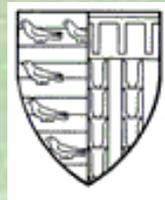


# Conservation and Development in the Brazilian Amazon: red, yellow and green

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# Overture

- Deforestation and land use change in Brazil, like in most countries, have occurred as an outcome of occupation, population growth, and economic development.
- Conservation becomes part of the development agenda in the 1980s, but the main processes of ecosystem conversion are still in place.

# The Problem

Maintenance of biologically diverse ecosystems

X

Land requirements and the opportunity costs  
of non-conversion

# The Hopes

- Can we balance the C-D Trade-off and arrive to socially better outcomes?
- Could we actually solve the trade-off and think of economic alternatives that promote conservation and development at the same time? (double dividends?)

This talk...

# Not about one project...

- Bioecon – Biodiversity and Economics for Conservation – Timo Goeschl and Tim Swanson
- Nemesis – Núcleo de Estudos e Modelos Espaciais Sistêmicos – Eustáquio Reis e Diana Weinhold
- Trade-Offs between Conservation and Development – Toby Gardner, Joice Ferreira, Jos Barlow, and Luke Parry
- CIFOR – Centre for International Forestry Research – Pablo Pacheco

# Not about one paper...

1. Reconciling Conservation and Development: A Dynamic Hotelling Model of Extractive Reserves, *Land Economics*, 2004 (with T. Goeschl)
2. 'Property Rights for Biodiversity Conservation and Development: Extractive Reserves in the Brazilian Amazon', *Development and Change*, 2006 (with T. Goeschl).
3. Causal Forces of Deforestation in the Brazilian Amazon: Does Size Matter? (with D. Weinhold and E. Reis), working paper, 2005.
4. Determinants of Technical Efficiency in Agriculture and Cattle Ranching, *Environmental Economy and Policy Discussion Paper Series*, n 09.2005
5. Deforestation, Growth and Agglomeration Effects: Evidence from Agriculture in the Brazilian Amazon, *Environmental Economy and Policy Discussion Paper Series*, n 29.2008
6. Mapping Investments in the Brazilian Amazon, 2010 (with P. Pacheco and T. Morello)

# The Aim

Reflections on a few key issues after almost ten years of research...

# Structure

1. Analytical Background
2. History and Geography
3. The Red
4. The Yellow
5. The Green
6. Other colours
7. Challenges ahead

# Economic Foundation

- Values
- Choice
- Diversity

# The value of a theory of value

*The most fundamental propositions in economic analysis are the propositions of the general theory of value. No matter what particular 'school' is in question, no matter what arrangement of subject-matter is adopted, the body of propositions explaining the nature and the determination of the relation between given goods of the first order will be found to have a pivotal position in the whole system.*

*Lionel Robbins, Essay on the Nature and Significance of Economic Science, p. 73 (1932)*

# Why is valuation so difficult?

- Direct Use Values – benefits from the consumption of different goods (agriculture, mining, timber, non-timber);
- Indirect Use Values - benefits deriving from ecosystem functions (climate stability);
- Option Values - option of using a certain asset in the future (functioning like an insurance).
- Bequest Values - derived from the knowledge that other might benefit in the future;
- Existence Values – derived from the very existence of a particular species, ecosystem, landscape.

# Individual Behaviour

- Objectives
- Constraints
- Incentives' mechanisms
- Individual choice
- Social outcomes

