



Tropentag, September 10-12, 2025, hybrid conference

“Reconcile land system changes  
with planetary health”

## The significance of tree registration in off-reserve landscapes: Enhancing Ghana’s tree accounting system for carbon offsetting and climate mitigation

EMMANUEL ADU-SARPONG<sup>1</sup>, VALERIE FUMEY-NASSAH<sup>2</sup>, MARY ADU-SARPONG<sup>3</sup>

<sup>1</sup>*Forestry Commission, Ghana, Plantations-Resource Management Support Centre, Ghana*

<sup>2</sup>*Forestry Commission, Ghana, Plantations-Forest Services Division, Ghana*

<sup>3</sup>*Forestry Commission, Ghana, Timber Industry Development Division-Forestry Commission,*

### Abstract

In carbon footprint assessment, accurately quantifying the data to determine the carbon stored by trees and forests in isolated tree landscapes, as well as their potential to absorb atmospheric carbon dioxide, has always been a challenge. This challenge leads to discrepancies in reporting obligations to FAO-FRA and other international bodies. Ghana has a land area of 238,540 km<sup>2</sup>, with 16.2 % of the land set aside as forest reserves and wildlife parks, with defined tree accounting protocols. In contrast, 83.8 % of the land is off-reserve and managed by multiple actors, underscoring the need for a systematic tree accounting system. The off-reserve landscape, predominantly interspersed with a cocoa agroforestry system in the southern portion of the country, has a sizeable number of trees on farms. The tree registration approach, a promising solution to the challenges of off-reserve tree data, offers a way to account for the fragmented tree-managed landscape. This approach not only creates a database suitable for reporting on off-reserve tree resources but also presents an exciting avenue for smallholder farmers to trade in carbon stocks.

The agroforestry practices in the landscape are primarily found on smallholder farms, with sizes ranging from 0.5 to 20 acres. Trees on Cocoa agroforestry farms range between 11 and 21 per acre, trees on fallow lands range from 4 to 12 per acre, and trees on other cropland landscapes range from 4 to 8 per acre. The tree species are diverse, with varying diameters that influence biomass and carbon content of the off-reserve landscape.

This innovative approach could be a game-changer, as it presents incentives to smallholder farmers for sustaining tree conservation in off-reserve areas, where these farmers essentially produce Ghana’s enviable cocoa. The results are not only promising but also impressive, showing that smallholders have the potential to store significant amounts of carbon, ranging from 1,378.23t C ha<sup>-1</sup> to 2,107.70t C ha<sup>-1</sup> per acre, thereby making a substantial contribution to carbon stocks.

**Keywords:** Landscape, off-reserve, tree accounting, tree registration