Predictors of Deforestation in the Brazilian Amazon

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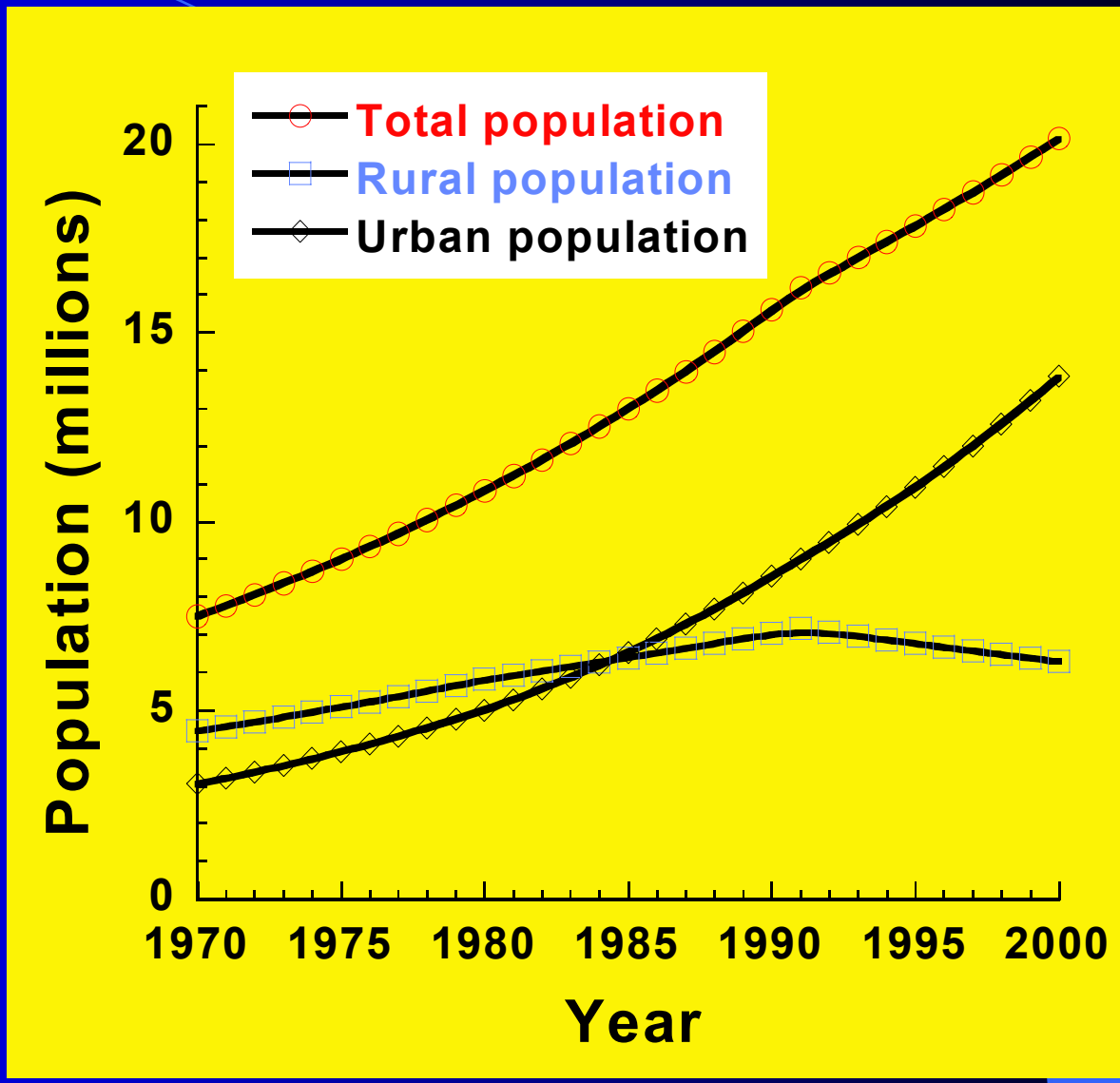
Goal

To identify key proximate causes of Amazonian deforestation

- Human demographic factors
- Factors that affect physical accessibility to forests
- Factors that affect land-use suitability for human occupation and agriculture

Amazon Population Growth

- Increasing at nearly twice the rate as the rest of Brazil (3.35%/year vs. 1.88%/year)
- Rapid immigration & growth