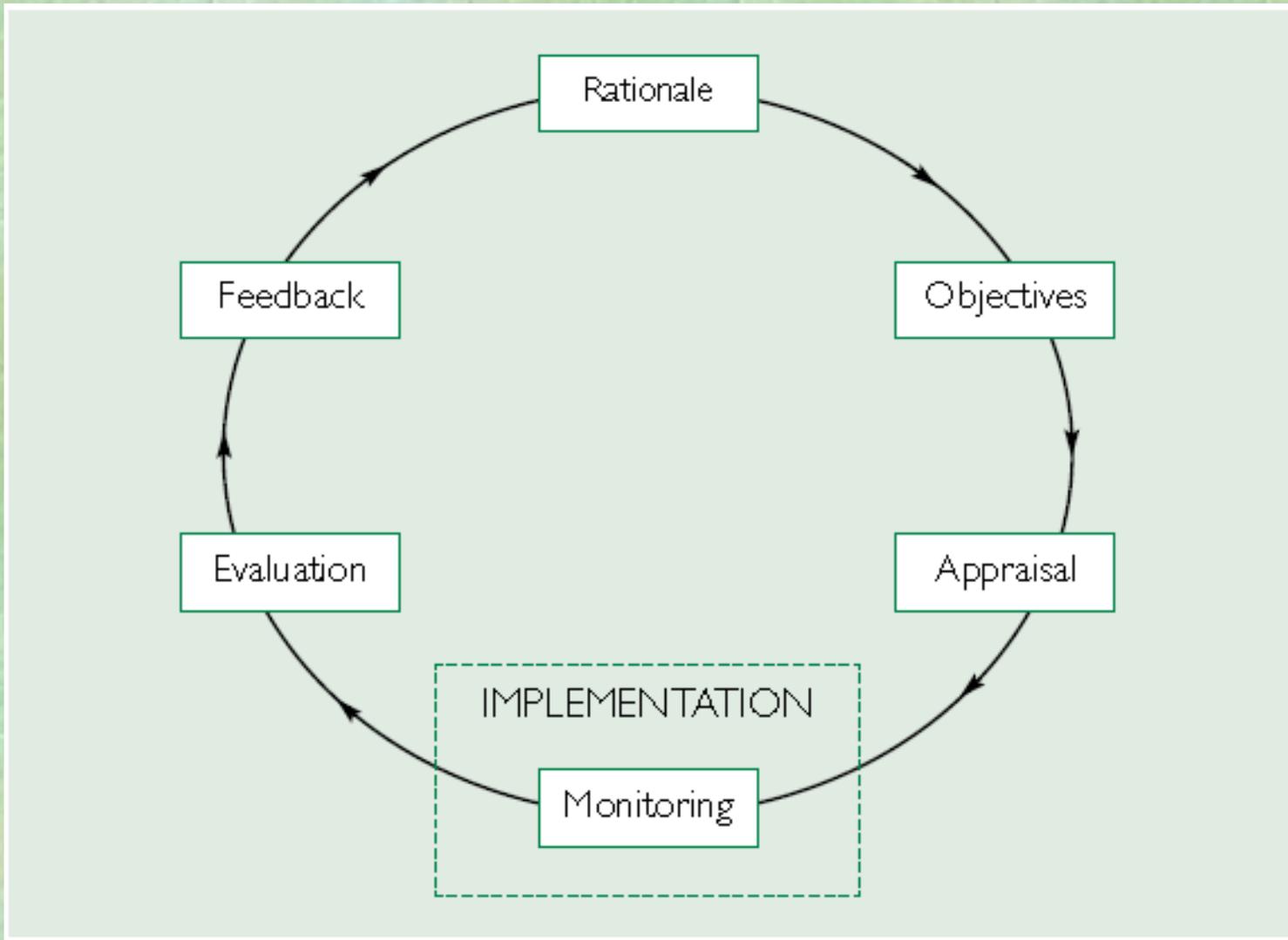
# The tale of sticks and carrots

- Rewards
- Punishment
- Incentives' mechanisms
- The principal-agent model

# A Diverse Menu

- Moral suasion
- Property rights
- Payments, taxes and subsidies
- Command-and-control
- Tradable permits and mixed policy

# Policy Evaluation



Source: HM Treasury – The Green Book

# The Amazon Region - Geography

- The Amazon forests constitute one of the main **global strategic ecosystems** due to its variety of species and its potential role related to climate change.
- The Amazon basin is the largest piece of contiguous tropical forest left in the world. The so-called “Legal Amazonia” in Brazil comprises about 5 million of square kilometres, more than half of the national territory.
- In the Brazilian Amazon, 70% is continuous forest domain and almost 85% of its original cover is still intact.

# The Amazon Region -Recent History

- 1960s - the military government decided to implement a wide development programme (*peopleless land for landless people*).
- Infrastructure - roads, hydroelectric facilities, railways and ports were built.
- Incentives for settlements - subsidised credit, tax breaks and land concession to whom were willing to establish agricultural enterprises in the region.
- These initiatives have produced huge economic, demographic and ecological impacts.

# Growth and Development

- Population increased from 7.3 million in 1970 to 13.2 million in 1985.
- Real GDP jumped from US\$ 2.2 billion to US\$ 13.5 billion
- 33 million hectares of forests were converted to agricultural land.

