

Peatland recultivation and GHG inventory: the LULUCF perspective

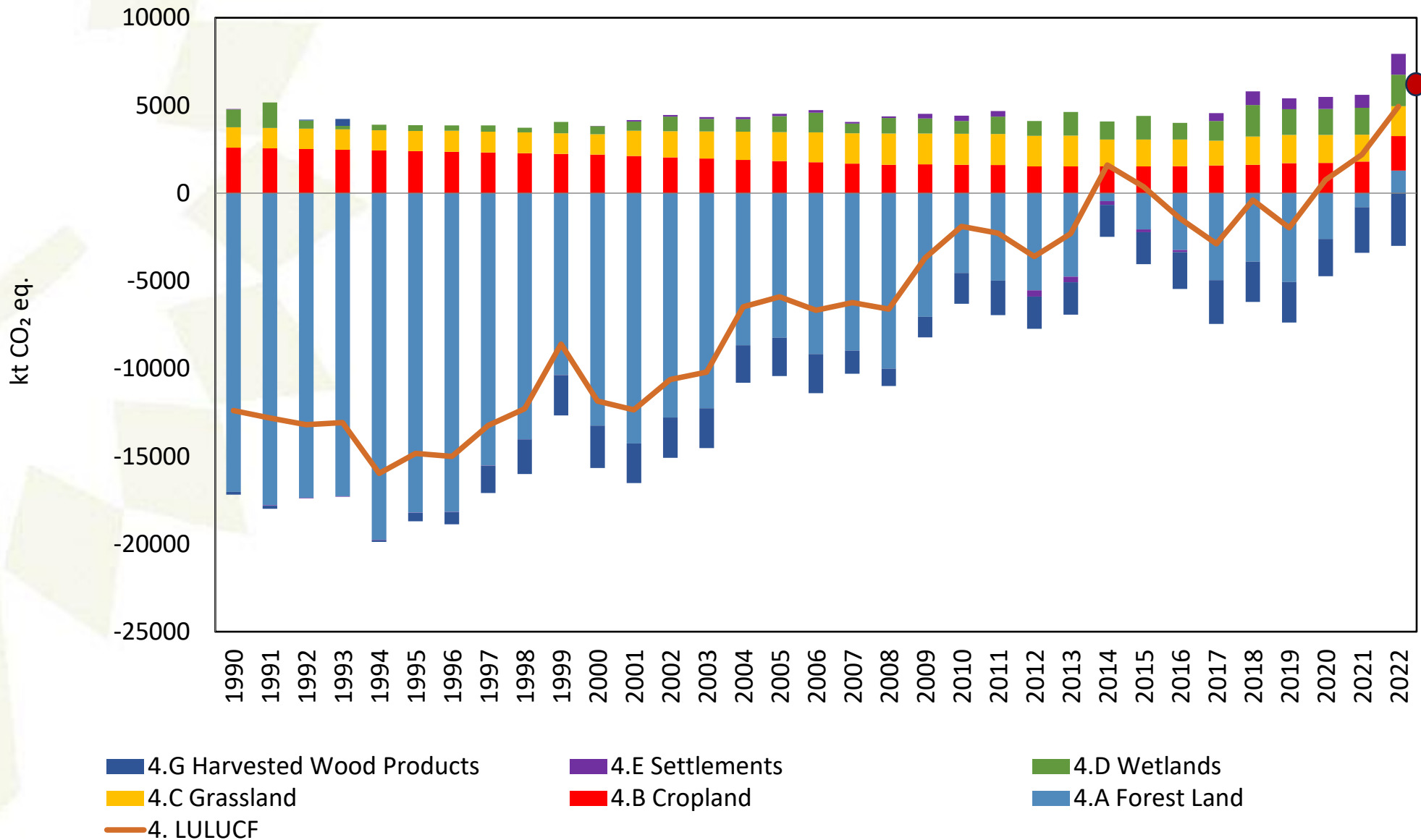
22nd Baltic Peat Producers Forum

19.09.2024

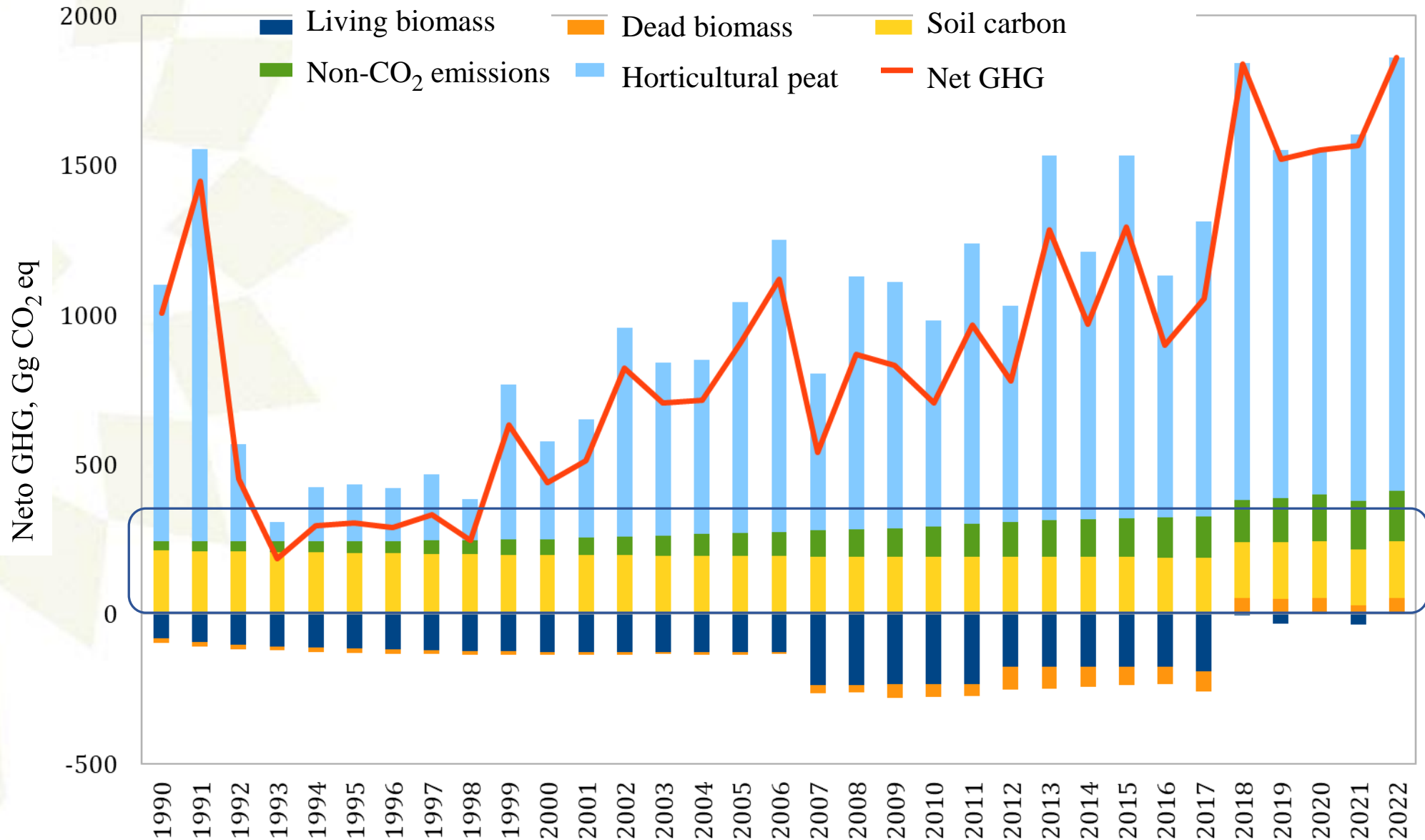
Latvian State Forest Research Institute «Silava»
Andis Lazdiņš, Aldis Butlers, Arta Bārdule, **Ieva Līcīte**

LSFRI Silava, Rīgas iela 111, Salaspils, LV-2169

Where do we stand in GHG inventory: the national picture of Latvia



Zooming in the Wetlands category: GHG sinks and sources



Zooming in the Wetlands category: GHG emission categories



Living biomass

Biomass of woody plants (trees in buffer zones and other groups of trees that do not meet the forest definition, as well as deforestation related wood)