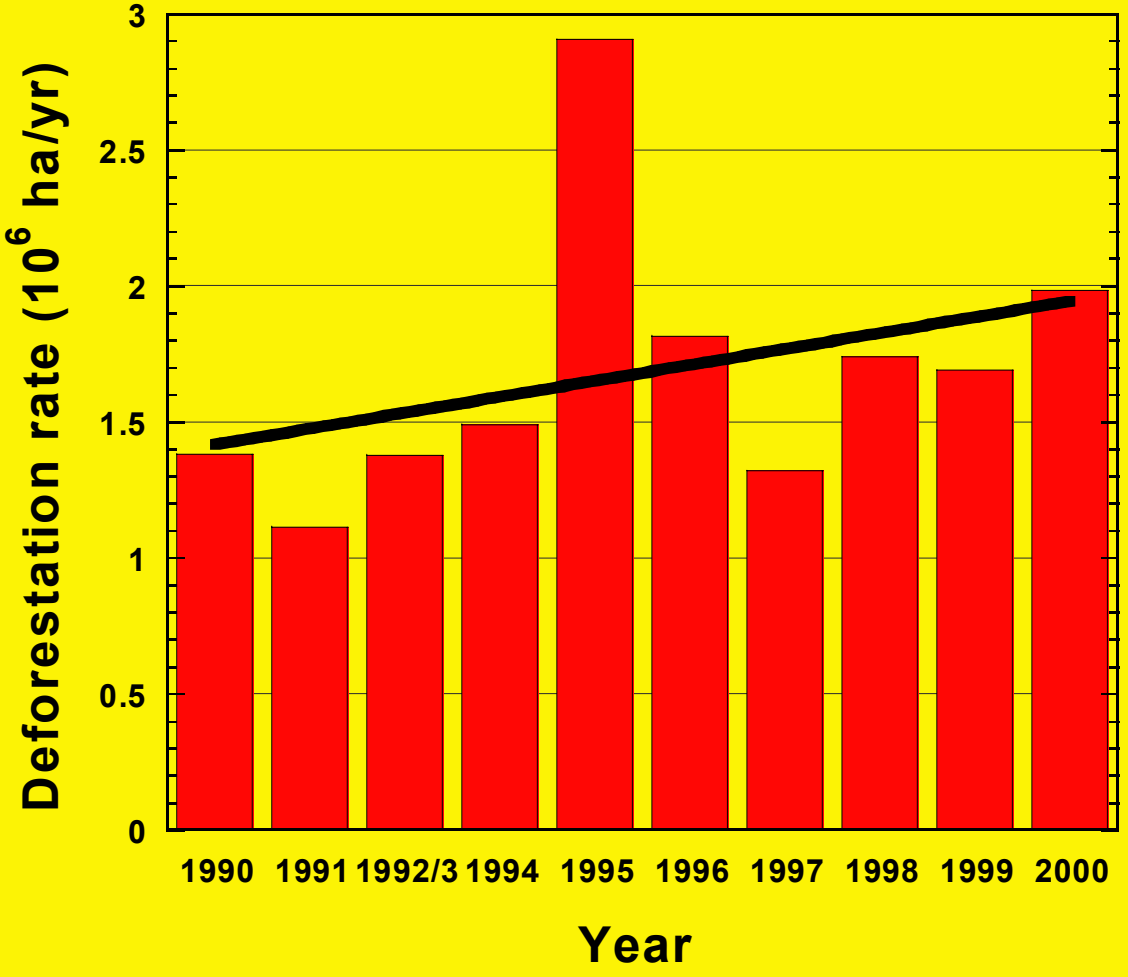


Amazon Deforestation

Increased significantly over the last decade

-1990-1994: 1.38 million ha/year

-1995-2000: 1.90 million ha/year



Key Development Trends

- Expanding timber industry
- Increasing mineral & gas development
  - Industrial operations
  - Illegal gold mining
- Industrial agriculture
- Many new infrastructure projects

