Anthropized Forests and Precision Restoration:

A New Frontier for Legal Reserve Areas in the Amazon

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Opportunities and Challenges

1) Sustainable Management of Anthropized Forests

2) Precision-Based Forest Restoration

The Anthropized Forests

Deforestation-free areas

Successive cycles of timber extraction

Partial biomass loss

Preserves partial original structure and ecological functionality

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Anthropized Forests in the Amazon

Private forest lands: 68 million hectares

Anthropized: 42,3 million ha (Lapola et al., 2023)

They still provide valuable environmental services

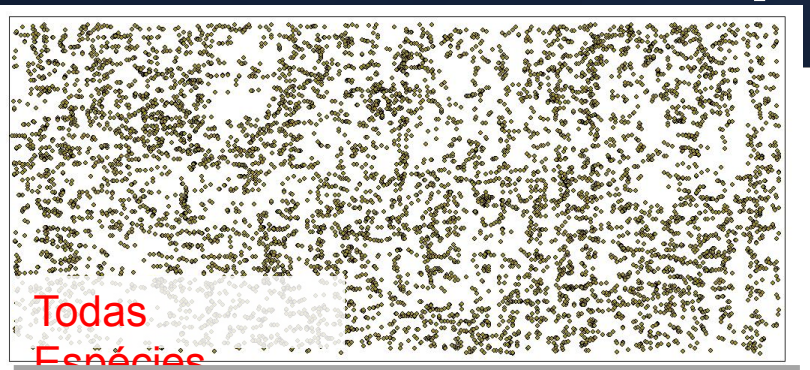
Risk of degradation progressing to deforestation

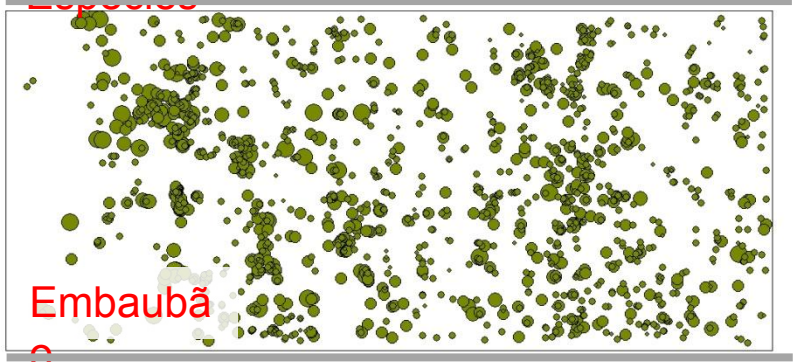
Why Manage Anthropized Forests?

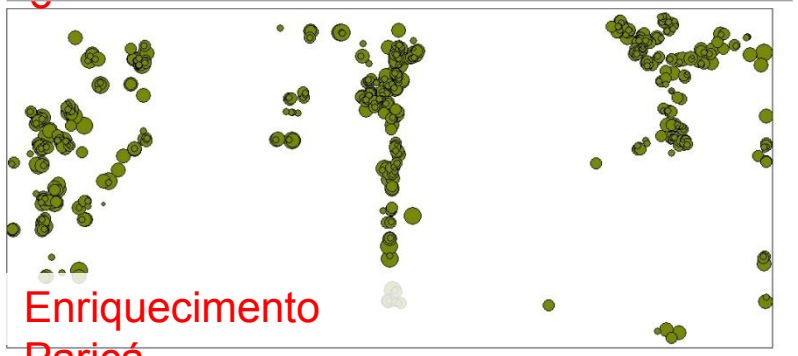
Indicators	Estimated Values
Available área for management (20%)	8 million hectares
Harvesting intensity	12 m^3/ha
Total estimated timber volume	8 million m^3
Average annual consumption per mill	9,600 m^3
Small/medium-sized mills	800 mills
Estimated green job creation	40,000 jobs in the supply chain

