Revisiting human settlement patterns and its relationship with deforestation in the Brazilian Amazon

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Session 1220

« *Matching the mismatches: linking scales in the Amazon* »

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Introduction

- **Impact of human settlement on natural resources**: a central issue in population and environmental studies [Ehrlich, 1968]

- A lot of studies show a **positive correlation between population density and deforestation** in tropical forest

  [Ehrhardt-Martinez, 1998; López-Carr and Burgdorfer, 2013; Bistinas et al., 2013; Laurance et al., 2014]

- But deforestation is a factor interacting with **complex social, economic, and political processes at local and global levels**

  [Hogan 2001; Geist and Lambin, 2002; Turner et al., 2007; Rudel et al., 2009; DeFries et al., 2010; Pacheco et al., 2011]

Research questions

- **How are the relationships between population densities and deforestation in the Brazilian Amazon?**

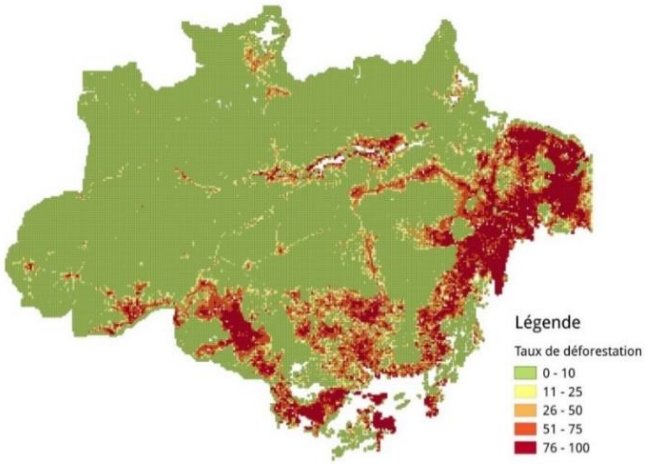
Hypothesis: strong deforestation rates may be observed in areas of low population densities because of expansion of large-scale agriculture and cattle ranching

Material and methods

- **Deforestation database** released by the Brazilian space research center (INPE)

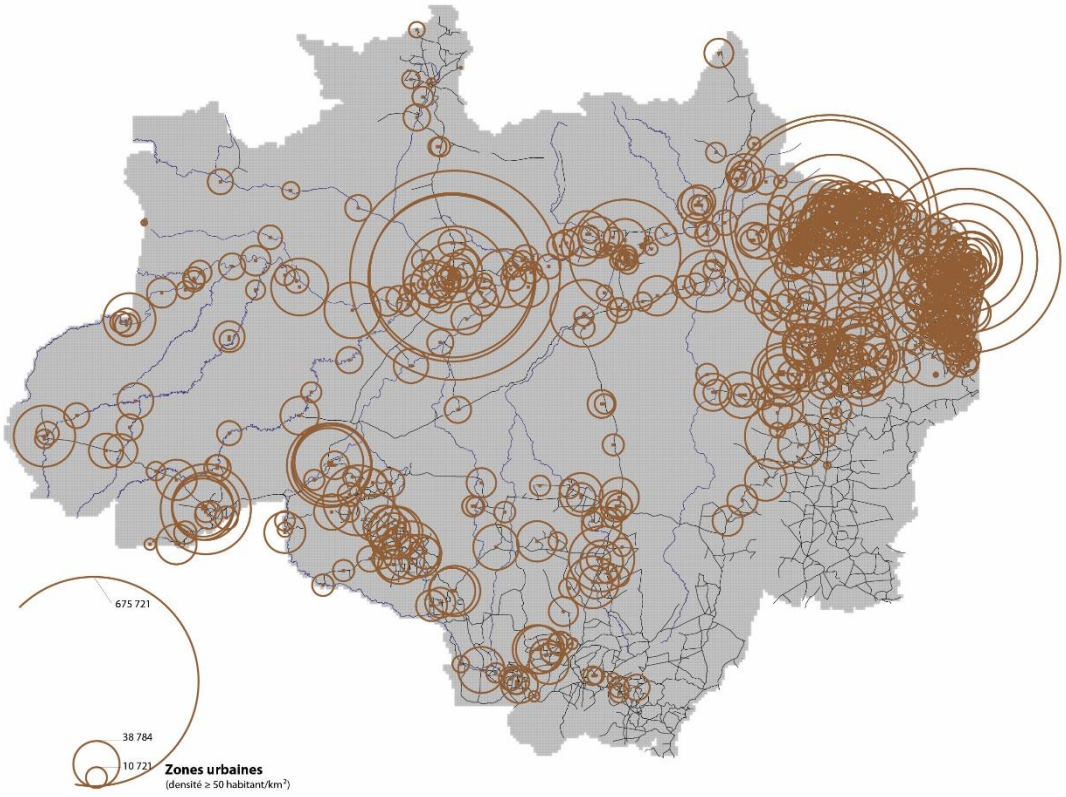
- **Population census data** at the census sector level published by the federal geographical and statistical agency IBGE

- All the data were projected in quadrat of 10 x 10 km, covering the whole Legal Amazon