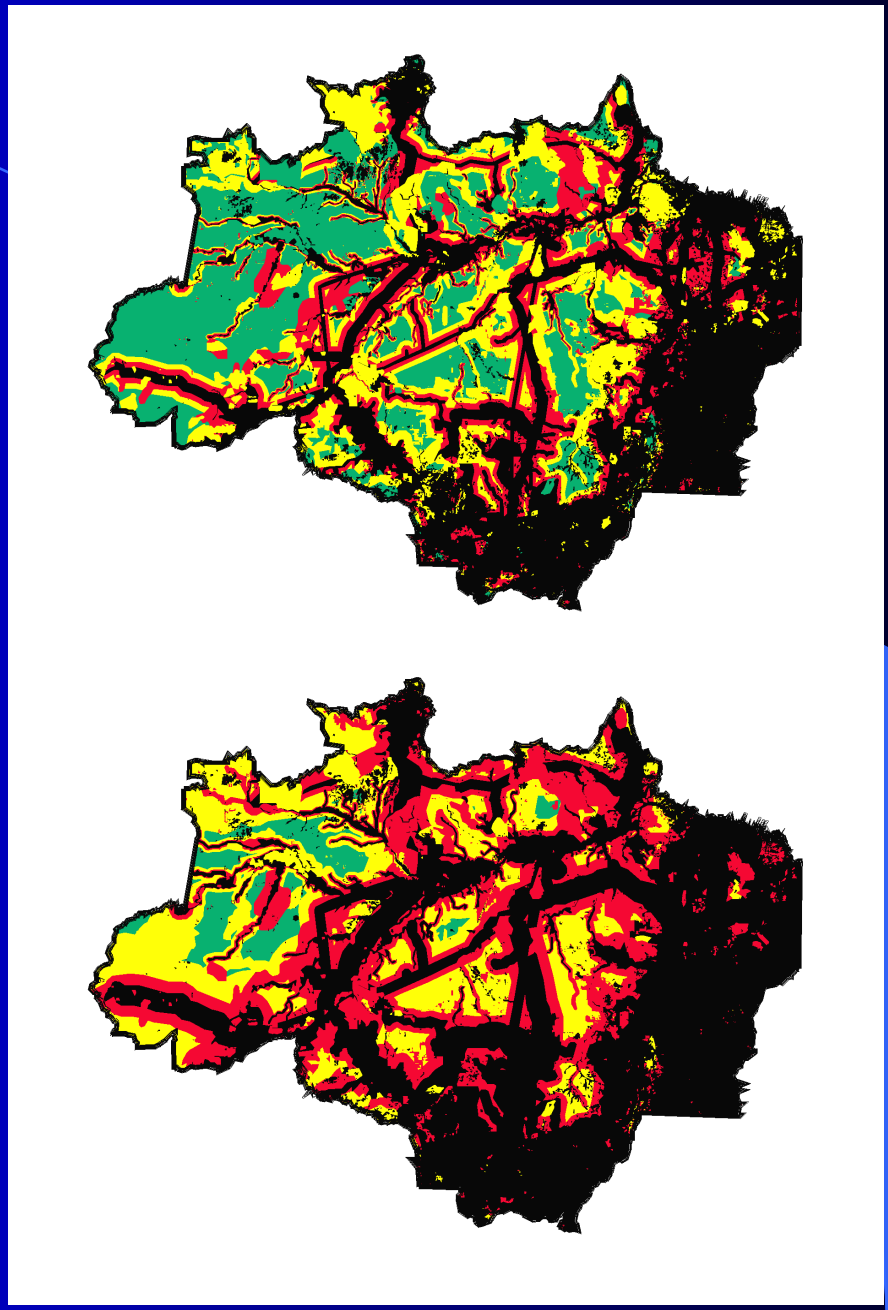
Avança Brasil Program

Proposed investments of over **$40 billion**

- 7500 km of highway paving
- Major railroad expansion
- River channelization
- Hydroelectric reservoirs
- Power lines
- Gas lines

Modeling Studies

Suggest potentially dramatic increases in forest loss, fragmentation, and degradation over next 20 years



GIS Data Layers

- Forest cover (circa 1999)
- Rural & urban population densities (circa 2000)
- Linear distances to nearest highway, road, and navigable river
- Annual rainfall and dry-season severity
- Soil fertility, waterlogging, and depth

The Challenge:
Potential predictors can have strong spatial autocorrelations

Strategy:

- Divide Amazon into small quadrats, and select a random subset (stratified on deforestation intensity) for analysis
- Use ordination analysis to extract statistically independent predictors
- Use multiple regressions to assess effects of new predictors on deforestation
- Repeat analyses at several spatial scales

Randomly Selected Plots