Consistent reporting of N_2O emissions from managed organic soils and other sources in LULUCF sector

Training seminar on QA/QC procedures in Land use, Land-use change and Forestry sector

18th – 19th May, 2015
Riga, Latvia

Aldis Butlers
Latvian State Forestry Research Institute 'Silava'
Riga street 111, Salaspils, LV-2169, Latvia
aldis.butlers@silava.lv

SILAVA

Definition of Consistency

- The same data sources and assumptions are used across gases and years of the inventory.
- The same methodology has been used for all years of a time-series.
- Data (activity data and measured data) have been collected using the same method for all years of the time-series.
- Appropriate splicing techniques in accordance with the good practice guidance have been applied in cases of inconsistencies of time-series or changes in methodologies.

Sources of N_2O emissions in LULUCF sector

- Direct N_2O emissions:
  - from drained organic soils on:
    - forest land,
    - cropland,
    - grassland,
    - settlements,
    - wetlands (peat extraction);
  - from mineral soils due to land-use change to:
    - cropland,
    - settlements.
- Indirect N_2O emissions:
  - from mineral soils due to land-use change to:
    - cropland,
    - settlements.

Direct N_2O emissions from drained organic soils *(equation 2.7 of the Wetlands Supplement 2013)*

$$N_2O-N_{OS}=[(F_{OS,CG,Temp}\cdot EF_{2CG,Temp})+(F_{OS,F,Temp,NR}\cdot EF_{2F,Temp,NR})]\text{; where}$$

N_2O-N_{OS} = Annual direct N_2O-N emissions from managed / drained organic soil, kg $N_2O-N\ yr^{-1}$

F_{OS} = Annual area of managed / drained organic soils, ha. The subscripts CG, F, Temp, NR refer to cropland and grassland, forest land, temperate and nutrient rich, respectively.

EF_2 = Emission factor for N_2O emissions from drained / managed organic soils, kg $N_2O-N\ ha^{-1}\ yr^{-1}$

Tier 1 N_2O emission factors for drained organic soils in all land-use categories

Land-use category	Climate/ vegetation zones	Emission factor (kg N_2O-N ha^{-1} yr^{-1})	95% Confidence interval	
Forest land, drained	Temperate	2.8	-0.57	6.1
Cropland, drained	Boreal and temperate	13	8.2	18
Grassland, deep-drained, nutrient-rich	Temperate	8.2	4.9	11
Peatland managed for extraction	Boreal and temperate	0.3	-0.03	0.64

Direct N_2O emissions due to land-use change are estimated by Tier 1 methodology (IPCC 2006)

$$N_2O - N_{N\ inputs} = F_{SOM} * EF_1 ; where$$

$N_2O - N_{N\ inputs}$ – annual direct $N_2O - N$ emissions from N inputs to managed soils, kg $N_2O - N\ yr^{-1}$

EF_1 – emission factor for N mineralised from mineral soil as a result of loss of soil carbon, kg $N_2O - N\ (kg\ N)^{-1}$

$$F_{SOM} = (\Delta C_{Mineral} * \frac{1}{R}) * 1000 ; where$$

F_{SOM} – the net annual amount of N mineralised in mineral soils as a result of loss of soil carbon throught chenge in land use or management, kg N.

$\Delta C_{Mineral}$ – average annual loss of soil carbon for land – use type, tonnes C

$R - C : N$ ratio of the soil organic matter

EF_1 – 0.01 kg N_2O $(kg\ N)^{-1}$

R – 15

Indirect N_2O emissions from mineral soils due to land-use change (IPCC 2006)

$$N_2O_{(L)} - N = F_{SOM} * Frac_{LEACH\text{-}H} * EF_5 ; \text{where}$$

$N_2O_{(L)} - N$ – annual amount of $N_2O - N$ produced from leaching and runoff of N additions to managed soils where leaching/runoff occurs, kg $N_2O - N\ yr^{-1}$

$Frac_{LEACH\text{-}(H)}$ – fraction of all N added to/mineralised in managed soils in regions where leaching/runoff occurs that is lost through leaching and runoff, kg $N\ (kg\ of\ N\ additions)^{-1}$

EF_5 – emission factor for N_2O emissions from leaching and runoff, kg $N_2O - N\ (kg\ N\ leached\ and\ runoff)^{-1}$

$$F_{SOM} = \left(\Delta C_{Mineral} * \frac{1}{R}\right) * 1000 ; \text{where}$$

F_{SOM} – the net annual amount of N mineralised in mineral soils as a result of loss of soil carbon throught chenge in land use or management, kg N.

$\Delta C_{Mineral}$ – average annual loss of soil carbon for land – use type, tonnes C

$R - C : N$ ratio of the soil organic matter

$Frac_{LEACH\text{-}H}$ – 0.3 kg N $(kg\ N)^{-1}$

EF_5 – 0.0075 kg N_2O-N $(kg\ N\ leached\ and\ run\text{-}off)^{-1}$

Thank you for attention!

SILAVA