

DEMONSTRATION OF CLIMATE CHANGE MITIGATION POTENTIAL OF NUTRIENTS RICH ORGANIC SOILS IN BALTIC STATES AND FINLAND

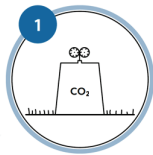
MAIN PROJECT RESULTS AND GHG EMISSIONS' MITIGATION MEASURES



LIFE OrgBalt PROJECT

The general idea of LIFE OrgBalt project is to explore the potential of Climate change Measures (CCM) practices that could contribute to a decrease of Green House Gas (GHG) emissions from drained nutrient-rich organic soils managed for agriculture or forestry purposes and demonstrate how these territories can be managed in a way that is balanced economically, socially, and environmentally.

MAIN RESULTS



IMPROVED GHG CALCULATIONS

Measurements of GHG emissions in managed organic soils which allows to develop and publish regional GHG emission factors. Improving activity data for GHG modelling by developing depth to water and wet area maps.



CLIMATE CHANGE MEASURES

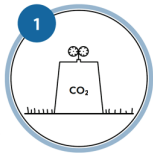
Implementation of sustainable, resilient, and cost-effective CCM management practices in selected demonstration sites Development of proposals for sectoral strategies and action plans to reduce GHG emissions from organic soils



TOOLS AND GUIDANCE

Development of a simulation tool for estimation of GHG emissions and socio-economic benefits of various land-management approaches Demonstration of public and private partnership model in implementation of the CCM measures





IMPROVEMENT OF NATIONAL GHG INVENTORY

Filling the knowledge gaps has been one of the primary roles of the LIFE OrgBalt project throughout the whole implementation period. One of the greatest achievements of the project is development of regionally harmonised, scientifically sound GHG and environmental data collection methodology.

Improvement of GHG inventory was achieved by developing project territory-specific activity data and GHG emission factors (GHG emission factors developed for cropland, grassland and forest land categories, and organic soil area mapping – as regards activity data). Improvement of GHG inventory calculation methods is crucial for more precise GHG inventory calculations and GHG emission projections.

An **emission factor** allows estimation of GHG emissions per unit of activity. It is the average emission rate of a given source, relative to units of activity or process.

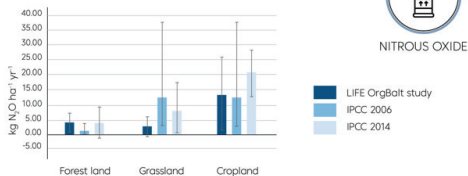
ACTIVITY DATA

Activity data (e.g. land use and management practices and conditions) in one of the most important elements of the GHG calculations and projections from organic soils, especially if change in climate conditions is considered in modelling. A set of maps was developed as a practical tool for planning sustainable soil management activities, both in the forestry and agricultural sectors.

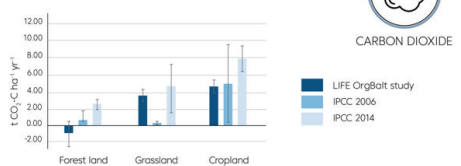
RESULT

GHG flux monitoring allowed the development of regional emission factors for carbon dioxide, methane, and nitrous oxide from drained, nutrient-rich organic soils. Key findings reveal that carbon dioxide and nitrous oxide emissions from grasslands and croplands are comparable and significantly higher than from forest lands. Forest lands showed no soil carbon stock loss, resulting in a negative carbon dioxide emission factor. Considering uncertainties, the methane emission factors developed for drained, nutrient-rich organic soils are not significantly different from the default ones (IPCC 2014) across all land use categories.

*Annual drained nutrient-rich organic soil GHG emission factors

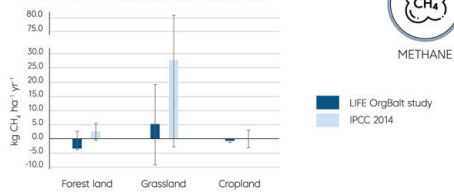


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*results based on scientific manuscripts prepared for or submitted for publishing. Slight changes may occur during the publishing process.

