvia”

Monitoring of mire management success

Report

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Monitoring of mire management success

The aim of the study is to evaluate the effectiveness of dams built to decrease the water level fluctuations in the drained bog. We assume that after the rising the water level in the bog there will be die back of *Calluna vulgaris* and *Pinus sylvestris* and *Sphagnum* cover as well as will increase.

Methods

Annual study of bog vegetation in permanent plots was chosen as appropriate method to detect changes in bog vegetation. Sample plots were established in 2010, before the dam building.

Selection of sample plots

Sample plots in Melna ezera Mire were established:

1) on ditches where dam building was proposed ;
2) in the bog area most likely influenced by dam building;
3) in remnants of non-flooded cutover peat fields;
4) in untouched areas of raised bog.

Sample plots were established along with the water level monitoring points and were arranged perpendiculary to ditches where applicable. Each sample plot is a 4m^2 circle plot and they are alocated in a five sample plots` row using 6m distance between the circle centres (Figure 1). Sample plots on ditches were 2x2m. Photo of each sample plot was taken. Centres of sample plots or the left side (on ditches) were marked with the ribbon attached to the tree.

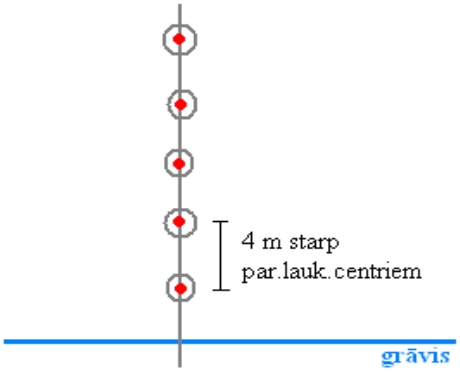

Figure 1. Design of the sample plots` arrangement in Melna ezera Mire.

Vegetation sampling

Field data form was prepared (Annex 1). All plant species were counted in sample plots and species cover in percentage as well as bare peat and open water were evaluated.

Nomenclature: vascular plants (Gavrilova, Šulcs 1999), bryophytes – (Āboliņa 2001), lichens – (Piterāns 2001).

Results

Study area

Melna ezera Mire Nature Reserve

Melna ezera Mire Nature Reserve (317 ha) is one of the two remnants of once existing 10 000 ha raised bog. Still the nature reserve plays important role providing ecological connectivity to Kemeri National Park and Cena Mire Nature Reserve in the west. Nature reserve is surrounded by peat cutting fields.

Only 36% of the nature reserve corresponds to the definition of Annex I habitat type 7110* Active raised bogs. However, even this part of mire is influenced by drainage and peat cutting in adjacent territory. Not surprisingly, habitat type 7120 Degraded raised bogs still capable of natural regenaration comprises almost 25% of the nature reserve and 12% are covered with peat fields most of which are permanently covered with shallow water. The rest of the nature reserve is covered by bog woodland formed in the process of bog overgrowing and dystrophic lakes.

(Management plan for Melna ezera Miere Nature Reserve, 2011).

Sample plot design

Seven sample plots on ditches, 15 sample plots in a drainage influenced raised bog and 17 sample plots on non-flooded cutover peat field were established in Melna ezera Mire (Annex 3). More sample plots in a less drainage influenced bog area will be established in 2011.

Vegetation description in sample plots

Sample plots were established in the northeastern part (A), central part (B) of the nature reserve and in the non-flooded area of cutover peat fields (C) within the nature reserve.

A. Northeastern part

Four sample plots in a ditch and ten sample plots in a drainage influenced bog were established (Annex 3).

Only some specimens of vascular plants and *Sphagnum* (*Sphagnum magellanicum, Sph. cuspidatum, Sph. flexuosum, Eriophorum vaginatum, Oxycoccus palustris, Rhynchospora alba*) were found in the ditch (MG1–MG4). The total plant cover did not exceed 2%; the rest was open water with mean depth of 20 cm. The ditch is ca.1 m wide.

