

Sustainable Forestry and the Changing Economics of Land Use on the Amazon Frontier

**Implications for Public Policy in
the Legal Amazon**

Preliminary Results

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Principle Conclusions

- The current pattern of exploitation of the Amazon does not generate quality development in the public interest.
- Market forces will, in general, lead to a pattern of “Boom-Bust” development that is not in the best interest of Brazilian society.
- Managed forestry represents a quality alternative to the “Boom-Bust” model.
- Managed forestry can also be fully complementary to a system of biodiversity conservation.
- The window to create FLONAS is now.

Role of Government on the Frontier

- Improve the quality of life of local populations.
- Balance the well-being of individuals and the costs they impose on the larger society.
- Promote equitable use of national patrimony.

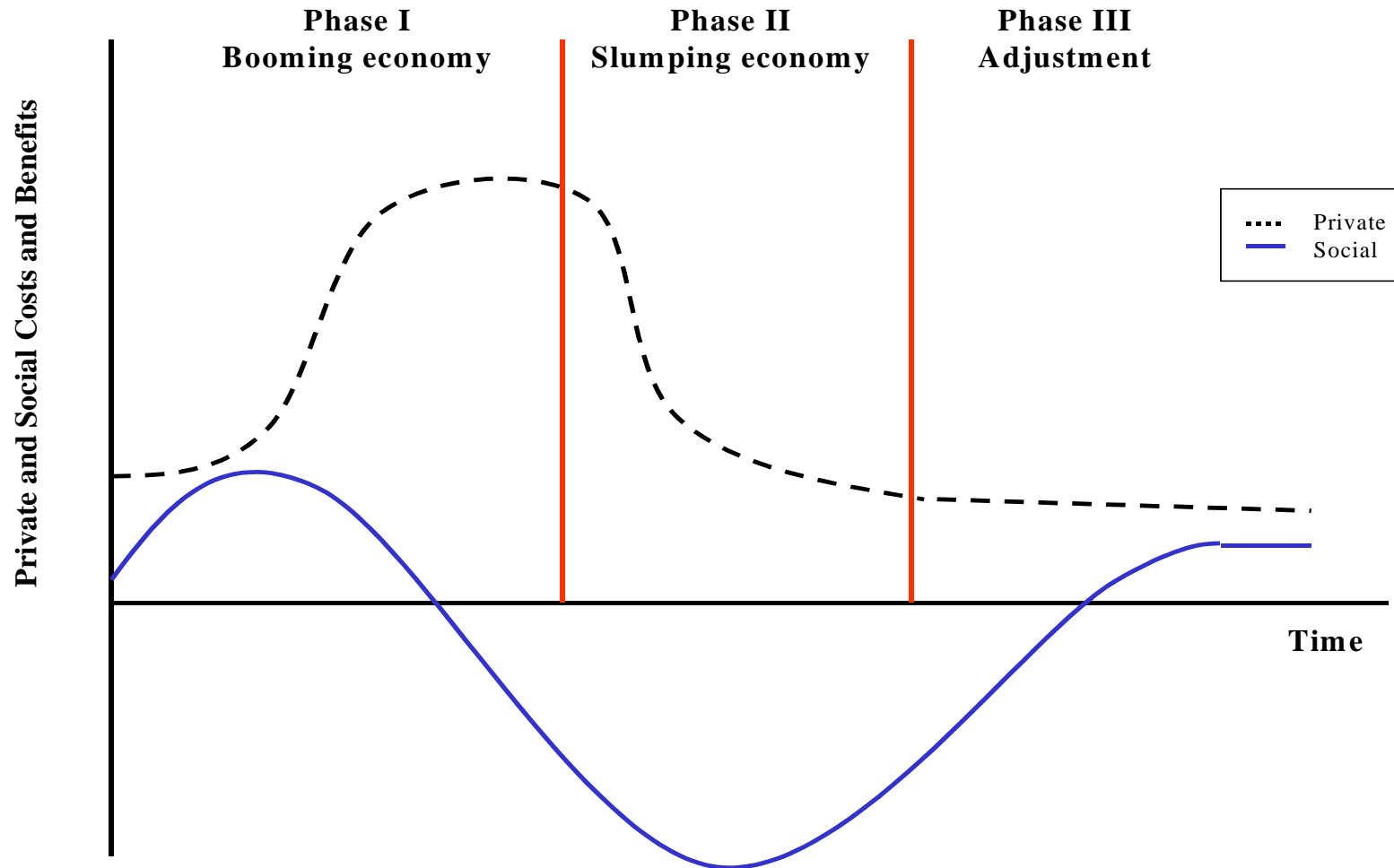
Improve Quality of Life of Local Populations

- Reduce income variability.
- Stabilize communities.
- Build human capital.

