



DISTRIBUTION OF PEATLANDS AND ORGANIC SOILS IN THE BALTIC SEA REGION



GAPS IN KNOWLEDGE AND CHALLENGES FOR CLIMATE CHANGE MITIGATION

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LIFE OrgBalt
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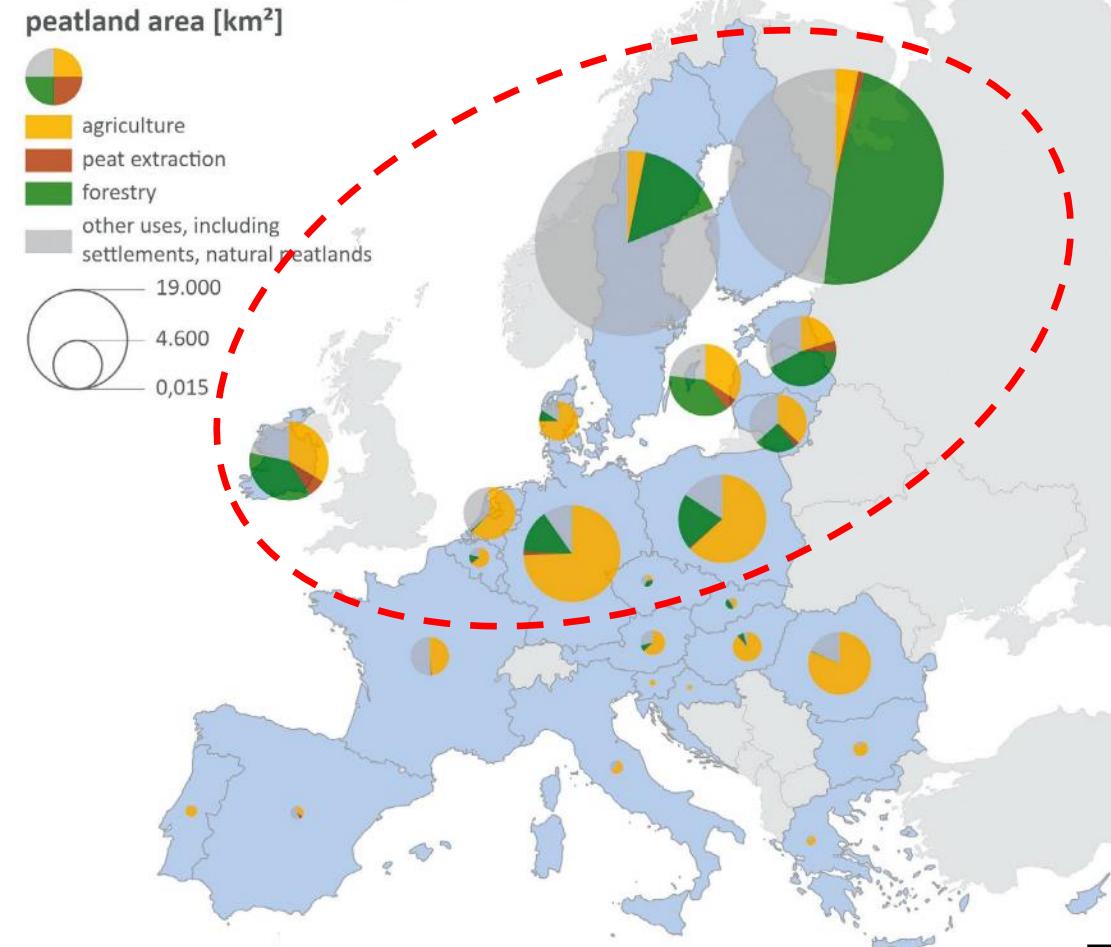


Latvia University
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and Technologies



Peatland use in the EU

- ⇒ Peatlands in the EU are **drained and used** for agriculture forestry and peat extraction
- ⇒ Peatland rich countries of the EU are in **Northern-Central Europe**.



Data: Global Peatland Database 2022
© GreifswaldMire Centre



Peatland use in the EU

⇒ EU is the **2nd largest** emitter of GHG from drained peatlands globally.

⇒ **7%** of the EU's annual GHG emissions = **230 Mt CO₂eq** from total drained peatlands.

(GPD 2022, EEA (2021) <https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer>)

⇒ Disproportional high emissions in some sectors e.g.
agriculture land use:

EU: 25% of agricultural emissions,

⇒ from **3%** of the production area.

