



LIFE ORGBALT NEWSLETTER



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



IN THIS ISSUE

WHERE DO WE STAND?

LATEST EVENTS

DISSEMINATION ACTIVITIES

THE PROJECT IN BRIEF

Abbreviations

EGU - European Geosciences Union
GHG - Greenhouse gas
ICOS - Integrated Carbon Observation System
PPC - Public and private sector cooperation



Dear reader,

Welcome to the 6th edition of the LIFE OrgBalt project newsletter. We have one year ahead of us before the culmination of the extraordinary journey of the LIFE OrgBalt project. This last year have signed the return to on-site events, which allowed the project's partners to meet in person and discuss the work of the last four years in person. Given the availability of new results, the scientific work of our Scientific team took off with six scientific articles published in the last year. The project was presented at important international conferences, which allowed our experts to share and gain 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



Latvia University
of Life Sciences
and Technologies



LITHUANIAN
RESEARCH CENTRE
FOR AGRICULTURE
AND FORESTRY





WHERE DO WE STAND?

As known, the COVID-19 outbreak brought unexpected challenges, which heavily impacted the project, causing a one-year delay in measurement activities. In this view, the project has been granted a one-year extension, which postponed the project's deadline to August 2024. This extension allowed experts to establish all 17 project demo sites and the scientific team to complete GHG emissions measurements and to work on data collection accurately. We are proud to have finished this phase, overcoming all challenges, and quickly moving on to the next, which concerns data processing and scientific publications' editing. Researchers have published their research results in six 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 networking and educational activities, with our experts participating in various events and conferences and engaging in networking with stakeholders and other projects (please see the "Latest events" section). Modeling activities also actively continue, and our experts are about to finalize the projections of data from the project's demo sites. Parallely, our experts continue testing projected climate data to simulate future GHG emissions. An initial report on proposals for the improvement of sectorial strategies and action plans to reduce GHG emissions from organic soils has been prepared and shared with regional ministries. The analyses of GHG emissions from the project demo sites based on the cross-analysis with data from the project over thirty reference sites will also contribute to a more updated analysis of the socio-economic impact of the implementation of the project proposed and studied Climate Change Mitigation measures. As explained in the previous editions, a public and private sector cooperation model (PPC model) has been created in this respect. The model has been completed and our experts are currently working on the last data revision and integration. 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. Training events will be planned until spring 2024 to present both models to interested stakeholders, landowners, and train final users to learn about their contents and functioning. The models will be publicly available to provide trained users with different financial and socio-economic indicators to evaluate the impact of the proposed measures on specific land plots on the one hand and at the national/regional level on the other. Finally, our communication team is actively working on dissemination activities to inform the public about the project's achievements and future planned activities, including the shooting of a new documentary, which will be released by the end of 2023. After a long, keen work on measurements and theoretical aspects, the project team is moving toward the practical part of the project, where the results of a four-year work period are becoming known, giving a boost to the whole team looking forward to presenting the project's outcome.

LATEST EVENTS

LIFE platform meeting on the benefits of peatland restoration for Europe



On April 26-28, 2023, in Berlin, Germany, top peatlands experts and representatives of 25 LIFE projects and two INTERREG projects working on peatlands met. Best practices and future policy developments for peatlands restoration were discussed. Over 90 participants physically attended the event, while 800 people followed an online event organized on the first day. LIFE OrgBalt experts – Latvian State Forest Research Institute Silava research assistant, LIFE OrgBalt project manager Ieva Līcīte, together with the researcher of the Finnish Institute of Natural Resources LUKE Jyrki Jauhiainen –

had the chance to be one of the protagonists of the event leading the third round of the workgroup “Peatland restoration and climate change mitigation” where they presented the report “LIFE OrgBalt and LIFE Restore projects GHG sequestration effects, the methods of GHG flux measurements and modelling, lessons learned and results”. An additional presentation, “LIFE OrgBalt project’s presentation,” was given by the same speakers to introduce the LIFE OrgBalt project, its objectives and share the lessons learned from the project’s research and field activities.

