

Remote Sensing studies in Latvian project sites



Institute for
Environmental
Solutions



Co-funded by
the European Union

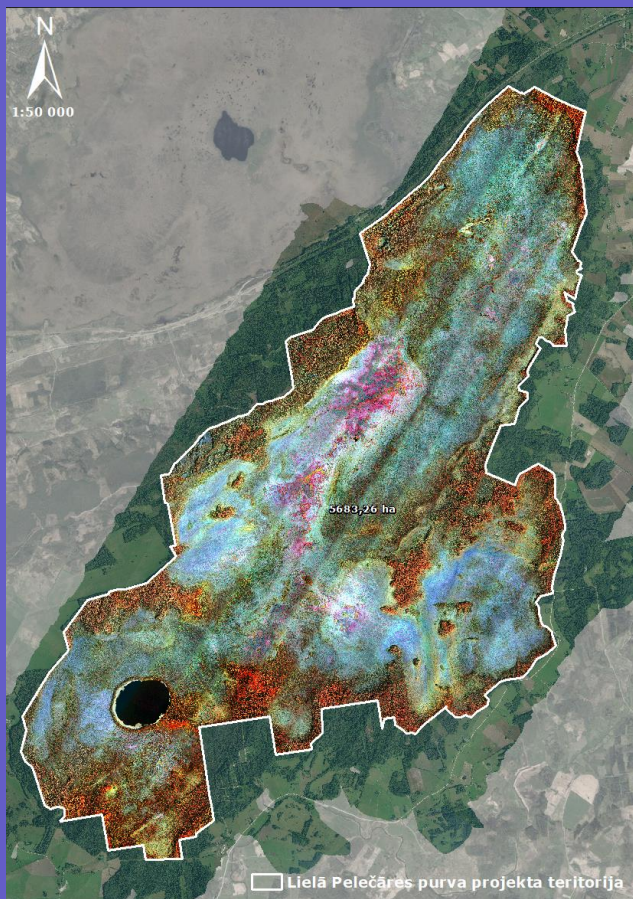
Rūta Abaja-Felce, Dainis Jakovels, Jevgenijs Filipovs, Agris Brauns
Project Scientific Group Meeting
26.09.2024.

University of Latvia, Riga

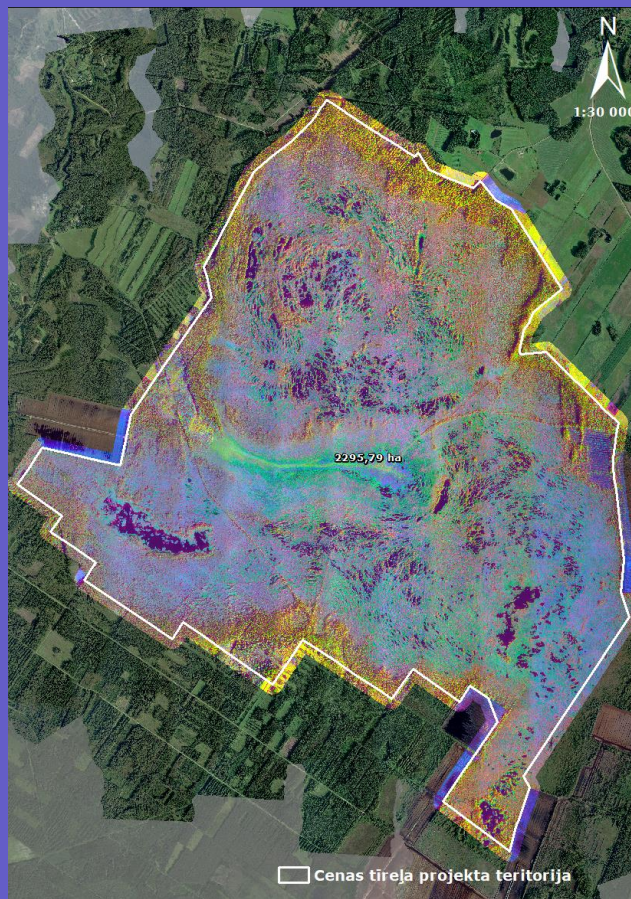
101074396 - LIFE21-CCM-LV-LIFE PeatCarbon

Project sites and remote sensing data

Collected airborne hyperspectral data over 3 project sites in Latvia



Infrared image of Lielais Pelēčāres Mire
RS data collected 16.08.2023.



Principal component analysis image of Cena
Mire. RS data collected 16.09.2023.



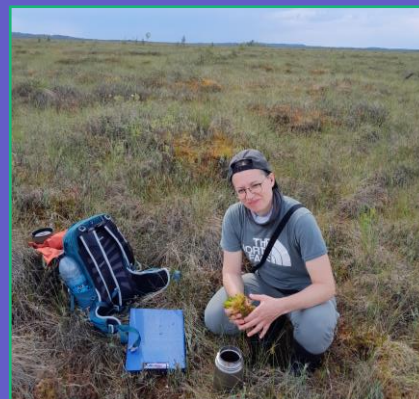
Principal component analysis image of Melnais
ezers Mire. RS data collected 16.09.2023.

Reference data gathering



Lielais Pelēčare Mire

Project sites	Dates of data gathering
Cena Mire	17., 19.10.2023
Melnais Lake Mire	02.11.2023
Lielais Pelečāre Mire	21.-22., 30.-31.05.2024
Sudas-Zviedru Mire	Planned in 2025



Team of reference data gatherers – Līga Strazdiņa (UL), Rūta Abaja-Felce (IES)

Reference data gathering



GEST type: Moist bog heath



GEST type: Wet meadows and forbs



GEST type: Wet peat moss lawn



GEST type: Moderately moist forsts and shrubberies



GEST type: Bare peat wet



GEST type: Moist forsts and shrubberies (OL)

