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## Comparison of the amount of carbon sequestered in different land use in the Amazon highland

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### Abstract

The Andean tropical mountain forest includes many types of ecosystems, which, to some extent, are capable of carbon sequestration. With ongoing climate change, it is very important to understand the global carbon cycle better. This study aims to assess carbon sequestered in different land use (coffee agroforestry systems, tropical cloud forests, and pastures) in the Peruvian Amazon highland. From coffee agroforestry systems (CAS), three smallholders with *Coffea arabica* and different shading trees (*Pinus tecunumannii*, *P. oocarpa*, *P. patula*, and *Inga* spp.), with average density of  $251 \pm 157$  trees ha<sup>-1</sup>, were selected. These agroforestry plantations were compared to secondary grown sparse forest stands, which represent the regional vegetation of the studied area, with average density of  $220 \pm 76$  trees ha<sup>-1</sup>. Pastures were composed of *Setaria* spp. and *Cynodon nlemfuensis*. In total, 77 study plots on 8 transects were compared. Location, total tree height and diameter at breast height (1,3 m; DBH  $\geq 5$  cm) were recorded. To estimate aboveground biomass and carbon, allometric equations were used. Root biomass was estimated with an equation by Cairns et al. (1997). The results varied across different land use types. In pastures, the total carbon amount was estimated on 12,71 Mg ha<sup>-1</sup>. The evaluation of soil carbon stocks (within the depth of 30 cm) was determined based on soil analysis using a Soli-TOC device (Elementar, Langensfeld Germany), where carbon (TOC) was determined by thermal differentiation (DIN19539 method). Soil carbon stocks were highest in forest stands in the upper soil layers. At lower depths (20–30 cm) the difference between the studied ecosystems was no longer registered.

**Keywords:** Agroforestry, carbon, carbon sequestration, climate change, coffee, land use, Peru