

Improving EU MS GHG reporting from Organic Soils

From an assessment of NIDs 2024

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Method

The following approach was implemented

- Use of 2024 reports based on 2022 data
- CRT Tables 4A to 4F and 4(II) examined to identify where organic soils are reported
- NIDs analysed to examine
 - Definition of organic soils
 - Assessment of activity data
 - Tier level and Emission Factors for all categories identified in CRT Tables

Definition of organic soils

Countries do not refer to the official IPCC definition of organic soils (see box)- the definition seems to be complicated to implement

Instead:

- Countries refer to their own soil maps and to the category of **histosols**

Discrepancies come from:

- Percentage of organic matter in the topsoil (9 to 17%)
- Minimum depth of the organic top layer (often 25 or 30 cms are considered)
- Based on scientific literature:
 - Some countries (3) introduce **two types** of organic soils, organic/ organo- mineral, peat/peaty.

Consequences:

- On emission factors
- On activity data

IPCC definition (too complicated?)

Thickness of organic horizon **greater than or equal to 10 cm**. A horizon of less than 20 cm must have 12 percent or more organic carbon when mixed to a depth of 20 cm.

Soils that are never saturated with water for more than a few days must contain more than 20 percent organic carbon by weight (i.e., about 35 percent organic matter).

Soils are subject to water saturation episodes and have either:

- At least 12 percent organic carbon by weight (i.e., about 20 percent organic matter) if the soil has no clay; or
- At least 18 percent organic carbon by weight (i.e., about 30 percent organic matter) if the soil has 60% or more clay;
- or an intermediate, proportional amount of organic carbon for intermediate amounts of clay.

Activity data

Quality work done by MS in general

Discrepancies:

- Some “intermediate” categories difficult to define (eg Cropland in Christmas trees)

Large areas in forests and wetlands

- seem to relate to a lack of definition of “managed land”. (e.g. what spacing of drain ditches in forests?)
- The total of 32Mha seems very high (higher than figures of around 24Mha often reported for EU peatland area)

Land use	Total Areas (Kha)
Forest	12,513
Cropland	1,207
Grassland	2,800
Wetland	15,904
Settlement	210
Other land	0
Total	32,634

Reporting methods

No report of organic soils (6)

Tier 1 methods:

Two main sources of information :

- IPCC Guidelines 2006 (10)
- Wetland Supplement 2013 (4)

Tier 2/3 methods

Variable approaches (7)

- Specific research & monitoring
- WT modelling
- Subsidence modelling
- Vegetation indicators

Specific cases of rewetted peatlands (4)

Reported only by 4 countries (using Tier 1 2013 approach)

Including 2 without emissions estimates

For most land uses: 2 sources of emissions

EQUATION 2.26

ANNUAL CARBON LOSS FROM DRAINED ORGANIC SOILS (CO₂)

$$L_{Organic} = \sum_c (A \cdot EF)_c$$

EQUATION 2.5

EMISSION FACTOR FOR ANNUAL CO₂ EMISSIONS DUE TO DOC EXPORT FROM DRAINED ORGANIC SOILS

$$EF_{DOC} = DOC_{FLUX_NATURAL} \cdot (1 + \Delta DOC_{DRAINAGE}) \cdot Frac_{DOC-CO_2}$$

For Wetlands: various sources of emissions

- Peat extraction: on-site emissions and off-site emissions (for horticulture, not energy)
- Managed land converted into flooded land or new wetland

Overview of Tier 2/3 EFs

Country	Land uses	Origin/method
Denmark	CL, GL	EFs (net ecosystem carbon balances) derived from on-site measurement of net ecosystem exchange and carbon removal in harvested biomass
Finland	CL, FL, GL, WL	EFs derived from on-site measurement of carbon balances completed by a statistical relationship between water table depth and temperature
Germany	CL, GL, S	Depth-to-water-table data simulated by a digital, dynamic groundwater map that is updated annually. The mean water table elevation allows to assess the annual emissions. Settlement emissions are 85% of the grassland emissions to take account of soil sealing.
Ireland	FL, GL, WL, S	EF determined from experimental carbon balance measurements . Results are available for FL and GL in nutrient poor peatlands only. Several country-specific EFs were derived for peat extraction sites.
Latvia	FL, CL, GL, WL, S	All EFs derived from a Life programme which conducted several experiments .
Netherlands	FL, CL, GL	EFs derived from subsidence data related to organic degradation
Sweden	CL, DOC	Review of research results, country survey for DOC in all land categories