GEST types and GHG emission factors

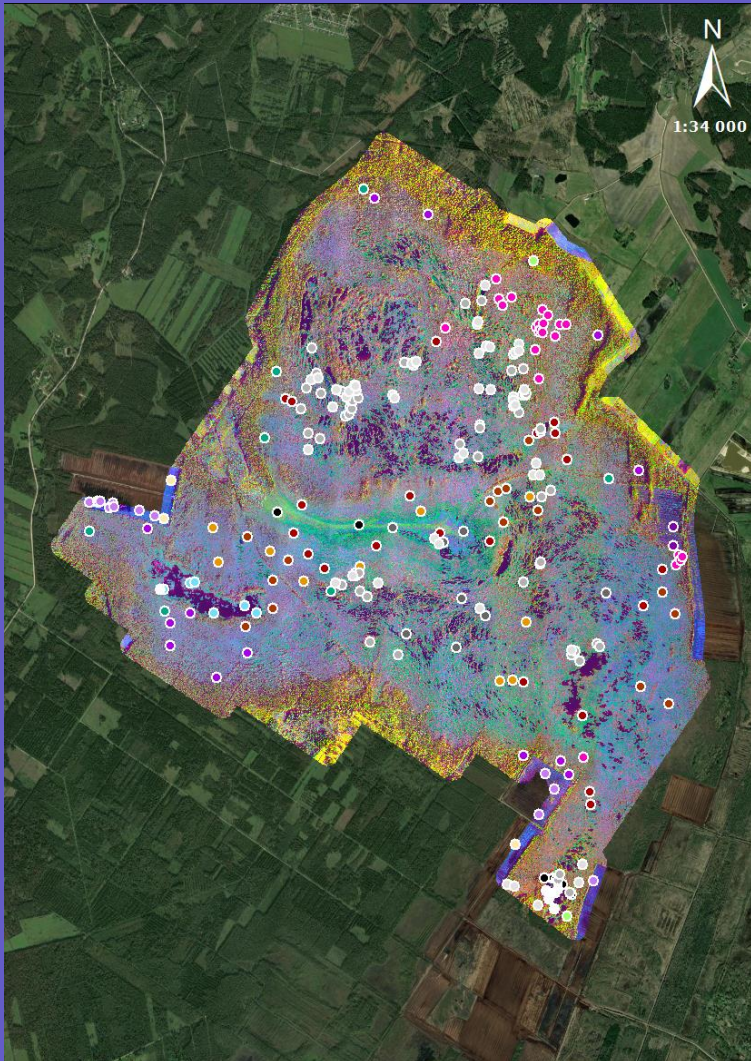


	GEST klase	Project sites in Latvia				Data without considering wood biomass				Data including wood biomass			
		Cenas Mire	Melnais Lake Mire	Lielais Pelēčāre Mire	Sudas-Zviedru Mire	Water level	CO ₂	CH ₄	GWP	Water level	CO ₂	CH ₄	GWP
1	Moist forests and shrubberies (OL)	X	X		X	3+	9.4	0	9.4	3+	-2.2	-1.8	-4
2	Moderately moist/dry bog heath	X				2+/2-	nd	nd	nd	2+/2-	nd	nd	nd
3	Moist bog heath	X				3+	9.4	0	9.4	3+	9.4	0	9.4
4	Dry forest and shrubberies (OL)	X	X			2-/3-	26	0	26	2-/3-	nd	nd	nd
5	Wet meadows and forbs	X	X			5+	0	5.8	5.8	5+	0	5.8	5.8
6	Moderately moist forest and shrubberies (OL)	X	X		X	2+	20	0	20	2+	-3.1	-0.11	-3.22
7	Open water/ditches	X			X	6+	nd	2.8	nd	6+	nd	2.8	nd
8	Wet peat moss hollows resp. flooded peat moss lawn	X	X		X	5+	-3.1	12	8.9	5+	-3.1	12	8.9
9	Wet peat moss lawn	X	X		X	5+	-0.5	0.3	-0.3	5+	-0.5	0.3	-0.3
10	Bare peat wet	X	X			4+	1.5	0.1	1.6	4+	1.5	0.1	1.6
11	Peat moss lawn on former peat-cut off areas	X	X			5+	1.5	0.4	1.9	5+	1.5	0.4	1.9
12	Very moist peat moss lawn	X	X			4+	-1.1	3.4	2.3	4+	-1.1	3.4	2.3
13	Wet peat moss lawn with pine trees	X	X			4+	3.9	0.2	4.1	4+	nd	nd	nd
14	Moderately moist (forb) meadows		X			2+	20	0	20	2+	20	0	20
15	Bare peat moist (OL)		X			3+	6.2	0	6.2	3+	6.2	0	6.2
16	Dry forests and shrubberies (ME/EU)		X			2-/3-	43.4	0	43.4	2-/3-	nd	nd	nd
17	Very moist bog heath		X			4+	1.7	3	4.6	4+	1.7	3	4.6
18	Bare peat dry (OL)		X			2-/3-	7	0.4	7.5	2-/3-	7	0.4	7.5
19	Wet tall reeds		X			5+	-2.3	6.3	4	5+	-2.3	6.3	4
20	Very moist meadows, forbs and small sedges reeds				X	4+	-0.5	2.3	1.9	4+	-0.5	2.3	1.9

GHG values (t CO₂ eq./ha/year) taken from literature: Jarašius L. et al. 2022. Handbook for assessment of greenhouse gas emissions from peatlands. Application of direct and indirect methods by LIFE Peat Restore. Lithuanian Fund for Nature, Vilnius, 201 p.