Baltic sea littoral countries: **29%-71%** of agricultural emissions,

⇒ from **4%-7%** of the production area

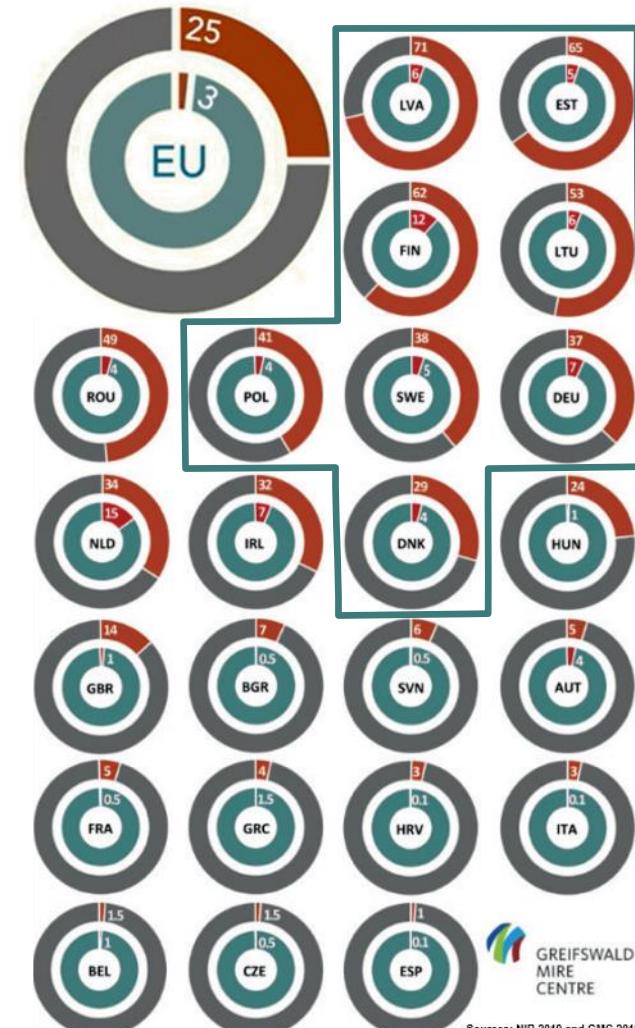


Fig: % of agricultural land on organic soils (inner circle) and % of their GHG emissions of total agricultural emissions (incl. LULUCF - outer circle)

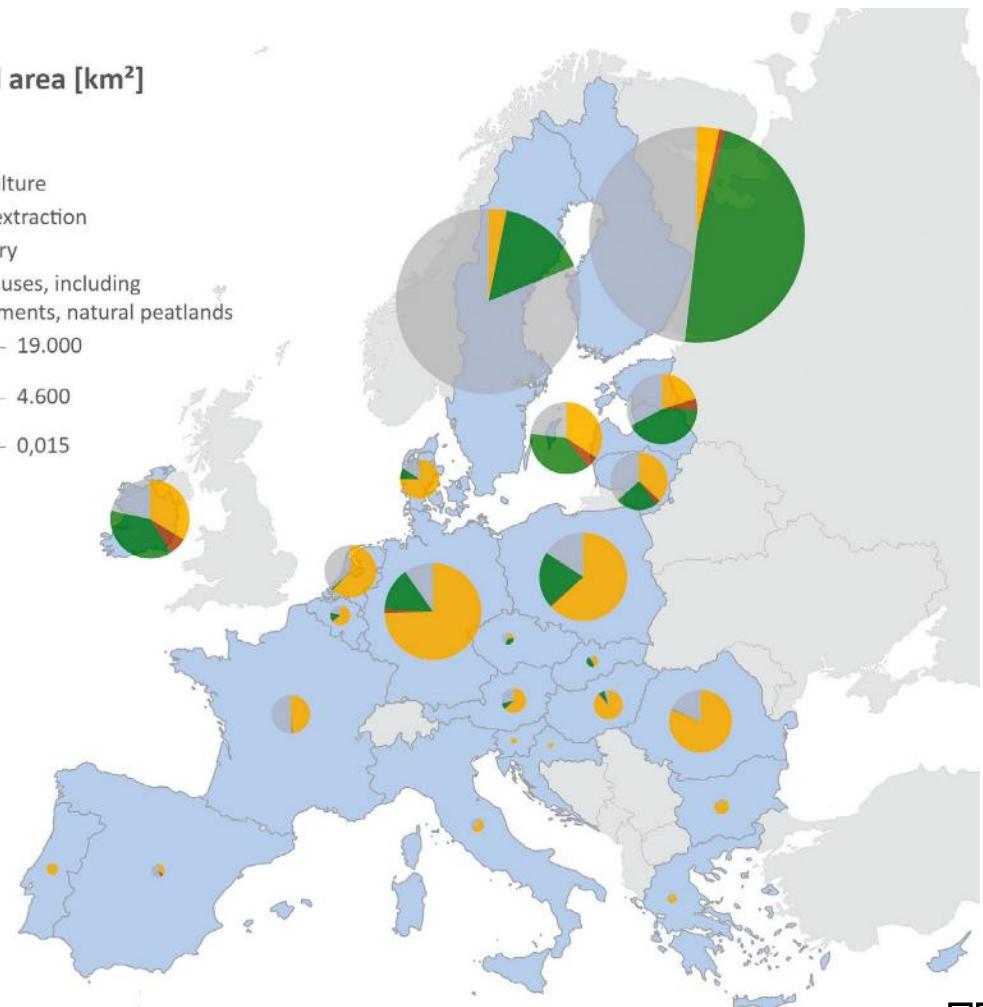
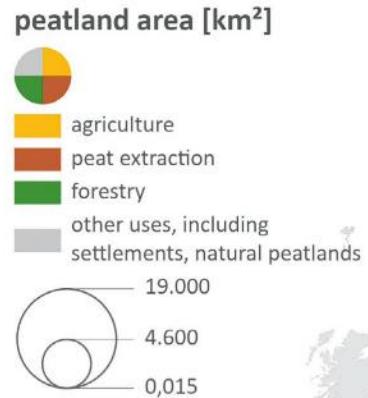
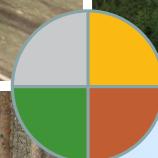
Source Position paper 2020: Peatlands in the EUv4.8.indd (greifswaldmoor.de)