Herbaceous plant biomass (carbon stock change as a result of land use change)

Dead biomass

Dead wood, logging residues (from buffer zones and other groups of trees that do not meet the forest definition, as well as dead wood in deforested areas, carbon input to the soil with litter)

Herbaceous plant biomass (carbon input into the soil with plant residues)

Soil

Carbon losses in drained, renaturalized and flooded organic soils

Carbon losses in drained, renaturalized and flooded mineral soils

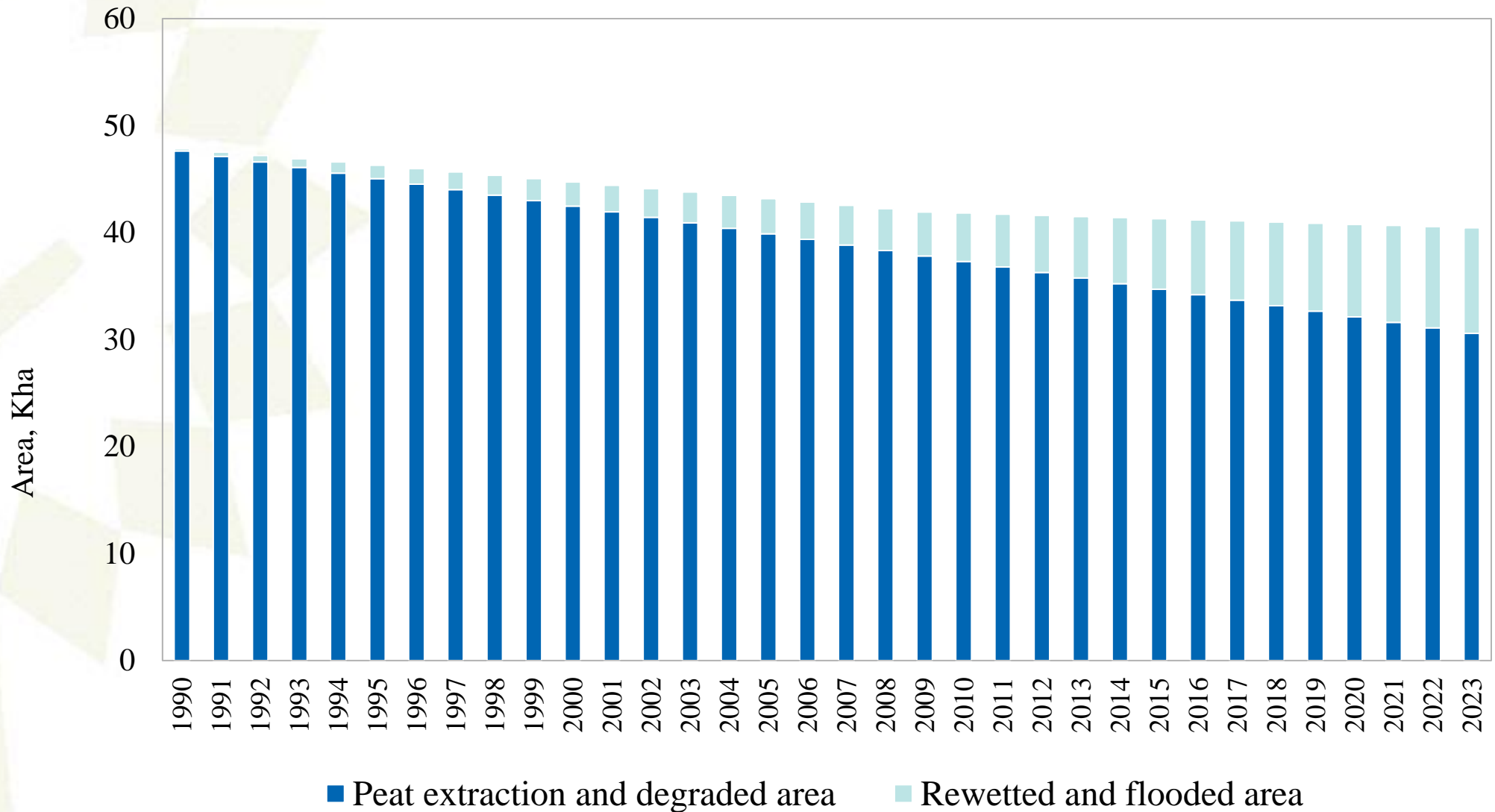
CH₄, N₂O from drained, renaturalized or flooded organic soil

