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

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Introduction

- **Questions**

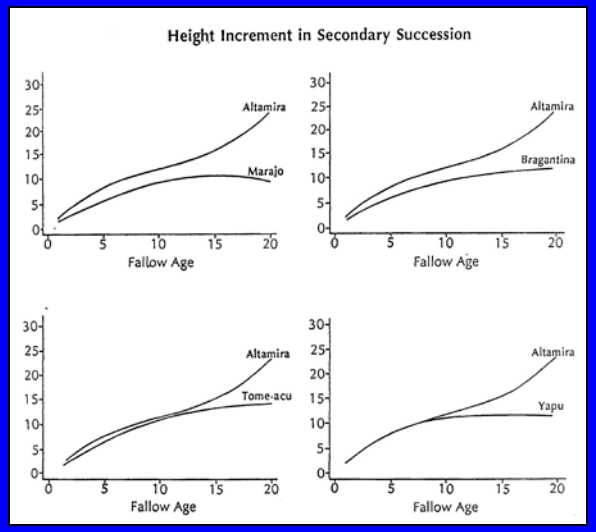
- What is the role of soil, land-use history, and landscape structure variables in influencing differential rates of regrowth?
- How do spectral characteristics of Landsat TM data relate to parameters of vegetation structure?
- What is the role of the land-use systems on forest fragmentation and landscape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

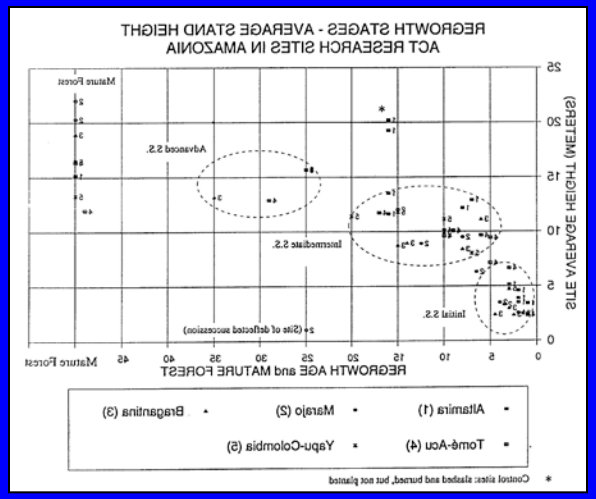
- **Goals**

- 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

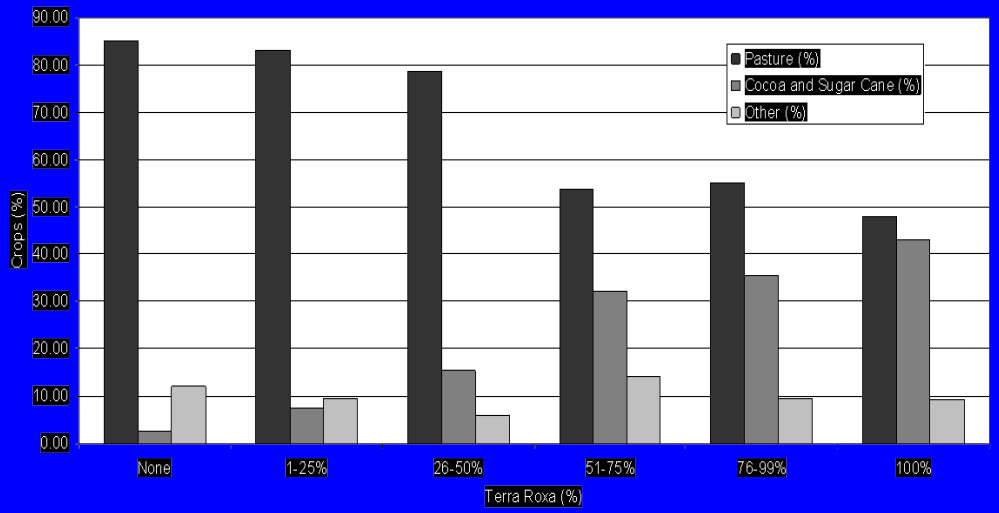
- Differences in soil quality explain important differences in rates of secondary succession across regions. (See figure at top right)
- Land use history explains important differences in rates of secondary succession better when comparing sites within a region.
- Structural criteria for characterizing 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.





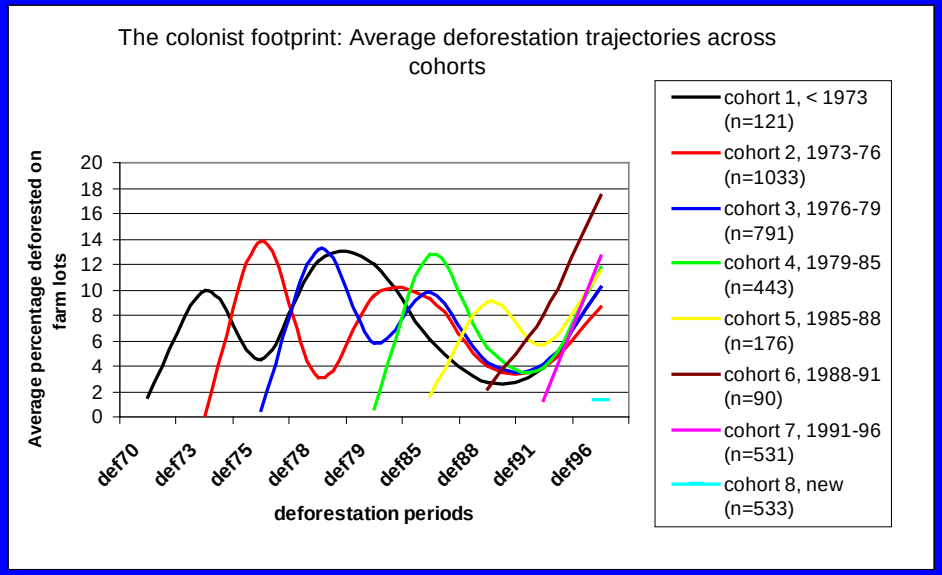
Results (continued)

CROPS AND TERRA ROXA



- 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

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