

Case Study 2 – Finland: Experiences with the use of Copernicus data in the detection and monitoring of land use and land-use change

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LULUCF in transition: present and future challenges for reporting and accounting

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FPCUP DG Clima Action: Developing support for monitoring and reporting of GHG emissions and removals from land use, land use change and forestry

- Action was carried out under the EU funded project Framework Partnership Agreement on Copernicus User Uptake (FPCUP)
- Finnish Meteorological Institute (FMI) and Finnish Environment Institute (SYKE) are partners of the Actions, FMI coordination. Luke acted as a subcontractor to FMI

More info about Action: <https://www.copernicus-user-uptake.eu/user-uptake/details/developing-support-for-monitoring-and-reporting-of-ghg-emissions-and-removals-from-land-use-land-use-change-and-forestry-73>

More info about FPCUP: <https://www.copernicus-user-uptake.eu/>



Luke's tasks

Current methods and data employed in the Finnish LULUCF GHGI, and contribute to a report on the needs for meeting technical requirements with respect to the Regulation (EU) 2018/841

To assess the potential of the Copernicus data to be used in LULUCF reporting

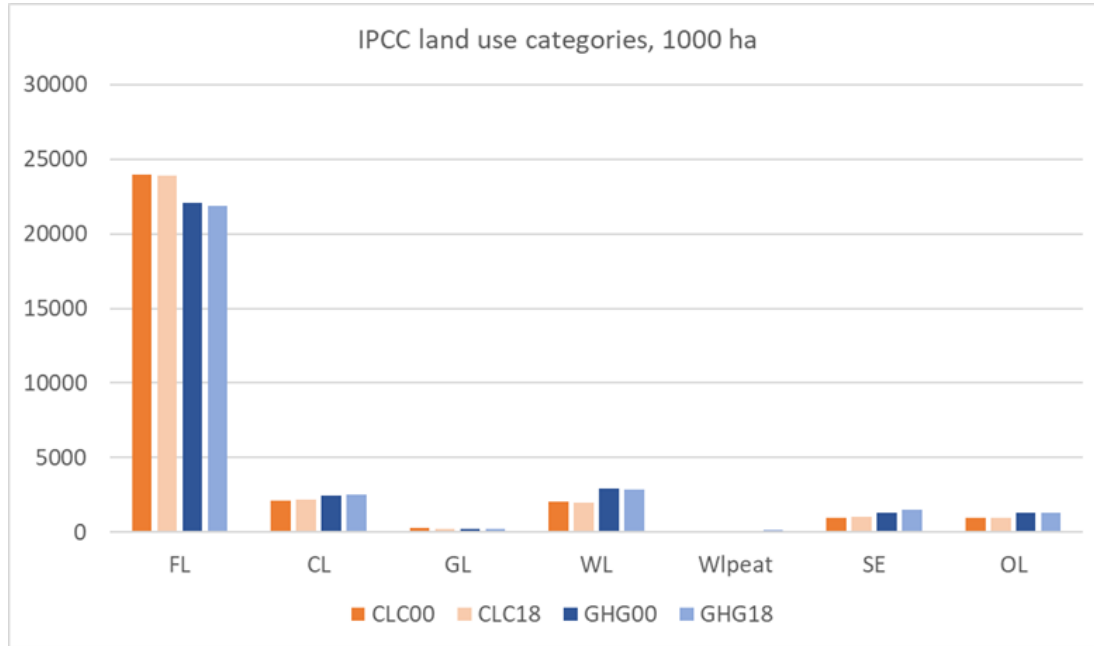
1. Comparison of IPCC land use classification and EU LULUCF accounting categories to the Copernicus land classification in Finland
2. Comparison of Finnish GHG inventory land use and land-use change area data to Copernicus HR CLC data
3. Estimation of emissions and removals based on the Corine land area data, compared with the GHGI data, and assessment of differences

Data and methods

- CORINE Land Cover (CLC) data 2018 was produced as a part of the EU Copernicus Land project by SYKE
 - national raster datasets for land cover (20 m x 20m) and change (0.5 ha) (close to Copernicus data in the future?)
 - older CLC datasets 2000, 2006, 2012 (pixel size 25 m x 25 m)
- CLC classes were classified into the IPCC LU categories
- LU time series 2000-2018 were constructed backwards from 2018 with the CORINE change layers
- Emission and removal estimation imitated GHGI methods