Market Failures on the Frontier

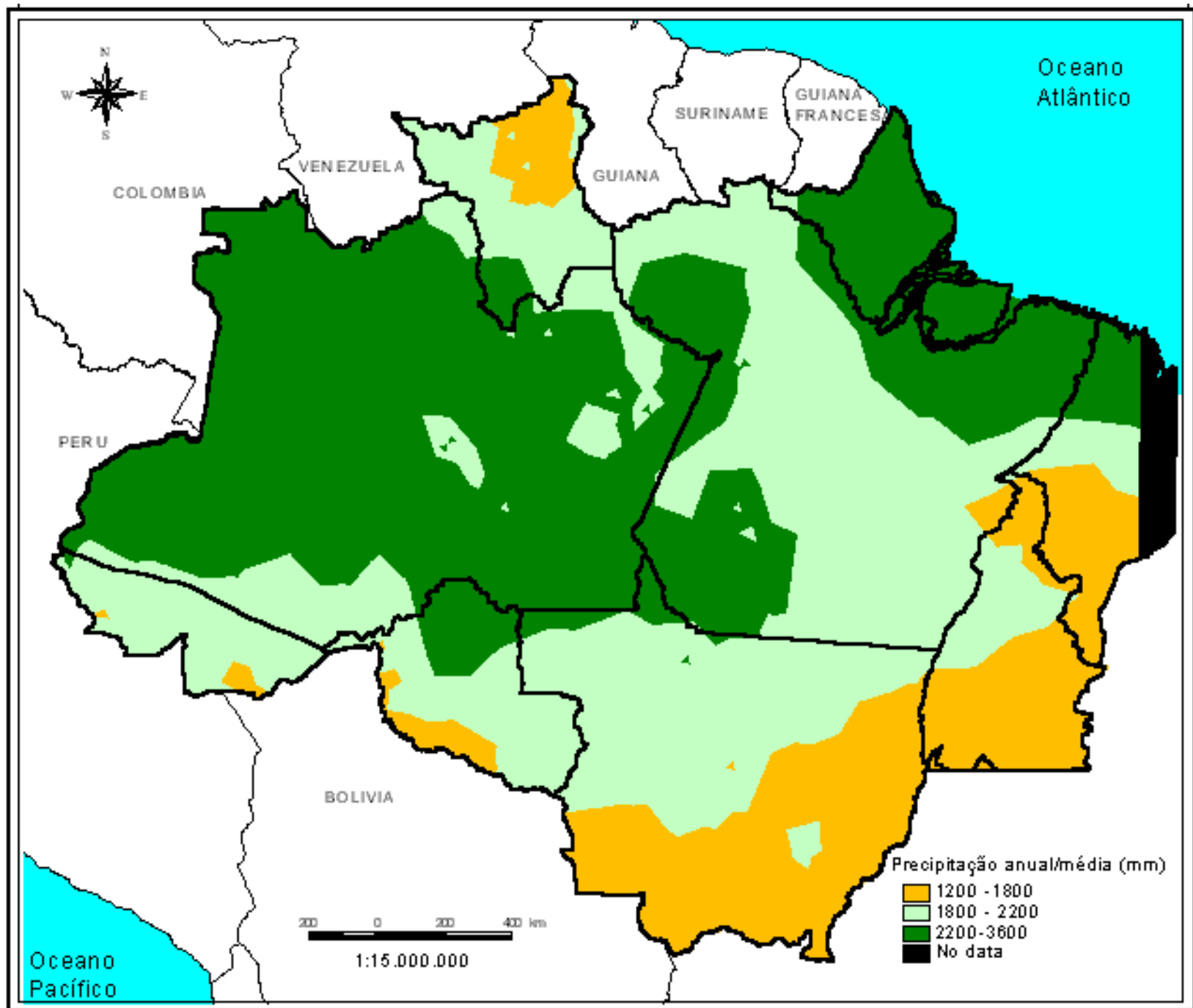
- Frontier conditions promote “mining” of the natural resource base.
 - Timber
 - soil minerals
- Resource abundance, lack of property rights and young governments lead to “immediatismo” and presence of uncontrolled externalities.

Private and Social Costs and Benefits of the “Boom-Bust” (mining) Economy



The Effect of Rainfall

- **Sombroek:** Need for a distinct dry season for crop ripening, hardening, and mechanized harvesting.
- **EMBRAPA Belem Soja Conference:** Regime of intense rainfall and weak period of lower rainfall eliminates the opportunity for production of grains on a large scale in the majority of the Amazonian territory.
- **RADAMBRASIL:** 7% of the 3.7 million KM² is of high of medium potential for agriculture.
- **Chomitz and THOMAS:** find a strong statistical relationship between higher rainfall and decreasing indicators of agricultural productivity based on the the 1995-6 agricultural census, holding constant infrastructure, markets, and land characteristics.



Land Use by Rainfall Zone

Rainfall area ¹		Percent of Total	area in establishment	area in ag use
Dry	83,657,222	17%	55.6%	38.2%
Humid	181,624,081	38%	28.7%	13.0%
Very Humid	219,488,782	45%	7.5%	3.2%
Total	484,770,085	100%	24%	13%

.1.Rainfall categories correspond to less than 1700 mm (dry), greater than 1700 and less than or equal to 2100mm (humid), and greater than 2100mm (very humid)

Land Use by Rainfall Zone

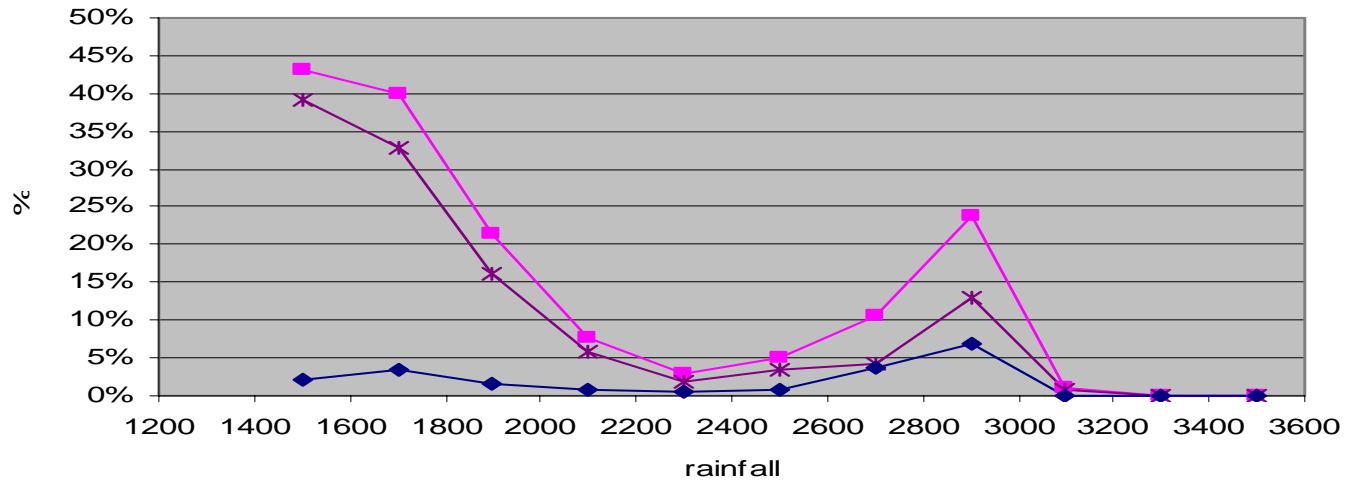
Rainfall area ¹	Percent ag use	pasture	annual	perennial	abandoned	other ³
Dry	100%	83.3%	5.1%	0.5%	8.4%	2.6%
Humid	100%	77.7%	9.1%	1.9%	7.7%	3.6%
Very Humid	100%	56.8%	7.2%	4.4%	20.9%	10.7%
Long settlement history Very Humid ²	100%	54.4%	5.8%	4.6%	28.5%	6.7%

