The complexity of climate change mitigation in agricultural peatlands

LIFE OrgBalt and JustFood Joint Webinar

April 12, 2023

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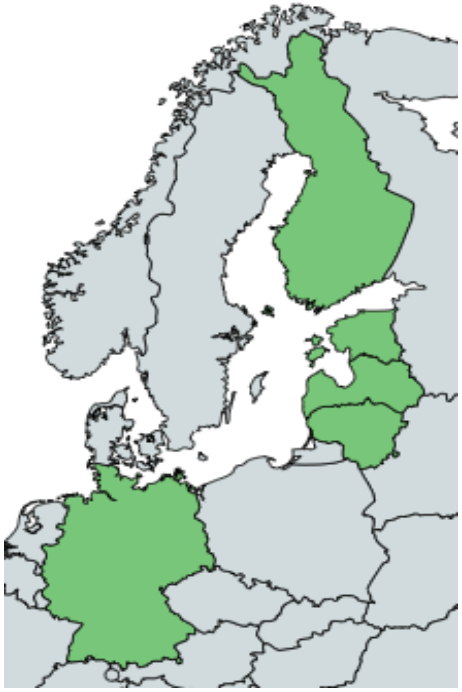
EU LIFE Programme project
"Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland"

LIFE OrgBalt "Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland" (LIFE18 CCM/LV/001158)

5 countries



8 partners

Latvia	LSFRI Silava
	LBTU
	Ministry of Agriculture
	Baltic Coasts
Lithuania	LAMMC
Estonia	Tartu university
Finland	LUKE
Germany	MSF

Project duration: 01/08/19 - 31/08/24

The main idea: improvement of organic soil management for contribution to climate change mitigation

Why it is important?

- Area of drainage based, flooded and rewetted managed organic soils in EU is 33.6 Mha (7% of the EU area);
- ~ 3% of EU`s agriculture land is on organic soils, but these soils are responsible for 25% of all agricultural GHG emissions;
- LIFE OrgBalt focuses on the most common group of organic soils – nutrient-rich drained organic soil in temperate climate region (cover 21 Mha or 61% of organic soils in EU countries).

How to?

Scope: nutrient-rich drained organic soil in forest and agriculture land

Targets:

✓ **GHG inventory improvements** – inclusion of project territory specific activity data and emission factors;

✓ **Demonstration of GHG mitigation measures** – identification and practical demonstration of cost effective climate change mitigation measures in agriculture and forest land;

✓ **Policy uptake** – tools for analysis and projections of climate change mitigation impacts and proposals for inclusion of the project measures into national policy planning documents.

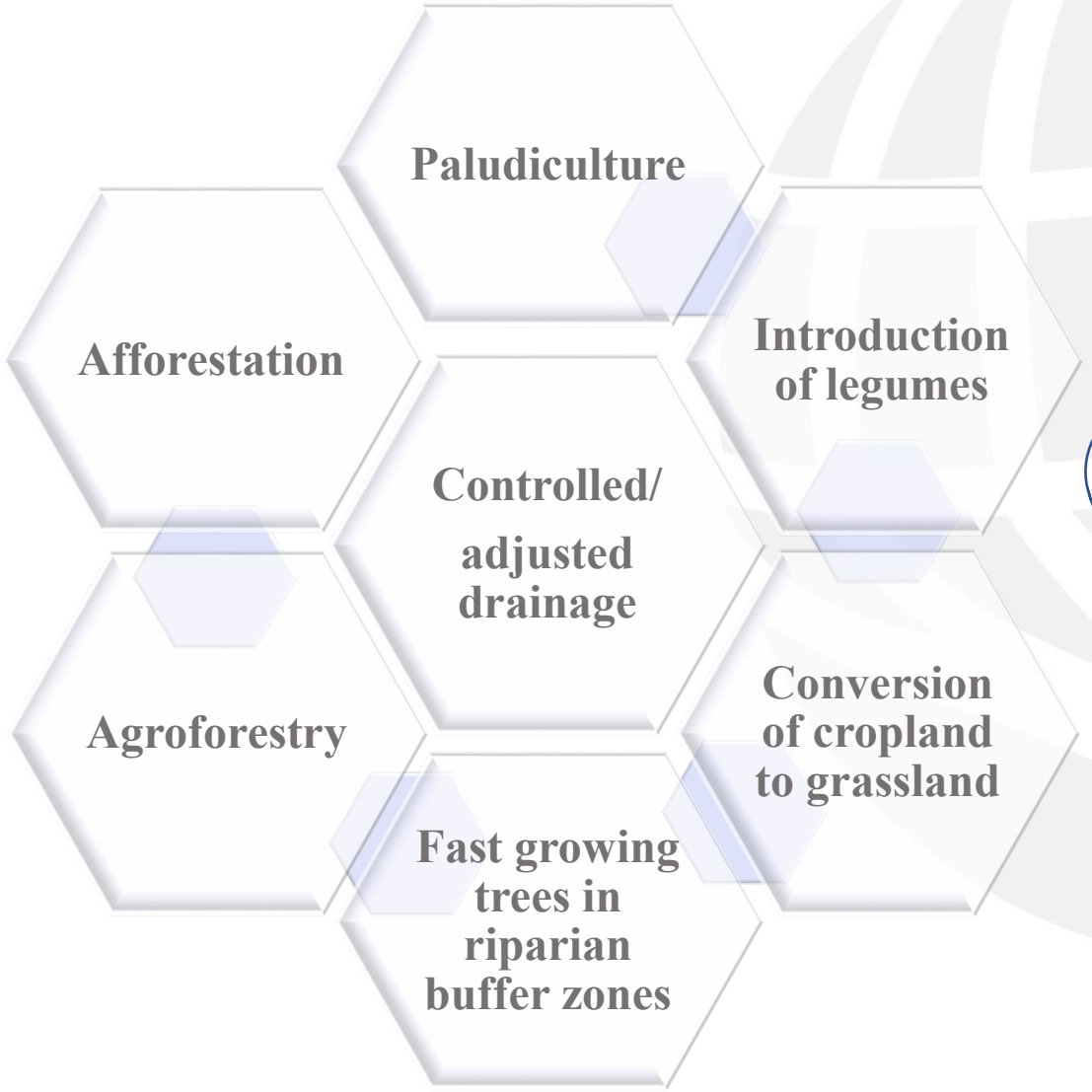
Demonstration of GHG mitigation measures