Examples of EFs: case of croplands

	Emission Factors (tC/ha/yr)	Comments
Cropland (CL)		
Tier 1		
CL remaining CL	10	Warm temperate
	5	Boreal/ cool temperate
	7.9	
Land converted to CL	5	Boreal/ cool temperate
Tier 2/3		
CL remaining CL	11.5	
	9.685	
	4.8	
	3.78	
	6.1	

Drainage more intensive
→ Cropland is the largest emitter (per ha)

Orders of magnitude equivalent in Tier 1 and Tier 2 methods
But Tier 2/3 tend to be higher (when comparing similar regions)

Examples of EFs: variability of wetland cases

	Emission Factors (tC/ha/yr)	Comments
Wetland (WL)		
Tier 1		
Peat extraction remaining peat extraction, on site	0.2	on-site emissions, nutrient poor
	1.1	on site emissions, nutrient rich
	2.8	For temperate and boreal climate
	2.8	for temperate or boreal climate
Peat extraction remaining peat extraction, off site	0.43	average EF for nutrient rich and poor (tC/t air-dry peat)
	0.4	Nutrient rich peat (tC/t air-dry peat)
	0.45	Nutrient poor peat (tC/t air-dry peat)
Flooded land remaining flooded land	0.34	Appendix 2 utilised with boreal climate and 180 days of ice-free period
Land converted to WL	1.63	
	2.8	
Land converted to WL (for peat extraction)	1.1	assumed nutrient rich
Wetland remaining WL	0.49	proxies are used to distinguish nutrient rich and poor. EF is the average

Wetland categories are very diverse

Do not easily fit with the IPCC categories

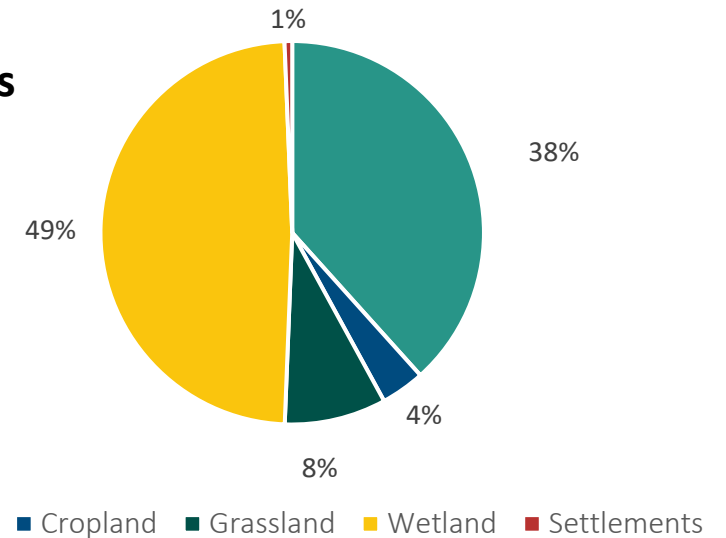
Emissions are not only soil emissions (e.g. off-site peat emissions)

Not always easy to assess if managed or not (e.g. flooded land remaining flooded land)

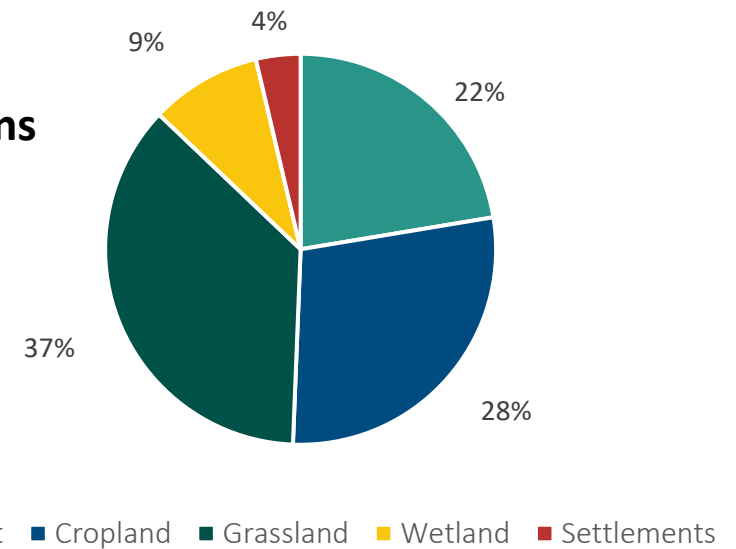
Total areas and emissions reported

Land use	Average IEF in CRT tables* (tC/ha/yr)	Total area (kha)	Total CO2 emissions reported (tCO2/yr)
Forest	1.3	12513	24245
Cropland	7.6	1207	30603
Grassland	3.3	2800	39521
Wetland	2.2	15904	9977
Settlement	4.8	210	3933
Other Land	-	0	0
Total	0,9	32634	108339

