



LIFE ORGBALT NEWSLETTER



“Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland”



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Abbreviations

COP28 - United Nations Climate Change Conference

CCM - Climate change mitigation

GHG - Greenhouse gas

PPC - Public and private sector cooperation

Dear reader,

Welcome to the 7th edition of the LIFE OrgBalt project newsletter. The last year of our project just started, and we are looking forward to presenting you the results of this four- year research and teamwork. Over the past few months, our team of researchers has been actively engaged in scientific work, adding five further scientific articles to our already long list of publications, contributing valuable insights to the broader scientific community. Our experts continued presenting the project at important international conferences, including the UN Climate Change Conference (COP28) which recently took place in Dubai, sharing and gaining knowledge on the project-related topics. This and much more have been on the LIFE OrgBalt working table since the last edition of our newsletter. Continue reading for the latest updates on the LIFE OrgBalt activities, developments, and events!



THE LIFE ORGBALT PROJECT TEAM





WHERE DO WE STAND?

Time went fast and the final year of the LIFE OrgBalt project have started. During the last months researchers continued their fruitful scientific work publishing their research results in five new scientific articles providing updated data and insights on greenhouse gas emissions fluxes in different types of lands and different conditions (please see the publications below). Continuous attention has also been given to modelling activities. Different modelling tools were tested, and experts have identified the model which best serves the project's needs. Currently a keen work on current input revision and further data inclusion is on-going and soon our experts will finalize the projections of data from the project's demo sites, which will be calculated also basing on the country-specific draft emission factors (EFs) that were calculated within the LIFE OrgBalt project. Our experts continued participating in various events and conferences, including the UN Climate Change Conference (COP28) which recently took place in Dubai, sharing and gaining knowledge on the project-related topics (please see the "Latest events" section). The analysis on the socio-economic impact of the implementation of the project proposed and studied Climate Change Mitigation measures continued and all data are now included in the project developed PPC model. The model will provide landowners with helpful specific financial and socio-economic indicators for each CCM measure implemented in the project relating them to a specific land plot which will be entered by users basing on the current characteristics of their land. In addition, a simulation model for regional-level projections of GHG emissions and socio-economic outputs is developed as a policy planning support tool to be implemented at the regional/national level to estimate GHG emissions and socio-economic benefits of various land-management approaches. More information in this respect will be given in our final newsletter. Our communication team has been actively working with partners and consultative organizations on the organization of a set of training events which will take place during spring 2024 to present both models to interested stakeholders and to provide practical insights on the models functioning. This last phase is particularly important for our communication team which is also actively working to disseminate and highlight at best the project's obtained results. A new short documentary was completed at the end of 2023 to present the main CCM measures implemented and tested within the project with a particular focus on their benefits. As anticipated in the previous newsletter, the project team is now finally taking advantages of all research and collected results to provide our stakeholders, which range from researchers to experts, to consultants, to landowners, to local communities, with practical tools and theoretical conclusions for a better understanding of CCM measures and a better knowledge of their impact.

LATEST EVENTS

LIFE OrgBalt presents the project's results at the UN Climate Change Conference COP 28 in Dubai

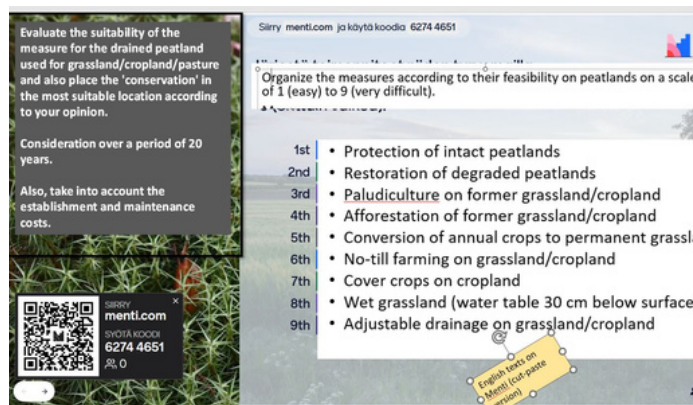


The 28th edition of the Conference of Parties (COP28) took place in Dubai from 30th November to 12th December 2023. LIFE OrgBalt took an active part in the conference, presenting the project's results and their potential contribution to the climate debate during the panel discussion "Contextualized Carbon Sequestration in Agricultural Soils: Potential and Limits" hosted within the Estonia pavilion. The regionally specific drained-nutrient rich organic soils emission factors calculated within the project's framework were officially presented for the first time at COP28.