1 Rainfall categories correspond to less than 1700 mm (dry), greater than 1700 and less than or equal to 2100mm (humid), and greater than 2100mm (very humid)

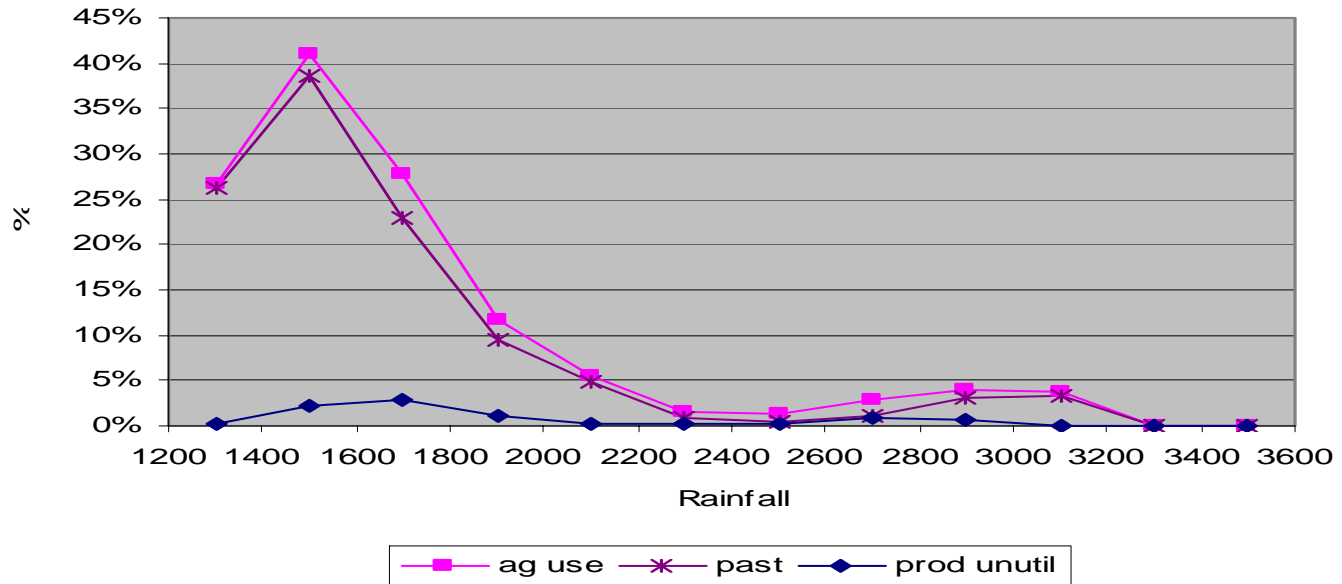
2 Corresponds to Belem/Bragantina and Macapa/Northeast Amapa