GEST type reference (Cena Mire)

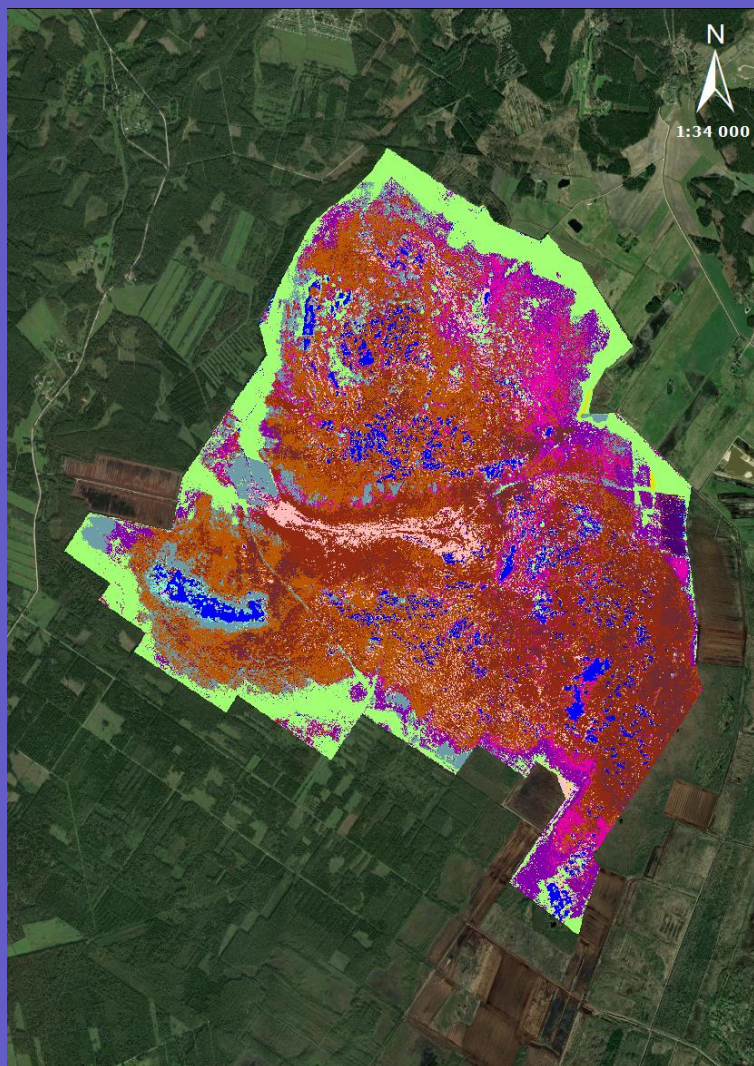
Collected reference data for supervised classification



- 1, Moderately moist/dry bog heath
- 2, Moist bog heath
- 3, Very moist peat moss lawn
- 4, Wet peat moss lawn
- 5, Wet peat moss lawn with pine trees
- 6, Peat moss lawn on former peat-cut off areas
- 7, Wet peat moss hollows resp. flooded peat moss lawn
- 8, Moist forests and shrubberies (OL)
- 9, Bare peat wet
- 10, Bare peat
- 11, Wet meadows and forbs_1
- 12, Wet meadows and forbs_2
- 13, Wet meadows and forbs_3
- 14, Wet meadows and forbs_4
- 15, Wet meadows and forbs_5
- 16, Wet meadows and forbs_6
- 17, Moderately moist forests and shrubberies (OL)

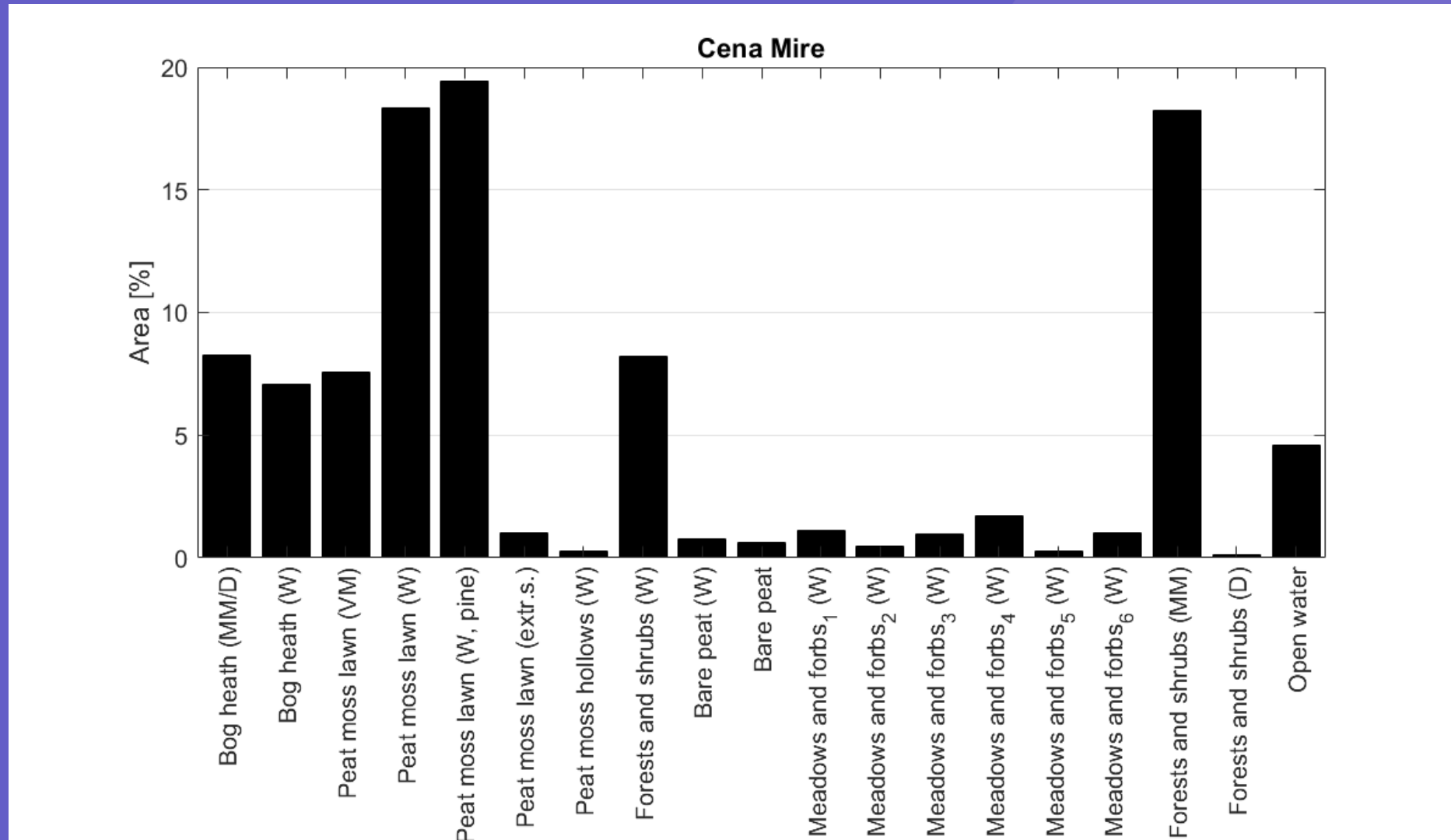
GEST type mapping (Cena Mire)