LIFE OrgBalt experts from all three Baltic States, Finland, and Germany, have been working in close cooperation since the midst of 2019 to calculate regionally specific GHG emission factors for agriculture and forest soils, thus providing locally specific data for GHG inventory improvements. Alar Astover, Professor of Soil Science, Estonian University of Life Sciences, moderated the session on the role of the contribution of agricultural soils in climate change mitigation by sequestration of carbon in mineral soils and reduction of GHG emissions from organic soils. Mineral soils were discussed by Ms Elsa Putku, Soil Science Expert, Centre of Estonian Rural Research and Knowledge, but the role of organic soils and data was presented by the LIFE OrgBalt project. The session focused on the discussion and demonstration of the significance of a locally contextualized approach, to achieve a more carbon-neutral and climate-resilient agriculture. Soils play a crucial role in climate change adaptation and mitigation, being the largest pool of organic carbon in terrestrial ecosystems. However, while it's recognized that sustainable agricultural practices can universally enhance carbon storage in soils, the organic carbon sequestration potential of soils and its impact on climate mitigation varies significantly depending on local climate, soil types, and management practices.

JustFood Living Lab - Vision Workshop

The Vision Workshop for stakeholders' meeting with farmers and local community members in Nurmes, North Karelia was held on Thursday November 9, 2023. This marks the beginning of the LIFE OrgBalt training workshops which has been organized by each partner country until April 2024 to present, show and explain the Public Private Cooperation Model and the Simulation Model to potential users.



A diverse range of stakeholders participated in the workshop which was attended by farmers, local community members and researchers. Several presentations were given. Research Professor Raija Laiho from the Natural Resources Institute Finland started with a detailed presentation on the potential uses of peat fields and their practical implications. Senior Researcher Jyrki Jauhiainen from the Natural Resources Institute Finland then led a discussion to further explore the topics covered in the presentation. The discussion revolved around the relevance of peatlands in various research contexts, the connection between scientific and policy-based information, and how these concepts are understood by farmers, local communities, and NGO representatives. The workshop included also a vision workshop facilitated by University Researcher Ari Paloviita from the University of Jyväskylä and Senior Researcher Jyrki Jauhiainen from the Natural Resources Institute Finland. This interactive session aimed to explore ways to incorporate CCM practices in agriculture, peatland, and forestry in the region. The potential use of the PPC model for planning was also presented, adding a practical element to the discussions. Stakeholders provided important feedback on how to further improve the PPC model. Participants highlighted the benefit of comparing the effects of different land uses and measures side by side provided by the PPC model.

It was suggested to develop further versions in local languages and to provide in addition both an evaluation of the long-term suitability of peatland for different land uses in the model, referring to the changes in the thickness of the organic layer due to the action, and background data based on researched knowledge that is applicable to local conditions.

Presentation:

The impacts of using peatlands for agriculture and possible uses in the future, Jyrki Jauhiainen, LUKE.



Field excursion to Lettosuo: presentations on field methods for estimating soil C-balance in Life OrgBalt



On 1st September 2023 a field excursion was arranged jointly by LifeOrgBalt and Horizon Alfa Wetlands project in conjugation of IBFRA conference 'Climate Resilient and Sustainable Forest Management' in Helsinki. The field excursion brought together about 50 scientists from Life OrgBalt, Horizon Alfa Wetlands and IBFRA conference attendees around the world. During the on-site event LifeOrgBalt scientists explained and demonstrated measurements that are conducted for estimating annual soil C-balance (flux and mass-based measurements) and soil CH₄ and N₂O balance (flux measurements).