3. Includes planted forest and fallow.

**Percent in Agricultural Use:
Less than 25 km from principal road**



Greater than 25 km from a principal road



—■— ag use —*— past —◆— prod unutil

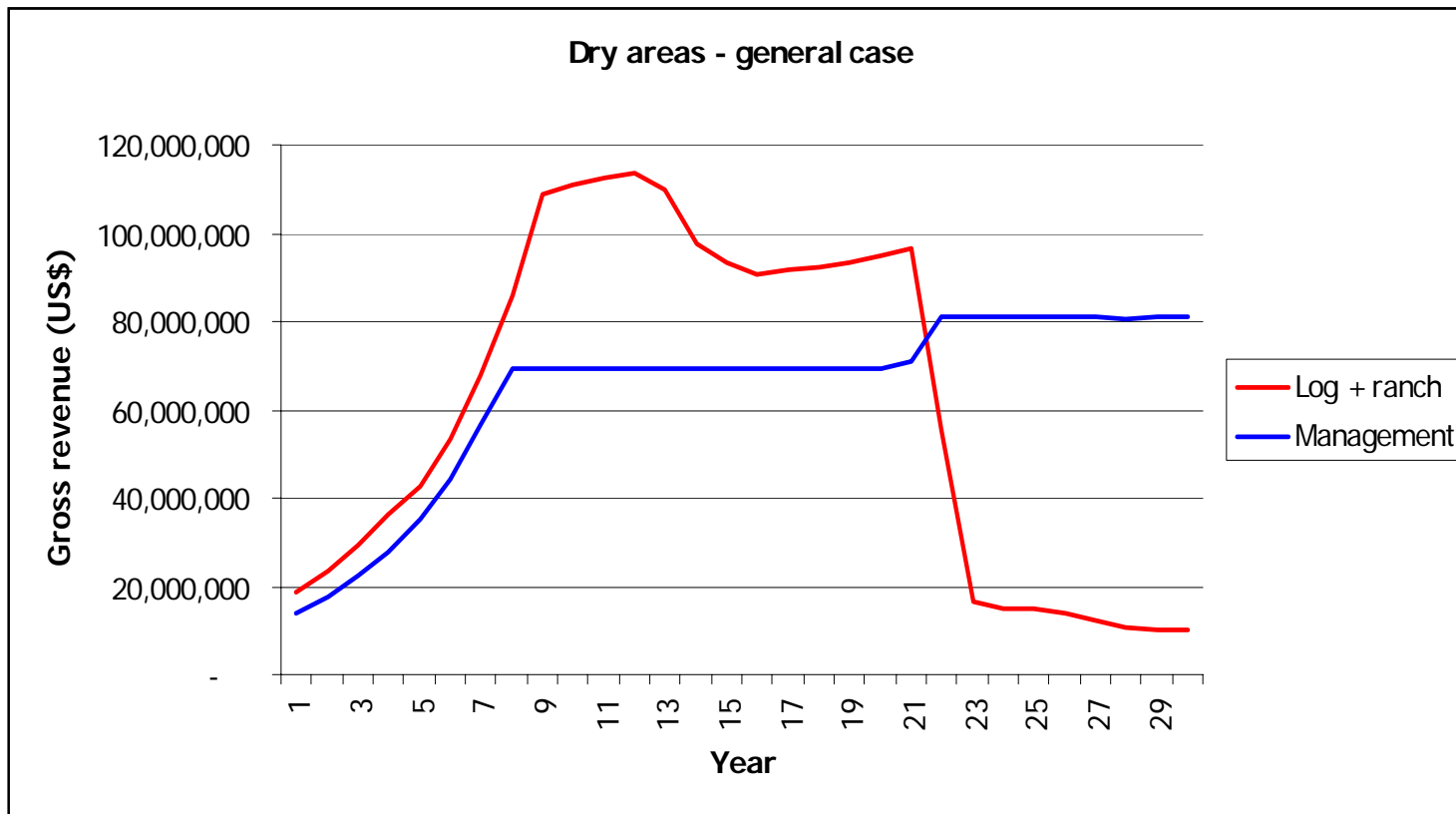
RADAMBRASIL Conclusions

Table 2. Agronomic Potential of the Legal Amazon

- Classes of Land Use Capability according to Radam Brasil Project

Potential Classes for Land Use	In the total area of the Study				In the Most Humid Area				In the Most Dry Areas			
	Forestry		Agriculture & Pasture Land		Forestry		Agriculture & Pasture Land		Forestry		Agriculture & Pasture Land	
	Km ²	%	Km ²	%	Km ²	%	Km ²	%	Km ²	%	Km ²	%
Insignificant	419.906	11	817.818	22	288.406	12	574.015	23	138.949	11	255.491	19
Very Low	41.044	1	1.333.224	36	22.743	1	1.081.114	44	18.301	1	252.109	19
Low	150.079	4	1.339.541	36	89.134	4	726.517	30	60.945	5	613.024	46
Medium	884.602	24	242.853	6	379.884	16	64.580	3	504.718	38	178.273	14
Hgh	2.258.244	60	20.439	1	1.666.830	68	770	0	595.654	45	19.669	1
TOTAL	3.753.875	100	3.753.875	100	2.446.997	100	2.446.997	100	1.318.567	100	1.318.567	100

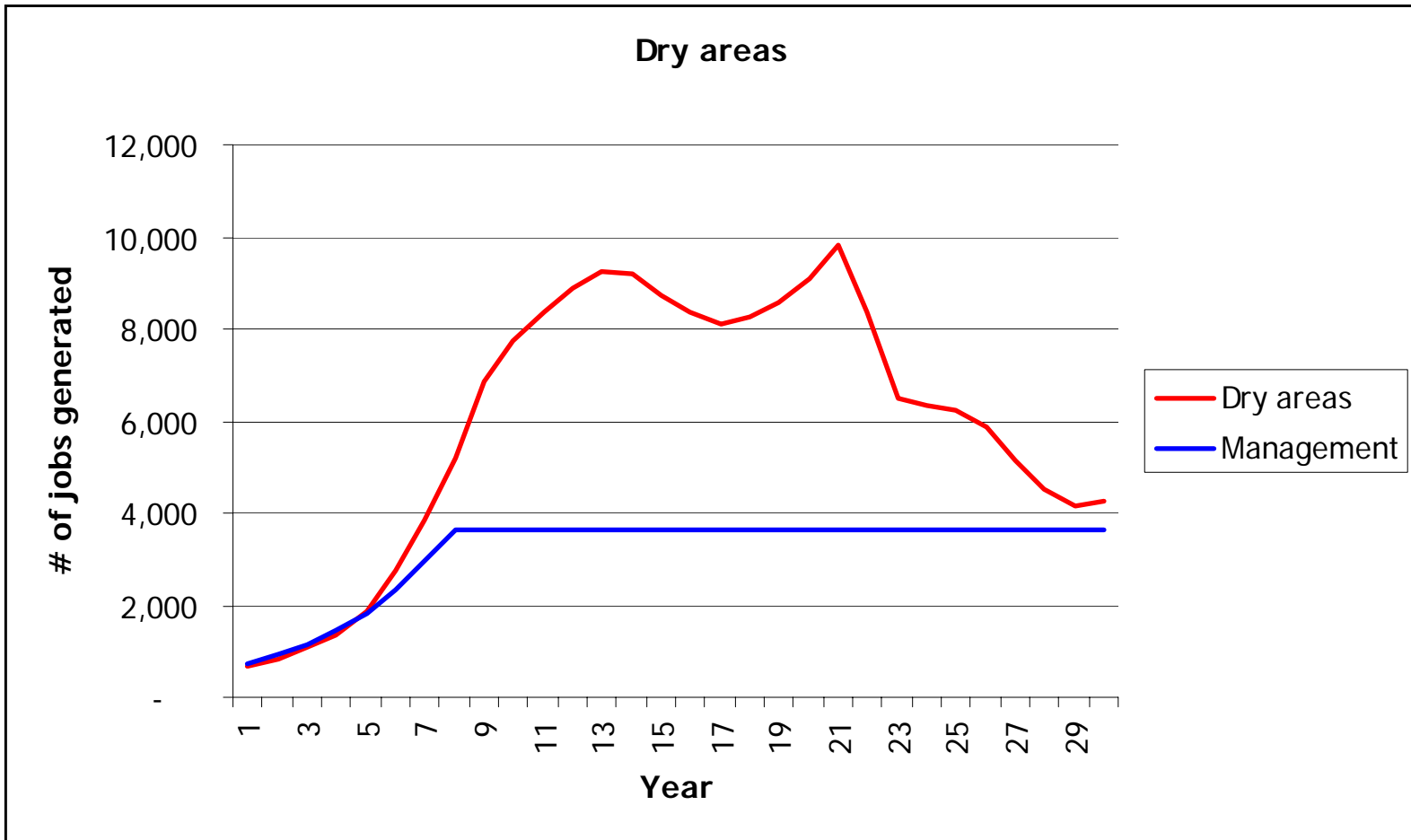
Stabilize local and regional incomes and communities