Peatland use in the EU

⇒ Larger areas of **still pristine mires** in the North-East in the **Baltic sea region**

- Protect what is left
- Rewet drained sites



Data: Global Peatland Database 2022
© GreifswaldMire Centre



Distribution of peatlands and organic soils in the Baltic Sea countries

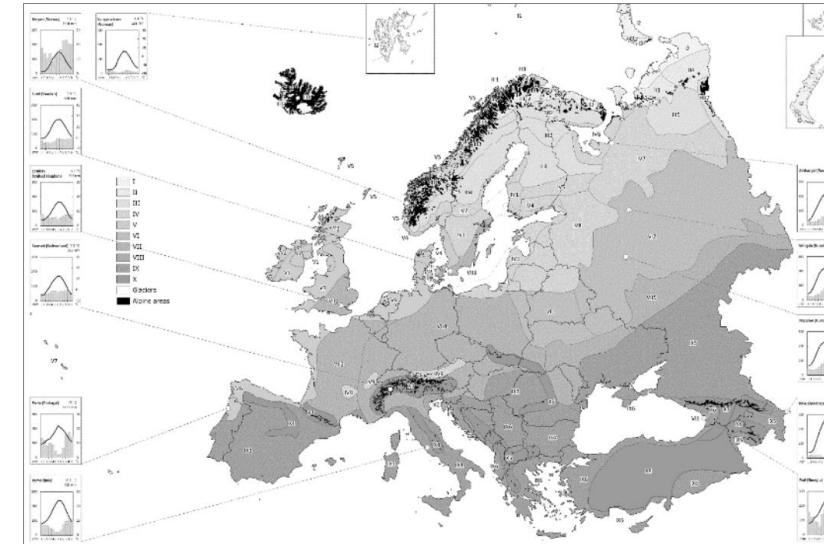
 peatland/organic soil



Peatlands & organic soils in the Baltic sea region

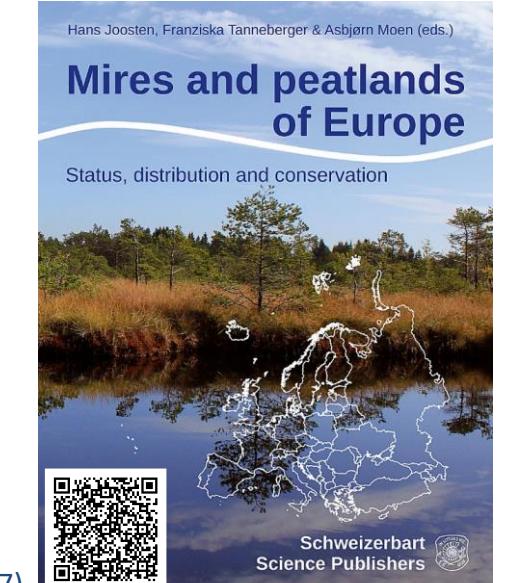


- ⇒ Compiled from available data sources for organic soils in Baltic sea countries (Global Peatland Database 2024)
- ⇒ Landscape approach and ecosystem understanding (geomorphology / topography, hydrology, and climate determine occurrence of peatlands)
- ⇒ All peatlands have formed as mires (in) landscapes



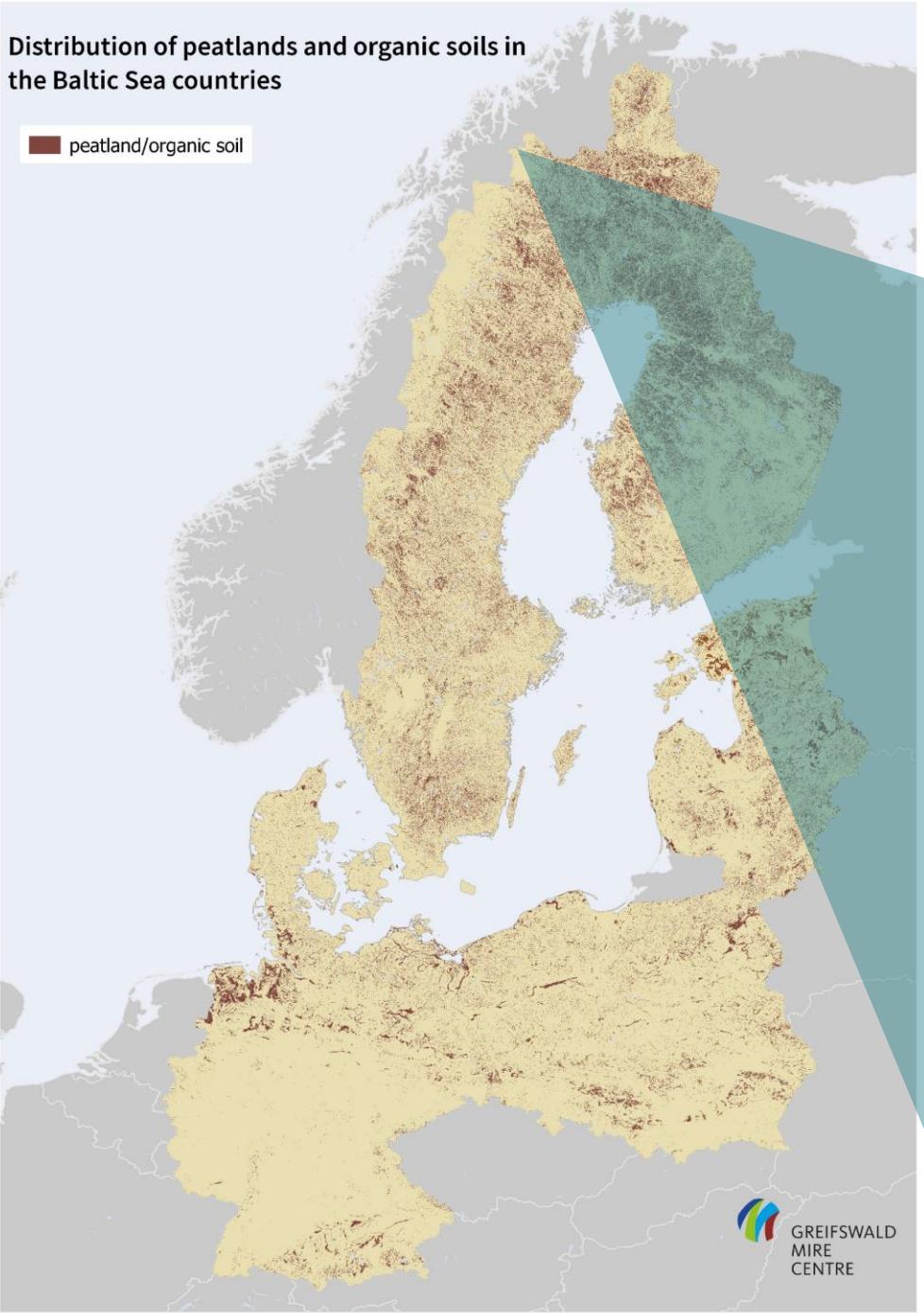
The 10 mire regions and 51 subregions in Europe (Moen et al. 2017)

