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

## **Influence of the land use changes and biodiversity loss in evapotranspiration fluxes regulation in Amazon ecosystem.**

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According to the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD) there are clear interlinkages between biodiversity, climate change and sustainable development. One of the most important ecosystem services refers to capacity of natural forests in regulating the water fluxes between the soil surface and the atmosphere (water balance) and by consequence stabilizing the climate seasonality. So studies of the relationship between land use changes, tropical forests biodiversity loss and the water ecosystem services, in face of the ongoing global climate change, are very important. The objective of this paper is to present the methodological approach and preliminary results on the influence of *Land use changes and ecosystem biodiversity loss* in the *Evapotranspiration Fluxes Regulation*, based on the correlation between these two spatial models, at regional scale, for the Pará State – Brazilian Amazon. The methodological approach of this work consists in the generation of an “ecosystem biodiversity loss” spatial model based on probabilistic distribution of evidences (Bayesian theory – Lindley 1972). 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 (data-driven models) using the Expectation Maximization algorithm (Buntine 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 evapotranspiration fluxes ecosystem service was estimated from MODIS Surface Resistance and Evapotranspiration (MOD 16), data developed by *Numerical Terradynamic Simulation Group (NTSG), College of Forestry & Conservation – University of Montana*. (Mu et

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*al.*, 2007). Preliminary results were promising, allowing establishing spatial patterns of biodiversity loss probabilistic distribution and also a preliminary assessment of the relationship with the evapotranspiration fluxes regulation. 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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