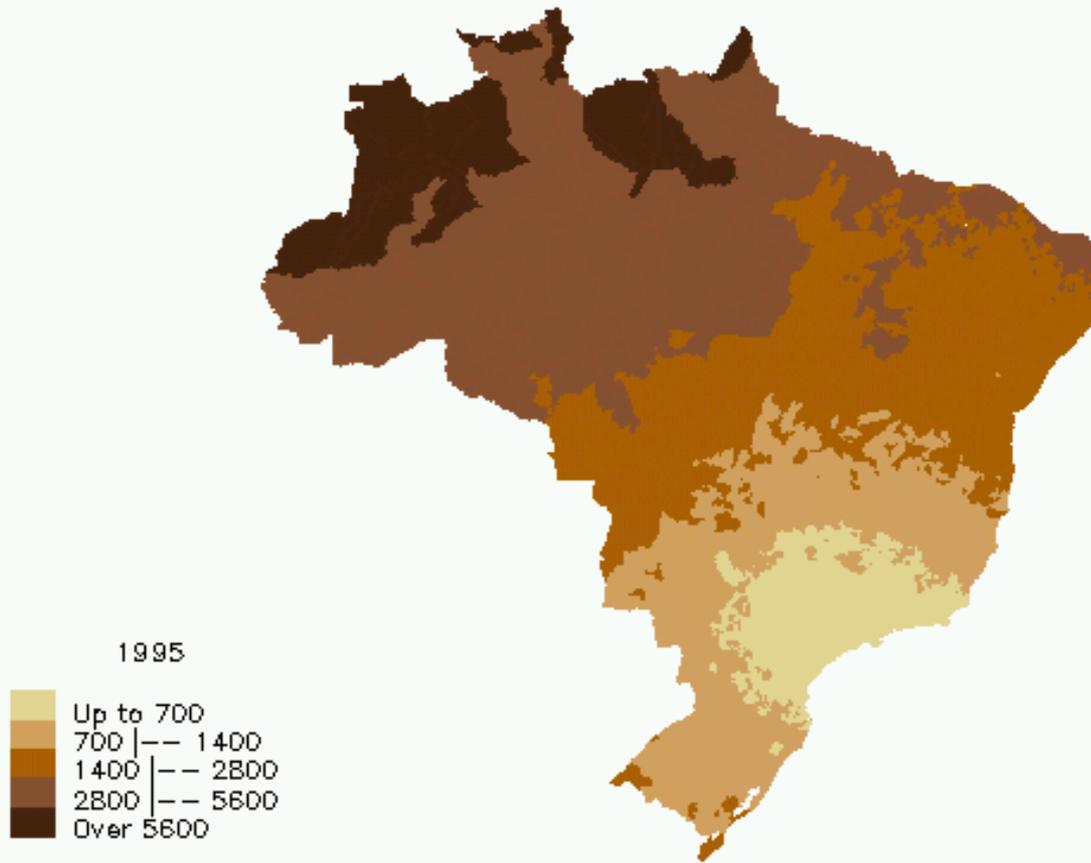


# Geography

- The macro process is primarily associated with geography.
- The arch of deforestation comprises the areas in closer proximity to regions, which concentrate most of the population and economic activity in the country.
- Two aspects are relevant to understand the impact of proximity to national centres: inward migration and exports to national markets.