www.greifswaldmoor.de



Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Mire diversity in the Baltic sea region



II Palsa mire region: Palsa mire at Kilpisjärvi, Finland



(Foto: © Biopix, A. Neuman)

Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Mire diversity in the Baltic sea region



III Northern fen region: Aapa mire complex, Hämeenjänkä, Finland



Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Mire diversity in the Baltic sea region



IV Typical raised bog region: Männiku Raba, Estonia



(Foto: A. Haberl)

Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Mire diversity in the Baltic sea region



IV Typical raised bog region: Purezera purvs, Latvia



(Foto: J. Peters)

Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Mire diversity in the Baltic sea region



IV Typical raised bog region: Reiskiai raised bog, Lithuania



(Foto: A. Haberl)

Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Mire diversity in the Baltic sea region



V Atlantic bog region: Store Mosse, Sweden



(Foto: A. Haberl)

Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Pristine Mires in the Baltic sea region



V Atlantic bog region: Tofte Mose, Denmark



(Foto: © Rune Engelbreth Larsen)

Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Pristine Mires in the Baltic sea region



VI Continental fen and bog region: Čepkeliai Pelkyno, Lithuania



Distribution of peatlands and organic soils in
the Baltic Sea countries

peatland/organic soil



Mire diversity in the Baltic sea region



VII Nemoral-submeridional fen region: Recknitz river valley mire, Germany



(Foto: A. Haberl)

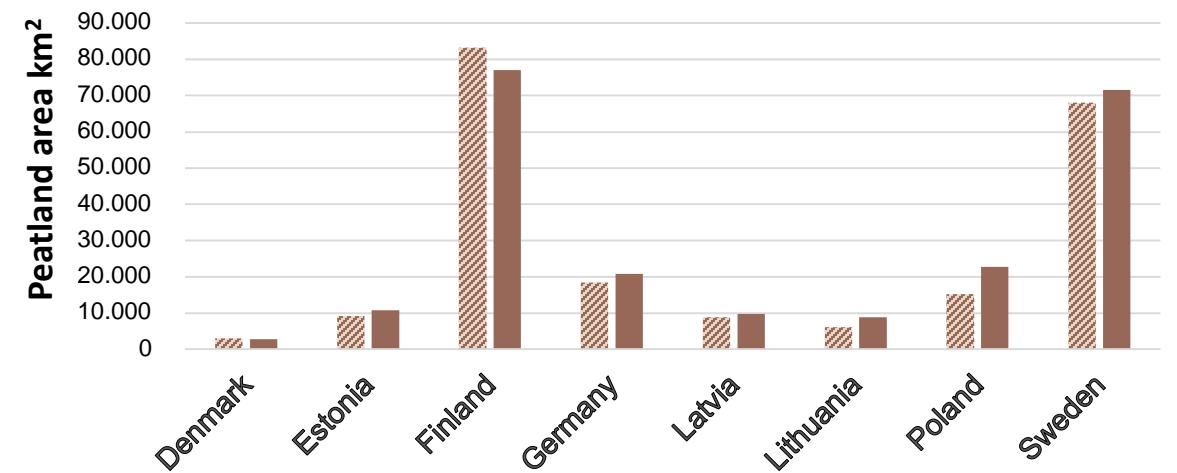
Distribution of peatlands and organic soils in the Baltic Sea countries

peatland/organic soil



Peatlands & organic soils in the Baltic sea region

- ⇒ **224 050 km²** total peatland area in the EU Baltic Sea littoral states (GPD 2024)
- ⇒ **~61%** are drained and degraded (GPD 2022/NIS 2021, agriculture, forestry, and peat extraction)