CH₄, N₂O from drained, renaturalized or flooded mineral soil

Horticultural peat

Fires in wetlands (accounting as in forest land)

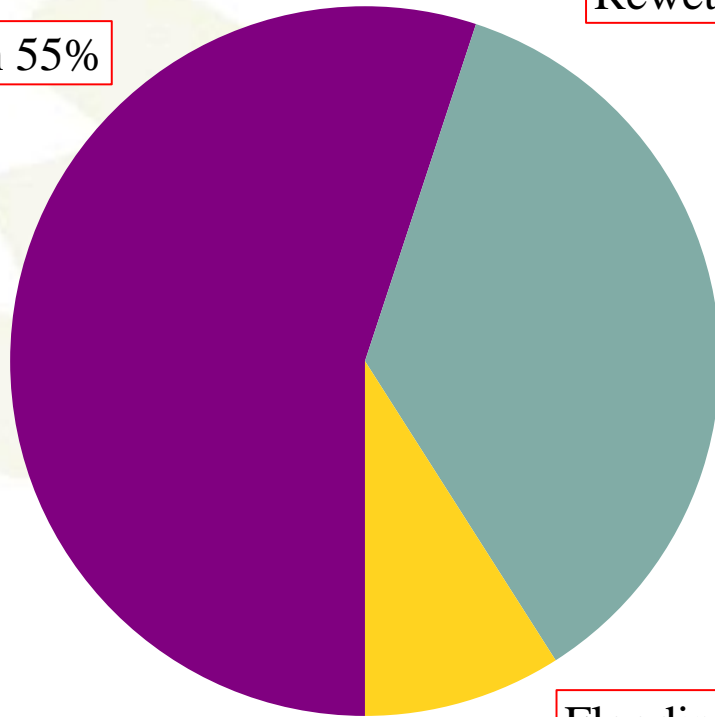
Managed Wetlands in GHG inventory



What do we know about recultivation potential? And impacts?

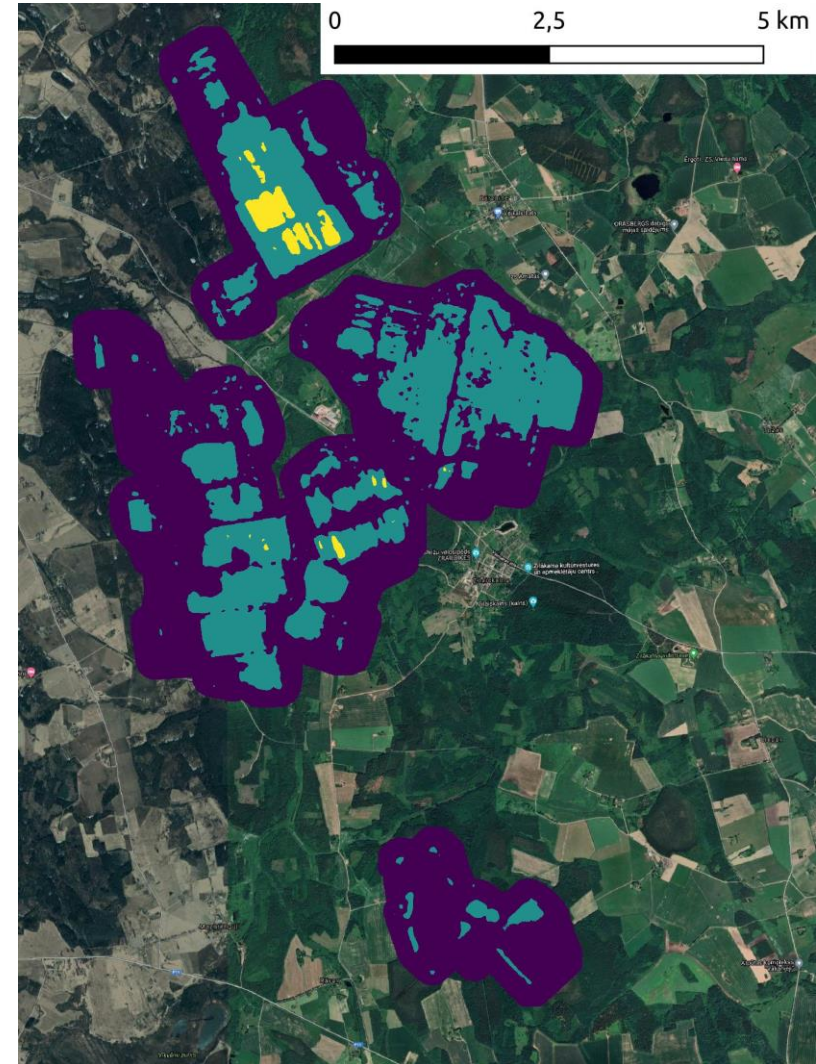
Possible land use by closing drainage systems in peat fields