Supervised classification (SVM)



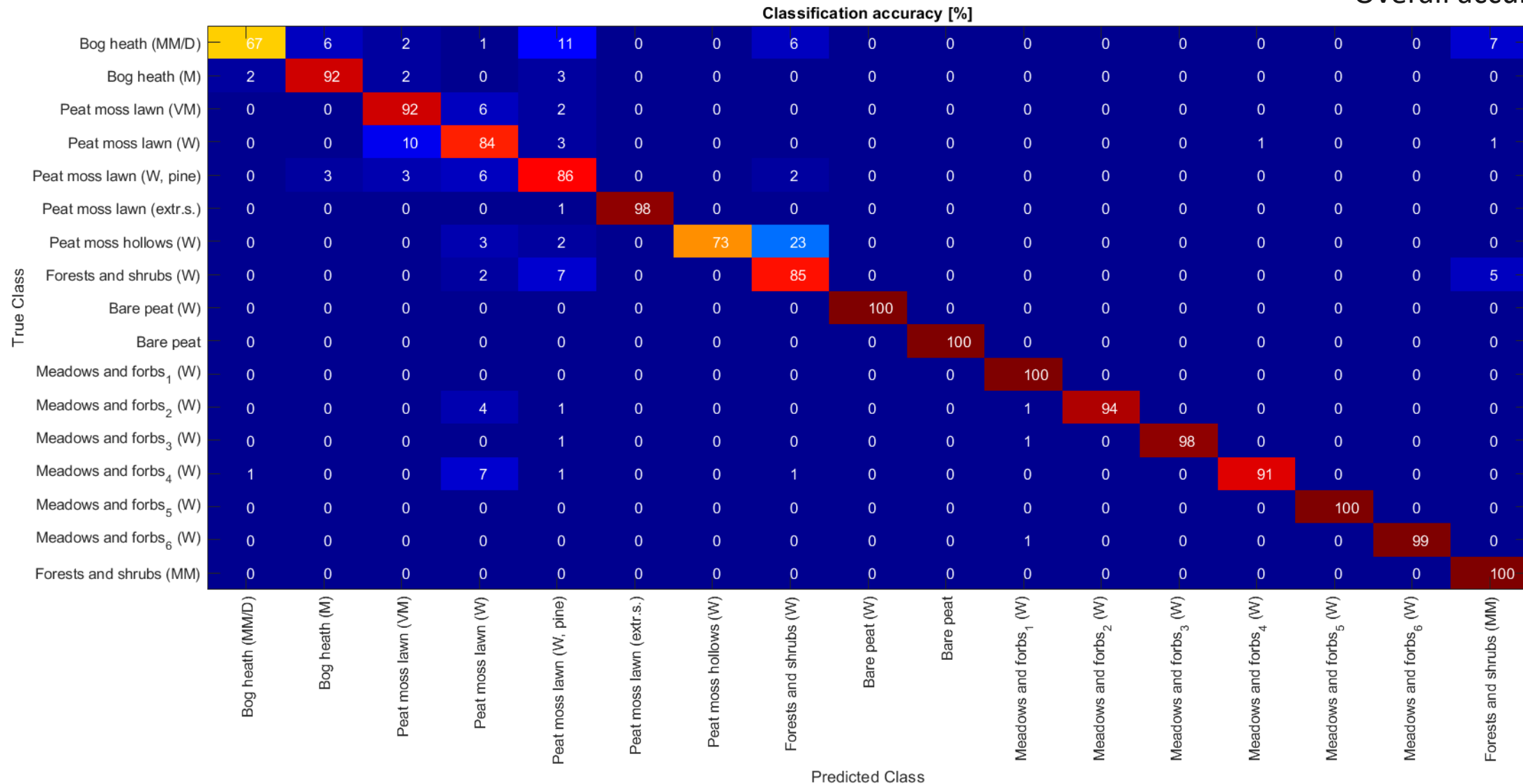
-  Moderately moist/dry bog heath
-  Moist bog heath
-  Very moist peat moss lawn
-  Wet peat moss lawn
-  Wet peat moss lawn with pine trees
-  Peat moss lawn on former peat-cut off areas
-  Wet peat moss hollows resp. flooded peat moss lawn
-  Moist forests and shrubberies (OL)
-  Bare peat wet
-  Bare peat
-  Wet meadows and forbs
-  Moderately moist forests and shrubberies (OL)
-  Dry forests and shrubberies (OL)
-  Open water

GEST type mapping (Cena Mire)