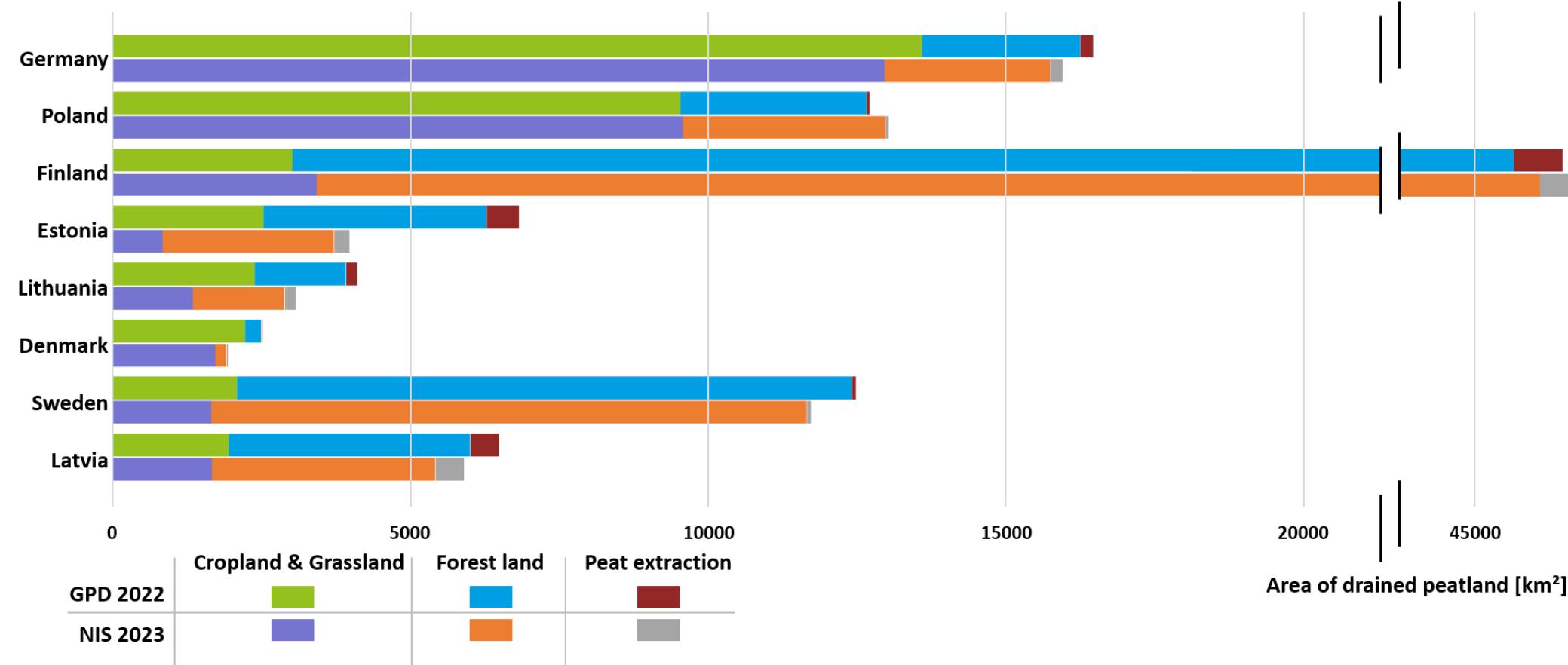


- GPD 2022: Total peatland area km² (Baltic sea region Σ = 211.502 km²)
- GPD 2024: Total peatland area km² (Baltic sea region Σ = 224.050 km²)

Drained peatland for agriculture, forestry & peat extraction in the EU Baltic sea countries GPD'22/NIS'21 vs NIS'23



Partner in the



⇒ The general picture is clear! And we know where we need to start!

Distribution of peatlands and organic soils in the Baltic Sea countries

peatland/organic soil



Why there are inconsistencies with other inventories?



⇒ Differences in modelling and strategic focus

- **incomplete model training data**
(field assessment, up to date ground data)
- **activity data bias**
(sectoral differences in cadasters & definitions)
- **administrative expert knowledge gap**
(lack of ecosystem understanding – technocratic focus)
- **administrative restrictions**
(bureaucratic procedures, e.g. UNFCCC or EU regulations)
- **political programs**
(conflicting priority settings)

⇒ **Communication and ground truthing is needed for further best knowledge updates!**

