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23. Challenges in exploring the relationship between biodiversity and ecosystem services at different spatial scales (OPEN)

Impacts of land use changes and biodiversity loss in the carbon stock ecosystem service in Brazilian Amazon

Presenting author: Margareth Goncalves Simoes
Other authors: Rodrigo Pecanha Demonte Ferraz; Peter Verweij, Miguel Equihual, Andrei Alvez
Institution: Empresa Brasileira de Pesquisa Agropecuária_EMBRAPA
Contact: margareth.simoes@embrapa.br

Biodiversity supports many ecosystem services that are very important for climate change mitigation and adaptation and according to the Convention on Biological Diversity (CBD) there are clear interlinkages between biodiversity and climate changes. There is a functional link between the tropical forest ecosystem biodiversity and their capacity for carbon uptake and storage. But land use changes and the expansion of agriculture practices reduce the ecosystems integrity modifying the functions related directly to the ecosystem services. The relationship between biodiversity loss and the ecosystem services in tropical forests, in face of the ongoing global climate change, has been quite accepted by the scientific community, but needs to be better quantified and understood. The objective of this paper is to present the methodological approach and preliminary results on the impact estimation of *Land use changes and ecosystem biodiversity loss* in *Carbon stock ecosystem service*, based on the correlation between these two spatial models at regional scale for each State of the Brazilian Amazon. The methodological approach of this work consists in the generation of an "ecosystem biodiversity loss" spatial model based on probability distribution of evidence parameters (Bayesian theory - Lindley 1972). The modeling process was based on learning process (dada-driven models) using the Expectation Maximization algorithm (Buntime 1994). Bayesian network has been established from an expert conceptual model that related different spatial data (Thematic maps and Remote Sensing data): (i) Biomass (MODIS/ USGS - NASA); (ii) EVI; (iii) LAI- Leaf Area Index (MODIS/ USGS - NASA); (iv) Tree Cover (MODIS/ USGS - NASA); (v) GPP- Gross Primary Productivity (MODIS/ USGS - NASA). The *carbon stock ecosystem service* was estimated from *aboveground carbon stocks spatial model* developed by Baccini *et. al.* (2004) within the *Pantropical National Level Carbon Stocks Project* held by the Woods Hole Research Center - WHRC, Boston University and the University of Maryland

(MA, USA). The methodology was based on ground data, MODIS 500m imagery and GLAS LiDAR data. Preliminary results were promising, allowing the establishment of biodiversity loss probabilistic distribution spatial patterns and also a preliminary assessment of the relationship with the carbon stocks (aboveground biomass). This work is part of the ROBIN Project – Role of Biodiversity in Climate Change Mitigation – sponsored by the European Union (FP7 Edict ENV. 2011.2.1.4 -1: Potential of biodiversity and ecosystems for the mitigation of climate change).

Keywords: Spatial modeling; Bayesian networks; Climate changes: Climate mitigation

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