# Access to National Markets

Custo de transporte para Sao Paulo

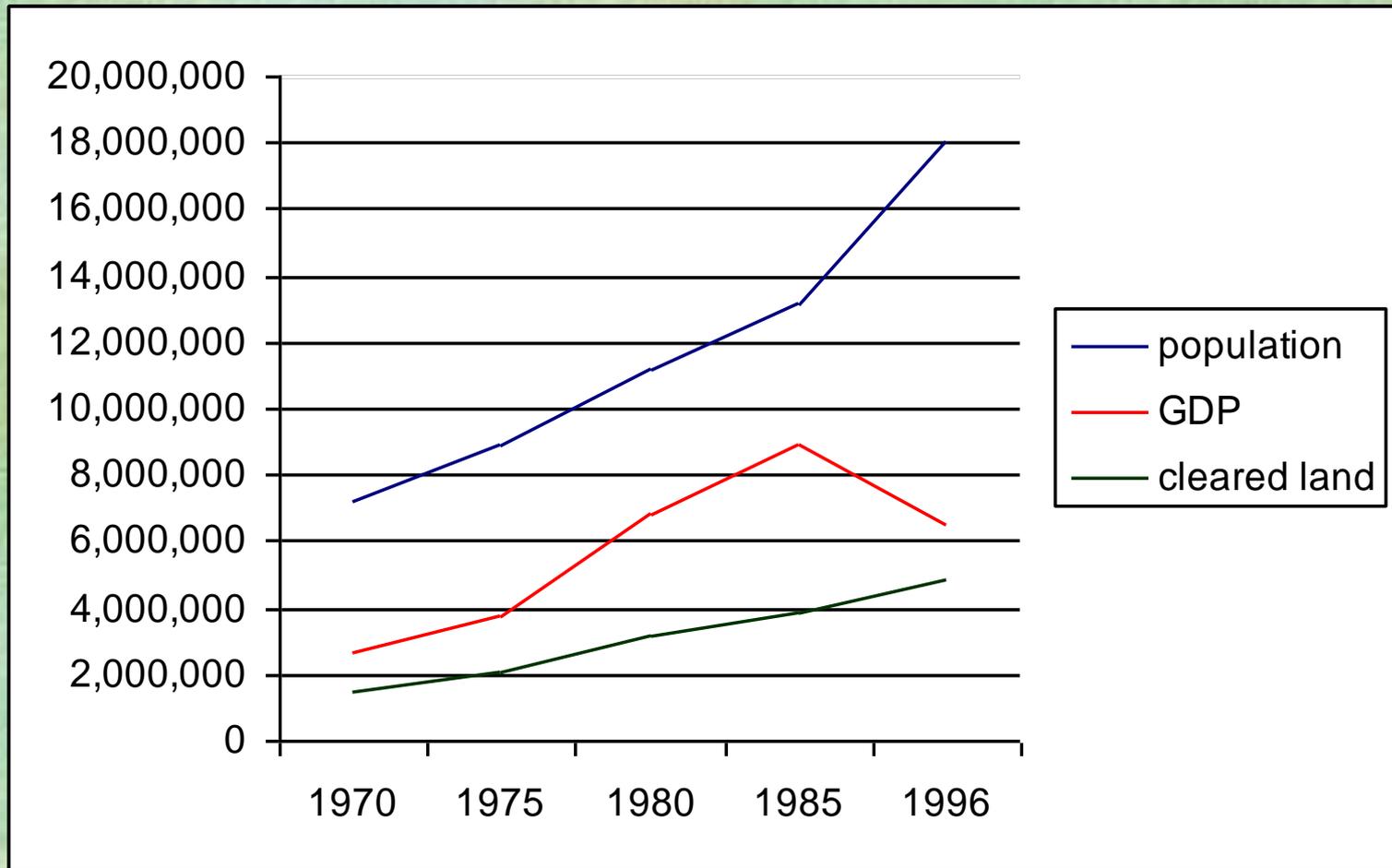


# History

- At local level history matters as well.
- The process of colonization within states has connections with the Brazilian political occupation over the last centuries when the local capitals were first established.
- After the launch of development programmes in the 1960s and 1970s these already established 'urban' structures were naturally used as local hubs for receiving initial population and investment flows.

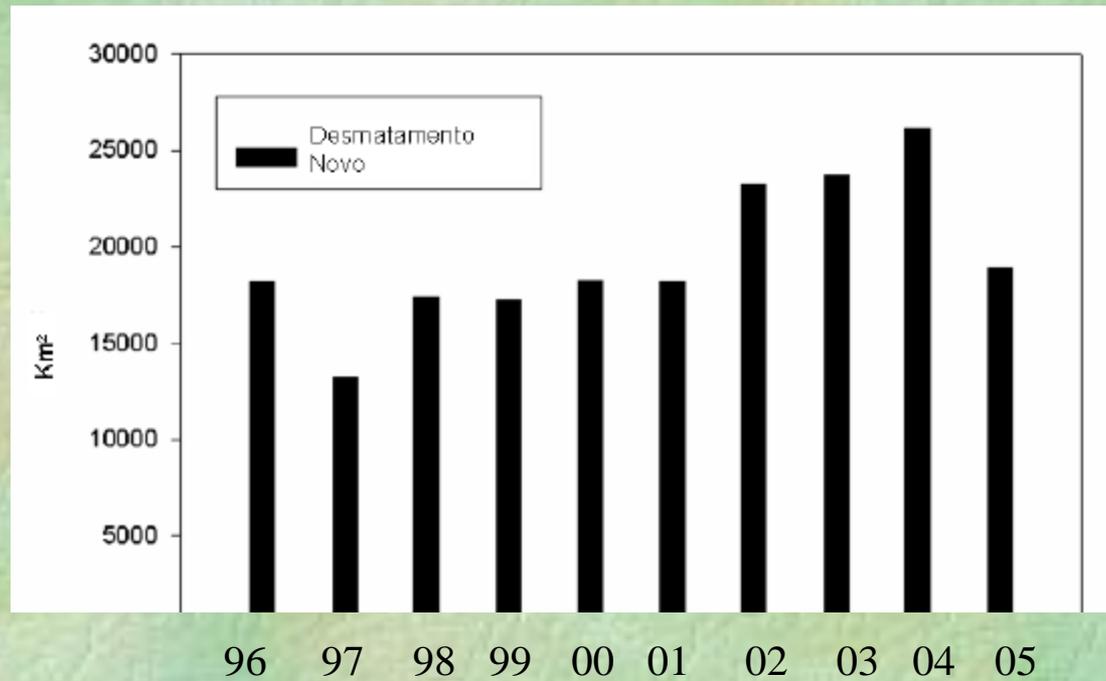


# Trends



Source: IBGE

# Recent Deforestation



Source: Nepstad et al (2007)