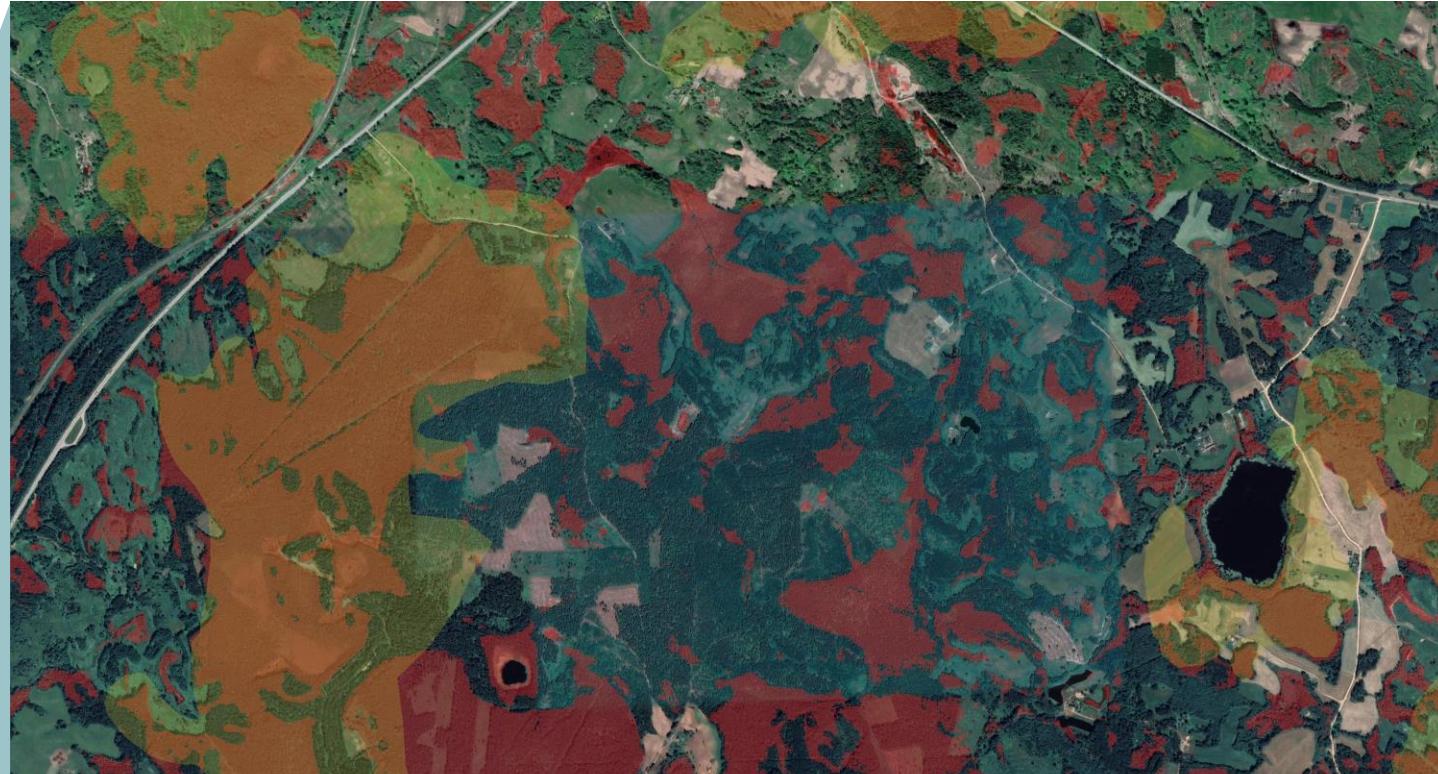
Distribution of peatlands and organic soils in the Baltic Sea countries

peatland/organic soil



Inconsistencies point at gaps in knowledge – SE Latvia

Sectoral inventory vs. landscape based machine learning



Learn more about the machine learning model /GIS approach for LV – organic soils from Janis Ivanovs at the poster session

www.greifswaldmoor.de



Šnore, A. (2013) Küdras ieguve. [Extraction of peat] 432 p.
Riga: NORDIK.

peat layer > 20 cm
Ivanovs, J.; Haberl, A.; Melniks, R. (2024)
Modeling Geospatial Distribution of Peat Layer Thickness Using Machine Learning and Aerial Laser Scanning Data. Land 2024, 13.



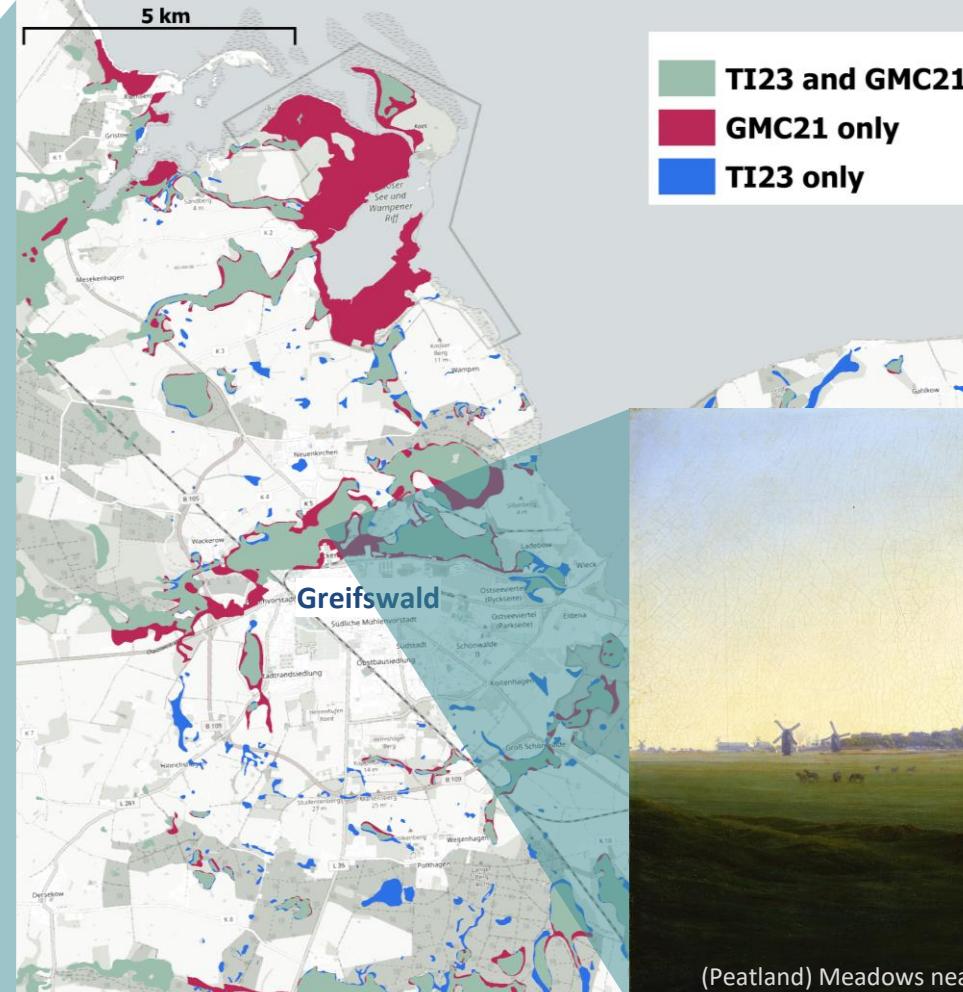
Distribution of peatlands and organic soils in the Baltic Sea countries