LIFE OrgBalt and JustFood Joint Webinar



On April 12, 2023, LIFE OrgBalt experts facilitated a joint project webinar for LIFE OrgBalt and JustFood. Moderation and lead of the webinar was done Ellen Huan-Niemi, Luke, who is involved in both projects. During the event, the LIFE OrgBalt project’s experience in working with agriculture organic soils and part of the activities under a living lab currently being set up for the JustFood project, were discussed. One of the LIFE OrgBalt project’s aims is to study the climate and socio-economic impacts of different agricultural organic soil management types. JustFood agroecosystem living lab aims to co-create policy measures to reduce greenhouse gas (GHG) emissions from agricultural peatlands in Finland. One of the main objectives of the living lab is to develop a shared understanding between relevant actors in the food system for creating actions and related policy measures to significantly reduce GHG emissions from agricultural peatlands in Finland.

Researchers from Silava (Ieva Līcīte, research assistant and project manager) and LUKE (Raija Laiho, research professor, and Teea Kortetmäki, postdoctoral researcher) gave the following three presentations:

- The complexity of climate change mitigation in agricultural peatlands, Ieva Līcīte LIFE OrgBalt manager, Latvian State Forest Research Institute SILAVA
- Just food system transition the question of peatland use for food production, Teea Kortetmäki, University of Jyväskylä, Finland
- Functioning of peatlands – implications for land-use impacts, Raija Laiho, Research Professor, Natural Resources Institute Finland (Luke)

BIOGEOMON 2022 - 10th International Symposium on Ecosystem Behavior



BIOGEOMON – Symposium on ecosystem behavior is a regular international forum and meeting point for ecologists and environmental scientists on various topics. The tradition started in 1987 when the first symposium (that time titled GEOMON, as in geologic monitoring) was organized in Prague, Czechoslovakia. It was motivated by a desire to understand the processes governing watershed chemistry. Five years later, the meeting was retitled BIOGEOMON and its focus broadened towards ecosystem manipulations at various scales, applied biogeochemical research, ecological modeling, and other interdisciplinary sciences. The 10th BIOGEOMON symposium was organized by the University of Tartu, Estonia, and the Czech Geological Survey, and took place in Tartu, Estonia on 26–30 June 2022. The focus of BIOGEOMON 2022 was on the biogeochemistry of various ecosystems as influenced by anthropogenic and environmental factors. Empirical and modeling studies on fluxes and processes related to the turnover of major and trace elements at the ecosystem, watershed, landscape, and global scale were considered. We are proud to highlight that several of our LIFE OrgBalt experts and members were involved in the event as organizers (Ülo Mander, Hanna Vahter), as part of the scientific committee (Ülo Mander, Kaido Soosaar) as session convener (Kaido Soosaar). The researchers Hanna Vahter and Muhammad Kamil Sardar Ali also held two poster presentations to give insights on their latest research projects. The following studies involving LIFE OrgBalt experts were presented:

- GREENHOUSE GAS EMISSIONS FROM DRAINED HEMIBOREAL PEATLAND FOREST SOILS IN ESTONIA, Muhammad Kamil Sardar Ali, Thomas Schindler, Hanna Vahter, Ain Kull, Ülo Mander and Kaido Soosaar
- DRAINAGE IMPACT ON N₂O & CH₄ FLUXES FROM GRASSLAND ON A DRAINED NUTRIENT-RICH ORGANIC SOILS – SITES, STEPS AND PRELIMINARY RESULTS, Hanna Vahter, Muhammad Kamil Sardar Ali, Thomas Schindler, Andis Lazdiņš, Ain Kull, Ieva Līcīte, Ülo Mander, Aldis Butlers and Kaido Soosaar

ICOS Science Conference 2022

The Integrated Carbon Observation System, ICOS is a distributed European-wide research infrastructure producing high-precision data on greenhouse gas concentrations in the atmosphere and carbon fluxes between the atmosphere, land, and oceans. This is important because globally, the amount of greenhouse gases in the atmosphere is rising continuously, causing the climate to change. ICOS provides standardized and open data from 149 measurement stations across 14 European countries. ICOS data is used by scientists who seek to understand this Earth System and by various governmental bodies and international organizations that need science-based and relevant information on greenhouse gases in their decision-making and in efforts to mitigate the consequences of climate change. The biennial ICOS Science Conference gathers close to 400 scientists to discuss scientific topics around greenhouse gas measurements and climate change. The themes of the conference vary from purely scientific sessions to ones related to policy-making, education and new developments in instrument manufacturing.