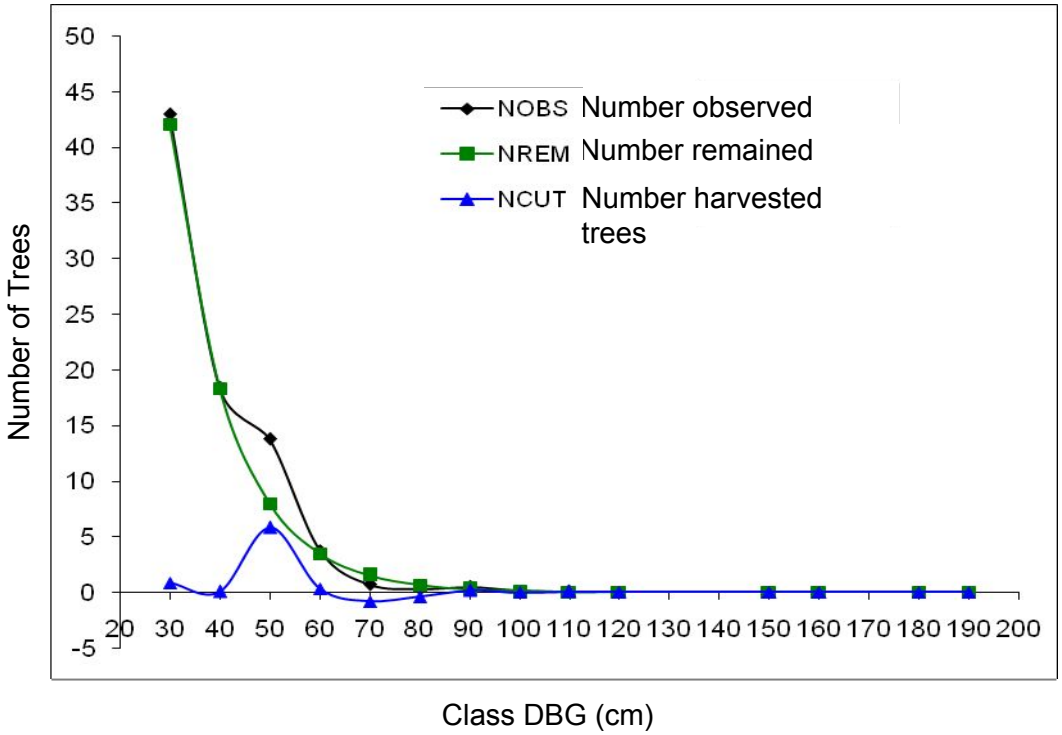
Source: Projeto Rede Biomassa (não publicado)

Management of Anthropized Forests









Siviero et al. (2020)

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Management of Anthropized Forests

Ecological-Silvicultural Core	
1. Silvicultural Practices	- Gap enrichment with native species + Natural regeneration
2. Harvesting Criteria	- Trees with DBH ≥ 25 cm for marketable
3. Management Protocol	- Harvest of 30 m^3/ha per cycle of 10–12 year
4. Benefits	- Maintain forest cover, Biodiversity conservation, Economic returns
Governance-Implementation	
5. Public Policy	- Incentives for sustainable use
6. Regulatory Context	- Efficient licensing procedures - Adapted management norms
7. Monitoring	- Continuous performance tracking
8. Technology Transfer	- Practical implementation of knowledge

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Precision Forest Restoration

Brazil's Commitment Under Paris Agreement

Restore 12 million hectares by 2030

Nearly half is in the Amazon

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Science
AAAS

Hyperdominance in the Amazonian Tree Flora
Hans ter Steege *et al.*
Science **342**, (2013);
DOI: 10.1126/science.1243092

Tree species: approx. 16,000 spp.