Demonstration sites: 10 sites in forest land, 7 in agriculture land. 14 sites in Latvia, 3 sites in Finland.




Outcome – knowledge on how to implement climate change mitigation (CCM) measures and what are awaited effects. Scientific (in-situ measurements in demo and reference sites) evidence about GHG effects and carbon input. **Any conclusions – based on direct measurements done by using specifically elaborated, harmonized methodology.**

CCM measures in agriculture land



Measures were selected based on available science and following the sustainability principle of the balance among all three pillars

CCM measures in agriculture land

CCM measure	CCM benefits
Paludiculture: afforestation with black alder and birch grassland → forest	✓Reduced GHG emissions from soil due to improvement of water regime by establishment of mounding and network of shallow furrows ✓ Accumulation of carbon in living and dead biomass, soil and litter and replacement effect of forest biofuel and harvested wood products ✓capability of alders to fix atmospheric nitrogen in symbiosis with the Frankia bacteria (Binkley 1981; Rytter 1996) - favorable for maintaining site productivity after harvest of tree biomass.

One of possible carbon farming/restoration approaches

CCM measures in agriculture land

CCM measure	CCM benefits
Conventional afforestation considering shorter rotation grassland → forest	✓ Reduced GHG emissions from soil (land use change) ✓ Accumulation of carbon in living and dead biomass, soil and litter and replacement effect of forest biofuel and harvested wood products ✓ Shorter rotation (50 yrs) ensure higher yield and replacement effect, as well as reduces carbon losses due to root rot and other disturbances

One of possible carbon farming approaches. Research evidence about GHG mitigation effect differs – project measurements to detect hemi boreal situation.

CCM measures in agriculture land

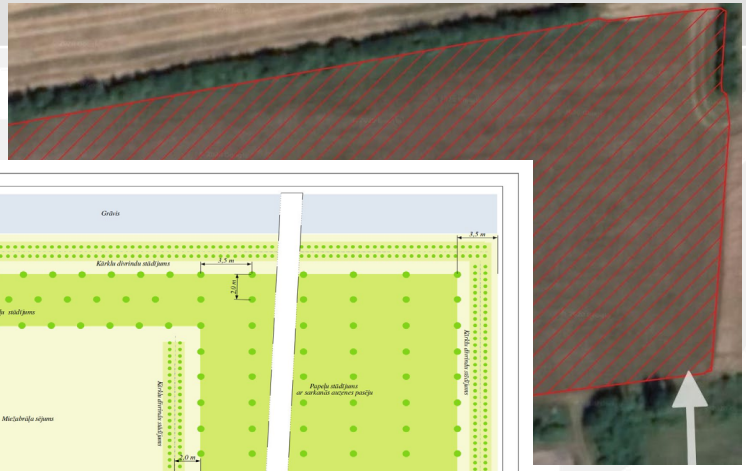
CCM measure	CCM benefits
Agroforestry - fast growing trees and grass cropland → agroforestry	✓ Increased carbon removals in living biomass and soil ✓ Reduced GHG emissions from soil (land use change) and replacement effect of woody (hybrid poplar - *clones: Vesten, OP42 or equivalents with approved suitability to grow in organic soil*) and herbaceous (festuca rubra) biofuel/seeds/fodder production and harvested wood products. Festuca rubra is found in almost all natural grassland areas. ✓ Increased biodiversity as co-benefit