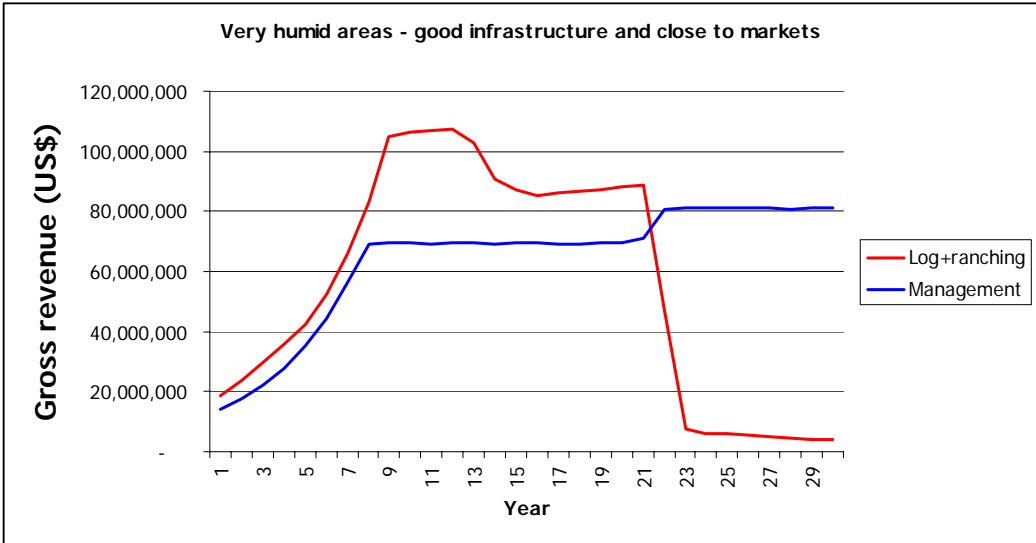
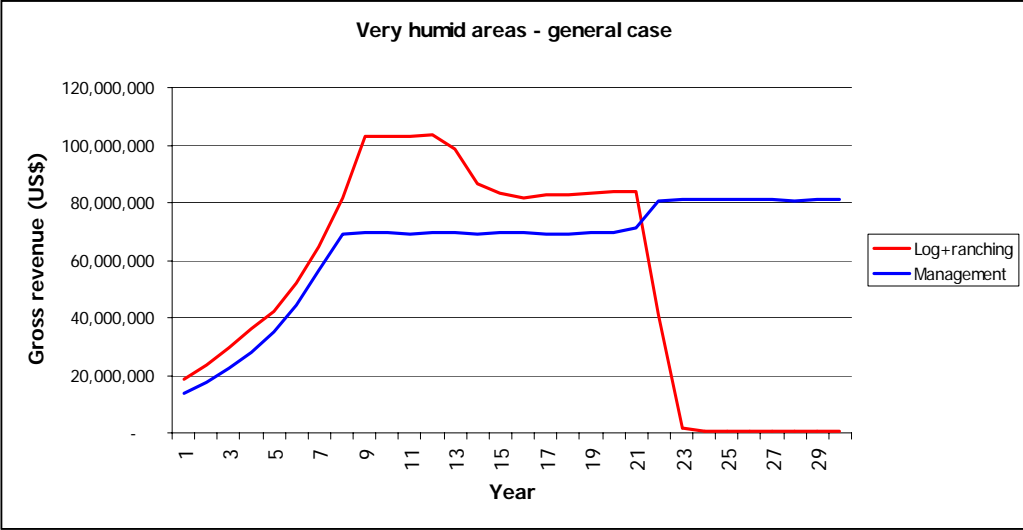
Employment

“Business as Usual” vs Forest Management

Dry Amazon

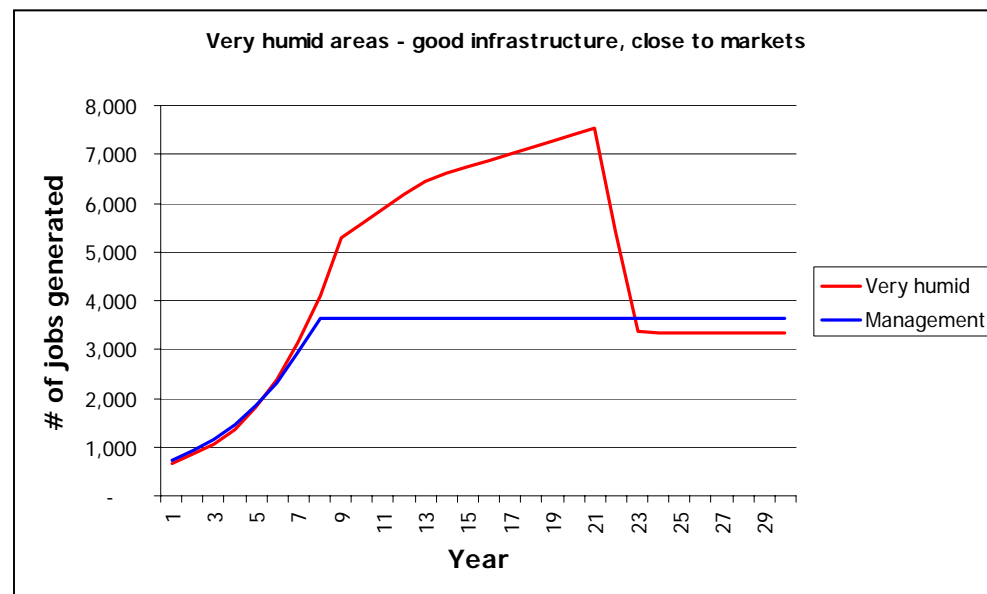
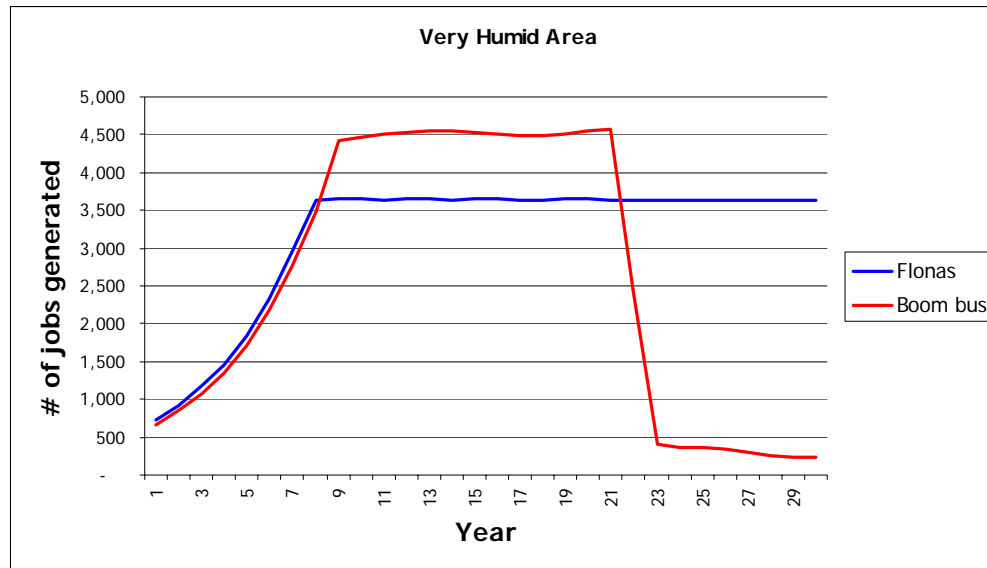