Afforestation 55%



Rewetting 36%

Flooding 9%

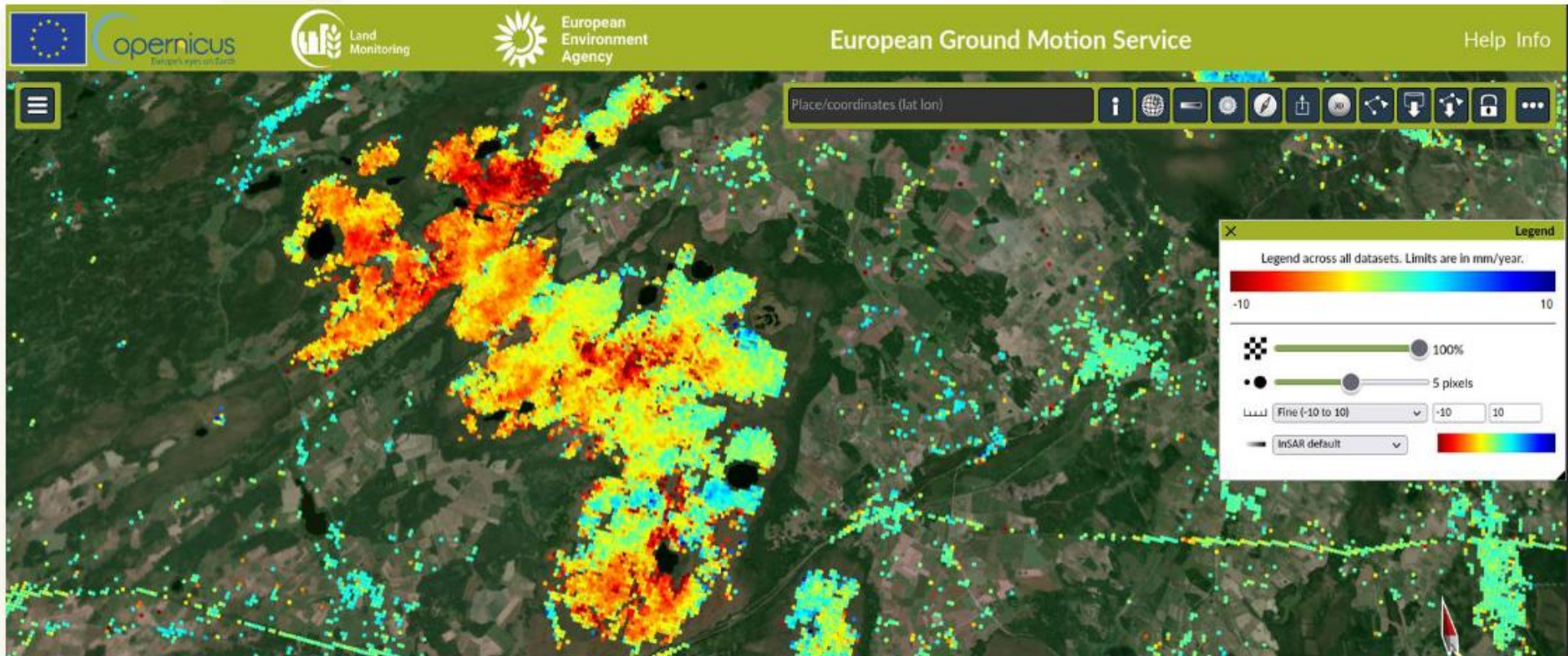


Source: Simulation based on LIFE REstore project results

Teiču mire - one of the least economically impacted areas

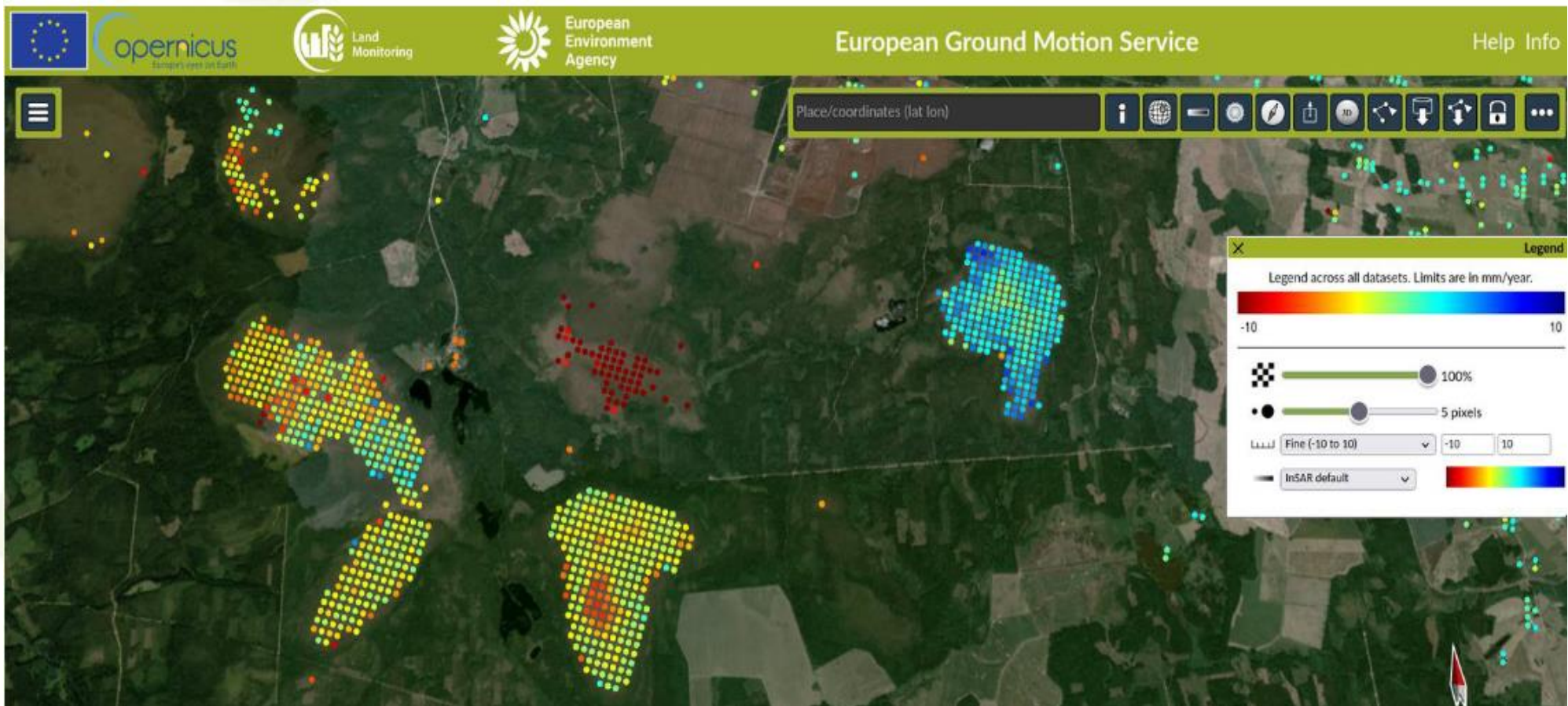


Land surface changes - 10 mm that equal to ~ 27 tons of CO_2 ha^{-1}yr



Ghezelayagh, P., Oleszczuk, R., Stachowicz, M., Eini, M. R., Kamocki, A., Banaszuk, P., & Grygoruk, M. (2024). Developing a remote-sensing-based