DISSEMINATION ACTIVITIES

[LIFE OrgBalt short documentary](#)

[Implemented climate change mitigation measures within LIFE OrgBalt](#)



Another short documentary was completed by the end of 2023. This third documentaries focuses on a short description of the main Climate Change Mitigation measures implemented in the projects. Interviews with our project's experts are included as well as images from some of the project's demo sites. A final short documentary will be developed by June 2024 to present the project's results. Stay tuned!

Scientific publications

Vigricas, E.; Ciuldiene, D.; Armolaitis, K.; Valujeva, K.; Laiho, R.; Jauhiainen, J.; Schindler, T.; Bardule, A.; Lazdinš, A.; Butlers, A.; et al. **Total Soil CO₂ Efflux from Drained Terric Histosols**. *Plants* 2024, 13, 139.

<https://doi.org/10.3390/plants13010139>

Abstract: Histosols cover about 8–10% of Lithuania's territory and most of this area is covered with nutrient-rich organic soils (Terric Histosols). Greenhouse gas (GHG) emissions from drained Histosols contribute more than 25% of emissions from the Land Use, Land Use Change and Forestry (LULUCF) sector. In this study, as the first step of examining the carbon dioxide (CO₂) fluxes in these soils, total soil CO₂ efflux and several environmental parameters (temperature of air and topsoil, soil chemical composition, soil moisture, and water table level) were measured in drained Terric Histosols under three native forest stands and perennial grasslands in the growing seasons of 2020 and 2021. The drained nutrient-rich organic soils differed in terms of concentrations of soil organic carbon and total nitrogen, as well as soil organic carbon and total nitrogen ratio. The highest rate of total soil CO₂ efflux was found in the summer months. Overall, the rate was statistically significant and strongly correlated only with soil and air temperature. A trend emerged that total soil CO₂ efflux was 30% higher in perennial grassland than in forested land. Additional work is still needed to estimate the net CO₂ balance of these soils. Keywords: total soil CO₂ efflux; drained peatland; Terric Histosols; perennial grassland; Norway spruce; black alder; silver birch

Jauhiainen, J., Heikkinen, J., Clarke, N., He, H., Dalsgaard, L., Minkkinen, K., Ojanen, P., Vesterdal, L., Alm, J., Butlers, A., Callesen, I., Jordan, S., Lohila, A., Mander, Ü., Óskarsson, H., Sigurdsson, B. D., Søgaaard, G., Soosaar, K., Kasimir, Å., Bjarnadottir, B., Lazdins, A., and Laiho, R.: **Reviews and syntheses: Greenhouse gas emissions from drained organic forest soils – synthesizing data for site-specific emission factors for boreal and cool temperate regions**, Biogeosciences, 20, 4819–4839, 2023.

<https://doi.org/10.5194/bg-20-4819-2023>

Abstract: We compiled published peer-reviewed CO₂, CH₄, and N₂O data on managed drained organic forest soils in boreal and temperate zones to revisit the current Tier 1 default emission factors (EFs) provided in the IPCC (2014) Wetlands Supplement: to see whether their uncertainty may be reduced; to evaluate possibilities for breaking the broad categories used for the IPCC EFs into more site-type-specific ones; and to inspect the potential relevance of a number of environmental variables for predicting the annual soil greenhouse gas (GHG) balances, on which the EFs are based. Despite a considerable number of publications applicable for compiling EFs being added, only modest changes were found compared to the Tier 1 default EFs. However, the more specific site type categories generated in this study showed narrower confidence intervals compared to the default categories. Overall, the highest CO₂ EFs were found for temperate afforested agricultural lands and boreal forestry-drained sites with very low tree stand productivity. The highest CH₄ EFs in turn prevailed in boreal nutrient-poor forests with very low tree stand productivity and temperate forests irrespective of nutrient status, while the EFs for afforested sites were low or showed a sink function. The highest N₂O EFs were found for afforested agricultural lands and forestry-drained nutrient-rich sites. The occasional wide confidence intervals could be mainly explained by single or a few highly deviating estimates rather than the broadness of the categories applied. Our EFs for the novel categories were further supported by the statistical models connecting the annual soil GHG balances to site-specific soil nutrient status indicators, tree stand characteristics, and temperature-associated weather and climate variables. The results of this synthesis have important implications for EF revisions and national emission reporting, e.g. by the use of different categories for afforested sites and forestry-drained sites, and more specific site productivity categories based on timber production potential. [...] [Read more](#)

Meļņiks RN, Bārdule A, Butlers A, Champion J, Kalēja S, Skranda I, Petaja G, Lazdiņš A. **Carbon Losses from Topsoil in Abandoned Peat Extraction Sites Due to Ground Subsidence and Erosion**. Land. 2023; 12(12):2153.