In this part of the nature reserve (M12–M16) mire consists of hummocks covered with dense *Calluna vulgaris* (Figure 4) and ca.4m high and dense *Pinus sylvestris* (Figure 6). The total *Sphagnum* cover, mainly formed by *Sphagnum rubellum,* varied between 2.5% at the ditch up to 81.5 % further from the ditch (Figures 5). Brown mosses and lichens together covered only about 2% from the sample plots. Mean species number was13.8. Heather and pine vitality was good and no dead heather was observed.

At the opposite side of the ditch (M17-M21) hummocks and lawns were present. *Calluna vulgaris* and *Pinus sylvestris* cover still was high, however showing distinct decrease in the sample plots located further away from the ditch (Figure 4, 6). *Sphagnum* cover varied from 11 % at the ditch up to 26–86% in the rest of sample plots and *Sphagnum magellanicum* was the dominant species. *Sphagnum* species of hollows and lawns, such as *Sph. tennelum* and *Sph. cuspidatum* were recorded. Brown mosses and lichens together covered only about 3% from the sample plots. Mean species number was 15.8. The heath and pine vitality was good and no dead heather

were observed, except M17 located at the ditch where 3% of dead *Calluna vulgaris* was found..

B. Central part of the mire

Three sample plots in a ditch and five sample plots in a drainage influenced bog were established (Annex 3).

The ditch, where dams will be built, was slightly overgrown with *Sphagnum cuspidatum* and *Sphagnum magellanicum* (30–68%) (MG5–MG7). Vascular plant cover formed by *Andromeda polifolia*, *Eriophorum vaginatum* and *Rhynchospora alba* was small and did not exceed 9% in a sample plot. The ditch is ca. 2m wide and the water level in October 2010 was 50 cm.

In this part of the nature reserve (M22-M26) mire consists of hummocks covered mainly with *Calluna vulgaris. Calluna vulgaris* cover was high, but *Pinus sylvestris* cover was small, estimated 20% as a maximum, showing no distinct decrease in the sample plots located further away from the ditch (Figure 5, 6). *Eriophorum vaginatum, Rubus chamaemorus, Andromeda polifolia* and *Oxycoccus palustris* cover was not significant. Total *Sphagnum* cover varied from 31% at the ditch up to 47–74% in the rest of sample plots and *Sphagnum rubellum* was the dominant species. Brown mosses and lichens together covered only about 3% from the sample plots. Mean species number was 13.2. The heather and pine vitality was good.

Changes in the drainage influenced bog vegetation depending on the distance from the ditch

There was statistically significant positive correlation between the *Sphagnum* cover and the distance form the ditch (p=0,051), however neither *Calluna vulgaris* cover, nor *Pinus sylvestris* cover showed any correlation with the distance from the ditch (Figure 1, 2, 3). It can be explained by small number of sample plots and the fact that the study area is surrounded by ditches and peat cutting areas. Therefore, the drainage influence is multiple and is not caused by only one ditch in particular. The *Pinus sylvestris* cover correlates positively with the species number (p=0,045), because the high pine cover indicates drier conditions where more species of brown mosses and lichens can grow. The mean total *Sphagnum* cover in the 30m zone along the studied ditches was 47,7 %, *Calluna vulgaris* cover – 88,3 %, but *Pinus sylvestris* cover in a shrub layer – 25,9 % (Figure 4, 5, 6). Mean species number per sample plot – 14,3.