Annual Gross Revenue: Business as usual vs Managed Forestry: very humid Amazon



Employment

“Business as Usual” vs Managed Forest: Very humid Amazon



“Business as Usual” does not appear to be generating quality development

- Low overall development of agricultural land
- Almost all land ends up in pasture
- Clear reduction in agricultural production with increasing rainfall
- Even areas with good infrastructure and markets ends up abandoned

Public Interest in Managed Forests (FLONAS)

- **Stabilize local and regional incomes and communities**
- **Ensure equitable distribution of the benefits of the exploitation of national patrimony.**
- **Prevent “premature” deforestation with subsequent degradation of the natural resource base.**
- **Ensure the protection of critical, representative ecosystems.**
- **Help loggers make the transition to managed forests**

Stabilize local and regional incomes and communities

Previous review of current use of land use in the Amazon and the economics of “business as usual” vs FLONAS shows the difference in the stability of the economic base of a FLONAS-based community

Distribution of the Benefits of Amazonian Development

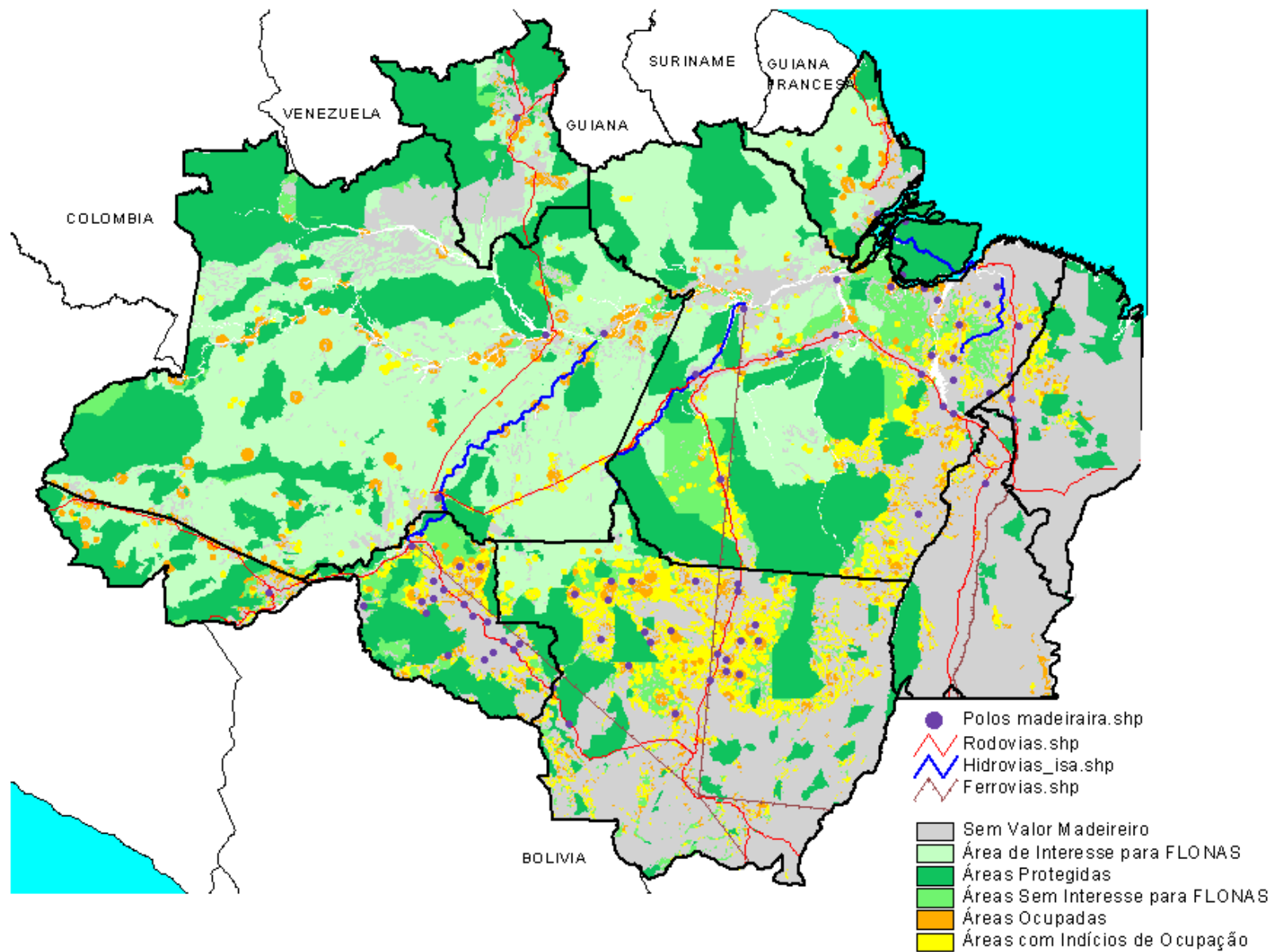
- The 1% of properties of more than 2000 ha have 47% of agricultural land,
- The 54% of properties of less than 20 ha have 1.1% of agricultural land
- Loggers currently pay less than 20% of ICMS due, and are mostly exempt from income tax.
- Loggers do not currently pay for use of national patrimony