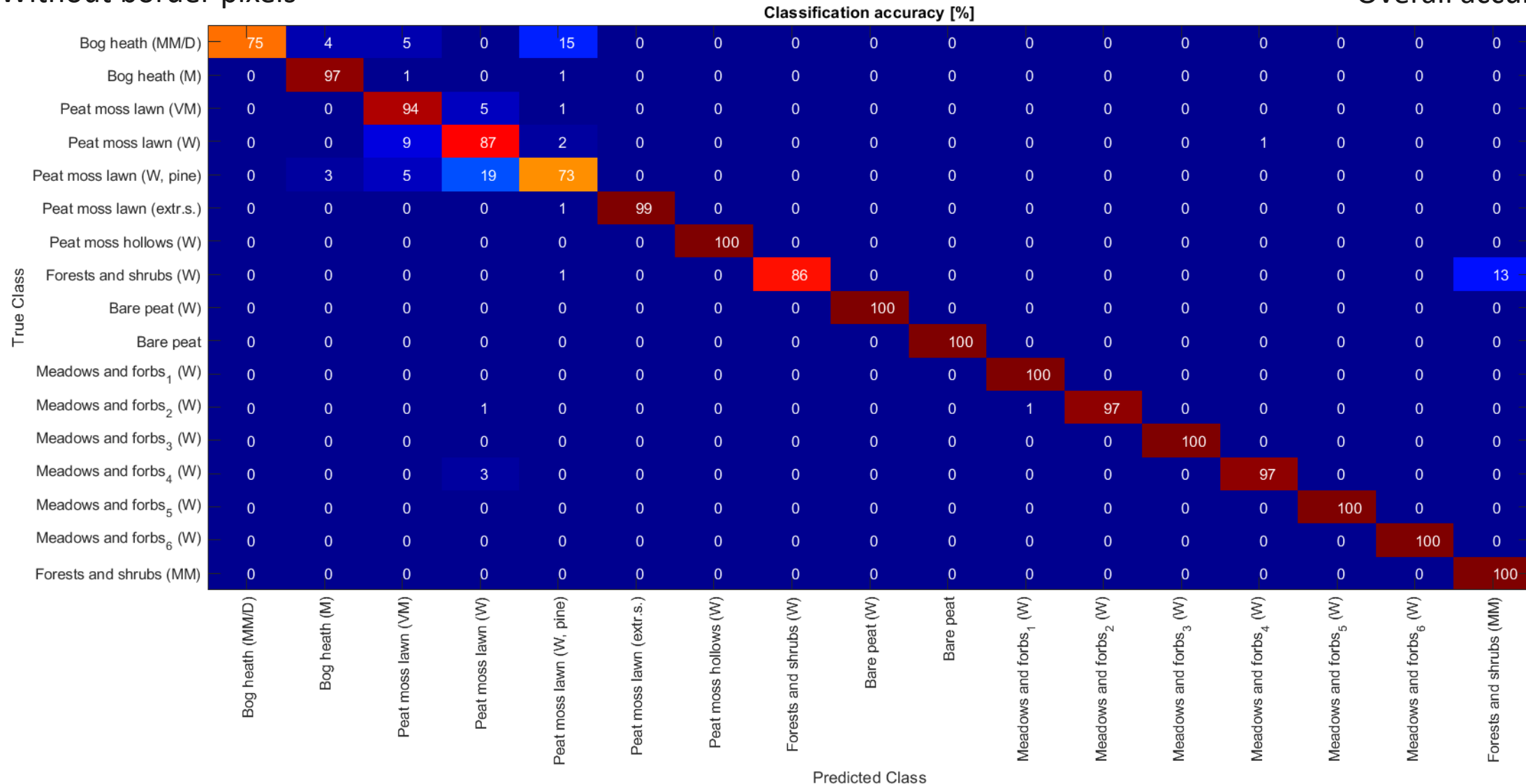


GEST type mapping accuracy (Cena Mire)

Overall accuracy = 88%

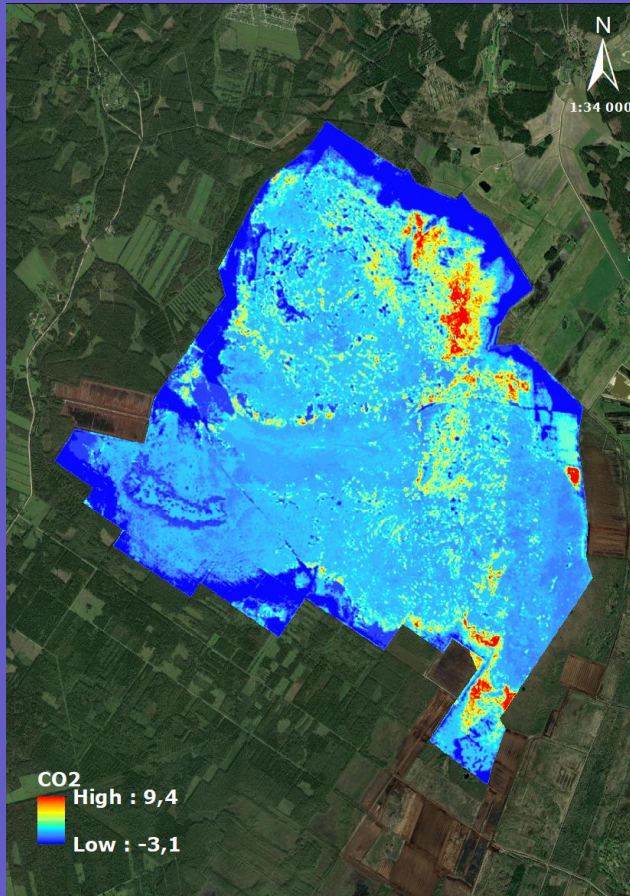


Overall accuracy = 93%

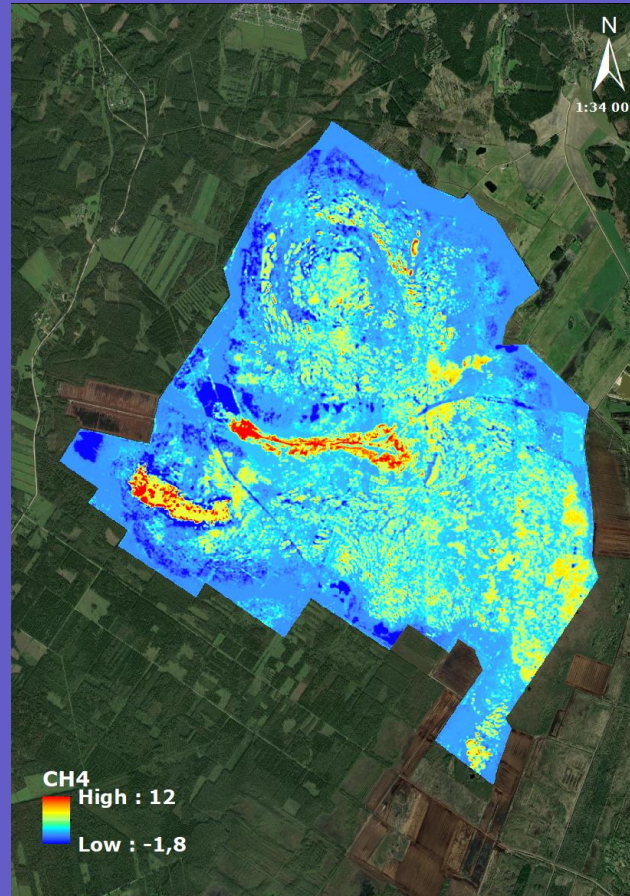


GHG emission mapping (Cena Mire)