indicator for peat soil vertical displacement. A case study in the Biebrza Valley, Poland. *Ecological Indicators*, 166, 112305. <https://doi.org/10.1016/j.ecolind.2024.112305>.

Stiklu & Lielsalas mire complex



Peatland management scenarios and related GHG impact projections



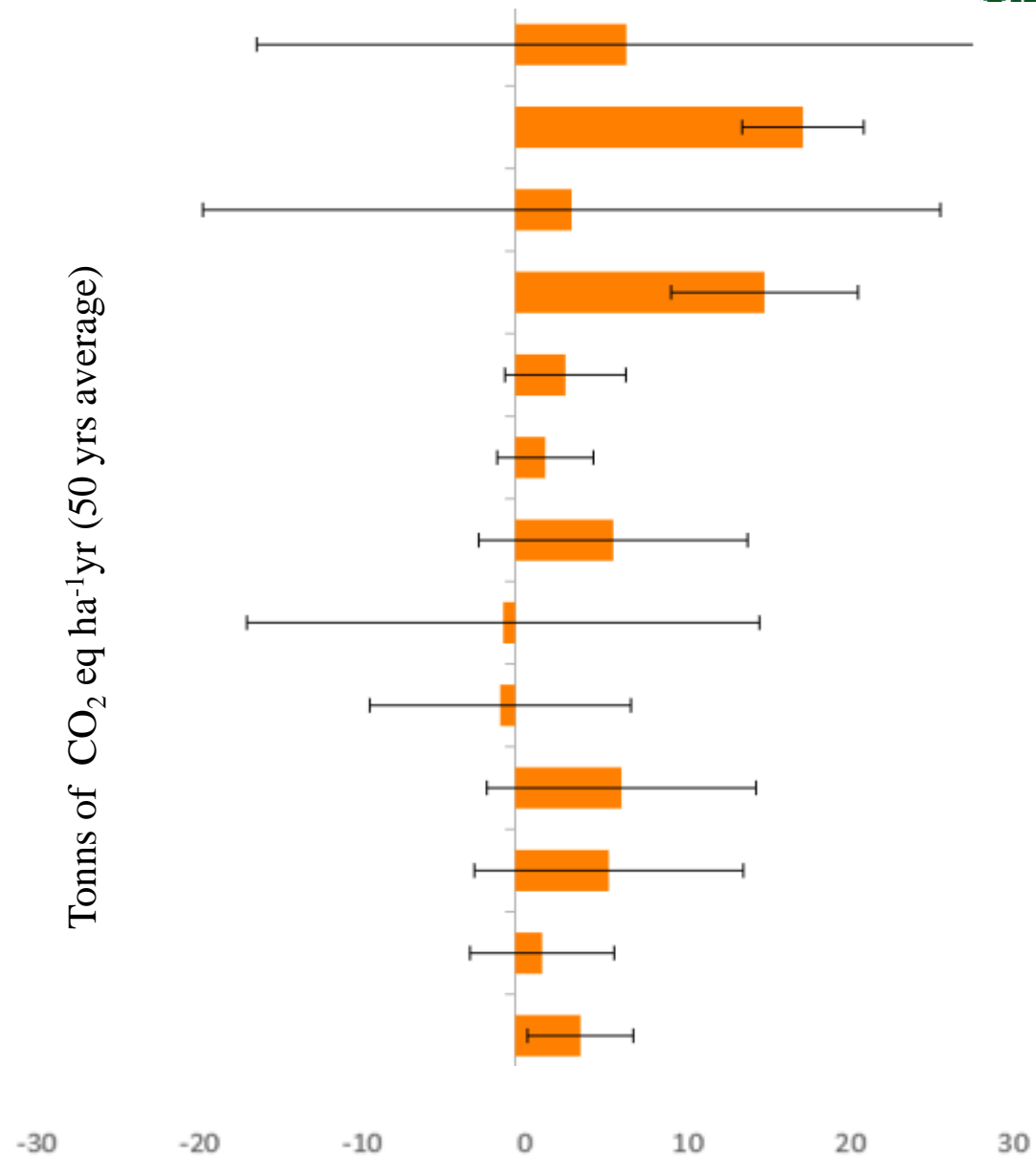
- Peat extraction field
- Abandoned peat extraction field with poorly developed
- Abandoned peat extraction field with developed vegetation (grass, shrubs, individual trees)
- Flooded area
- Paludiculture (reed)
- Sowing of reed canary grass & other grasses
- Renaturalized fen
- Renaturalized mire
- Cranberries, cloudberries, etc., berries characteristic of the bog vegetation
- Blueberries
- An area forested with conifers on drained soil
- Area forested with deciduous trees on drained soil
- An area forested with conifers on wet soil
- An area forested with deciduous trees on wet soil

