

Hamburger Connection Fuels Amazon Destruction¹

Cattle ranching and deforestation in Brazil's Amazon

CENTER FOR INTERNATIONAL FORESTRY RESEARCH

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The Brazil Government's National Institute of Space Research (INPE) will soon release the latest annual deforestation figure for the Brazilian Amazon². It is expected the rate of deforestation will equal last year's appallingly high figure of 2.5 million hectares, and could even be higher.

This report explains the link between this frightening increase in deforestation and the growth in international demand for Brazilian beef. It also calls on the international community to provide urgent assistance. Brazil's beef exports have grown markedly due to the devaluation of the

Brazilian currency and factors related to animal diseases such as foot and mouth disease, mad cow disease (Bovine Spongiform Encephalopathy), and the avian flu.

While many analysts have previously discussed the link between cattle ranching and deforestation in the Amazon, until now the main concern has been production for sale within Brazil. Until this report, very little attention has been given to the role played by the international demand for Brazilian beef in rapidly escalating Brazil's loss of Amazonian rainforest.

Figure 1. Brazil's Legal Amazon Region.



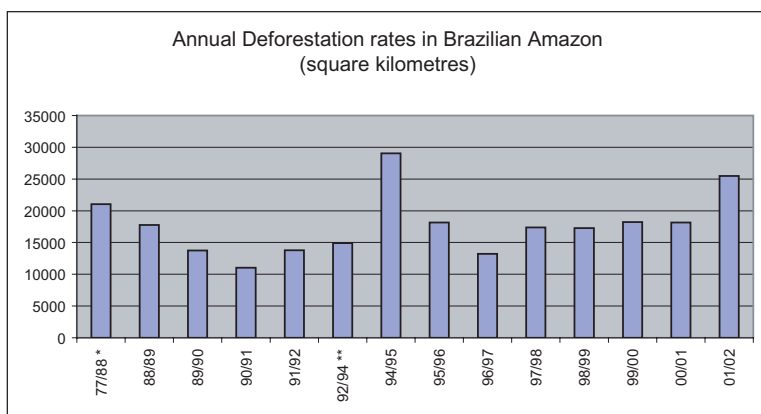
¹ While this report is largely the result of research undertaken by CIFOR scientists, researchers from other agencies have also contributed significantly. These agencies include: CIRAD (the French Center for International Cooperation in Agricultural Research for Development); Embrapa (Brazil's Agricultural Research Corporation); IBAMA (Brazil's State Agency for Environment and Renewable Natural Resources) and INPE (Brazil's Space Research Institute - Ministry of Science and Technology).

² All references to the Amazon in this report refer to Brazil's "Legal Amazon", an administrative region comprising nine states and covering five million square kilometers - more than 50 percent of Brazil's total land area. The Legal Amazon comprises the states of Acre, Amapá, Amazonas, Pará, Rondônia, Roraima, Mato Grosso, Maranhão, and Tocantins, and has a population of 20 million people. It contains the largest portion of the world's terrestrial biodiversity and plays a crucial role in sequestering carbon and reducing the rate of global warming.

Deforesting the Amazon

The accumulated area of deforestation in the Brazilian Amazon rose from 41.5 million hectares in 1990 to 58.7 million hectares in 2000.³ In just ten years the country lost an area of forest twice the size of Portugal or the size of Uruguay. In the two years after the alarmingly high level of deforestation in 1994-95, analysts were optimistic rates were starting to fall. However, they began rising again in 1997-98 and then skyrocketed in 2002. (see figure 2)

Figure 2. Annual Deforestation rates in Brazil's Amazon.



Source: Brazil's National Institute of Space Research (INPE). *Decade Mean **Biennium Mean.

Cattle and Deforestation

The overwhelming majority of the forest area lost in the Brazilian Amazon eventually becomes pasture. According to the most recent census figures available, the area of land devoted to crops in 1995-96 amounted to 5,608,000 hectares while the figure for pasture was 33,579,000⁴.

In other words, for every one hectare of cropland there were almost six hectares of pasture. Nothing suggests that pattern has changed since 1996. Figures and tables in this report provide statistical and visual evidence about the continuing close correlation between deforestation and the growth of cattle ranching.

Although the last few years have witnessed a great deal of justifiable concern about the expansion of soybean cultivation into the Amazon,

that still explains only a small percentage of total deforestation. The total area of soybeans in the Legal Amazon in 2002 was only 4.9 million hectares, while the area in pasture was almost certainly more than ten times that amount.⁵ Moreover, much of the soybean area is in the savanna region of Mato Grosso and in places that have been deforested for many years. Only a relatively small percentage represents new forest clearing.