peatland/organic soil



Inconsistencies point at gaps in knowledge – on our doorstep

Thünen Institute 2023 vs. GMC/GPD 2021



(Peatland) Meadows near Greifswald, Caspar David Friedrich, 1821/22



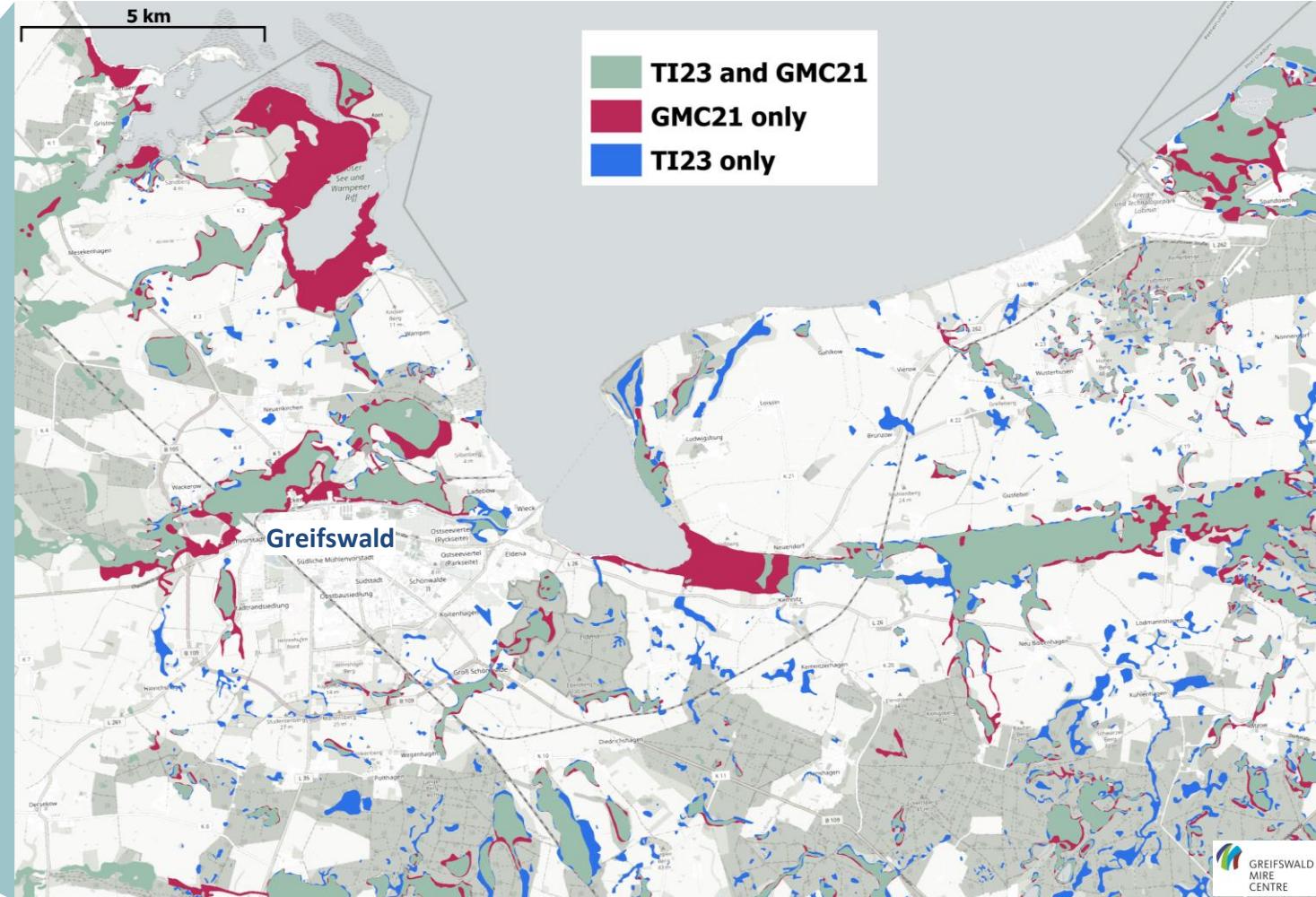
Distribution of peatlands and organic soils in the Baltic Sea countries

peatland/organic soil



Inconsistencies point at gaps in knowledge – we need to fill!