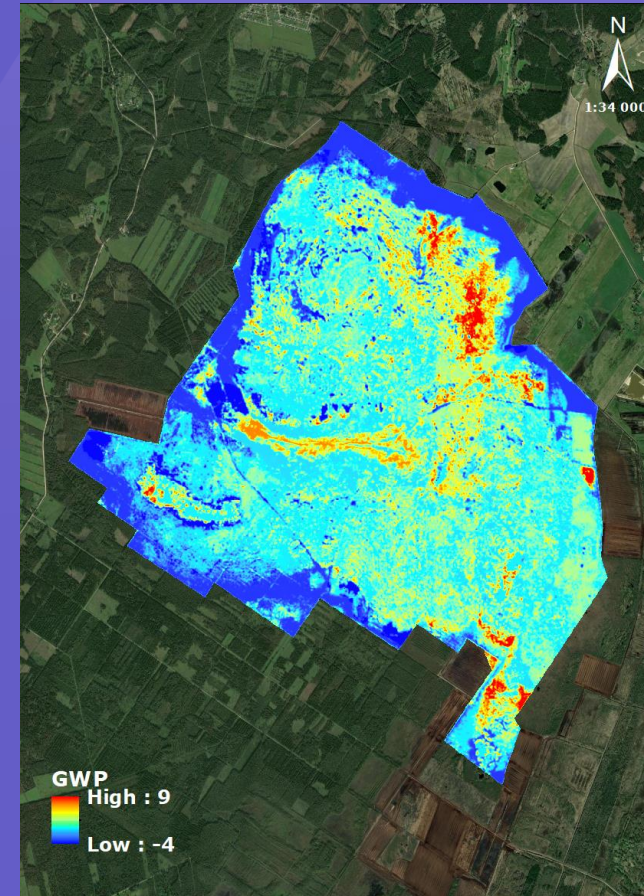
GHG emission maps of the Cena mire based on GEST methodology



CO2 emission image (t CO₂ eq./ha/year)

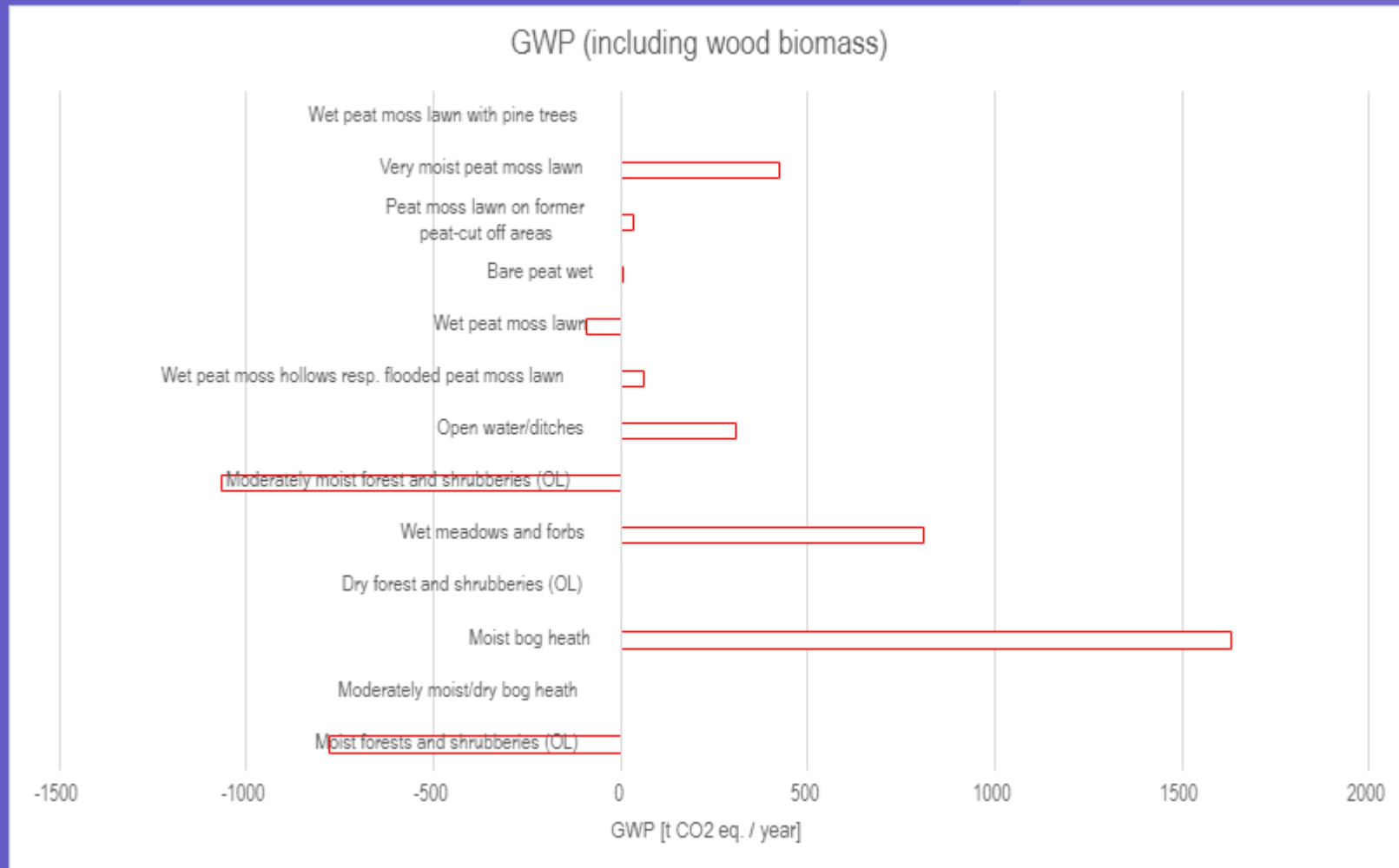


CH4 emission image (t CO₂ eq./ha/year)