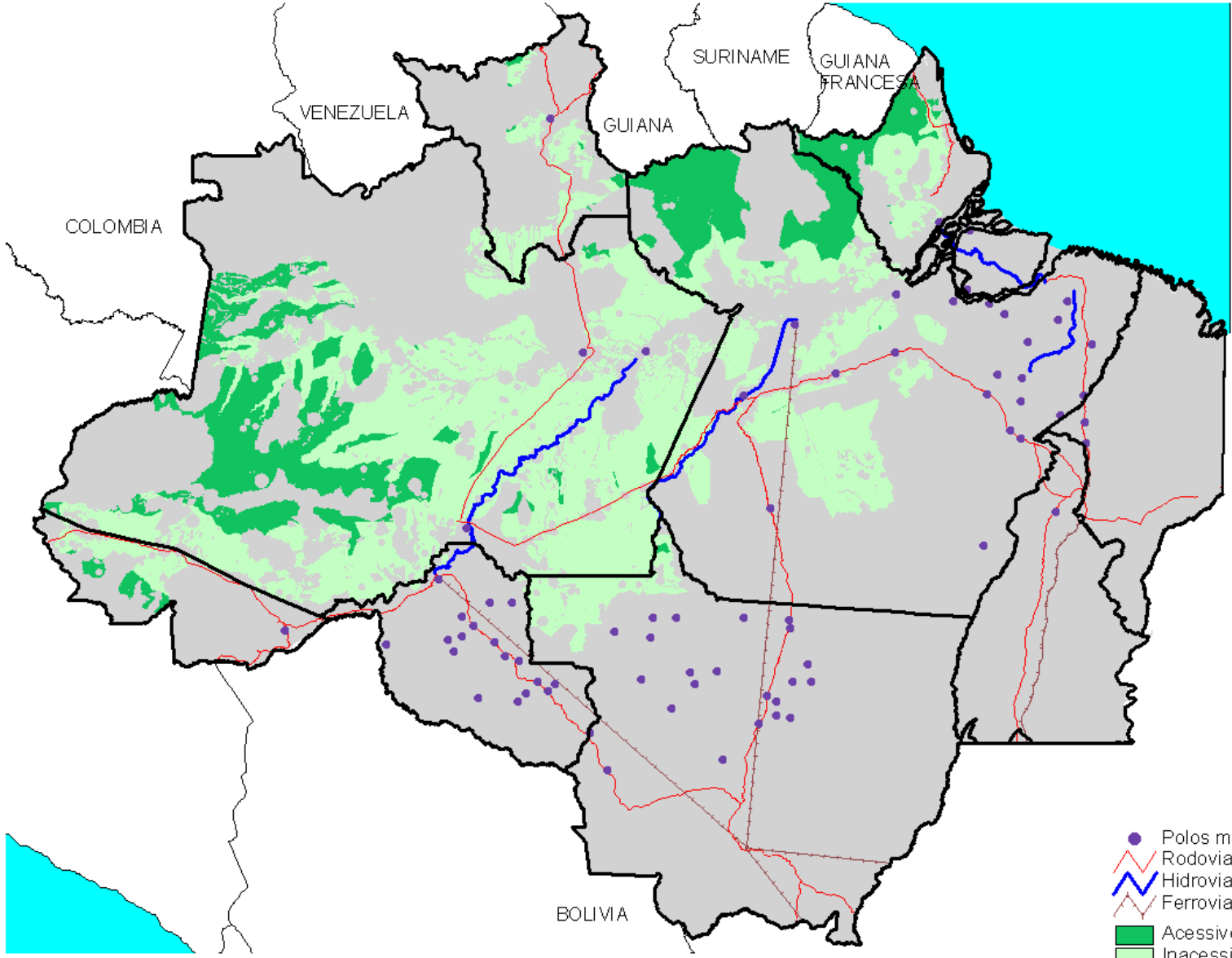
Prevent “premature” deforestation

- Deforestation today is leaving behind a badly degraded and low value land resources.
- New technology may emerge in the future that can generate high economic value from the forest ecosystem, or that can socially justify its alteration.
- Current deforestation preempts the option of taking advantage of potential future opportunities

Criteria for FLONAS

- Little or no current human occupation,
 - exclude areas with “hot pixels,
 - exclude area surrounding the 832 municipios
 - exclude area surrounding the 822 INCRA settlements
- Not currently a public protected area,
- Economic potential and low agricultural opportunity cost (RADAMBRASIL, AMAZON))

