17 SITES FOR DEMONSTRATING CLIMATE CHANGE MITIGATION APPROACHES WITHIN LIFE ORGBALT PROJECT

Demonstration of climate change mitigation (CCM) practices in nutrient-rich organic soils is one of the key elements of the LIFE OrgBalt project. In total 17 demonstration sites are established in Latvia and Finland, with additional reference sites across the Baltic States. By measuring the greenhouse gas (GHG) fluxes in the demonstration and reference sites, the results of implementing various CCM measures is continuously studied.

Regional coverage across the Baltics and Finland

LIFE OrgBalt developed 3 sites demonstrating continuous cover forestry (CCF) management aiming to reduce CO2 emissions from forestry drained peat in Finland and 14 demonstration sites established in Latvia, both on agricultural and forest land. Moreover, GHG fluxes are monitored in 53 sites (including demonstration sites) providing comprehensive data for the whole area of the Baltic States and comparable with data sets available in Finland and Germany. Figure 1 displays the geographic coverage of the demonstration and monitoring sites in boreal climate areas in Finland and temperate region in the Baltic states.

Climate change mitigation measures tested in forestry lands

A detailed description of all demonstration sites and measures applied can be found on the LIFE OrgBalt website. The CCM measures selected for testing for implementation in forest land has some similarities in the implementation, we would like to highlight two key groups: Measures related to afforestation and forest restoration and measures that aimat increase in forestcarbon stocks throughthe modification offorest management practices

Measures related to afforestation and forest restoration

These measures are involving forest regeneration after clear or selective felling activities with following planting of tree species that are suitable for growing in nutrient-rich organic soils, like grey alder, pine, black alder and birch and other tree species. Clearance of drainage systems (ditch system) is part of implementation of some measures. Other scenarios include rewetting aspects (avoided maintenance of drainage systems) and application of wood ash.

For example, a land plot is established where paludiculture practices are implemented by afforestation of grassland with black alder and birch (LVC303), turning a animal feeding glade into a forest stand.

Another method applied is conventional afforestation with

spruce considering shorter rotation (LVC302), in an area previously used as pasture or perennial grassland for fodder production.

Another plot demonstrates the semi-natural regeneration of clear-felling sites with grey alder without reconstruction of drainage systems (LVC309). This is done by using genetically selected planting material and improvinghydrological regime –furrows to ensure excess water runoff to the relief lows.

The implementation of a riparian buffer zone is done in a forest land planted with black alder (LVC311). Tree growing conditions are improved by using high quality plantingmaterial and preparing soil with moundingmethod including establishingof deep furrows for excess surface water drainage in spring time and after rainfalls.

The application of wood ash after commercial thinning in spruce stands (LVC307) is implemented with the purpose to demonstrate enhanced stand growth conditions. 5 tonnes of wood ash material – retained ash that is already carbonized (hardened), are applied per hectare of land.

Moreover, forest regeneration of coniferous trees without the reconstruction of drainage systems (LVC312) is implemented, using the mounding method (and deep furrows to drain excess surface water during springtime and after heavy rains) for soil preparation.

<u>Measures that aim at increase in forest carbon stocks(in soil and biomass) through the modification of forest management practices</u>

This category includes implementing continuous cover forestry (CCF) with repeated selective logging operations as a forest management as an alternative to conventional even aged stand management where tree generations grow in rotation cycles ending to clear felling (harvest).

The CCF method is applied as forest management method in a spruce stand (LVC308), where clear felling is replaced with selective felling.