<https://doi.org/10.3390/land12122153>

Abstract: Peat erosion has a significant impact on soil fertility, agricultural productivity, and climate change dynamics. Through this process, the topsoil rich in organic matter and carbon, (C) is removed and can travel long distances, causing a net C loss.



Additionally, peat undergoes oxidation, resulting in further C loss. In our study, we evaluated C losses from 11 peat extraction fields in two study sites, abandoned for more than 15 years and overgrown by vegetation of different densities. We used high-resolution airborne laser scanning point clouds and multispectral aerial images acquired periodically within a 9-year period, as well as chemical analyses of the topsoil layer. In our study, we found a strong correlation between peat subsidence, C loss, and the vegetation density (NDVI value). NDVI also determines most of the uncertainty in elevation data. We found also that both erosion and peat subsidence are significant sources of C losses from peat extraction sites. At a site monitored for over 9 years, our estimated ground elevation changes ranged from 0.1 cm y⁻¹ to 0.58 cm y⁻¹; however, at a different site monitored over a 4-year period, the values ranged from 2.14 cm y⁻¹ to 5.72 cm y⁻¹. Accordingly, the mean annual C losses varied from 0.06 to 0.22 kg C m⁻² y⁻¹ and from 1.21 to 3.57 kg C m⁻² y⁻¹. [Read more](#)

Mikko Peltoniemi, Qian Li, Pauliina Turunen, Boris Tupek, Päivi Mäkiranta, Kersti Leppä, Mitro Müller, Antti J. Rissanen, Raija Laiho, Jani Anttila, Jyrki Jauhiainen, Markku Koskinen, Aleksi Lehtonen, Paavo Ojanen, Mari Pihlatie, Sakari Sarkkola, Elisa Vainio, Raisa Mäkipää, **Soil GHG dynamics after water level rise – Impacts of selection harvesting in peatland forests**, Science of The Total Environment, Volume 901, 2023, 165421, ISSN 0048-9697
<https://doi.org/10.1016/j.scitotenv.2023.165421>

Abstract: Managed boreal peatlands are widespread and economically important, but they are a large source of greenhouse gases (GHGs). Peatland GHG emissions are related to soil water-table level (WT), which controls the vertical distribution of aerobic and anaerobic processes and, consequently, sinks and sources of GHGs in soils. On forested peatlands, selection harvesting reduces stand evapotranspiration and it has been suggested that the resulting WT rise decreases soil net emissions, while the tree growth is maintained. We monitored soil concentrations of CO₂, CH₄, N₂O and O₂ by depth down to 80 cm, and CO₂ and CH₄ fluxes from soil in two nutrient-rich Norway spruce dominated peatlands in Southern Finland to examine the responses of soil GHG dynamics to WT rise. Selection harvesting raised WT by 14 cm on both sites, on average, mean WTs of the monitoring period being 73 cm for unharvested control and 59 cm for selection harvest. All soil gas concentrations were associated with proximity to WT. Both CH₄ and CO₂ showed remarkable vertical concentration gradients, with high values in the deepest layer, likely due to slow gas transfer in wet peat. CH₄ was efficiently consumed in peat layers near and above WT where it reached sub-atmospheric concentrations, indicating sustained oxidation of CH₄ from both atmospheric and deeper soil origins also after harvesting.