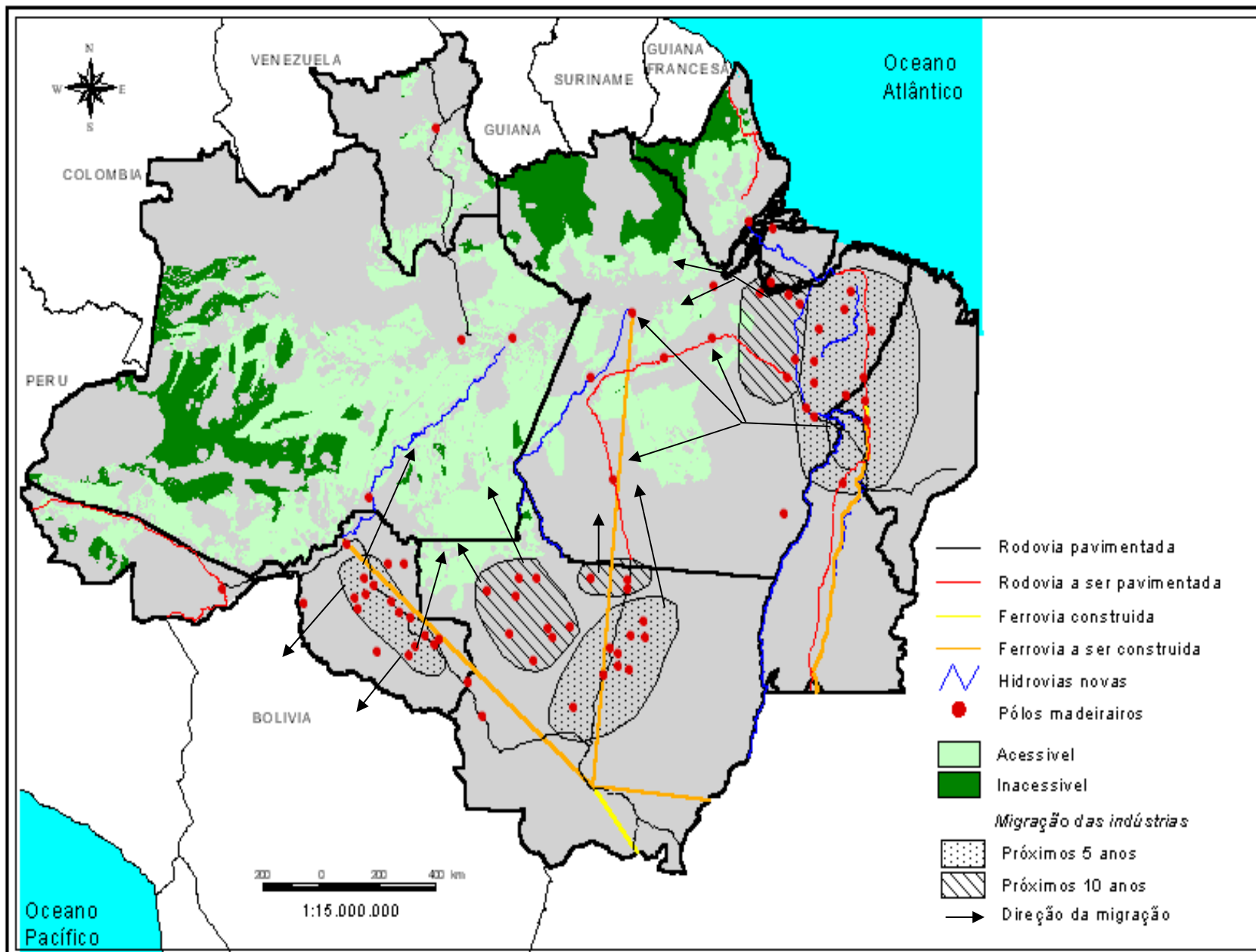




- Polos madeiraira
- Rodovias
- Hidrovias
- Ferrovias
- Acessível
- Inacessível

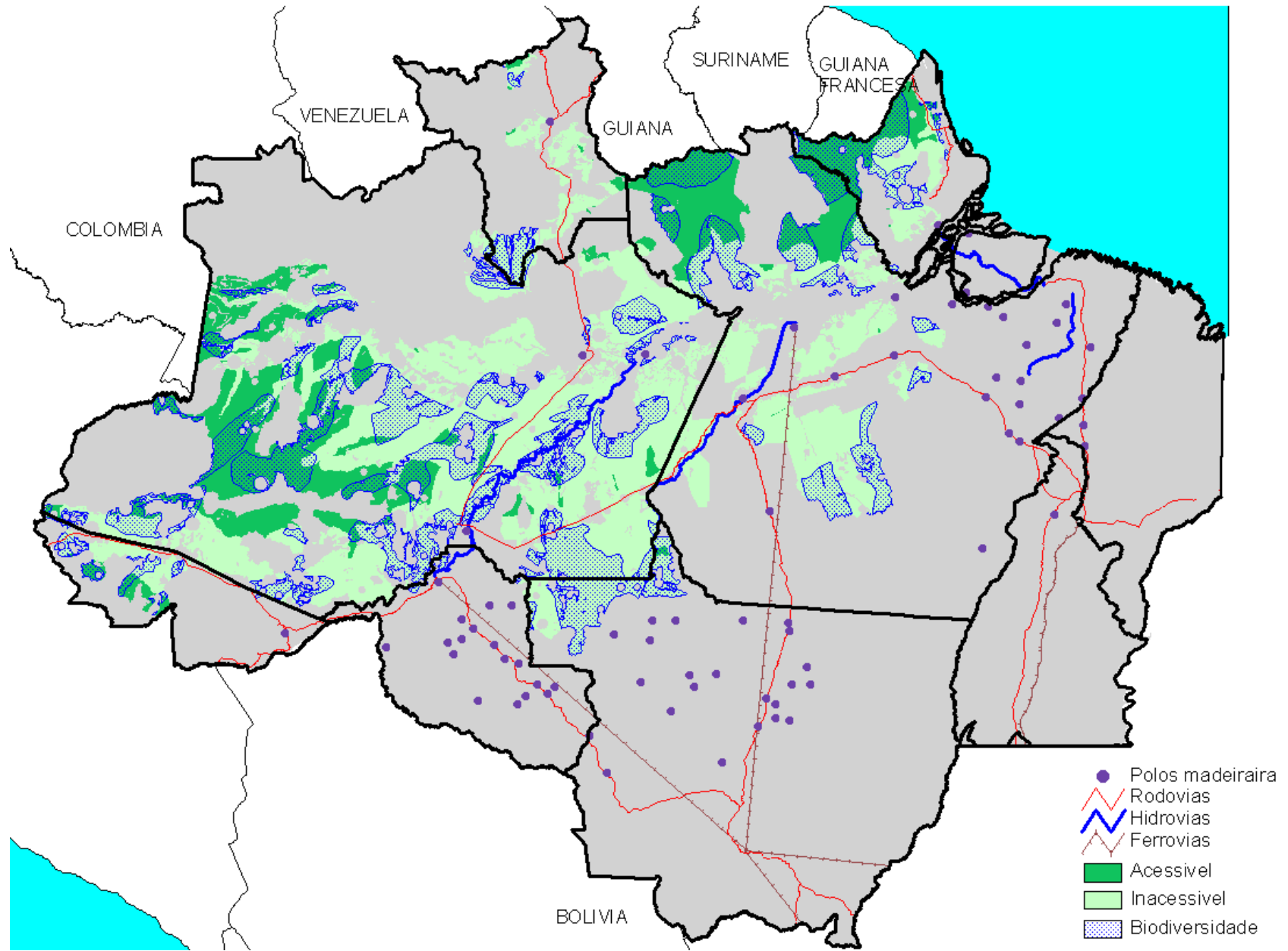
Help loggers make the transition to managed forests

- Current “logging poles” will run out of economically available logs in 5-10 years,
- Substantial migration is already taking place out of Paragominas, Central Mato Grosso, and Rondônia,
- Starting now through the next 15 years is the window of opportunity to make a smooth transition to a FLONAS-based forest industry



Ensure the protection of critical, representative ecosystems

- Managed Forests can form an essential part of a mosaic of land use combining productive use with conservation.
- 1.2 million Km² of potential Flonas as defined above
- Of which 450 thousand Km² (9% of the Amazon) has high biodiversity potential
- Current timber production could be sustainably produced on less than 350 thousand Km²



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- Managed forestry represents a quality alternative to the “Boom-Bust” model.
- Managed forestry can also be fully complementary to a system of biodiversity conservation.
- The window to reform the Forest Sector is now.