Activities



Emissions



Discussion of possible improvements

Organic soil definitions

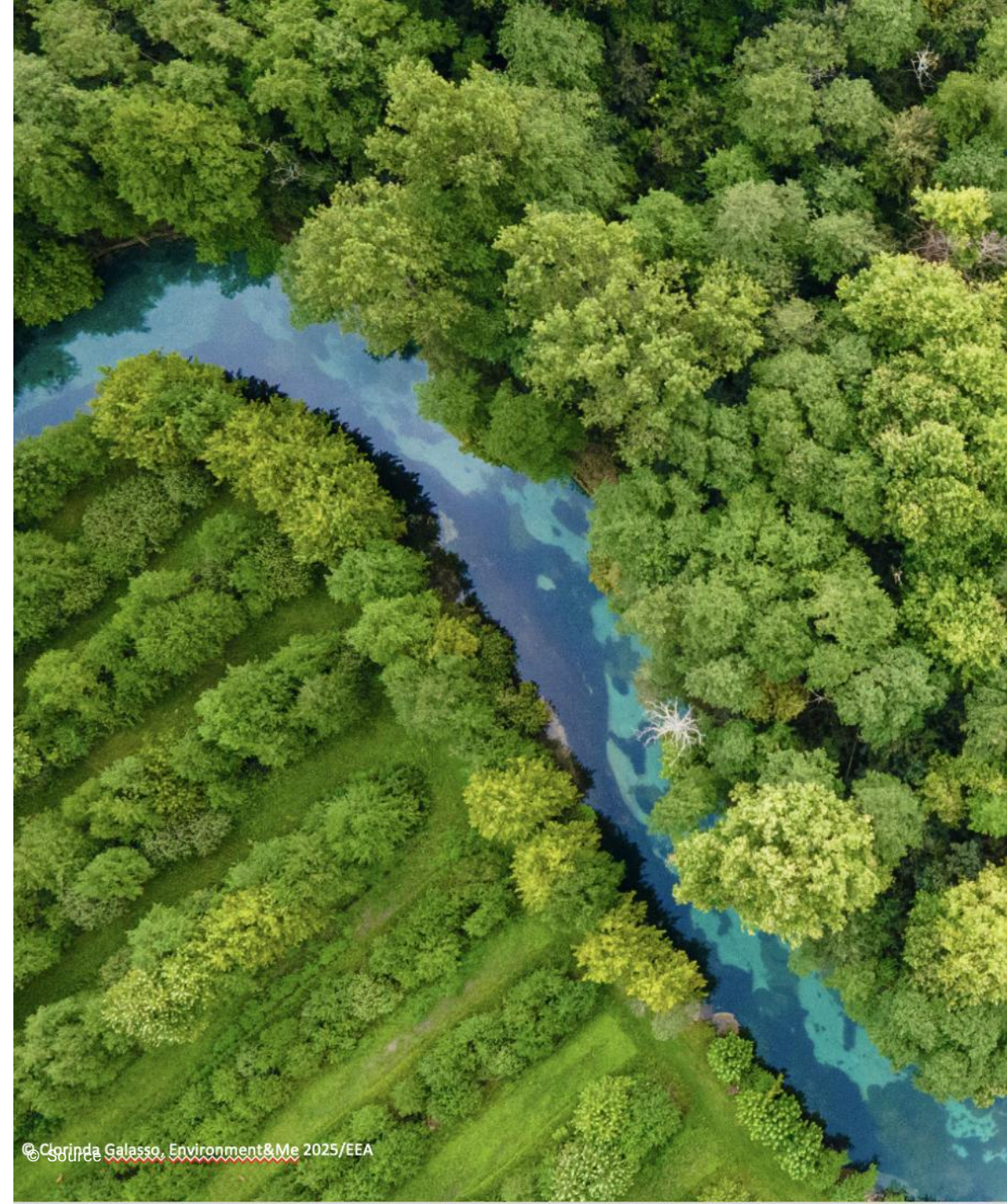
- Compare definitions utilised and assess influence on activity data
- Agree on including two categories of organic soils (peat, peaty)

Areas of organic soils

- Define more precisely what “managed” land means for forests and wetlands
- Ensure coherence between areas of cultivated soils in Tables 3D (agriculture) and Tables 4B and 4C (LULUCF)

Emission factors

- Ensure 2013 Wetland Supplement EFs are utilised
- Better use the Tier 2/3 results already available at regional level
- Clarify terminology for wetlands



Thank you!

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