Based on soil gas concentration data, surface peat (top 25/30 cm layer) contributed most to the soil-atmosphere CO₂ fluxes and harvesting slightly increased the CO₂ source in deeper soil (below 45/50 cm), which could explain the small CO₂ flux differences between treatments. N₂O production occurred above WT, and it was unaffected by harvesting. Overall, the WT rise obtained with selection harvesting was not sufficient to reduce soil GHG emissions, but additional hydrological regulation would have been needed. [Read more](#)

Upenieks, E. M. & Rudusāne, A. **Afforestation as a type of peatland recultivation and assessment of its affecting factors in the reduction of GHG emissions**. Rural Development, 2023, 295-300.

<https://doi.org/10.15544/RD.2021.052>

Abstract: Peatlands play a significant role in the regulation of greenhouse gasses (GHG) by sequestering carbon from the atmosphere. Unsustainable peat extraction can lead to an increase in GHG emissions. It is important to recultivate the peatland after the extraction of peat so that it does not become an emitter but remains a carbon sink and sequestrator. One of the most effective and suitable types of recultivation in Latvia that also has a positive effect on GHG circulation is afforestation. The aim of the study is to describe afforestation as a type of recultivation and to evaluate its influencing factors in the reduction of GHG emissions in peatlands. The study analyzed the data obtained in the LIFE REstore project which contains measurements of the three main GHGs (CO₂, CH₄ and N₂O) and the factors affecting them. The results show that in afforested areas the closest correlation with the amount of emitted CO₂ out of all the analyzed factors is formed by soil temperature. As it increases, so do the CO₂ emissions. As the depth of soil increases, the correlation between temperature and CO₂ emissions becomes closer. In the study areas, regularities that would directly explain the relatively low amount of GHG emissions in the afforested areas were not found among the analyzed quantitative factors.

Kristine Valujeva, Elizabeth K. Freed, Aleksejs Nipers, Jyrki Jauhiainen, Rogier P.O. Schulte, **Pathways for governance opportunities: Social network analysis to create targeted and effective policies for agricultural and environmental development**, Journal of Environmental Management, Volume 325, Part B, 2023, 116563, ISSN 0301-4797, <https://doi.org/10.1016/j.jenvman.2022.116563>

Abstract: Participatory techniques are widely recognized as essential in addressing the challenges of agri-environmental policy and decision-making. Furthermore, it is well known that stakeholder analysis and social network analysis are useful methods in the identification of actors that are involved in a system and the connections between them. To identify key stakeholders and improve the transfer of information from national-to farm-level, we compared a stakeholder analysis with farmer-centric networks for primary productivity, carbon regulation and biodiversity through the case study of Latvia. Farmer-centric networks show a higher number of stakeholders communicating on the topic of primary productivity network comparing to other topics.



We found three pathways for improving knowledge transfer in agri-environmental governance: horizontal strengthening of farming community, horizontal strengthening of policy departments, and vertical strengthening between policy departments and farmers. The first step is to ensure that policy-makers have a common understanding of the results that should be achieved. The second step is the transfer of know-how between farmers to develop new solutions. The third step is the training of advisers in the land multifunctionality and the strengthening of communication and knowledge transfer between policy departments and farmers in order to jointly achieve the desired direction at that national level. Long-term cooperation between many stakeholders, including knowledge transfer, the development and implementation of solutions, and monitoring are essential in order to adequately address global societal challenges. The application of our mixed methods approach to elucidate pathways for improved governance of knowledge and information is of direct relevance to other jurisdictions seeking to transition towards multifunctional and sustainable land management. [Read more](#)

THE PROJECT IN BRIEF

Duration: 08/2019 - 08/2024

Project code: LIFE18 CCM/LV/001158

Total PROJECT budget: 3 360 948 EUR

EU LIFE funding: 1 844 004 EUR



The LIFE OrgBalt project aims to improve GHG reporting data (activity data and emission factors) available for nutrient-rich organic soils. Furthermore, the project aims to identify and to demonstrate sustainable, resilient, and cost-effective climate change mitigation measures applicable in nutrient-rich organic soils and to provide tools and guidance for the elaboration, implementation, and verification of the results of climate change mitigation policies. The project is implemented by eight partners from five EU Member States – Latvia, Lithuania, Estonia, Finland and Germany and unites representatives from public administration institutions, and scientific and non-governmental organizations.

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