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

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Introduction

• Questions
  ➢ What is the role of soil, land-use history, and landscape structure variables in influencing differential rates of regrowth?
  ➢ How do spectral characteristics of Landsat TM data relate to parameters of vegetation structure?
  ➢ What is the role of the land-use systems on forest fragmentation and landscape structure?

• Goals
  ➢ To combine field inventories of soil and vegetation to quantify ecological thresholds driving structural and functional dynamics of secondary succession areas subjected to different land use histories across seven study regions.
  ➢ To develop models that incorporate socioeconomic, institutional, and demographic determinants of land use and cover change.
  ➢ To strengthen capacity of Amazonian institutions to carry out land use and land cover change and human dimensions research.
Results

- Differences in soil quality explain important differences in rates of secondary succession across regions. (See figure at top right)

- Land use history explains important differences in rates of secondary succession better when comparing sites within a region.

- Structural criteria for characterizing stages of secondary succession facilitate comparison. (See figure at bottom right)

- There is great variance in estimates of biomass depending on the choice of allometric equation used. 13 equations examined in a review paper.
Results (continued)

- Differences in soil quality explain much of the variance in crop choice. (See figure at top right)

- There is a consistent generational trajectory to deforestation by households in the Amazon frontier (cohort effect) in which households follow an initial period of high rates of deforestation, followed by a steadily declining reliance on mature forest deforestation. The cohort effect persists in spite of period effects (e.g. hyperinflation). (See figure at bottom right)
• Future Steps

➢ More publications are in preparation and five dissertations are in progress.

➢ Develop a SQL and Visual Basic query system of use by all of LBA.

➢ Develop a course that will introduce theory and methods on the human dimensions of global change relevant to LBA. A request for funding to teach the course in a convenient Amazonian location has been submitted, and a preliminary meeting of interested persons was held in June.

➢ Moran prepared a paper that will serve as basis for discussion to develop a plan for a human dimensions component within LBA. A workshop on this issue to take place at Open Science meeting in Belem in June 2000.

➢ We will be conducting field research in Santarem in the Summers of 2000 and 2001 to provide a complementary human dimensions perspective to the biophysical studies in and around the flux tower.
Conclusions

- Events such as tight credit, hyperinflation, and other market signals affect the magnitude of deforestation but not its trajectory.

- The most useful descriptors of forest fragmentation are the distribution and variance in number, size, and shape of patches.

- Soil quality influences crop choice by farmers, rate of turnover of farmers on properties, and biomass accumulation in secondary forests.

- Our project has discriminated process of secondary succession, biomass change, and land use/cover change, and found significant scale-dependencies.
Publications