Logging rarely leads directly to deforestation in the Amazon. Most loggers only remove a small number of trees per hectare. That often damages the forest but it does not destroy it. Logging does contribute indirectly to deforestation by making it easier for forests to catch fire and for farmers to move into forested areas. However, logging is much less damaging than the growth of cattle ranching.

Massive Growth in Amazon's Cattle Numbers

Cattle expansion in the Amazon in the last twelve years has been phenomenal. During this period, the number of cattle more than doubled, from 26 million in 1990 to 57 million in 2002. In the process it has gone from representing 17.8% of Brazil's total cattle herd to almost one third (see table 1). In fact, 80% of all of the growth in Brazil's livestock population in this period was in the Amazon. The overwhelming majority of the new cattle are concentrated in Brazil's Amazon states of Mato Grosso, Pará, and Rondônia, which were also the states with the greatest deforestation in 2002 (see table 2).

Beef Exports: The Hamburger Connection

Back in the early 1980s, well-known environmentalist, Norman Myers, coined the phrase "the hamburger connection". The phrase described how the rapid growth of beef exports from Central America to fast food chains in the United States was driving deforestation.⁶ At the time, however, the term did not apply to Brazil, as the country exported little beef and most of the beef produced

³ Monitoring of the Brazilian Amazon Forest by Satellite 2000-2001, Brazil's National Institute of Space Research (INPE) and the Foundation for Science, Applications and Spatial technology (Fundação de Ciência, Aplicações e Tecnologia - FUNCATE).

⁴ Agricultural census. 1995-96. Brazilian Institute of Geography and Statistics (IBGE) www.ibge.gov.br

⁵ United States Department of Agriculture, Foreign Agricultural Service, Production Estimates and Crop Assessment Division, 2004. "The Amazon: Brazil's Final Soybean Frontier", January 13, http://www.fas.usda.gov/pecad/highlights/2004/01/Amazon/Amazon_soybeans.htm

⁶ Myers, N. 1981. "The Hamburger Connection: How Central America's Forests Became North America's Hamburgers." *Ambio*, 10: 3-8.

Table 1. Brazil's Amazon Cattle Herd in Relation to Total Brazilian Herd, 1990-2002 (,000 heads)

	1990	1995	2000	2002
Amazon	26 258	37 499	47 536	57 389
Brazil	147 102	161 228	169 876	185 347
Amazon as % of Brazil	17.8	23.3	28.0	31.0

Source: Brazilian Institute of Geography and Statistics (IBGE) www.ibge.gov.br

Table 2. Cattle herd size by states

State	Cattle herd size	
	1990	2002
Rondônia	1 718 697	8 039 890
Acre	400 085	1 817 467
Amazonas	637 299	894 856
Roraima	-	423 000
Pará	6 182 090	12 190 597
Amapá	69 619	83 901
Tocantins	4 309 160	6 979 102
Maranhão	3 900 158	4 776 278
Mato Grosso	9 041 258	22 183 695

Source: Brazilian Institute of Geography and Statistics (IBGE) www.ibge.gov.br (2004)

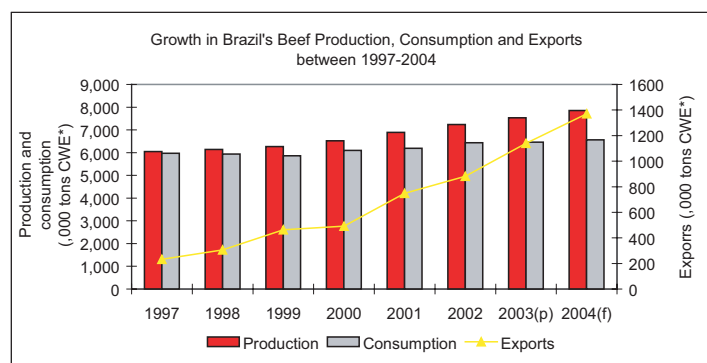
in the Amazon was consumed within the region itself.

The Amazon region did not even produce enough beef to feed its own population until 1991. After that the region began to produce a growing surplus of beef for the national market, but Brazilian beef exports to other countries continued to play a minor role. At the time, Brazil experienced a strong "domestic hamburger connection", affecting initially the Atlantic forest and later the Amazon. Brazilian beef consumption quadrupled between 1972 and 1997. Much of this was led by growing urban incomes, causing per-capita meat consumption to more than double over the same time span.⁷

As recently as 1995, Brazil exported less than \$500 million dollars of beef.⁸ By 2003, only eight years later, Brazil was exporting three times as much, \$1.5 billion dollars.⁹ Between 1997 and 2003, the volume of exports increased more than fivefold, from 232,000 to nearly 1.2 million metric tons in carcass weight equivalence (see figure 3).