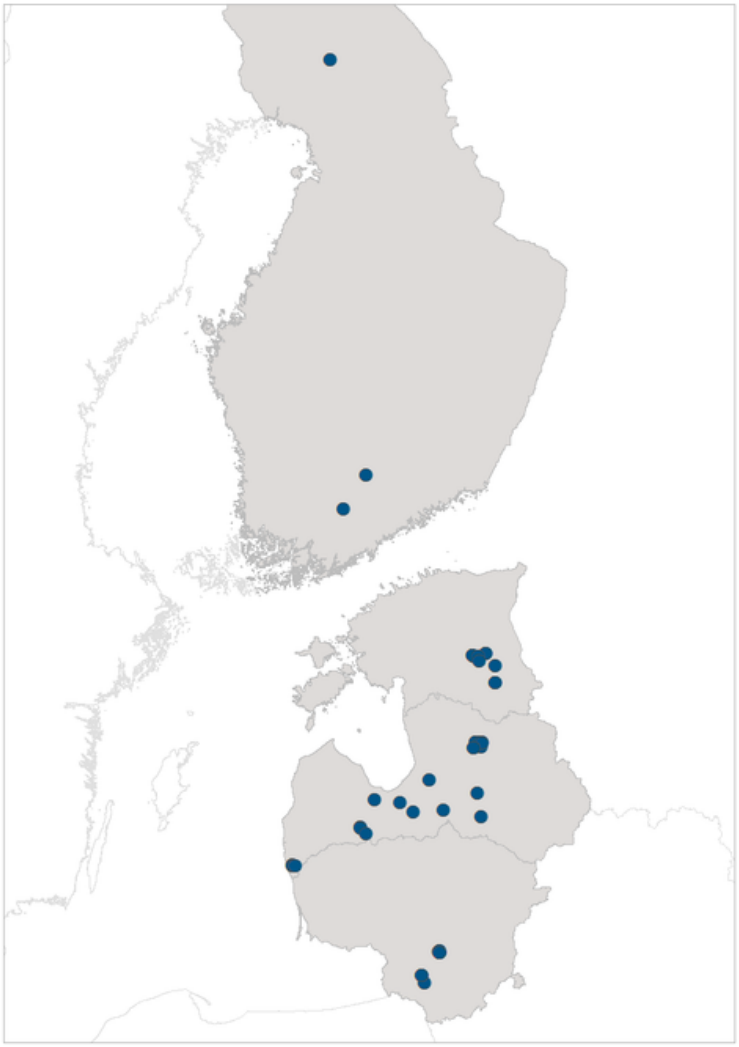

Figure 1. Demonstration and monitoring sites of LIFE OrgBalt.

In another case, strip harvesting in pine stand (LVC313) is implemented, where again clear felling is replaced with selective felling.

CCF management including selective logging in spruce stand without full ditch network maintenance (FIC301) is compared with two even-age forestry management locations (harvest-ready and recently clear-felled area).

Another CCF forestry site in South Finland is established in mixed forest dominated by Scots pine (FIC302). The Northmost CCF site (FIC303) in the LIFE OrgBalt is located close to climatic conditions limiting commercial forestry and it represents small gaps harvesting and natural tree regeneration in mixed stands.

Climate change mitigation measures tested on agricultural land

For measures implemented on agricultural lands and

selected for testing we would like to highlight three key groups: Change of crop type, Complete or partial afforestation of land and Climate smart drainage activities.

Change of crop type

These measures involves change of crops by turning cropland used for cereal production into grassland using fast growing grass types with following agro-technical grass cleaning once per vegetation season and help-planting (if needed to replace cuttings that are dried or damaged by animals).

For example, a plot is dedicated for demonstration of the conversion of cropland used for cereal production into grassland considering periodic ploughing (LVC301). Another measure aims to introduce legumes in conventional farm crop rotation (LVC304a, LVC304b), attracting nitrogen and biomass.

Complete or partial afforestation of land

These measures involve transformation of cropland to tree plantation by planting of specific fast growing tree types like black alder or willows and clearing of drainage systems (ditch system). Trees are planted in buffer zones in lines in perpendicular to the diches in one or several rows.

With the use of fast-growing trees and grass, an agroforestry approach is implemented in one of the sites (LVC306). As a result, a cropland is transformed into a tree plantation.

This category of measures also includes introducing fast growing species in riparian buffer zones (LVC310), where the transformation of strip areas along drainage diches in cropland to tree plantation areas are done to avoid nutrient leaching and increase carbon removals in living biomass and other carbon pools.

Climate smart drainage activities

Within this category of measures, a plot that demonstrates controlled drainage of grassland considering even groundwater level during the whole vegetation period (LVC305) is developed. A reduction in GHGemissions from organicsoils is expected due to limited fluctuations of groundwater level during and outside the growing season, reduced leaching of nutrients to surface water bodies as drainage water is stored in the field.

The methods selected are incorporated and tailored to the specific conditions of the project, and measures in demonstration are innovative in the context of the Baltic states and Finland, and to some extent, also in Germany.

Measurements of greenhouse gas emissions in reference sites

Demonstration sites are complemented by reference sites to evaluate the situation prior to CCM measure implementation and to assess the long term impacts (e.g. grassland afforested 20 years ago). Controlling of the CCM effects is done by establishing control plots besides demonstration sites (e.g. cropland still remaining cropland beside an area where cropland is converted to grassland).

Similarly, CCF forestry sites in Finland have reference sites where data is collected in conventional even aged mature forest stands and recently clear-felled stands planted with next rotation of tree seedlings. Similar measurements of GHGs and environmental data (GHG, water,soil and biomassdata gathering andanalyses) are done in demonstration and reference sites. The same sampling and flux calculation methods are applied both for reference and demo sites, and the same time period is used for sampling to guarantee comparability of data between the sites and countries.

Expected results and future applicability

It is expected that the measures implemented will not only aid in reducing GHG emissions, but also bring other environmental benefits. For example, logging operations in CCF forestry cause only moderate disturbance to forest floor vegetation and thus forest characteristics for recreational uses are preserved. Some of the practices may reduce risks associated with natural disturbances in forests with wet organic soils, reduce leaching of nutrients to surface water bodies,

increase carbon stock in soil and below-ground biomass, and bring other benefits, depending on the measure implemented.

Besides the tangible environmental benefits, quantitative assessment tools and activity datasets for GHG emissions and CO2 removals will be developed during the project, to demonstrate, evaluate and implement climate change mitigation measures that are appropriate for the situation in the Baltic States, the effectiveness of which has been demonstrated in other countries with similar conditions (e.g. Finland or Germany). The methodological approach developed as a result of the project will be suitable for application outside Baltic States, Finland, Germany and in the whole cool & TCM (temperate cool and moist) climate zone.

LIFE ORGBALT TEAM

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