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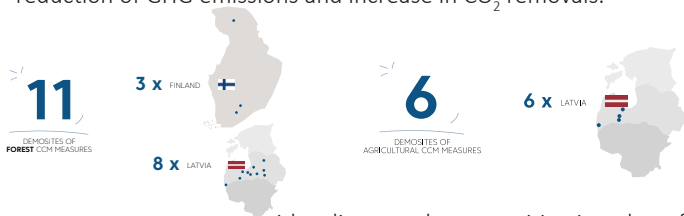


*results based on scientific manuscripts prepared for or submitted for publishing. Slight changes may occur during the publishing process.



CLIMATE CHANGE MITIGATION MEASURES

CCM management practices were implemented in nutrient rich organic soils in 17 demonstration sites on agricultural and forestry lands – each of differing land use type, drainage conditions and other characteristics. The process of establishing the climate change mitigation measures in the demonstration sites differs for each scenario, while the key benefits brought by the practices are the same – reduction of GHG emissions and increase in CO₂ removals.



Examples of management measures with climate change mitigation benefits demonstrated and analysed in the project include such practices as introduction of paludicultures, conversion of cropland to grassland, controlled drainage, agroforestry, continuous forest cover, wood ash application.

Over a two-year period, LIFE OrgBalt project has carried out measurements of GHG fluxes and other environmental variables in agricultural and forest land with nutrient-rich drained organic soils. Data collected at the demonstration sites of implemented CCM scenarios, among other parameters, is analysed and applied in modelling tools developed. The results reveal the most cost-effective climate change mitigation measures in organic soil management.

MAIN RESULTS

Identification of organic soil management practices with the greatest climate change mitigation effects and cost-efficiency.

Main results are available here:

https://www.orgbalt.eu/?page_id=2758



BENEFITS OF CCM MEASURES IMPLEMENTED

- Over a five-year period in agricultural organic soils, the most financially and economically beneficial CCM measure is **Conversion of cropland to grassland** followed by potentially efficient, but still requiring further evaluation, **Controlled drainage of grassland**. These CCM measures appear profitable for landowners and beneficial from socio-economic perspectives, including GHG emission reductions and the provision of ecosystem services. However, due to limited knowledge about the effect of the Controlled drainage of grassland only Conversion of cropland to grassland can be recommended for climate change mitigation while maintaining productivity, and further studies are necessary to reveal the mitigation potential of Controlled drainage.
- **Agroforestry with fast-growing trees and grass** and planting **Fast-growing species in riparian buffer zones** provide the best financial and socio-economic returns among afforestation measures over a 100-year period; however, plant protection measures are crucial to ensure the proposed effect.
- CCM measures – such as **Conventional afforestation** with spruce and **Paludiculture – afforestation of grassland with black alder and birch** show relatively high socio-economic benefits but are not very profitable for landowners. These measures should be taken into account in further political discussions for public funding support to promote practices that ensure climate change mitigation. Significantly higher risks should be considered in the paludicultures.
- In forest lands, the most socio-economically beneficial measures are **Application of wood ash**, especially in mature forests, and **Regeneration with black alder** by planting trees on mounds. **Strip harvesting in pine stands** requires further evaluation of long term effect and the effect of size and shape of openings of the tree growth and soil GHG emissions. Continuous cover as a forest regeneration method in spruce stands is not recommended due to significant increase of risk of natural disturbances and limited ability to regenerate forest stands with high quality planting material. All forestry CCM measures indicate a negative financial outcome for foresters in the long term. Therefore, public funding support should be considered for these measures.

GUIDANCE AND TOOLS



LIFE OrgBalt project has developed two important tools to provide landowners and institutions with a socio-economic analysis of the measures implemented. Although both models are based on data relating to potential implementation of climate change mitigation measures, their target audiences differ. The simulation model serves as a tool for policy planning and decision-making at a regional and national level, meanwhile the PPC model provides site-specific calculations, and

its main target audience is landowners.

SIMULATION MODEL

The Simulation model is a policy planning / decision support tool for projections of GHG emissions and socio-economic consequences of selected management options and initial conditions. The model is designed to reflect activity data, emission factors and socio-economic estimates. It includes geospatial information

layers with data on soil, water and land use related indicators in all target countries.

