Investing into Soil Organic Carbon management for resilient upland farming project (ISOC)

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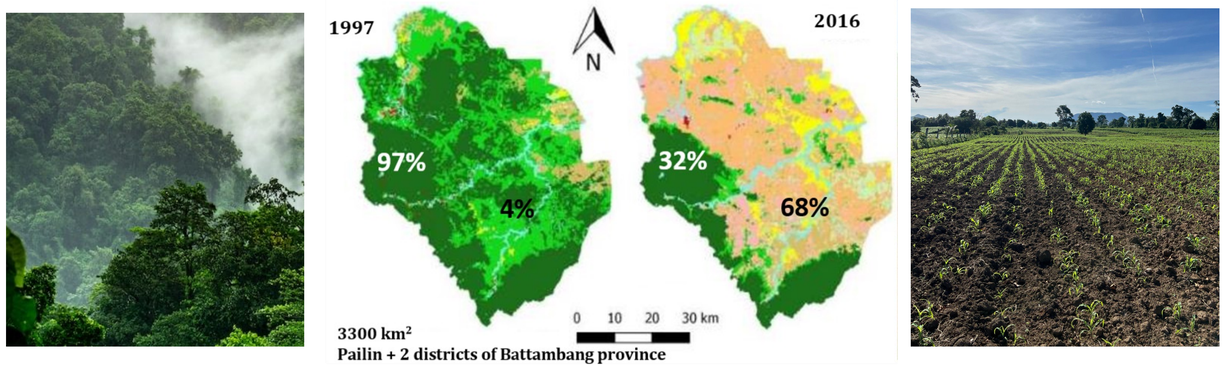
Implemented in the upland part of Battambang province

Background and objectives

The effects of land use and land cover changes on soil organic carbon stocks are of concern in the context of international policy agendas on greenhouse gas emissions mitigation and fight against land degradation.



Land use and land cover changes over the last two decades in the North-western region of Cambodia (from Kong et al., 2019). White numbers: change in forest coverage between 1997 and 2016. Black numbers: change in crop cultivation between 1997 and 2016.

Objectives

Overall, improved understanding of the climate change mitigation and adaptation impacts of conservation agriculture through the assessment of soil organic carbon and ecosystem services for annual upland cropping systems.

Specifically, (**1**) to assess the impact of the continuous plow-based CT on SOC stock vis-a-vis the native vegetation, (**2**) quantify the magnitude of SOC increase under CA-based cropping systems, (**3**) assess the impacts of conventional plough-based management and CA-based cropping systems on multiple ecosystem services on farms (supporting, regulating, provisioning, non-marketed services) and (**4**) feed policy dialogue via the National Council on Sustainable Development and the Conservation Agriculture and Sustainable Intensification Consortium

Approaches and technology used

The study will contribute to enrich the GHG inventory assessing the changes in soil organic carbon under different land uses with an assessment of the depletion (from forest to cultivated lands) and of the restoration rate (comparison between conventional and conservation agriculture-based management). The study will focus exclusively on soil organic C contents and stocks

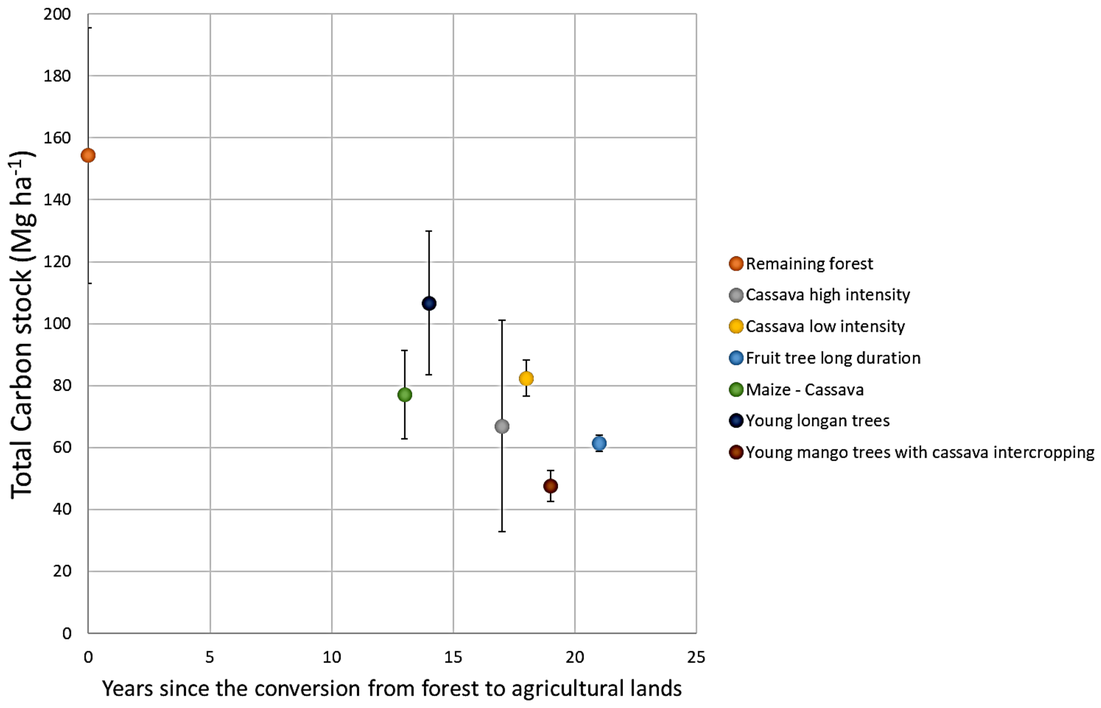
The PhD study will take stock of (i) one randomized block design experiment that was established in May 2020 (Borun village) and (ii) of a network of farms to assess multiple forms of ecosystem services.