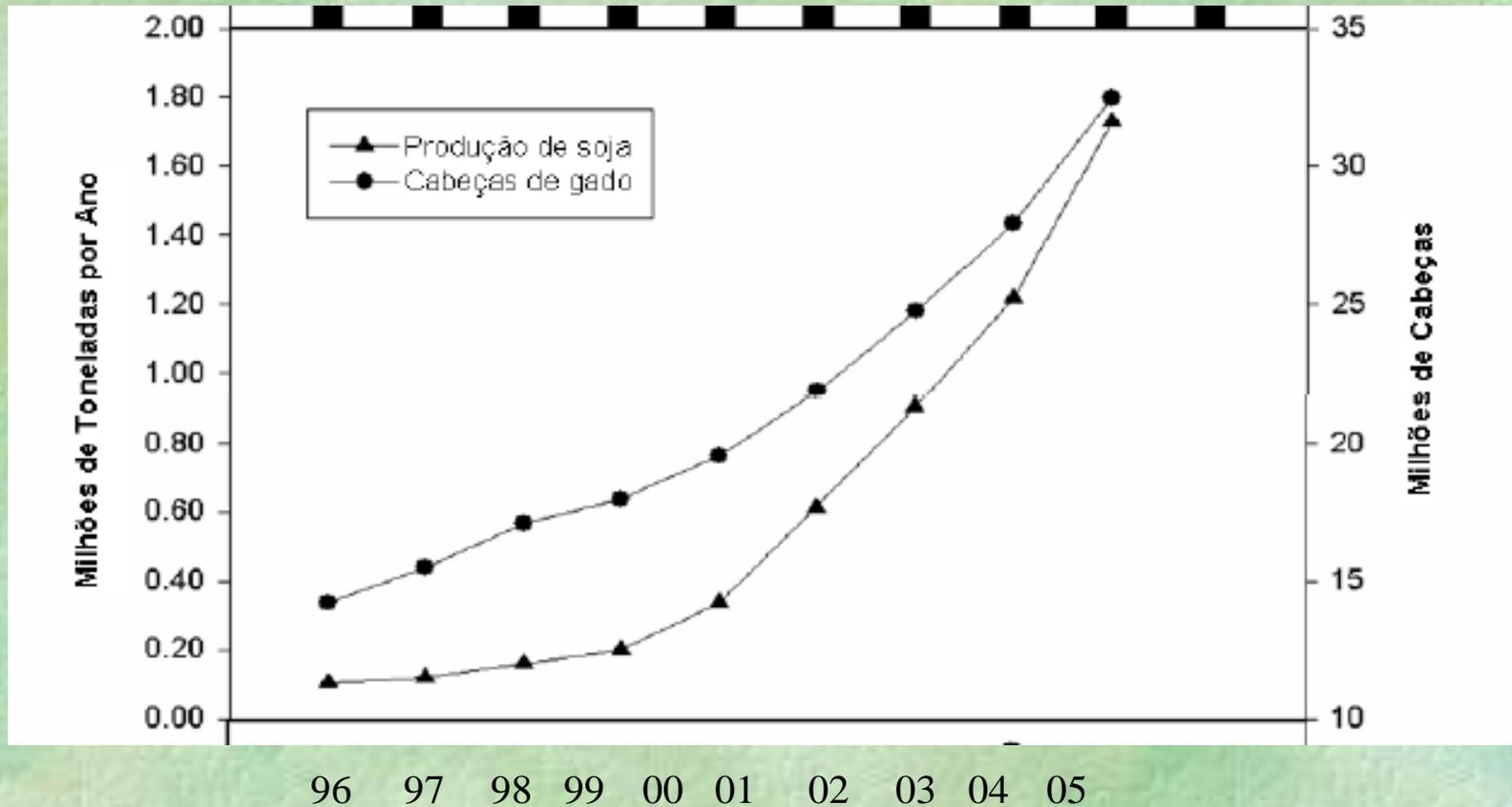
# The Red



# The Red

- Historic cycle
- The Peão
- A variety of property rights
- A variety of property sizes
- Incentives: subsistence
- Incentives: domestic markets
- Incentives: international markets and foot-and-mouth disease
- Global pressures and trackability

# Livestock and Beans



Source: Nepstad et al (2007)