The 5th ICOS Science Conference took place in Utrecht and online worldwide from the 13th to the 15th of September 2022. The overarching theme of the conference was "Tracking progress to carbon neutrality".

The researcher, Hanna Vahter, held a poster presentation to give insights on her latest research project

- [DRAINAGE IMPACT ON GREENHOUSE GAS FLUXES FROM DRAINED NUTRIENT-RICH ORGANIC SOILS UNDER GRASSLANDS IN THE HEMIBOREAL ZONE](#)

Hanna Vahter, Muhammad Kamil Sardar Ali, Thomas Schindler, Andis Lazdiņš, Ain Kull, Ieva Līcīte, Ūlo Mander, Aldis Butlers and Kaido Soosaar

EGU General Assembly 2023



The European Geosciences Union (EGU) General Assembly 2023 brought together geoscientists from all over the world to one meeting covering all disciplines of the Earth, planetary, and space sciences. The EGU aims to provide a forum where scientists, especially early career researchers, can present their work and discuss their ideas with experts in all fields of geoscience.

The EGU23 General Assembly took place in Vienna and online around the world, 23rd to 28th of April 2023 and welcomed 18,831 registered attendees, of which 15,453 made their way to Vienna from 107 countries and 3,378 joined online from 105 countries. Six thousand three hundred fifty-seven presentations were given in 938 sessions. The researcher, Hanna Vahter, held a poster presentation to give insights on her latest research project.

- [DRAINAGE IMPACT ON GREENHOUSE GAS EMISSIONS FROM GRASSLANDS AND CROPLANDS ON NUTRIENT-RICH ORGANIC SOILS IN BALTIC COUNTRIES](#)

Hanna Vahter, Muhammad Kamil Sardar Ali, Thomas Schindler, Andis Lazdiņš, Ain Kull, Ieva Līcīte, Ūlo Mander, Aldis Butlers, Jyrki Jauhainen, Dovile Ciuldiene, and Kaido Soosaar

Nordic-Baltic Workshop on Greenhouse Gas Exchanges and Carbon Cycling in Managed Peatlands



The workshop took place in Vindeln, Sweden, from the 12th to the 15th of June, 2023. The two main set goals were:

- 1) Gather and synthesize the current knowledge on the climate impact of drained and restored peatlands within the Nordic-Baltic domain;
- 2) Explore the possibilities for synthesis papers and common research proposals.

Despite the extensive efforts undertaken by governmental agencies and forest stakeholders to restore drained boreal peatlands in the Nordic-Baltic countries, empirical knowledge for evaluating the implications on the GHG balance is scarce. As a result, the climate impact of drained and restored peatland areas is currently highly uncertain.



The program included a three-day Scientific Part, including plenary lectures, breakout sessions and field trips to natural, drained, and rewetted peatland sites within the Kulbäcksliden and Trollberget research infrastructures and a final discussion with stakeholders, which took place on the fourth day. The researchers Hanna Vahter, Muhammad Kamil Sardar Ali, Korrensalo Aino, and Paavo Ojanen held a poster/oral presentation to give insights on their latest research project.

- HOW DOES DRAINAGE IMPACT GREENHOUSE GAS FLUX EMISSIONS FROM GRASSLANDS AND CROPLANDS ON DRAINED NUTRIENT-RICH ORGANIC SOILS IN BALTIC COUNTRIES?