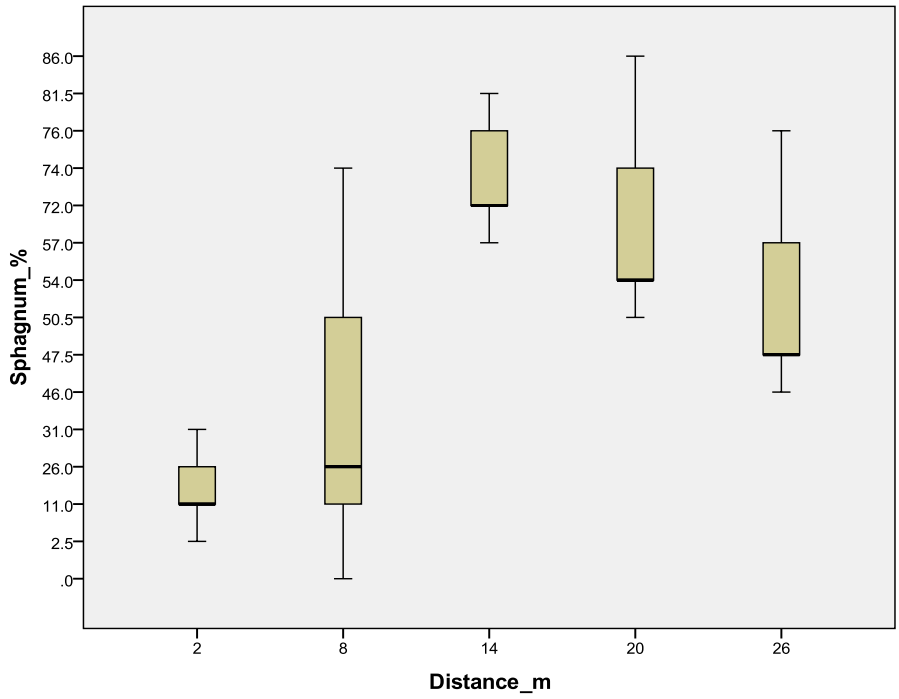

Figure 1. Changes in total *Sphagnum* cover, %, depending on the distance from the ditch.

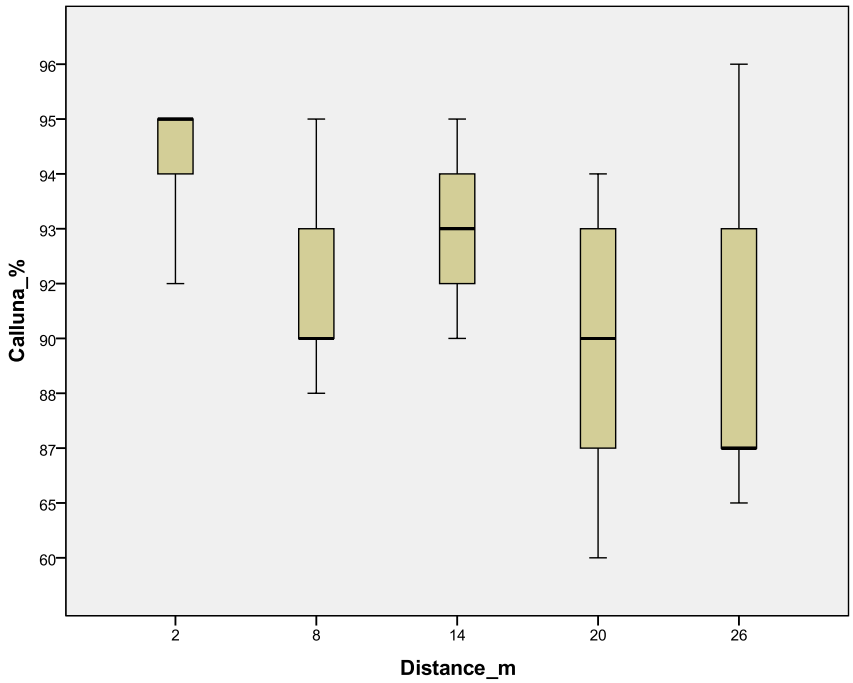

Figure 2. Changes in *Calluna vulgaris* cover, %, depending on the distance from the ditch.

