LBA Abstract

Human and Physical Dimensions of Land Use/Cover Change in Amazonia: Forest Regeneration and Landscape Structure

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Emilio F. Moran, Eduardo S. Brondizio, Dalton M. Valeriano, Flavio J. Ponzoni, Paul Mausel, and J.C. Randolph

Building on 25 years of research experience in the Eastern Amazon, this study will focus on advancing our understanding of land use and land cover change. It will develop a Spectral Library that will serve the research community and assist in testing of a new generation of sensors (e.g. TM7). This project will build on a seven-region study, along the LBA transects, supported for the past six years by NSF and NIGEC, and encompassing a sample of 100+ sites. We used a nested-georeferenced approach that included soil analysis, vegetation stand structure and composition, land use histories, institutional analyses, demography of households, and land cover classification using Landsat TM multitemporal data to understand the rates of growth of secondary vegetation. The seven regions provide a wide array of land uses and land cover along an east-to-west transect extending from the Amazon estuary and Bragantina region east of BelTm near the Atlantic coast, all the way to the Tapajos/Santarem region. This 160,000 km2 area will be examined for land cover changes and their relation to past patterns of land use for a minimum of no less than 25 years. We propose in this NASA/LBA project to extend this work by:

A. Quantifying ecological thresholds driving structural and functional dynamics (e.g. rates of regrowth and species replacement) of secondary succession areas subjected to different land use histories across the seven study regions;

B. Generating models that incorporate socioeconomic, institutional, and demographic determinants of land use and cover change at a variety of scales;

C. Developing a Spectral Library of land cover classes present that can be applied to previous (MSS and TM5) and forthcoming sensors (TM7) through the integration of vegetation inventories, image calibration, and hyperspectral field assessment;

D. Providing hands-on experience to a cohort of Brazilian doctoral students in their work on land use/cover change and the human dimensions of such change in research in the Amazon region, and to provide other opportunities for mid-career training preferentially to colleagues at Amazonian institutions.

This study will provide the research community with a Spectral Library to facilitate inter-image comparisons of land cover classes and land use dynamics at the center of the LBA campaign. Hyperspectral calibration of a range of land covers of interest to LBA, such as mature upland and floodplain forests, stages of secondary successional vegetation, selectively logged forests, pastures, annual and perennial cropped fields, and savannas, will be an important component of this study. Building this Spectral Library is a challenge that we can undertake only because of the comprehensive nature of past georeferenced field research encompassing physical, biological and social science variables, and because of its spatial distribution over seven different regions that permits scaling from farm/household to regional dimensions of land use and land cover.

RESEARCH TEAM

Dr. Emilio F. Moran, Director, Anthropological Center for Training and Research on Global Environmental Change (ACT), Indiana University

Dr. Eduardo S. Brondizio, Assistant Director, Anthropological Center for Training and Research on Global Environmental Change (ACT), Indiana University

Dr. Dalton M. Valeriano, Instituto Nacional de Pesquisas Espaciais, Department of Remote Sensing

Dr. Flavio J. Ponzoni, Instituto Nacional de Pesquisas Espaciais, Department of Remote Sensing

Dr. Paul Mausel, Department of Geography & Geology, Indiana State University

Dr. J. C. Randolph, School of Public and Environmental Affairs, Indiana University