

Assessing land-use history for reporting on cropland dynamics - A case study using the Land-Parcel Identification System in Ireland

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In developed countries, cropland and grassland conversions and management can be a major factor in Land Use and Land Use Change (LULUC) related Greenhouse Gas (GHG) dynamics. Depending on land use, management and factors such as soil properties land can either act as source or sink for GHGs. Currently many countries depend on national statistics combined with socio-economic modelling to assess current land use as well as inter-annual changes. This potentially introduces a bias as it neither provides information on direct land-use change trajectories nor spatially explicit information to assess the environmental context. In order to improve reporting countries are shifting towards high resolution spatial datasets.

In this case study, we used the Land Parcel Identification System (LPIS), a pan-European geographical database developed to assist farmers and authorities with agricultural subsidies, to analyse cropland dynamics in Ireland. The database offer high spatial resolution and is updated annually. Generally Ireland is considered grassland dominated with 90 % of its agricultural area under permanent grassland, and only a small area dedicated to cropland. However an in-depth analysis of the LPIS for the years 2000 to 2012 showed strong underlying dynamics. While the annual area reported as cropland remained relatively constant at 3752.3 ± 542.3 km², the area of permanent cropland was only 1251.9 km². Reversely, the area that was reported as cropland for at least one year during the timeframe was 7373.4 km², revealing a significantly higher area with cropland history than annual statistics would suggest. Furthermore, the analysis showed that one quarter of the land converting from or to cropland will return to the previous land use within a year.

To demonstrate potential policy impact, we assessed cropland/grassland dynamics from the 2008 to 2012 commitment period using (a) annual statistics, and (b) data including land use history derived from LPIS. Under current reporting standards temporary grassland is considered cropland for reporting purposes. Therefore taking land use history into account increases the area reported as cropland in 2008 by 45.7 % and the area remaining cropland in 2012 by 17.5 % compared to using annual statistics.

In conclusion we showed that high resolution spatial datasets are an important tool to better understand land use dynamics, and can directly improve national GHG accounting efforts. Furthermore, knowledge of land use history is important to assess local GHG dynamics, and can therefore contribute to ultimately progress reporting to higher Tier level reporting.