Results: different human settlement patterns

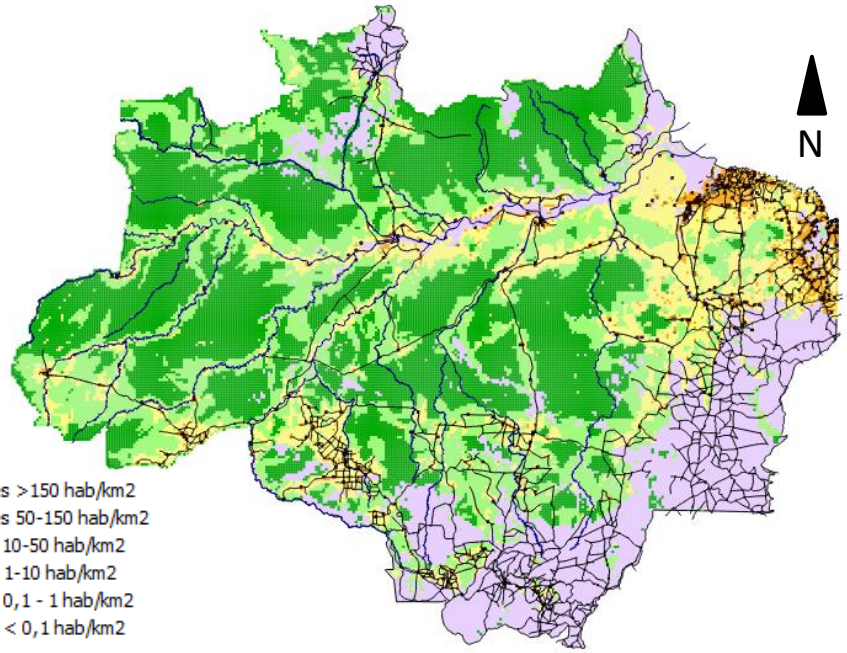
1. Densely populated urban areas are increasing



- ✓ 71.5% of the population (13.1 million people) live in urban areas in 2010
- ✓ Increased by 30.3% in 10 years
- ✓ **Strong rural exodus**: rural population only grew from 2.4%
- ✓ Cities attract people: **access to jobs and public services** (school and healthcare)

Results: different human settlement patterns

2. Preserved forests have different human settlement patterns: from empty forests to populated forests



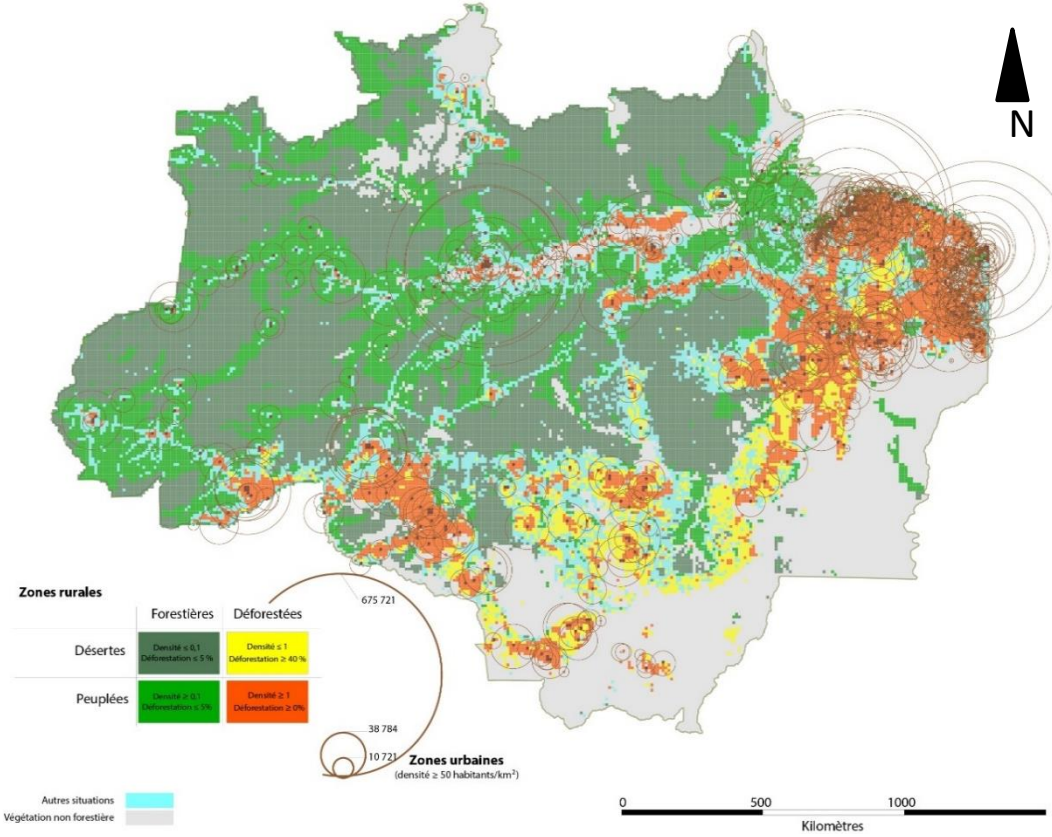
- ✓ **"empty" forests** cover a large surface: 2,405,551 km² have less than 1 inhabitants/km² (61.6% of the Amazon forest)
- ✓ Average population density is low: 0.13 inhabitants/km²

But, the number of people living in these well preserved forest is not as low as one can imagine.

- ✓ **Peopled forest:** 688,380 people live in areas where deforestation is less than 5%

Results: different human settlement patterns

3. Small population densities living in deforested areas: deforested human deserts



- ✓ **"Deforested human desert"** 2,554 quadrats (6.4% of the Amazon) have more than 40% of deforestation but have population densities lower than 1 inhabitants/km^2 in 2010
- ✓ **Rôle of large scale soy and beef productions**

Conclusion

- ✓ **'Moving frontier':** complex interactions between demographical changes and deforestation

- ✓ **Amazonian land-use frontier may have changed in nature:** from a process of agrarian colonization "*a land without men for men without land*" idealized in the years 1970, it is now a **complex process of large-scale mechanized agriculture and cattle ranching implementation.**

- ✓ **« Peopled forest » :** series of experiments combining human presence and conservation of biodiversity

⇒ **Should be preserved at all costs by the implementation of adapted public policies.**