Hanna Vahter, Muhammad Kamil Sardar Ali, Thomas Schindler, Andis Lazdiņš, Ain Kull, Ieva Līcīte, Ūlo Mander, Aldis Butlers, Kaido Soosaar

- GREENHOUSE GAS FLUXES FROM NUTRIENT-RICH ORGANIC IN ESTONIA AND LATVIA

Muhammad Kamil Sardar Ali, Kaido Soosaar

- PEAT RESPIRATION IN DRAINED PEATLAND FORESTS UNDER VARYING TREE HARVEST REGIMES

Korrensalo Aino, Mäkiranta Päivi, Ojanen Paavo, Laiho Raija, Anttila Jani, Penttilä Timo, Jauhiainen Jyrki, Salovaara Petri, Lehtonen Aleks, Peltoniemi Mikko, Mäkipää Raisa

- IMPACTS OF PARTIAL HARVEST AND CLEARCUT ON METHANE AND NITROUS OXIDE EMISSIONS OF FORESTRY-DRAINED BOREAL PEATLANDS

Paavo Ojanen, Päivi Mäkiranta, Raija Laiho, Timo Penttilä, Kari Minkkinen, Meeri Pearson, Sakari Sarkkola, Jani Anttila, Raisa Mäkipää

DISSEMINATION ACTIVITIES

Scientific publications

Bardule A, Polmanis K, Krumšteds LL, Bardulis A, Lazdiņš A (2023). Fine root morphological traits and production in coniferous- and deciduous-tree forests with drained and naturally wet nutrient-rich organic soils in hemiboreal Latvia. iForest 16: 165-173. –

doi: <https://doi.org/10.3832/ifor4186-016>

Abstract: Fine root production is one of the key elements of carbon (C) turnover in soil in afforested peatlands and forest lands with organic soils. We estimated variability in fine root morphology traits and annual production in hemiboreal forests dominated by coniferous trees (Norway spruce) and deciduous trees (silver birch and black alder) with nutrient-rich organic soils in Latvia. In total, 23 research sites were established in drained and naturally wet forests of different ages, and ingrowth core techniques were used to sample fine roots and subsequently determine fine root morphology traits and annual production and calculate C input through fine root litter. Significant differences in several fine root morphological traits between coniferous- and deciduous-trees-dominated stands were found. [...] [Read more](#)



Butlers, A. & Lazdins, A. Case study on greenhouse gas (GHG) fluxes from flooded former peat extraction fields in central part of Latvia. Research for Rural Development 2022, Annual 28th International Scientific Conference Proceedings, 2022, Vol 37, 44-49.

doi: <https://doi.org/10.22616/rrd.28.2022.006>

Abstract: Flooded Land is defined as water bodies where human activities have caused changes in the amount of surface area covered by water, typically through water level regulation. Former peat extraction fields are a type of flooded lands which are often mentioned significant source of greenhouse gas (GHG) emissions. In Latvia, the area of flooded lands in former peat extraction fields is 5.3 kha. The aim of the study is to evaluate GHG emissions from flooded former peat extraction fields to define that the flooded lands are the key source of GHG emissions and approve that further studies are necessary to elaborate country specific emission factors. The study is implemented in three areas in the central part of the country, where peat extraction was stopped 25-35 years ago. [...] According to the study results, flooded lands are a significant (one of the largest) source of emissions, and further studies are necessary to improve GHG modelling solutions and activity data. [Read more](#)

Petaja G, Ancāns R, Bārdule A, Spalva G, Meļņiks RN, Purviņa D, Lazdiņš A. Carbon Dioxide, Methane and Nitrous Oxide Fluxes from Tree Stems in Silver Birch and Black Alder Stands with Drained and Naturally Wet Peat Soils. *Forests*. 2023; 14(3):521.

doi: <https://doi.org/10.3390/f14030521>

Abstract: The aim of this study was to evaluate the impact of groundwater level, soil temperature and general soil chemistry on greenhouse gas (GHG)—carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O)—fluxes from tree stems in deciduous stands with nutrient-rich naturally wet and drained peat soils. In total, nine sample plots were established in the central and north-eastern part of Latvia. [...] Tree stands of different ages and tree dimensions were selected for the study. [...] The study found that CO₂ fluxes from tree stems show a distinct seasonal pattern and a strong positive correlation with soil temperature. Significant differences in CO₂ fluxes were found between temperature ranges below and above 5 °C, indicating that this temperature represents a threshold value. [...] [Read more](#)