GWP emission image (t CO₂ eq./ha/year)

GHG emission budget assessment (Cena Mire)



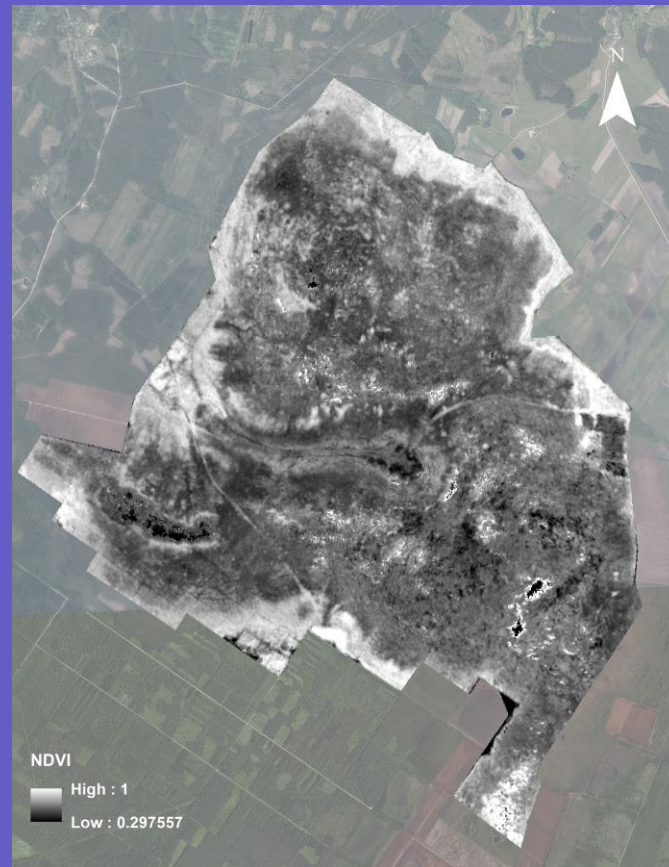
Total GWP = 1340 t CO2 eq. / year

Sentinel-2 data capabilities (Cena Mire)

NDVI dynamics over different seasons in 2023



Max NDVI for Spring



Max NDVI for Summer

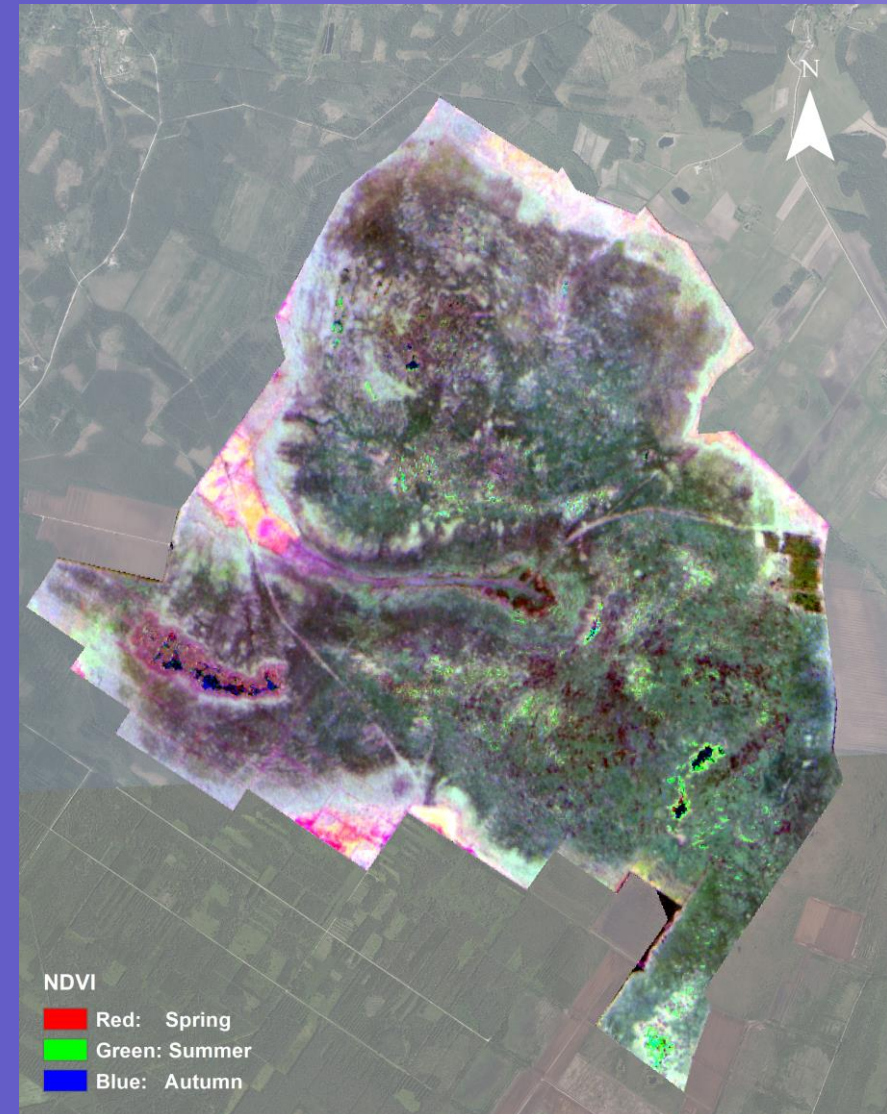


Max NDVI for Autumn

Sentinel-2 data capabilities (Cena Mire)

