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Land use changes scenarios and future environmental services provision in the Brazilian Amazon

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According to the Convention on Biological Diversity (CBD) there are clear interlinkages between biodiversity and climate changes, because biodiversity supports many ecosystem services that are very important for climate change mitigation and adaptation, like carbon uptake and storage as well as regulation of evapotranspiration flux. Large-scale and high-intensity land use changes (LUC) are intrinsically related to the loss of biodiversity, and the decrease of natural systems integrity responsible to maintain ecosystem services (ES). Landscape-scale patterns of land use (LU) can be correlated with different levels of ecosystem integrity (EI) and consequently with the potential ES provision. Once established the relations between LU patterns and EI/ES is possible to predict future environmental services provision considering different LUC scenarios. Despite the fact that the deforestation rates are decreasing in Brazilian Amazon, there is a region of increased anthropogenic pressure called arc of deforestation where deforestation and agriculture-livestock expansion are causing land use changes that reduce the ecosystems integrity and the ecosystem services provision. The objective of this work is to present the methodological approach and results of the prediction of future impacts on Ecosystem Services, based on Land Use Change Scenarios generation in the Brazilian Amazon. The methodological approach included: (i) Ecosystem Integrity Spatial Model (EISM) based on Bayesian probabilistic distribution of evidences using a Remote Sensing dataset. (Thematic maps and Remote Sensing data): Biomass (MODIS/ USGS – NASA); EVI; LAI– Leaf Area Index (MODIS/ USGS – NASA); Tree Cover (MODIS/ USGS – NASA); GPP– Gross Primary Productivity (MODIS/ USGS – NASA). The validation was based on knowledge and field controls; (ii) Correlation of EISM and ES Models: (ii a) Evapotranspiration Fluxes (ET) – MODIS/MOD16; (ii b) Aboveground Carbon Stocks Spatial Model (WHRC); (iii) Legal Amazon LUC-SSPs scenarios (Adapted from the IPCC-SSPs) – Clue Model (1km2 pixel; projected to 2050). The preliminary results showed the decrease of ecosystem integrity related with each LUC scenario considered, allowing to estimate the impacts on the ecosystem services studied: water fluxes (ET) and aboveground carbon stocks. This work is part of ROBIN Project (EU- FP7 ENV.2011.2.1.4-1).

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