GHG impact assessment based on IPCC default emission factors and research data

GHG reduction compared to peat extraction field (50 years time horizon)



- Area forested with deciduous trees on wet soil
- Area forested with deciduous trees on drained soil
- Area forested with coniferous trees on wet soil
- Area forested with coniferous trees on drained soil
- Blueberries
- Cranberries, cloudberryes, etc., berries characteristics of the bog vegetation
- Renaturalized mire
- Renaturalized fen
- Sowing of reed canary grass & other grasses
- Paludiculture (reed)
- Flooded area
- Abandoned peat extraction field with developed vegetation (grass, shrubs, individual trees)
- Abandoned peat extraction field with poorly developed vegetation



Emerging research needs



Regulation 2018/1999 Annex V Part 3 amended by Regulation 2023/839 requires Tier 3 estimation of carbon fluxes from the particular land areas (incl. but not only - land use units with high carbon stocks, in particular areas of undrained wetlands, forests and wooded lands) as early as possible and from the greenhouse gas inventory submission in 2030 onwards.

Handbook on the updated LULUCF Regulation EU 2018/841 - Guidance and orientation for the implementation of the updated regulation:

A large area of lands will require Tier 3 methods. Substantial areas meeting these areas (e.g. undrained wetlands) are currently considered as 'unmanaged' under UNFCCC reporting and their emissions and removals are therefore not estimated. The Regulation (LULUCF) still allows not to report the emissions and removals in unmanaged land. Nevertheless, if a Member State applies Tier 3 methods generically for a reporting category (e.g. forest land remaining forest land, wetland remaining wetland), then the requirement will be fulfilled for the aforementioned land areas too.

Emerging research needs



- Assessment of GHG emissions and carbon cycling in bogs and transitional bogs not directly affected by economic activities.
- Changes in groundwater levels and soil carbon uptake by plant residues for modelling GHG emissions and carbon cycling characterizing GHG emissions from wetlands not directly affected by economic activity.
- Integration of different datasets for modelling the carbon cycle and GHG emissions using remote sensing data and meteorological observations.
- Equations for modelling GHG emissions and carbon cycling in areas not directly affected by economic activity.
- Calculation of GHG emissions with the higher level (Tier 3) methods – deterministic model of climatic factors, humidity regime and vegetation cover.

Conclusions



- There is **no one-size-fits-all solution** that would ensure a positive climate effect in all managed wetlands. Probably any recultivation project should combine several measures that ensure the best ratio of emissions reduction and implementation risks.
- An important factor affecting the carbon balance and total emissions from the recultivated area is **CO₂ sequestration in the biomass of living plants**, so to a large extent the potential for reducing GHG emissions – means the biomass increase.
- The **uncertainty of forecasts and the risk of not achieving the expected result** is the most significant problem for climate change mitigation measures.
- **Areas not directly affected by economic activity can be an important source of emissions**, but current knowledge is insufficient to assess what and how to do and how realistic the possibility of emission reduction is.

Thank you!