- Simulation model is developed as a data-based support tool for policy planning and decision-making at a regional and national level.
- It evaluates the impact of climate change mitigation measures on socio-economic benefits of various land-management approaches and GHG emission reduction at a national level for the Baltic States.
- Results of Simulation model also demonstrate potential locations of the GHG emission reduction measures.



Simulation model is available here:

<https://bioekonomika.lbtu.lv/orgbalt/>



PRIVATE AND PUBLIC PARTNERSHIP TOOL

The public and private sector cooperation model (PPC model) – a functional land management model as a tool for climate change mitigation and sustainable soil management. The aim of the model is to suggest innovative land management practices. The model demonstrates how these important territories can be managed while ensuring that economic, social, and climate mitigation benefits are achieved.

The PPC model is created to examine the benefits and costs of proposed CCM practices, financing opportunities, institutional arrangements and enabling conditions that could motivate the implementation of CCM measures. This model is a support tool for estimations of the economic benefits of the CCM land-management measures on multiple levels – national and individual farm levels.

THE PPC MODEL IN PRACTICE

Users can choose the type of land (e.g. agricultural land, forest land) and, after which they are asked to enter a series of relevant data. The model returns economic and financial data to evaluate the return on investment and the potential GHG reductions of the selected scenario.

RESULTS

Model shows that all afforestation measures bring significantly bigger cumulative reductions of GHG emissions than other sets of measures due to more significant changes in land use. Investment costs and financial return differ significantly due to growth rate of selected species and lengths of rotation periods respectively.

Measures related to planting fast growing tree plantations are the most profitable within the group of afforestation measures taken into consideration, while the least profitable is the set of measures related with planting of black alder and excluding the maintenance of drainage systems.

The financial return from agriculture CCM measures is larger and payback period is shorter than that of forestry measures. However, it must be considered that while these sets of measures provide annual income, compared to forestry measures risks related to weather conditions (droughts, frosts, snowless winters, flooding, hail, etc.) may be comparatively higher for the harvest.

The PPC model is available here:

https://www.orgbalt.eu/?page_id=2761



CAPACITY BUILDING

Proposals for sectoral strategies and action plans to reduce GHG emissions from organic soils

Proposals for improvement of sectoral strategies and action plans to reduce GHG emissions from organic soils are developed to provide comprehensive and transparent information on the situation in Latvia and the project partner countries, and in the European Union (EU) as a whole. Organic soil management and GHG accounting improvements are crucial for climate policy as it is now. There are many policy documents – legislative acts, strategies and action plans – not only in the partner countries but also on EU level, which can benefit from improved CCM measures, especially when incorporated in a model that can give the overall picture on both farm level and regionally. The most important documents where the CCM measures can be implemented are the Common Agriculture Policy and National Climate and Energy Plans.

NATIONAL WORKSHOPS AND TRAINING SESSIONS

LIFE OrgBalt organised workshops and training sessions across all Project participant countries – Latvia, Estonia, Lithuania, Finland, and Germany, engaging more than 500 participants. The activities were designed to disseminate the research findings, introduce significance and influence of policy initiatives on organic soil management and enable practical use of supportive tools developed for the sustainable management of nutrient rich organic soils. National workshops included external expert presentations who gave the participants an insight on organic soil management good practices in partner countries for knowledge exchange. National workshops and Training sessions were focused on main Project target groups – landowners and managers, farmers and foresters, NGOs, rural and forestry advisors, scientific organizations as well as policy planners.

THE LIFE ORGBALT PROJECT IN BRIEF

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THE LIFE ORGBALT PARTNERS

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Latvia University of Life Sciences and Technologies
/ <https://www.lbtu.lv>

Ministry of Agriculture of the Republic of Latvia /
<https://www.zm.gov.lv>

Association “Baltic Coasts” / www.baltijaskrasti.lv

Lithuania Lithuanian Research Centre for Agriculture and
Forestry / <https://www.lammc.lt>

Estonia University of Tartu / <https://ut.ee>

Finland Natural Resources Institute Finland LUKE /
<https://www.luke.fi>

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Project website: www.orgbalt.eu

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The information reflects only the LIFE OrgBalt project beneficiaries’ view and the European Climate, Infrastructure and Environment Executive Agency is not responsible for any use that may be made of the information contained therein.