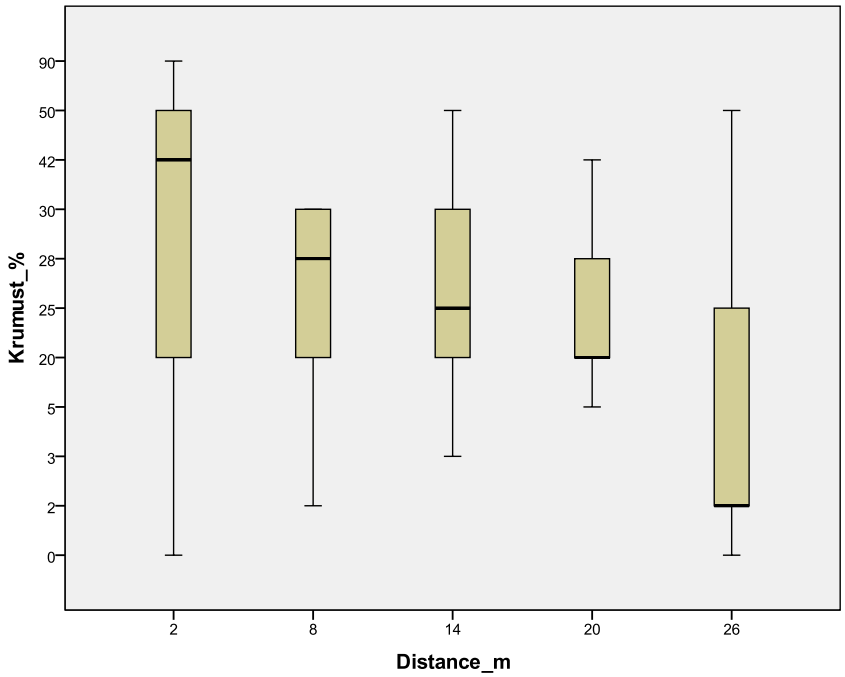

Figure 3. Changes in *Pinus sylvestris* cover, %, depending on the distance from the ditch.

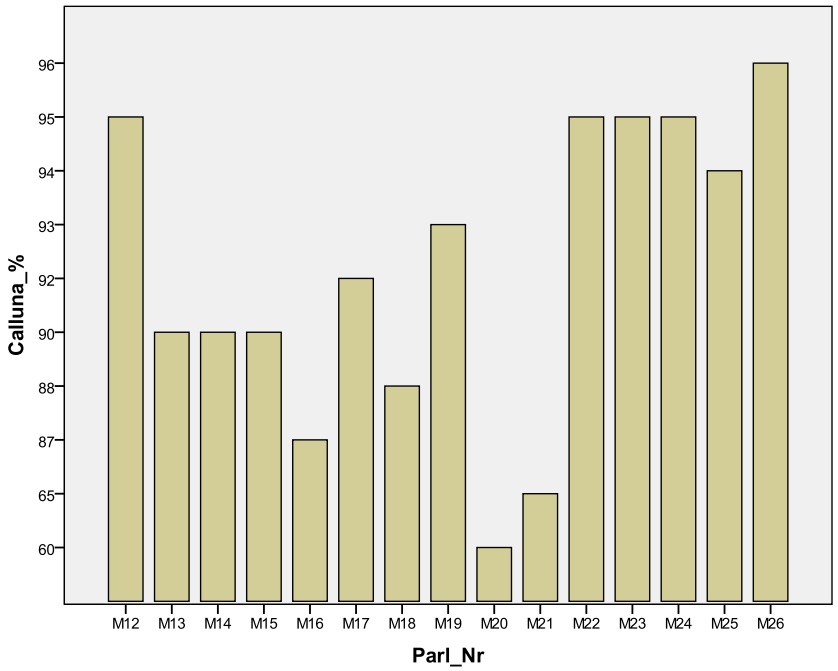

Figure 4. *Calluna vulgaris* cover, %, in the sample plots in the Melna ezera Mire Nature Reserve.

