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[C4.2-1] Linking forest Management and Soil Processes to Ecosystem Productivity and Functions

Carbon Stock Measurement to Evaluate Ecosystem Service from Carbon Sequestration

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The aim of this study is to establish parameters to evaluate ecosystem service from carbon sequestration of the actions supported by the Sustainable Rural Development Program in watersheds of the state of Rio de Janeiro, southeastern Brazil – Rio-Rural. The Rio-Rural program supports sustainable agriculture practices and the conservation of natural resources, such as rotational grazing systems, the protection of springs and streams, agroforestry and restoration of degraded areas. To do so, carbon stocks were determined under degraded *Brachiaria* spp pasture, as well as in a semideciduous broadleaf Atlantic Forest fragment. We measured carbon stock in the soil, aboveground biomass and liter components. The study area is located in the municipality of São José de Ubá, northwest of the state, which has a hot and humid tropical climate and clearly defined seasons (Aw in the Köpen classification). Three 50-meter long, 1.0-meter wide transects, situated at upper, middle and footslope were demarcated. Three 1.0-meter-deep trenches were made to collect samples at depths of 0-10, 10-20, 20-30, 30-50, 50-100 cm in order to quantify C-stock in soils. One 25 cm² sampling square was used to collect liter in the forest and aboveground biomass (BAS) in pasture. We also measured the diameter at breast height and the height of all living and dead trees with diameter ≥ 10 cm. In the lab we measured the dry biomass, the carbon content of grassland and liter dry biomass, wood density, and soil carbon content and density. The forest area showed some 125 MgC ha⁻¹, of which 71 MgC ha⁻¹ in soil and 53 MgC ha⁻¹ in BAS. In pasture area, carbon stock was 84 MgC ha⁻¹, mostly soil carbon stock. The data analysis also showed that soil carbon stock under pastures are significantly higher compared to that of the forest, although total carbon stock is higher in the forest area due to the contribution of aboveground biomass carbon stock. Taking into account that grassland is the most typical land use in the study region, any intervention aimed to increase carbon stock should target pasture areas. For now, our study indicates that Rio-Rural actions have the potential to improve carbon sequestration. The study's next step will be to measure C stocks in improved management pasture, agroforestry, and restoration and regeneration of forest areas. It can encourage decision makers to join in a Payment for Ecosystem Services (PES) program.

Keywords : Land use change, Carbon stock, PES