Trees/palms: 390 billion (DBH ≥10 cm)

227 sp Hyperdominants

How to Select Species for Forest Restoration

Precision Forest Restoration

Selection of structuring species are based on the following papers:

- Salomão et al. Revista Árvore (UFV impresso), v.36, n.6, p.989-1007, 2012
- Salomão et al. Bol. Mus. Para. Emílio Goeldi, Cien. Nat., v.7, p.57-102, 2012
- Salomão et al. Floresta (UFPR impresso), v.42, p.115-128, 2012
- Salomão et al. Ciência Florestal (UFSM impresso), v.23, p.139-151, 2013
- Salomão R. P. Restauração Florestal de Precisão, Novas Edições Acadêmicas, 405p., 2015

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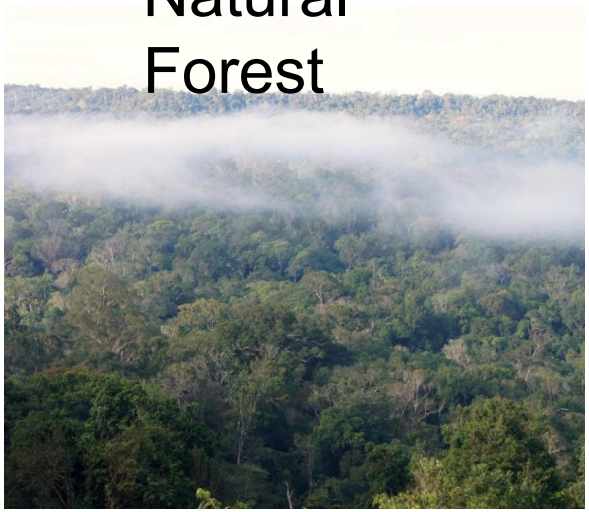
CHALLENGE for Forest Restoration

Natural Forest



Mined Area

Select Structuring Species

- Define community structure (abundance, biomass, canopy height)
- Drive occurrence of associated species
- Are critical for restoring original forest architecture

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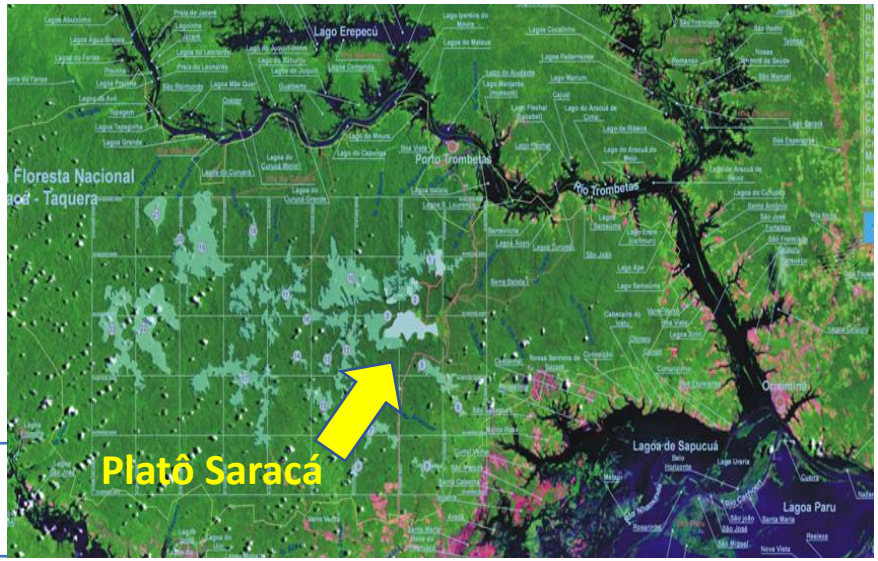
Precision Forest Restoration: Our Approach for Platô Saracá Taquera



1.321 ha

315 plots (0,25 ha) = 78,75 ha

36.289 individuals (DAP ≥ 10 cm)