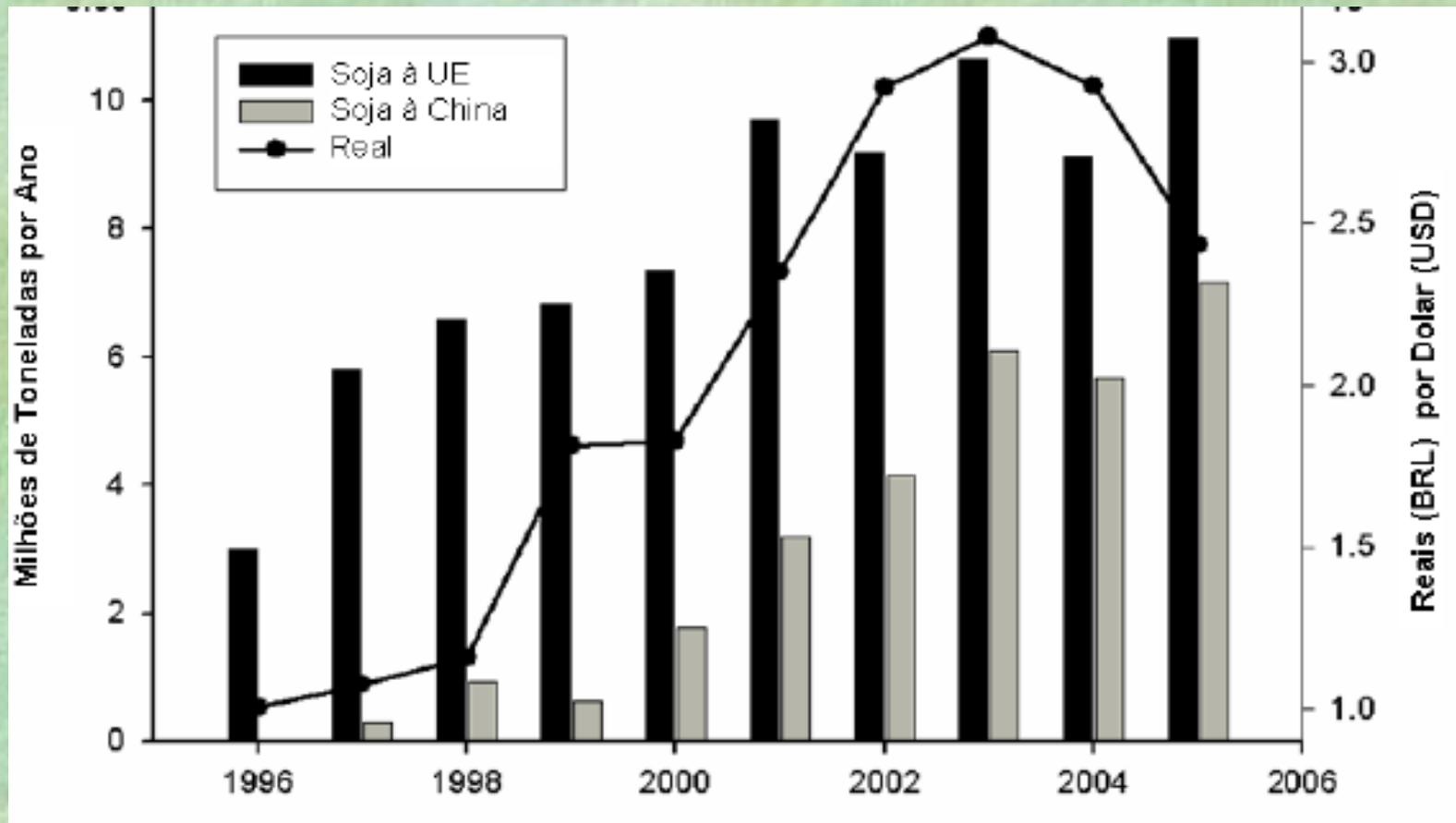
# The Yellow



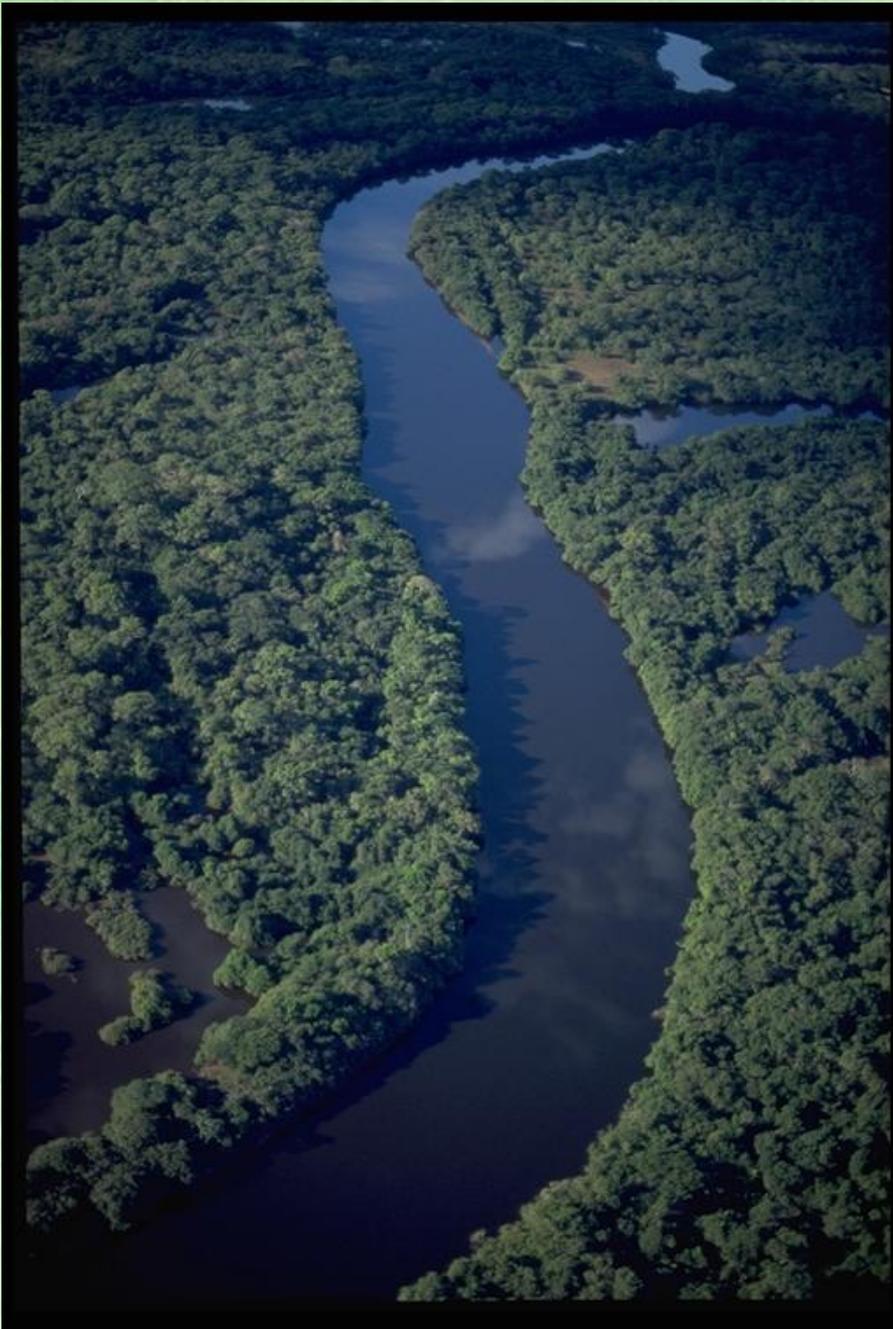
# The Yellow

- Recent development
- The harvester
- Private property rights
- Large property sizes
- Incentives: domestic markets
- Incentives: international markets
- Moratória da Soja
- Links with cattle ranching

# International demand: European Union and China



Source: Nepstad et al (2007)