Vanags-Duka M, Bārdule A, Butlers A, Upenieks EM, Lazdiņš A, Purviņa D, Licīte I. GHG Emissions from Drainage Ditches in Peat Extraction Sites and Peatland Forests in Hemiboreal Latvia. *Land*. 2022; 11(12):2233.

doi: <https://doi.org/10.3390/land11122233>



Abstract: We determined the magnitude of instantaneous greenhouse gas (GHG) emissions from drainage ditches in hemiboreal peatlands in Latvia during the frost-free period of 2021 and evaluated the main affecting factors. In total, 10 research sites were established in drained peatlands in Latvia, including active and abandoned peat extraction sites and peatland forests. Results demonstrated that in terms of global warming potential, the contribution of CO₂ emissions to the total budget of GHG emissions from drainage ditches can exceed the CH₄ contribution. The average CO₂ and N₂O emissions from drainage ditches in peatland forests were significantly higher than those from ditches in peat extraction sites, while there was no difference in average CH₄ emissions from ditches between peatland forests and peat extraction sites. Emissions from ditches of all GHGs increased with increasing temperature. In addition, CO₂ and N₂O emissions from drainage ditches increased with decreasing groundwater (GW) level. [Read more](#)

Samariks V, Lazdiņš A, Bārdule A, Kalēja S, Butlers A, Spalva G, Jansons Ā. [Impact of Former Peat Extraction Field Afforestation on Soil Greenhouse Gas Emissions in Hemiboreal Region](#). *Forests*. 2023; 14(2):184.

doi: <https://doi.org/10.3390/f14020184>

Abstract: The reduction of greenhouse gas (GHG) emissions and climate change mitigation are global issues. Peatlands in Europe are widely distributed in the Nordic-Baltic region, and Baltic countries are some of the largest peat suppliers for horticulture in Europe. However, there is no sustainable substitute for peat in the horticulture industry. Therefore, it is necessary to identify suitable re-cultivation types for former peat extraction fields because knowledge about the effect of re-cultivation on annual carbon and GHG budgets is limited. [...] The aim of the study was to assess the influence of diverse re-cultivation management strategies on the GHG emissions of former peat extraction fields. [Read more](#)

Zaiga Anna Zvaigzne ZA, Butlers A. [Application of fourier-transform infrared spectroscopy for quantification of chemical parameters in peat samples](#). International Scientific Conference Engineering for Rural Development, 2023.

<https://www.tf.lbtu.lv/conference/proceedings2023/Papers/TF097.pdf>

Abstract: The demand for the characterization of soil properties on a wide geographical scale with a high spatial resolution is constantly growing to implement various competitive studies, including climate and ecology studies. However, conventional soil analysis methods are time-consuming and expensive. Fourier-transform infrared spectroscopy (FTIR) has the potential to provide an alternative solution for the rapid and cost-effective determination of soil chemical and physical parameters. In this study, we calibrated a mid-infrared diffuse reflectance Fourier transform spectrometer (MIR-DRIFTS). [Read more](#)



Articles

Climate change mitigation scenarios involving drainage activities in grasslands



Drainage and water level management are crucial processes in agriculture to minimize soil degradation and nutrient leaching. In the context of nutrient-rich organic soils in grasslands, the fluctuations in water level can damage the soil and can potentially cause emissions of greenhouse gases. The article gives insights on how managing the level of water in the soil can be beneficial to even out wet and dry periods, both helping the farmer's productivity and soil quality. It focuses on the project's demonstration site LVC305, located at the Teaching and research farm "Vecauce", which differs from others in terms of drainage activities and is set up to measure the impact of controlled drainage of grassland considering even groundwater level during the whole vegetation period, on GHG emissions and other environmental factors.

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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