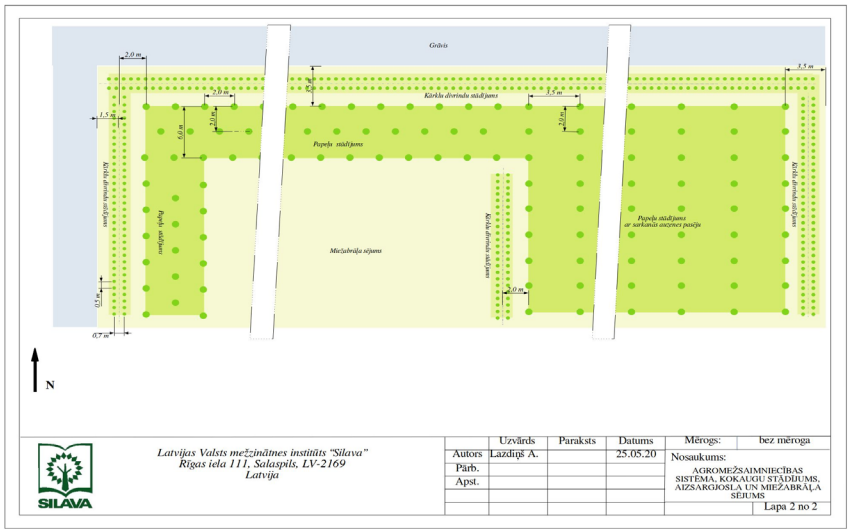
One of possible carbon farming/restoration approaches

CCM measures in agriculture land

CCM measure	CCM benefits
Fast growing species in riparian buffer zones cropland → agroforestry	✓ Increased carbon removals in living biomass and soil ✓ Replacement effect of woody (hybrid poplar and willow) and herbaceous (reed canary grass) biofuel and harvested wood products ✓ Avoided nutrient leakage from farmland

One of possible carbon farming/restoration approaches. Includes agroforestry component.





CCM measures in agriculture land

CCM measure	CCM benefits
Conversion of cropland used for cereal production into grassland cropland → grassland	✓ Reduced GHG emissions from soil (land use change) ✓ Increased carbon stock in soil and below-ground biomass ✓ Reduced risks of nutrient leaching and soil erosion ✓increased biodiversity as co-benefit

One of possible restoration approaches (establishing of pasture/meadow)

CCM measures in agriculture land

CCM measure	CCM benefits
Controlled drainage of grassland considering even groundwater level during the whole vegetation period grassland → grassland	✓ Reduced GHG emissions from organic soils due to reduced fluctuations of groundwater level and due to higher soil moisture and lower soil O_2 (available for aerobic microbial respiration) ✓ Reduced leaching of nutrients to surface water bodies ✓ In summer drought additional water is available to meet crop demand ensuring higher carbon inputs into soil

CCM measures in agriculture land

CCM measure	CCM benefits
Introduction of legumes in conventional farm crop rotation	✓ Reduced N_2O emissions from soil reported in agriculture sector because of avoided mineral fertilizer application and gradual nitrogen input by symbiotic organisms ✓ Increased carbon input with plants ensuring increased soil carbon stock

One of the possibly controversial measures, but is under testing within the project

Where is complexity of climate change mitigation in agricultural peatlands hiding?

Interests of farmers vs public and climate

Still restricted knowledge about the real GHG effects

Substantial lack of up-to-date information about the real condition and spread of organic soil

Restricted information and scientific data available about the socio-economic impacts

Political fear of taking any decisions in a constantly changing regulatory situation

Lack of clarity about organic/peat/peaty/peatland/wetland definitions used, especially in policy docs

Possibly the best solution to minimize complexity and uncertainties – work hard on the best available data and decisions based on regional research data

OrgBalt LIFE project

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For more information welcome to our home page!: https://www.orgbalt.eu

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The project "Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland" (LIFE OrgBalt, LIFE18 CCM/LV/001158) has received funding from the LIFE Programme of the European Union and the State Regional Development Agency of Latvia. www.orgbalt.eu

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