Finnish CLC: https://www.avoindata.fi/data/en_GB/dataset/corine-maanpeite-2018

Results 1



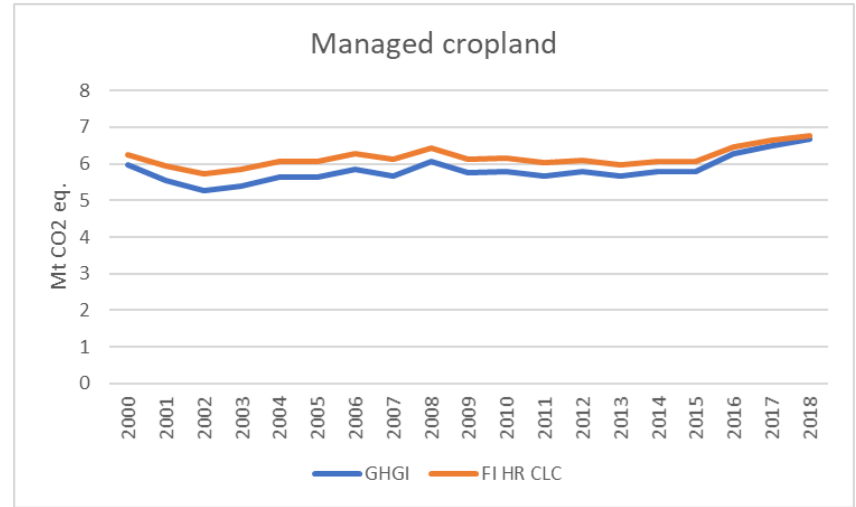
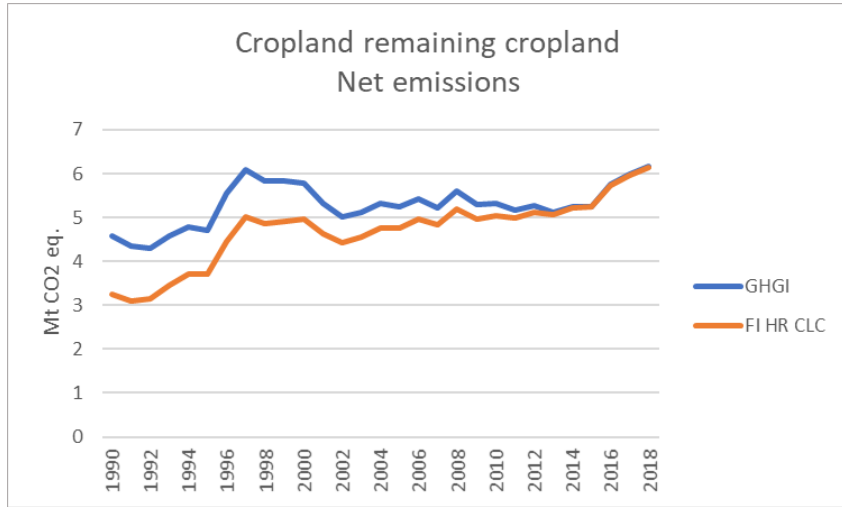
Forest land (FL)

- CLC areas with tree cover are forest
- GHGI trees also on wetlands, settlements and other land

Other data sources are needed

- for cropland and grassland soil database was used to separate mineral and organic soils (CLC, GHGI)
- data on drainage on forest land from NFI

Results 2



For LU changes before 2000, the change layer 2000->2006 was used, even though not correct!

Findings

Different classifications. CLC is land cover data and in the IPCC classification the land use is the determining factor and the land cover secondary.

Misclassification. Grassland areas were at the same level on both datasets, but contents were different as abandoned fields with some trees tended to be classified as forest land in Corine and less intensively cultivated fields were still in Cropland category in GHGI and grasslands in CORINE.

Emissions and removals. The area data need to be linked to appropriate carbon stocks and emission factors. When area estimates and carbon stock changes are estimated based on different data sources, there is a risk to break this linkage. For example, forest land area is estimated from CLC data and tree biomass stocks from NFI data. The third dimension to the estimation is the soil type and drainage situation on organic soils.

Time series. CLC data covers years from 2000, meaning that the first ten years of the time series are lacking, but required for the GHGI. Further work is needed to solve this problem, keeping in mind the time series consistency.

Placing events for right years. Annual land-use change areas are averages between two CLC rounds. The aim is to report annual changes in occurrence year, especially afforestation and deforestation.

Uncertainty. All above mentioned issues, in addition to other matters, should be considered when the uncertainties are estimated. Challenging task to include all relevant components from different sources.

Some final thoughts

- We consider, Finland's current sampling based method used to monitor LU and LUC fulfills the requirements for spatially explicit land-use conversion data
- Even so, development work has been done to better catch the LU changes for recent years. New ways to use all available national spatial data are explored.

Possibilities:

- Verification data
- More teamwork between national data providers – less costs

Thank you!