Figure 2: The 2-hactar randomized block design experiment

Results

Seven categories of land use and land cover changes :

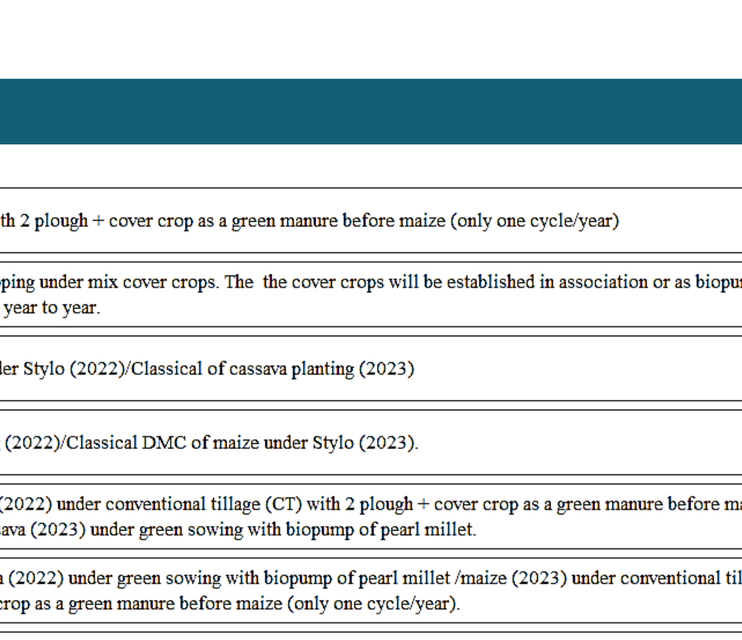
1. *Forested area uncultivated for decades*
2. *Mango trees cultivated since 19-22 years*
3. *Annual crops since 19 years with transition to longan 5 years ago*
4. *Maize cultivation since 12-16 years*
5. *Annual crops since 19 years with fruit trees in the last 5 years*
6. *Fields cultivated since 13-19 years with one year of maize and one year of cassava rotation since the conversion*
7. *Fields cultivated since 13-19 years with maize and cassava and with maize representing the highest share in the cropping sequence*



T1:	Conventional tillage (CT) with 2 plough + cover crop as a green manure before maize (only one cycle/year)
T2:	Classic CA maize monocropping under mix cover crops. The the cover crops will be established in association or as biopump depends on the rainfall from year to year.
T3:	Classical DMC of maize under Stylo (2022)/Classical of cassava planting (2023)
T4:	Classical of cassava planting (2022)/Classical DMC of maize under Stylo (2023).
T5:	Bi-annual rotation of maize (2022) under conventional tillage (CT) with 2 plough + cover crop as a green manure before maize (only one cycle/year).)/cassava (2023) under green sowing with biopump of pearl millet.
T6:	Bi-annual rotation of cassava (2022) under green sowing with biopump of pearl millet /maize (2023) under conventional tillage (CT) with 2 plough + cover crop as a green manure before maize (only one cycle/year).
T7:	Permanent cover crops for mono-cropping maize
T8:	Full conventional tillage-based maize monocropping as reference.

Technologies used

- *Direct seeding mulch-based cropping system*



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