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Analysing Future Scenarios of Land-Use Change in Southern Amazonia and its Impacts on CO₂ Emissions

JAN GÖPEL¹, RÜDIGER SCHALDACH¹, KATHARINA H. E. MEURER², JAN SCHÜNGEL¹

¹*University of Kassel, Center for Environmental Systems Research, Germany*

²*Georg-August-Universität Göttingen, Geographical Institute, Germany*

Abstract

The calculation of robust estimates of future CO₂ emissions from land-use change is an important element to support the framing of the Brazilian climate mitigation strategy. Prerequisite is information on the future development of land-use changes under the combination of various driving factors operating on different scale-levels (e.g. regional planning policy and global world market prices for agricultural commodities). The scenario technique in combination with land-use models offers a suitable tool to systematically explore a wide range of plausible future development pathways of the regional land-use system. The available scenarios for the Amazon region concentrate on future deforestation and include only very simple assumptions regarding the driving factors (e.g. rates of deforestation). However it is debated that these efforts neglect the linkage between regional and global drivers or have only a much idealised representation of regional land-protection strategies without considering existing policy frameworks.

One aim of the BMBF project CarBioCial was the development of a set of more detailed scenarios as a basis to analyse future land-use changes until 2050 and its impact on environmental factors such as soil erosion and greenhouse gas emissions (CO₂, N₂O) on different geographic scale levels. Going beyond the existing regional scenarios, four story-lines were developed by experts that portray both regional development trends and their linkages to the global scale (e.g. to global markets of agricultural commodities). In this study we will apply the regional LandSHIFT model especially developed to be applied for this regional approach to land use modelling to generate land-use maps for the different scenarios. On the basis of these maps we will calculate resulting CO₂ emissions from land-use change using the INPE-EM model. The results from this study will be a valuable source of information for regional decision makers to frame potentials and risks of the different future development pathways for achieving the Brazilian climate mitigation goals.

Keywords: Carbon dioxide emissions, landSHIFT, regional land use change modelling