898 species

62 families

Salomão et al., 2012

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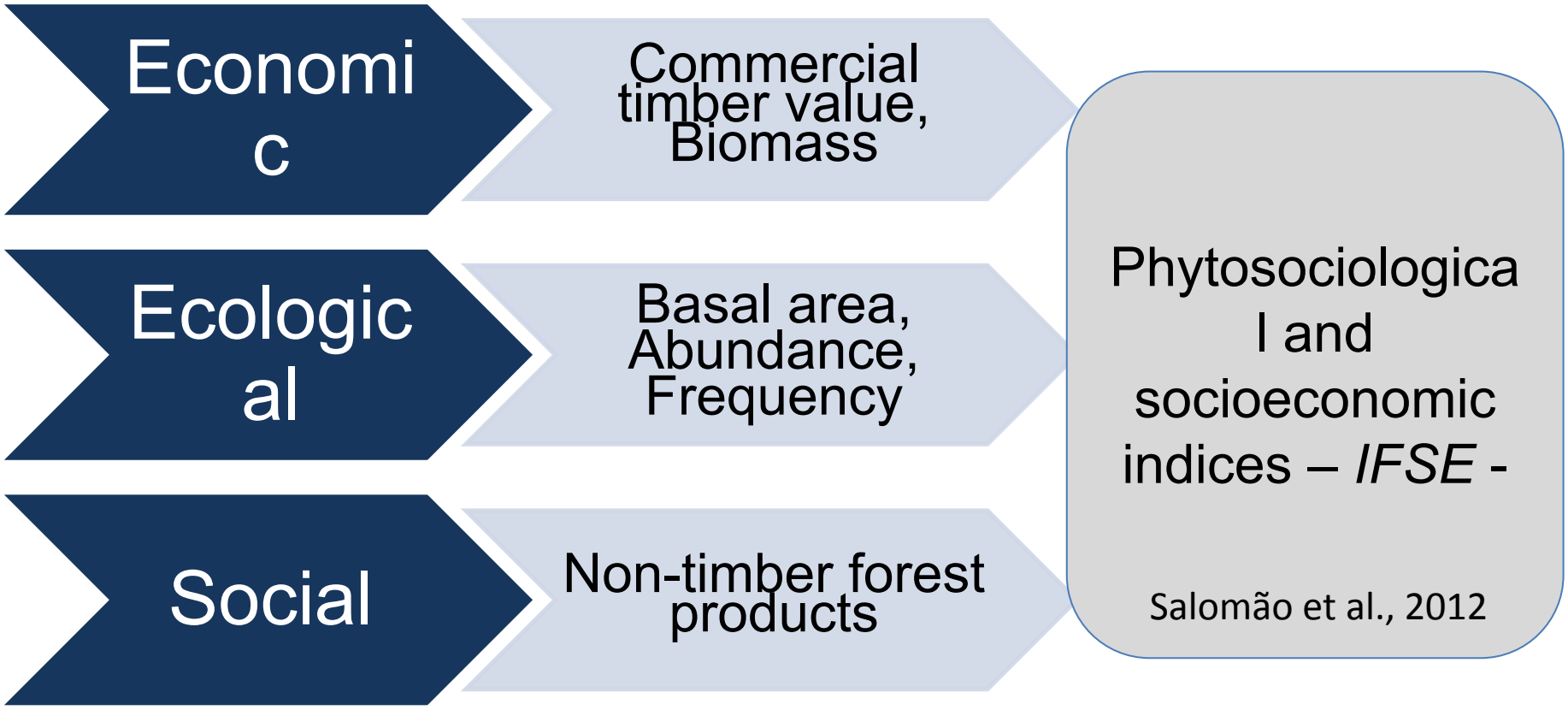
Factors for Selecting Species in Precision Forest Restoration



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Number of Species for Precision Forest Restoration

IFSE	Species Dominance				Total
	High	Intermediate	Low	1+2	
Number spp	1	24	873	25	898

Structuring Species for "Precision Forest Restoration"