Meanwhile, domestic beef consumption, which for decades has been responsible for the sector's expansion, developed slowly. For the first time ever, the growth in Brazilian livestock production - 80% of which was in the Amazon - was largely export driven (see figure 3). Although there is no consolidated data available on the ranking of exports for 2003, some experts claim that Brazil now ranks as the world's largest beef exporter.

Figure 3. Growth in Brazil Beef Production, Consumption and Exports between 1997 and 2004



Source: United States Department of Agriculture (USDA), Foreign Agricultural Service (FAS), 2004. *CWE = carcass weight equivalence in '000 of metric tons (p) = preliminary (f) = forecast

What Drives Brazilian Beef Exports?

Currency Devaluations

One major factor that has been driving the rise in Brazilian beef exports - and Amazon deforestation - has been the massive devaluation of the national currency, the real, from 1.2 reais per dollar in

⁷ Faminow, M.D. 1998. Cattle, Deforestation, and Development in the Amazon, An Economic, Agronomic, and Environmental Perspective, Wallingford, CAB International. <http://earthtrends.wri.org/text/AGR/variables/193.htm>

⁸ Margulis, S. 2004. "Causes of Deforestation in the Brazilian Amazon", Washington D.C.: World Bank.

⁹ United States Department of Agriculture, "Brazil Livestock and products: semi annual report" 2004. GAIN report BR4605.

December 1998, to 3.6 reals per dollar in December 2002.¹⁰ As a result, the price of beef in Brazilian reals approximately doubled in that period, creating a huge incentive for ranchers to expand their pasture area (see figure 4). At the same time, the price of Brazilian beef in dollars has fallen, which has made Brazil's exports more competitive on international markets.

Several studies in the past had already predicted that large currency devaluations would lead to a major increase in agricultural and livestock driven deforestation. These studies use macro-economic models known as Computable General Equilibrium models to simulate how changes in exchange rates might affect land use - and hence deforestation. The most sophisticated and recent of these studies, by Andrea Cattaneo, predicted that under the most realistic set of assumptions a 40% real devaluation of the Brazilian currency would increase deforestation by 20% once markets adjusted.¹¹

Livestock Disease Trends

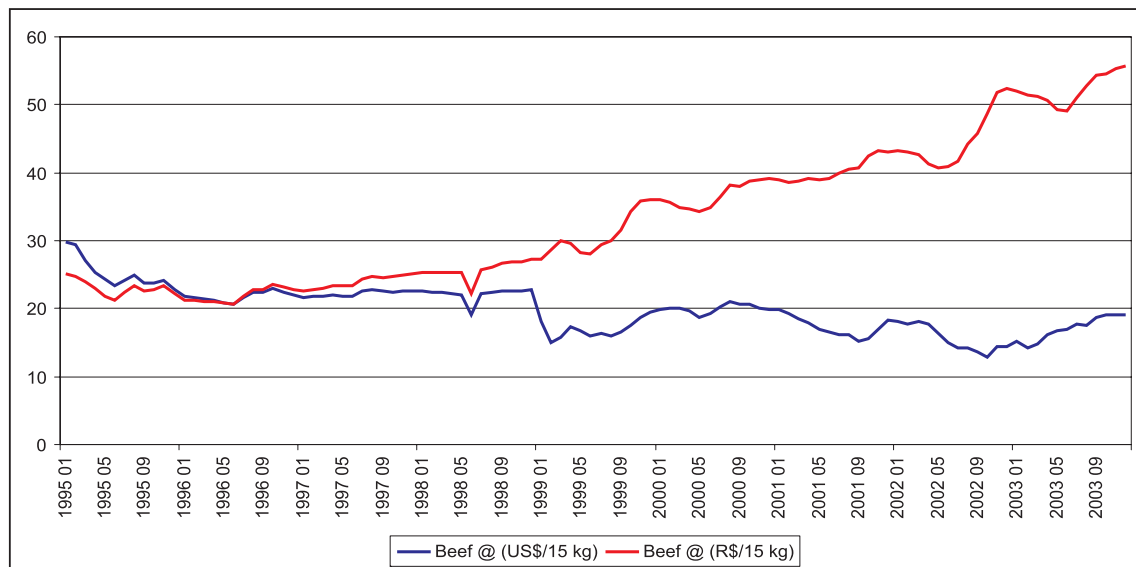
For many years the presence of foot and mouth (FMD) disease in most of Brazil had kept the country from exporting its beef products to many international markets. Prior to 1998, no Brazilian state had been certified as being free of the

disease. That year the two southern states of Rio Grande do Sul and Santa Catarina were declared free of FMD. Since then the certified area has expanded greatly. As of 2003, 85% of the country's cattle herd was in areas that had been certified as not having FMD (see figure 8). Between 1994 and 2002 the proportion of cattle vaccinated against the disease rose from 64% to 86%.