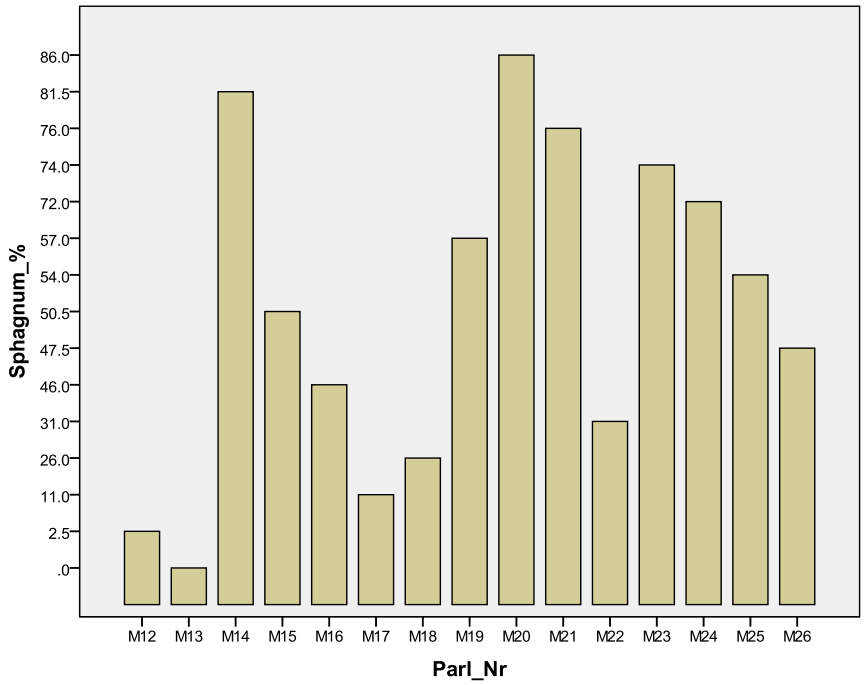

Figure 5. *Sphagnum* cover, %, in the sample plots in the Melna ezera Mire Nature Reserve.

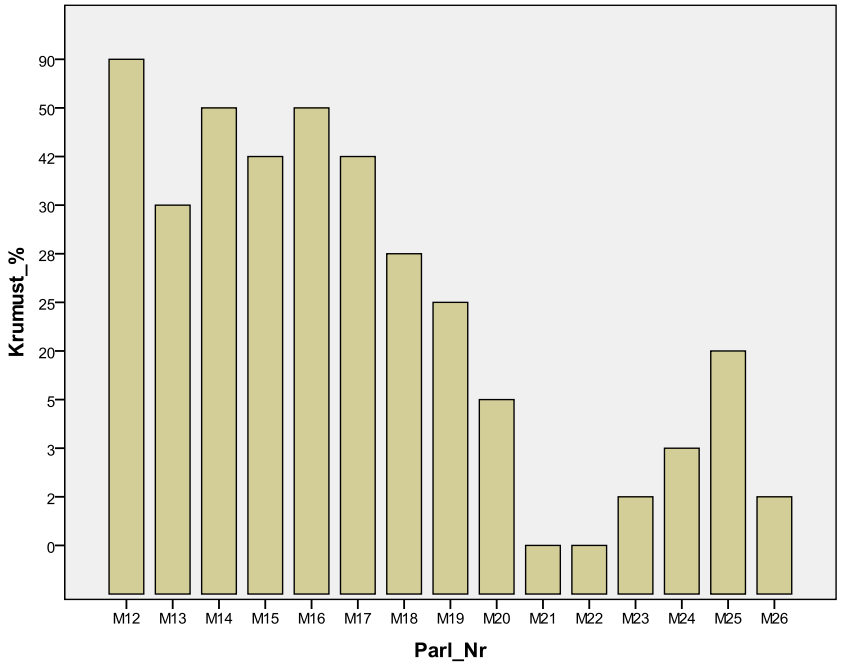

Figure 6. *Pinus sylvestris* cover, %, in the sample plots in the Melna ezera Mire Nature Reserve.

C. Non-flooded cutover peat fields

17 sample plots on non-flooded cutover peat field were established in Melna ezera Mire. Dam building is not planned in this part of the nature reserve due to safetey reasons for international airport „Rīga". Significant changes in plant cover and composition is not expected in this part of the nature reserve.

Sample plots M1-M6 were established on the peat strip between the flooded areas characterised by bare peat and sparse vegetation cover. Sparse *Pinus sylvestris*

and *Betula pubescens* form the shrub layer, while *Eriophorum vaginatum, Andromeda polifolia, Eriophorum polystachion, Molinia caerulea, Vaccinium uliginosum, Juncus effusus,* and *Carex rostrata* – the herb layer. Some specimens of brown mosses, such as *Polytrichum juniperinum* were occasionally found. The mean species cover was low – four species.

Sample plots M7–M11 were established on the next peat strip between the flooded areas and also are characterised by bare peat and sparse vegetation cover, except M7 and M9, where high cover of *Calluna vulgaris* (M7) and *Eriophorum polystachion* (M9) was recorded. M7 was located at the bog woodland margin, but M9 – in a small depression on the peat strip. Some specimens of brown mosses, such as *Polytrichum juniperinum, Pohlia nutans* and *Dicranella varia* were occasionally found. Scarce *Pinus sylvestris* and *Betula pubescens* form the shrub layer like in the first peat strip. The mean species number is low – 5.8 species.