Salomão et al., 2012

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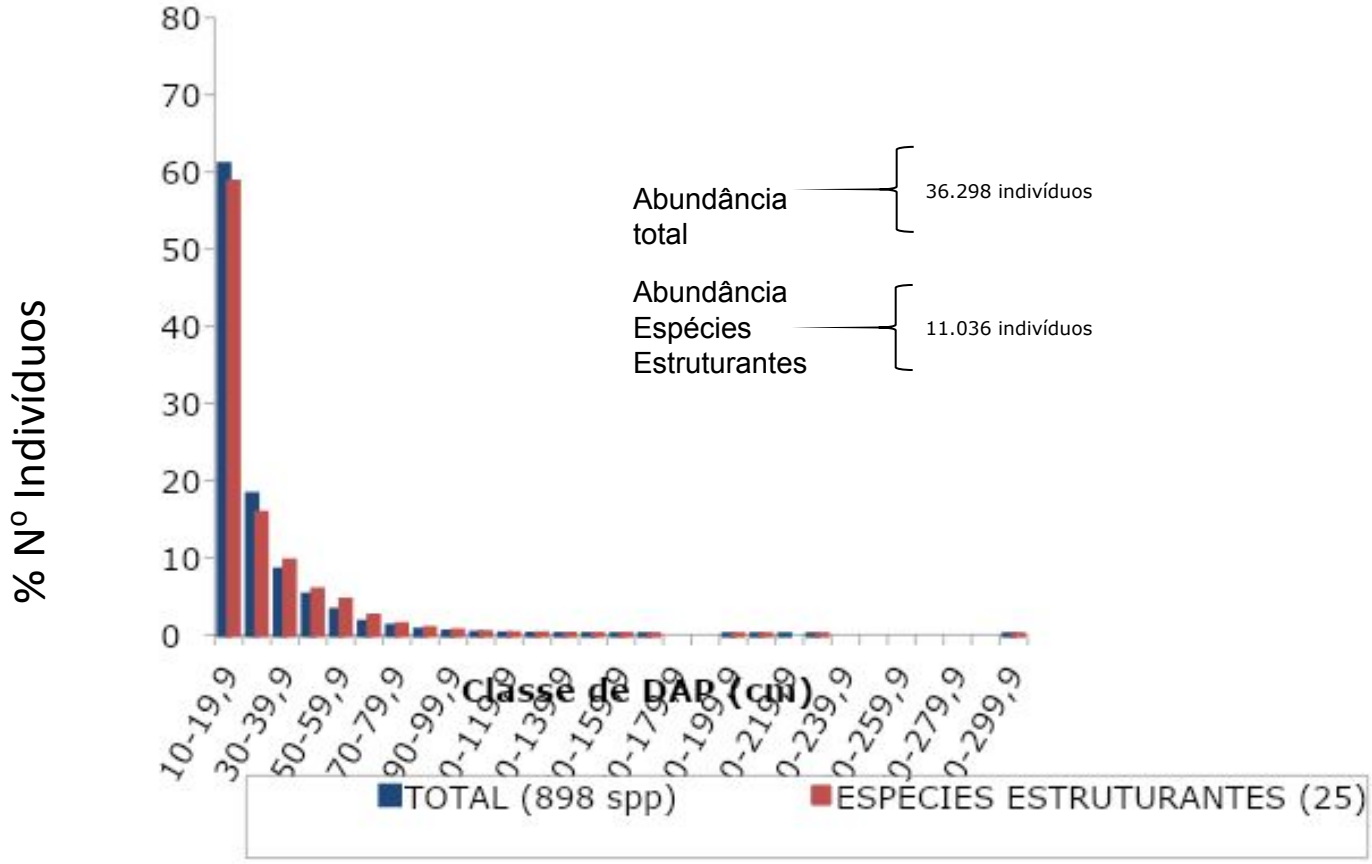
Diameter Structure of Structuring Species Individuals



Salomão et al., 2012

Precision Forest Restoration
- RestauraFlorestas -

Reference Forest Inventories

Digital System

Salomão et al., não publicado

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Thank You

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