

Estimating emissions and removals for Zimbabwe's Land Use, Land Use Change and Forestry (LULUCF) Greenhouse Gas Inventory.

Gotore T¹, Muchawona A¹, Zhakata W², Ngarize S³

1. Forestry Commission Zimbabwe

2. Climate Change Climate Change Management Department, Ministry of Environment Zimbabwe³

3. Independent International Climate and Forestry expert, Zimbabwe



LULUCF Sector Overview

Overall, the (LULUCF) sector remained a net sink from 1990 until 2009 and became a net source from 2010-2017 at 9020.59 Gg CO₂-equivalents and 1337.32 Gg CO₂-equivalents respectively. The key drivers for this decrease are increased rates of deforestation on the indigenous forests, harvesting of timber in the plantation forests and infrastructure development including creation of dams for hydropower and irrigation (Figure 1).

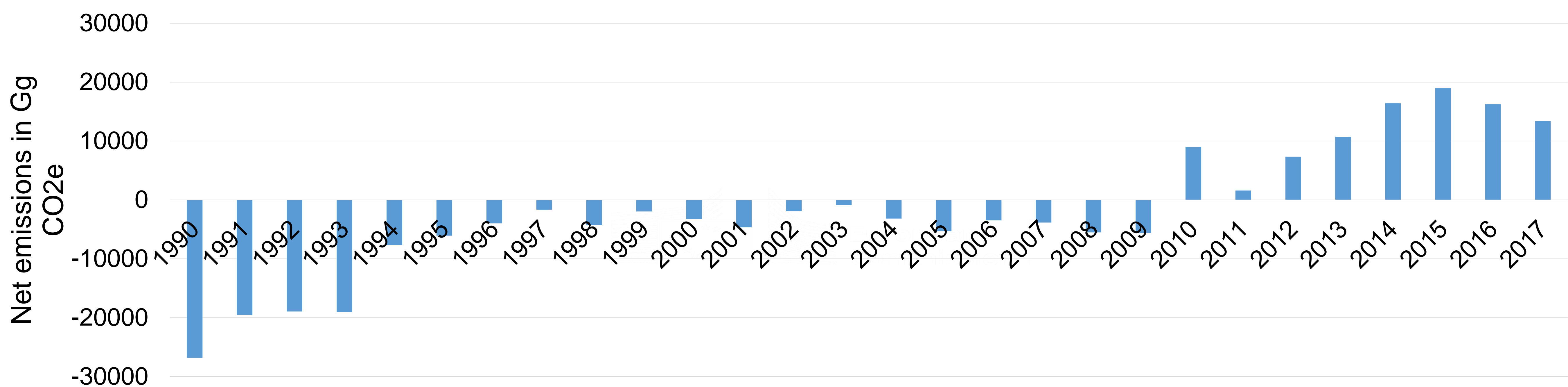


Figure 1: Net CO₂ emissions and removals (Gg CO₂-equivalents per year) from the LULUCF sector – time series 1990-2017

Methods

- Wall to wall mapping generated land cover maps for 1992 and 2017 which were the main source of activity data. The maps were converted to land use data using IPCC classes. The IPCC Approach 2 (total land-use area, including changes between categories) for the six identified IPCC land use categories or sub-categories stratified according to the soil type, ecological and climate zones. The total land area was classified as managed.
- The land cover maps were validated using a collection of over 500 field data. The overall agreement of the maps reached more than 85 %.
- Due to a lack of more land use data between 1992 and 2017, the total change in land converted to other land use types was equally distributed across the years between 1992 and 2017 to estimate the annual change in land use.
- For all land categories the IPCC (2006) Tier 1 methods and default parameters and emission factors were used to estimate emissions and removals. For land remaining forest land, annual change in biomass stocks in forests, accounted for i) biomass growth, ii) net emissions due to wood removals and fuel wood use, and iii) net emissions due to disturbances (e.g. forest fires). For land converted to forest land, a 20 year transition period was assumed (IPCC, 2006), accounting for carbon changes in dead organic matter and soil carbon. For other land use types, only changes in CO₂ sources and sinks from conversion to those land use types were accounted for in this assessment. Net CO₂ emissions from conversion of land to non-forest land use types, accounted for changes in biomass, dead organic matter and soil organic carbon.

Results

Forest land is responsible for most of the CO₂ removals in the sector and is declining sink across the time series. Grassland and Cropland had the largest net emissions at 19983.44 Gg CO₂e per year and 7763.26 Gg CO₂e per year respectively. Net emissions from Wetlands were at 164.18 Gg CO₂-e while emissions from Settlements and other land were 224.72 Gg CO₂e per year and 147.62 Gg CO₂e per year (see figure 2 below).

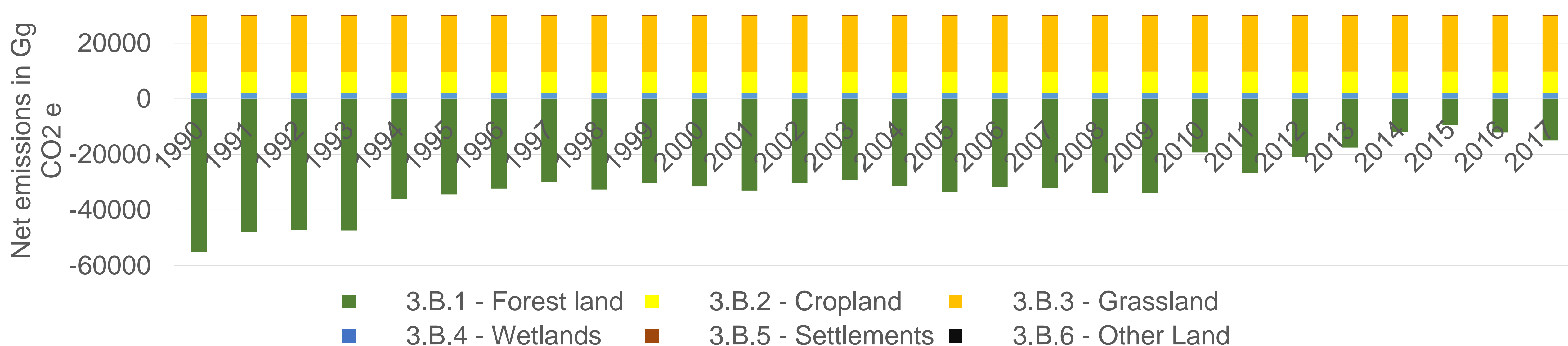


Figure 2. Net CO₂ emissions and removals (Gg CO₂-equivalents per year) from the LULUCF sector by land-use category (forest land, cropland, grassland, wetlands, settlements and other land) from 1990 to 2017.

Challenges related to emissions/removals

There remains huge challenges on collection of disaggregated activity data for all IPCC land uses and for carbon pools, for all IPCC land uses including related emission factors. There is need to build capacity in data collection and to embrace sample-based approach (Collect earth) to address the over averaging posed by using two maps over a long period of time.