# The Green

# The Green Consumer



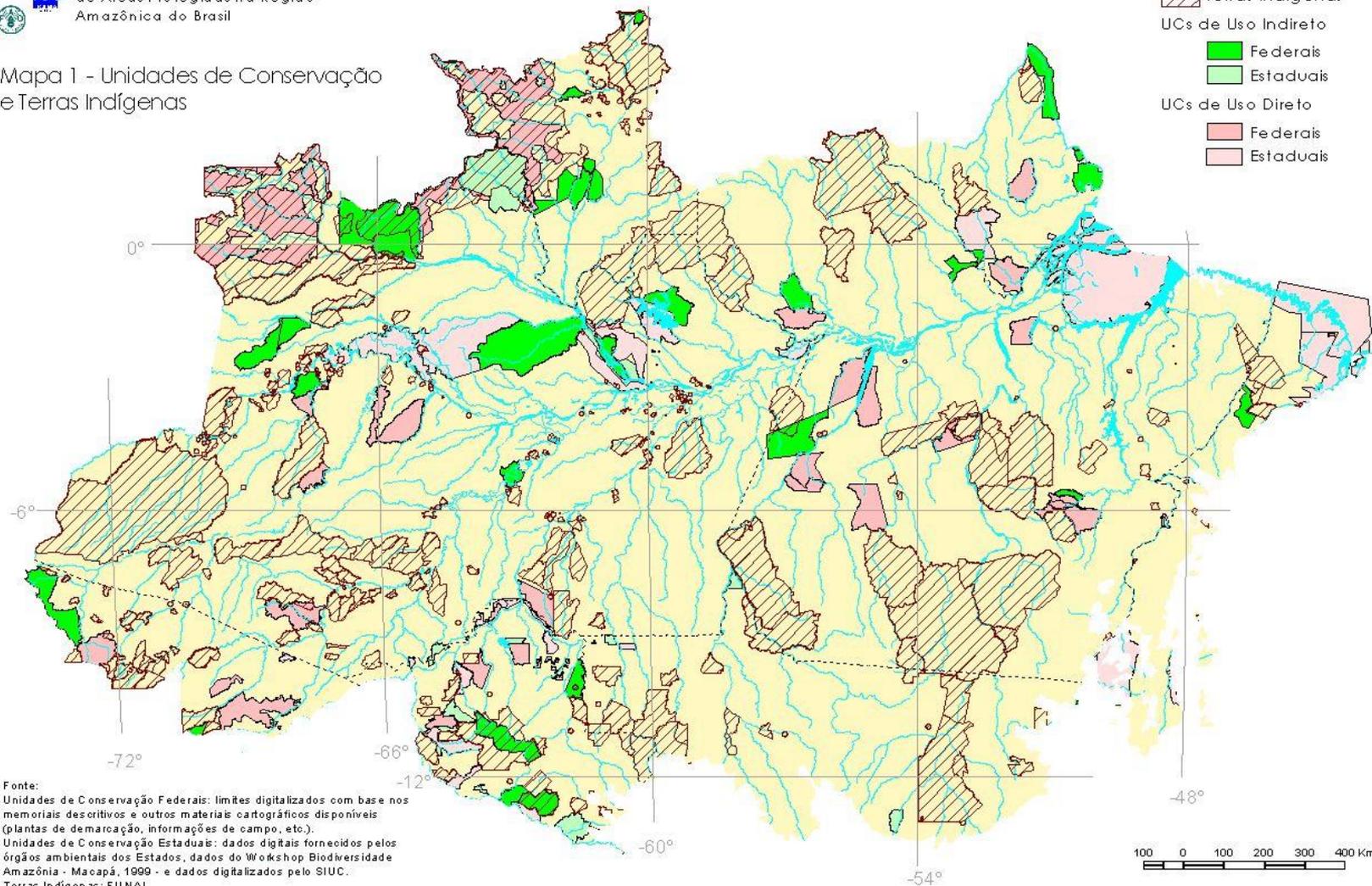
# Land Use Constraints

- Forest code: Legal forest reserve
- Management plans
- National parks
- Indian reserves
- Biological reserves
- National Forests
- Extractive Reserves
- Payment for environmental services (REDD)?



Projeto Expansão e Consolidação  
de Áreas Protegidas na Região  
Amazônica do Brasil

Mapa 1 - Unidades de Conservação  
e Terras Indígenas



Fonte:

Unidades de Conservação Federais: limites digitalizados com base nos memoriais descritivos e outros materiais cartográficos disponíveis (plantas de demarcação, informações de campo, etc.).

Unidades de Conservação Estaduais: dados digitais fornecidos pelos órgãos ambientais dos Estados, dados do Workshop Biodiversidade Amazônia - Macapá, 1999 - e dados digitalizados pelo SIUC.

Terras Indígenas: FUNAI.

Other Colours...

# Logging



# Fires



# Mining



# Energy



# Cities within the forest



# Industrial District (Zona Franca de Manaus)



# Tourism



# The ones who were there first



Índia Arauaque

# Wrapping Up – Property Rights

- The economic literature and public policy concerned with balancing development and environmental conservation have emphasized the role of property rights and the importance of selecting areas where land use restrictions would be established.

# Wrapping Up – Land Zoning

- On the one hand, different zoning schemes have been proposed as forms of turning the current Forest Code more flexible, impacting the efficiency and the environmental outcomes of economic activities carried out over privately owned land.
- On the other, reserves, parks or national forests have been created in order to guarantee the conservation of strategic areas.

# Wrapping Up - Valuation

- The identification and measurement of opportunity costs related to economic choices impacting the spatial distribution and the evolution of regional development in the Amazon are important steps in generating relevant information for public policy making.

# Wrapping Up – Incentives

- The understanding of incentive structures capable of motivating agents to make land use choices with a view in the long run and considering social goals is crucial for the relationships between governments and society.

# Wrapping Up – Complexity

- The complexity of the reality on the ground, however, indicates that more efforts enhancing the theoretical developments, improving empirical methods, and evaluating policies are needed to further the understanding of underlining processes of economic growth, development and conservation in the Brazilian Amazon.

# A final thought...

- Local, regional, national and international institutions have to play their part if we were to arrive to sustainable development in the Amazon.
- We are all stakeholders
- We all benefit, we all have to pay...

# CARTE DE LA TERRE FERME, DU PEROU, DU BRESIL, ET DU PAYS DES AMAZONES,

Dressée sur les Mémoires les plus Nouveaux & les observations les plus exactes.

Tome IV. de l'Atlas de la France.



**OBSERVATION**  
Sur les IV. Parties de l'Amérique Méridionale  
Contenues dans cette Carte.

La Terre Ferme, qui est le plus grand des pays de l'Amérique Méridionale, en est aussi une des plus considérables parties. Elle forme une espèce de triangle, dont le sommet est à l'Est de l'Orinoco, et dont la base est formée par le Rio de la Plata. Elle est bornée au Nord par le Rio de l'Orinoco, au Sud par le Rio de la Plata, et à l'Est par le Rio de l'Orinoco. Elle est divisée en plusieurs provinces, dont les principales sont le Rio Negro, le Rio de la Plata, le Rio de l'Orinoco, et le Rio de l'Amazone.

Le Brésil est une des plus grandes parties de l'Amérique Méridionale. Il est borné au Nord par le Rio de l'Orinoco, au Sud par le Rio de la Plata, et à l'Est par le Rio de l'Orinoco. Il est divisé en plusieurs provinces, dont les principales sont le Rio Negro, le Rio de la Plata, le Rio de l'Orinoco, et le Rio de l'Amazone.

Le Pays des Amazones est un grand pays qui se trouve au Sud du Brésil. Il est borné au Nord par le Rio de l'Orinoco, au Sud par le Rio de la Plata, et à l'Est par le Rio de l'Orinoco. Il est divisé en plusieurs provinces, dont les principales sont le Rio Negro, le Rio de la Plata, le Rio de l'Orinoco, et le Rio de l'Amazone.

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