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First estimate on CO₂ emission factor of organic soils under unproductive wetland

A summary of the few available data and emission factor suggested for the Swiss GHG Inventory

The current country specific CO₂ emission factor for drained peatlands in the Swiss Greenhouse Gas Inventory is $9.52 \pm 2.2 \text{ t C ha}^{-1} \text{ a}^{-1}$. Bogs of the 'Swiss Federal Inventory of Raised and Transitional Bogs of National Importance' cover ca. 5500 ha. Hitherto these bogs were not included in the emission calculation for the LULUCF sector as they were regarded undisturbed. However, many of these bogs are weakly managed and therefore considered to be a CO₂ source but to emit less CO₂ in comparison to peatlands under intensive agricultural use.

A first evaluation revealed that those bogs mainly fall into the combination categories CC42 (unproductive wetland) and CC12 (managed forests). Based on two previous studies from three sites in Switzerland, a revised but still preliminary EF for bogs of the Swiss Federal Inventory of Raised and Transitional Bogs of National Importance in CC42 areas is suggested.

Rogiers et al. (2008) studied a moderately drained bog ('Seebodenalp') managed as extensive meadow and estimated an emission factor of 5.0 and $9.1 \text{ t C ha}^{-1} \text{ a}^{-1}$, mean value $7.05 \text{ C ha}^{-1} \text{ a}^{-1}$. The two estimates derive from uncertainties on the time since onset of drainage. Each factor represents the mean of the same four field replicates.

Leifeld et al. (2011) studied a moderately drained bog used as extensive meadow ('Eigenried') and estimated an emission factor of $1.4 \text{ t C ha}^{-1} \text{ a}^{-1}$. The factor was based on three replicates.

Leifeld et al. (2011) studied a second moderately drained bog ('Ägeriried') and estimated an emission factor of 4.9 and $10.0 \text{ t C ha}^{-1} \text{ a}^{-1}$, mean value $7.45 \text{ t C ha}^{-1} \text{ a}^{-1}$. As with 'Seebodenalp', the two estimates derive from uncertainties on the time since onset of drainage. Each factor represents the mean of the same three replicates.

Based on the three means 7.05, 1.40, and 7.45 t C ha⁻¹ a⁻¹ above, the overall mean emission factor for the three sites is 5.30 t C ha⁻¹ a⁻¹; the corresponding standard deviation is 3.38 and the corresponding 95% confidence interval is 6.22 t C ha⁻¹ a⁻¹. This revised EF will be used for land use category CC42 and small areas in CC32, 34, 36, 37.

Currently no country specific CO₂ EF estimates for drained organic soils in forests is available. For those areas the IPCC default value for temperate forests of $0.68 \text{ t C ha}^{-1} \text{ a}^{-1}$ is used (IPCC 2003).

For comparison, Höper (2007) reported EF [t C ha⁻¹ a⁻¹] of drained bogs in the temperate zone of between 1.3 (forest), 2.45 and 4.4 (abandoned bog) and 3.5 to 4.4 (grassland).



References

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