Sample plots M27–M32 will serve as direct indicators of water level rise as they were established in the lowest part of the cutover peat field where water had been retreated (Annex 3). Small *Betula pubescens* and separate tussocks of *Eriophorum vaginatum*, some *Calluna vulgaris* were only plant species found here. The mean species number was low – 2.5 species.

D. The most natural part of the bog

Sample plots will be established in the core area of the nature reserve in 2011, where bog vegetation is at least influenced by drainage and peat cutting.

23.02.11.

/Liene Auniņa/

References

Āboliņa, A. 2001. Latvijas sūnaugu saraksts. *Latvijas Veģetācija*, **4**, 47 – 87.
Gavrilova, G., Šulcs, V. 1999. *Latvijas vaskulāro augu flora.* Zinātne, Rīga. 135 lpp.
Piterāns, A. 2001. Latvijas ķērpju konteksts. *Latvijas Veģetācija*, **4**, 5 – 46.

Other sources

Dabas lieguma „Melnā ezera purvs" dabas aizsardzības plāns. 2011. Latvijas Dabas fonds, Rīga. [Management plan of the Melna ezera Mire Nature Reserve. 2011. Latvian Fund for Nature, Riga]

Annexes

Annex 1. Field data form for monitoring of vegetation changes in the Melna ezera Mire Nature Reserve.
Annex 2. Photos of the sample plots in the Melna ezera Mire Nature Reserve.
Annex 3. Location of the sample plots in the Melna ezera Mire Nature Reserve.
Annex 4. Vegetation of sample plots in the Melna ezera Mire Nature Reserve.

Annex 1

Field data form for monitoring of vegetation changes in the Melna ezera Mire Nature Reserve.

Purva veģetācijas izmaiņas grāvjos ar dambjiem

Lauka datu forma

Purva nosaukums			
Datums		Eksperts	
Parauglaukuma ID		Koordinātas X,Y	

Parauglaukuma izmērs	
Attālums līdz tuvākajam dambim, m	
Grāvja dziļums, m	

Sugas nosaukums	**Segums parauglaukumā, %**

Piezīmes

Liene Auniņa, 2010.

Augsto purvu struktūru un veģetācijas uzskaites datu forma

Lauka datu forma

Purva nosaukums			
Datums		Eksperts	
Parauglaukuma ID		Centra koordinātas LKS-92	*x* *y*
Fotografēšanas virziens (no-uz)		Fotogrāfiju failu nosaukumi	

Parauglaukums ∅4 m *(koku stāvs – h >7 m, krūmu stāvs – 1-7 m, lakstaugu stāvs līdz 1 m)*

Lokalizācija	purva mala, purva centrālā daļa, starp centru un malu, ūdenstece purvā		
Augstie ciņi, %		Lēzenie ciņi, %	
Atklāts ūdens, %		Ieplakas, %	
Atklāta kūdra, %		Līdzens reljefs, %	
Priedes koku stāvā, gab. un %		Bērzi koku stāvā, gab. un %	
Priedes krūmu & lakstaugu stāvā, %		Bērzi krūmu & lakstaugu stāvā, %	
Priedes dīgsti, gab.		Bērza dīgsti, gab.	

Vaskulāro augu sugas	**Projektīvais segums %**
Sūnas un ķērpji	

Koku, krūmu un sīkkrūmu vitalitāte				
Vitalitāte*	**Laba (1)**	**Vidēja (2)**	**Vāja (3)**	**Nokaltis (4)**
Priežu vitalitāte (h > 7 m)				
Priežu vitalitāte (h < 7 m)				
Bērzu vitalitāte (h > 7 m)				
Bērzu vitalitāte (h < 7 m)				
Viršu vitalitāte				
Citu sīkkrūmu vitalitāte				

**Vitalitāti attiecīgajā ailē norāda ar eksemplāru skaitu, piemēram, viens koks ar vāju vitalitāti, viens ar labu vitalitāti.*

Parauglaukumu tieši ietekmējošie faktori

Piezīmes