PRESENTATION
EVALUATION OF ECOSYSTEMS FUNCTIONS AND SERVICES

HYDROLOGIC RESPONSES TO DEFORESTATION IN SOUTHWESTERN AMAZON SUB-BASINS CORROBORATED BY HYDROLOGIC SIMULATIONS

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The regulation of the water balance and river flow by forests provides ecosystem services that are critical for many societal and ecological needs. Deforestation in tropical forests has been altering the water balance of river basins, thus degrading ecosystem services. We present and discuss how deforestation in Southwestern Amazon could be linked to observed and simulated changes in river flows of its basins: Juruá, Purus and Madeira river basins, which together contribute to ~24% of the Amazon River discharge. Considering its importance in terms of being one of the main ways of transportation in the region and also for the provision of high-quality water and fisheries, it is important to evaluate how deforestation could affect the river flows of those basins.

The analysis of observed discharge in a wide range of river stations (~25 stations) for the 1970-2010 period showed that heavily deforested areas present increased river discharge (Madeira), while the behavior of less deforested basins varies showing little increase (Purus) or even decrease in river discharge (Juruá) which could be linked to local precipitation changes.

To understand the physical mechanisms of land cover and rivers interaction, the deforestation impacts on water balance over the three basins were studied using the coupled dynamic vegetation model IBIS (Foley et al., 1996) and the hydrologic model THMB (Coe et al., 2007). We run a set of simulations using the atmospheric forcing from the 1950-2000 period and two land cover scenarios: the potential vegetation and present land cover maps; we considered only the direct impacts of forest clearing, without any climate response to deforestation. Simulations showed an increase of about 2%, 4% and 13% in discharge for the Juruá, Purus and Madeira rivers, respectively, as result of the present deforestation, values proportional to deforested areas in each of those basins.

Keywords: ecosystem services, deforestation, water balance, dynamical models.

Acknowledgment: This work was supported by grants from the Moore Foundation, Climate and Land Use Alliance, FAPEMIG, CNPq and NASA.