Potential use of Lidar (light detection and range) to planning agrosilvopastoral systems in degraded lands in Amazon observing the Brazilian forest low and minimizing carbon emissions

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Introduction: The use of Lidar to biomass and carbon stocks estimative in native and planted forests is well known and has increased in the last decade. Recently, Lidar was used to planning and monitoring forests operations and to estimate volume and biomass in the Antimary State Forest in the western Amazon. The use of this technology allowed the elaboration of high resolution 3D surface and canopy digital terrain models. These models information are essentials not only to forest companies but to the adequate planning of any land use. In this work we propose a methodology to agrosilvopastoral systems (ASPS) implementation through the use of Lidar which by the previous identification of the permanent preservation areas (PPA), forest cover and relief, guarantee the observance of the Brazilian forest low and minimize carbon emissions.
Material and Methods: A 50 ha area of degraded pastures in the Rio Branco municipality was selected to the study. Inside this area an ASPS implementation planning simulation was performed. The methodology followed three phases: i. topographic and drainage description; ii. micro-zoning and iii. ASPS model definition. In the first phase topography and drainage were described through a 3D surface model. In the micro-zoning phase the PPA were defined following the prescriptions of the Brazilian low and the need of PPA restoration verified. Also, a digital survey of the remaining vegetation was performed through the use of a 3D canopy model, determining the forest cover and defining the vegetation to be preserved (e.g. big trees) and to be removed (e.g. weeds and shrubs).
Results and Conclusions: i. the total PPA area was calculate as 11,2 ha and 6.0 ha of this area demand restoration; ii. the area has 4.9 ha covered by trees higher than 10m and to the establishment of the ASPS 2.0 ha of these trees (out of the PPA) were removed; iii. 13.1 ha of secondary vegetation, composed by trees lower than 5m need to be removed to the ASPS implementation (vegetation inside the PPA was preserved) and iv. the final area to the ASPS was 38.9 ha and considering a 20 x 4 m spacing a total of 4860 trees will be planted. The spacing was defined taking in consideration the machinery which will be used to the crops.

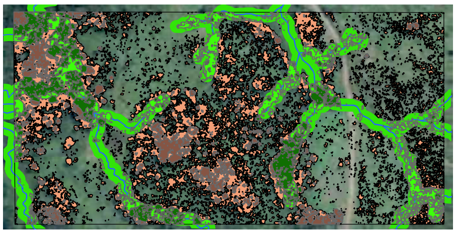

Figure 1. ASPS selected area image presenting: i. permanent preservation areas (striped green areas); ii. remaining above 10m height (dark green) and below 5m (light green) vegetation; iii. to be removed vegetation (light and dark brown areas) and iv. drainage (blue lines)

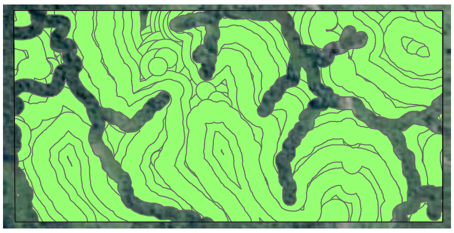

Figure 2. ASPS final area presenting the planting lines according to the defined spacing (20m) and following the area topography.

Resilience of mixed systems to climatic change and the impact of integrated systems on microclimate and biodiversity

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