NDVI dynamic over different seasons

An RGB representation of seasonal NDVI observations



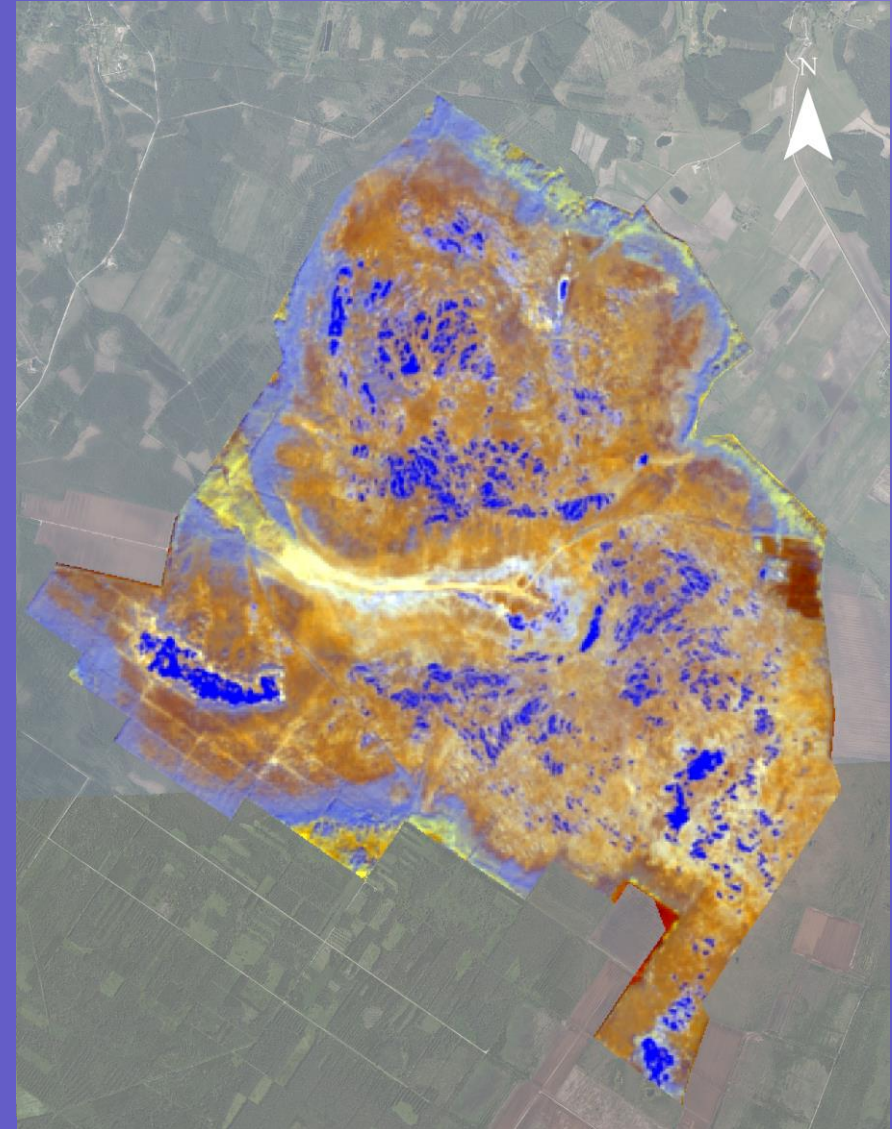
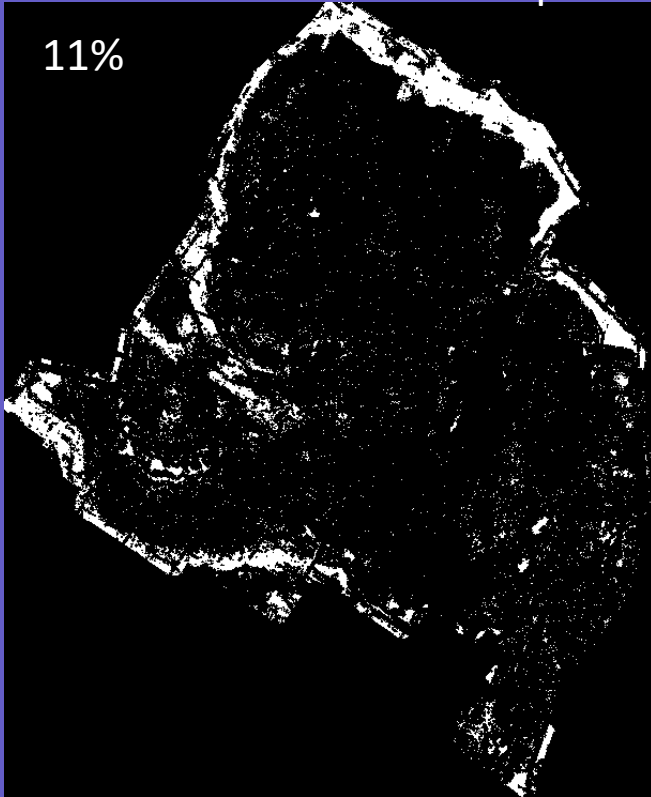
Sentinel-2 data capabilities (Cena Mire)

Principal component analysis

Sentinel-2 observation date 29-08-2024

Clear 10 m reference class pixels

11%



Rūta Abaja-Felce

IES coordinator and peatland habitat expert in the project

E: ruta.abaja@vri.lv

P: +371 27181676

Dainis Jakovels

Leading RS data expert in the project

E: dainis.jakovels@vri.lv

P: +371 29116741



**Institute for
Environmental
Solutions**

"Lidlauks", Priekulji parish
Cēsis county, LV-4126, Latvija
T.: 64127951
lidlauks@vri.lv
vri.lv

Our social media:
FB / IG / TW: @videsinstituts
LinkedIn: Institute for Environmental Solutions