Thünen Institute 2023 vs. GMC/GPD 2021



Distribution of peatlands and organic soils in the Baltic Sea countries

peatland/organic soil



Conclusions

- ⇒ There is no universal and best map.
- ⇒ We know already enough to act.
- ⇒ Inconsistencies should make us aware and stimulate exchange and improvement.
- ⇒ Inclusion of ground water models & topological data improve maps.
- ⇒ To improve modelling more and up to date on ground training plots are needed.



Distribution of peatlands and organic soils in the Baltic Sea countries

peatland/organic soil



Data References, GPD 2024



Denmark

- Adhikari, K. et al. (2013) High-resolution 3-D mapping of soil texture in Denmark. *Soil Science Society of America Journal*, Wiley Online Library; <https://acess.onlinelibrary.wiley.com/doi/abs/10.2136/sssaj2012.0275>.
SKOV- OG NATURSTYRELSEN (2009) Naturbeskyttelsesloven, Lovbekendtgørelse nr. 933 af 24.09.2009 om naturbeskyttelse [Nature Protection Act, Act no. 933 of 24.09.2009 on nature protection, in Danish].

Estonia

- ESTONIAN LANDBOARD (2017) Soilmap of Estonia– Mullastikukaart, National Soilmap of Estonia, Dataset deposit, <https://doi.org/10.15155/re-72>.
KMOCH, A. ET AL. (2021) EstSoil-EH: A high-resolution eco-hydrological modelling parameters dataset for Estonia. *Earth System Science Data*; <https://doi.org/10.5194/essd-13-83-2021>.

Finland

- LUKE OPENDATA (2021) Site main class 2021 (1-4) ©Natural Resources Institute Finland, <https://kartta.luke.fi/index-en.html>.

Germany

- TEGETMEYER, C. ET AL. (2021) Aggregierte Karte der organischen Böden Deutschlands, 2nd revised version. Proceedings of the Greifswald Mire Centre 01/2021 (ISSN 2627-910X), 10 p. [in German].
https://greifswaldmoor.de/files/dokumente/GMC%20Schriften/2021-01_Tegetmeyer%20et%20al.pdf.

- WITTNEBEL, M. ET AL. (2023) Aktualisierte Kulisse organischer Böden in Deutschland. [Updated area of organic soils in Germany, in German], Göttingen: OpenAgrar-Repository. Online: https://atlas.thuenen.de/layers/geonode_data:geonode:ti_kulisse_kat_final_v10.

Latvia

- Ivanovs, J. et al (2024) R. Modeling Geospatial Distribution of Peat Layer Thickness Using Machine Learning and Aerial Laser Scanning Data. *Land* 2024, 13, 466. <https://doi.org/10.3390/land13040466>

- Šnore, A. (2013) Küdras ieguve. [Extraction of peat] 432 p. Riga: NORDIK.

Lithuania

- VŠĮ Gamtos paveldo fondas (2018) Lietuvos pelkių ir durpynų GIS duomenų bazės atnaujinimas.

Poland

- MINISTERSTWO ŚRODOWISKA (2006) System Informacji Przestrzennej o Mokradłach Polski. Instytut Melioracji i Użytków Zielonych w Falentach, Zakład Ochrony Przyrody Obszarów Wiejskich, <http://www.gis-mokradla.info> (data made available as at 30.10.2006).
LASY PAŃSTWOWE (2020). Bank Danych o Lasach, <https://www.bdl.lasy.gov.pl/> (accessed in July 2021).

- KZGW (2010). Mapa Podziału Hydrograficznego Polski 2010 (jeziora, rzeki_s). Krajowy Zarząd Gospodarki Wodnej, Warszawa, <https://dane.gov.pl/pl/dataset/2167/mapa-podzialu-hydrograficznego-polski-w-skali-110> (accessed in October 2021).

- KZGW (2021). Geobaza do aktualizacji planów gospodarowania wodami na obszarach dorzeczy – geobaza aPGW. Krajowy Zarząd Gospodarki Wodnej, Warszawa, <https://apgw.gov.pl/pl/ii-cykl-materiały-do-pobrania> (accessed in August 2021).

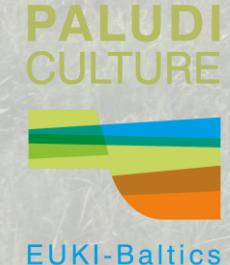
Sweden

- RIMONDINI, ET AL. (2023) Maps of peatlands in the forested landscape of Sweden. Dataset version 1. Bolin Centre Database, <https://doi.org/10.17043/rimondini-2023-peatlands-1>.



PEATLANDS MUST BE WET!

*Learn more about Baltic paludiculture at the poster session:
EUKI Carbon capturing by Baltic peatland farmers*



Implementing Partners:



ESTONIAN
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based on a decision of the German Bundestag

<https://www.succow-stiftung.de/en/peatland-climate/euki-carbon-capturing-by-baltic-peatland-farmers>