Assessing carbon stocks at the landscape level in Jimma, Ethiopia

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INTRODUCTION

The growing levels of greenhouse gases (GHG) in the atmosphere are now directly and unequivocally linked with changes to the global climate (IPCC 2007). Among the anthropogenic sources of GHG the conversion of natural forests and woodlands, particularly in the tropics, is estimated to account for 12-18 % (IPCC 2007; van der Werf et al. 2009). For most developing countries emission reductions will have to come from Land Use, Land Use Change and Forestry (LULUCF) also called ecosystem carbon (Verbist et al., 2011). Local communities and farmers can play an important role in this. What are suitable mechanisms to provide farmers and communities with a carbon premium if they store more carbon in or on their land? How can biodiversity be preserved or increased? In a first step there is a need for a better assessment of carbon and biodiversity under different land use systems, but also for simple and reliable methods that can be used by local institutions and communities.

Fig. 1 Study area (Image © Google Earth http://g.co/maps/bjzng)

OBJECTIVES

- Assess belowground and aboveground carbon under different land use types
- Asses tree biodiversity in coffee gardens and coffee forest

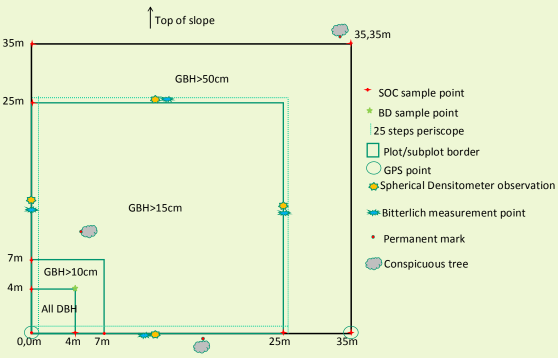

Fig. 2 Plot design

METHODS

Garuke, a study area of 16 km^2 , was selected (Fig. 1). The area was divided in grid cells of 100× 100 m^2, which were used for stratified random sampling . A nested plot design was used to allocate the necessary measurements (Fig. 2). A slope correction was performed directly when laying out the plots. Girth and height of all trees were measured in plots of 7 × 7 m^2, 25 × 25 m^2 and 35 × 35 m^2, using a girth threshold of respectively 0.10, 0.15 and 0.50 m. Canopy closure was assessed with a spherical densitometer and canopy cover using the periscope method at the sides of the 25 × 25 m subplot. Basal area was assessed at 4 points of the 25m subplot using the Bitterlich relascope method. A mixed soil sample was taken from 8 points (Fig. 2) at depths of 0-5, 5-15 and 15-30 cm. Per 5 cm depth soil bulk density samples were taken to a depth of 30 cm at one location per plot. To allow future measurements in these permanent plots two GPS measurements were made at the two lower corner points of the 35 m plot and a small sketch map was made with the location of the most conspicuous large trees of the plot. In addition a small metal plate was nailed on the bottom of these trees.

RESULTS

Data were collected from 71 plots allowing the establishment of detailed baseline dataset for future above and belowground carbon assessments. First observations suggest that there is a large potential to store more carbon in the landscape. The interest in climate change, potential mitigation actions and opportunities is large, but capacity is low. A lecturer from Jimma University will build further on this work in the years to come and prepare a proposal to carry out PhD research at K.U.Leuven on this topic through the existing VLIR-IUC collaboration.

CONCLUSION

First observations suggest a large potential to store carbon at landscape level. There is a large need for further research, training and capacity building at the level of the universities, local government and communities.

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