Most of the country has now been certified as free of FMD. This has greatly helped Brazil to gain access to a number of new markets in Europe, Russia, and the Middle East. Between 1990 and 2001, the percentage of Europe's transformed meat imports that came from Brazil rose from 40% to 74%.¹²

The improvement in the FMD situation has been particularly important for stimulating Amazon beef production. Once some federal states in the south were certified as being FMD-free in 1998, other states that still had FMD - including all of the Amazonian states - were restricted from sending any beef products to FMD-free areas, except for meat that had been de-boned. That made it much more difficult for the Amazon's ranchers to sell beef to the country's large urban markets such as São Paulo or Rio de Janeiro, much less export it abroad.

Figure 4. Brazilian beef prices, 1995-2003 in reals and dollars.



Source: Fundação Getulio Vargas (FGV), taken from IPEA www.ipeadata.gov.br

¹⁰ The Real has since strengthened to about 2.9 reals per dollar.

¹¹ Cattaneo, A. 2002. Balancing Agricultural Development and Deforestation in the Brazilian Amazon. Washington D.C. International Food Policy Research Institute; Wiebelet, M. 1994. "Stopping Deforestation in the Amazon: Trade-off Between Ecological and Economic Targets?" *Weltwirtschaftliches Archiv - Review of World Economics* 131: 542-68.

¹² European Union statistics cited by National Interprofessional Office for Meat, Livestock and Agriculture (OFIVAL - France) 2004. <http://www.ofival.fr>

Now, however, the situation has changed. Since 2003 the states of Mato Grosso, Rondônia, and Tocantins have been declared FMD-free, and can now sell their beef any where they want. These states account for over 60% of the region's cattle herd. By 2005, the Brazilian government expects the entire country to be declared free of the disease.¹³ These changes have increased beef prices in the Amazon, and hence the incentive to deforest.

Problems outside Brazil with Mad Cow disease (BSE) and the avian flu have also encouraged beef exports. Many countries banned beef imports from Canada and the United States after several BSE cases were discovered in 2003, and avian flu problems in Asia reduced poultry exports from those countries. This resulted in some consumers switching to beef from Brazil.

Other Changes in the Amazon

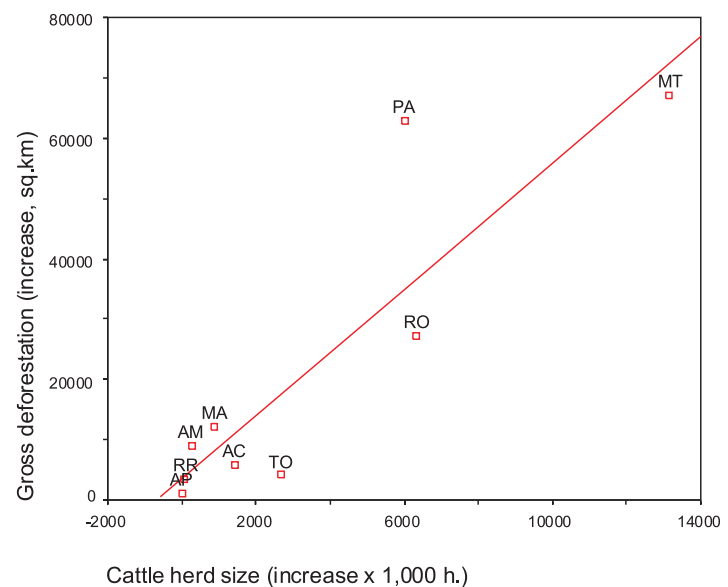
The previously mentioned changes in exchange rates and livestock diseases have given much greater force to Amazonian dynamics that were already underway. These include the rapid expansion of the region's road and electricity network and large investments in modern new slaughterhouses and meatpacking and dairy plants. Very low land prices in the Amazon also help to make ranching profitable. These prices remain very low in part because farmers find it easy to illegally occupy government land without being prosecuted, and to deforest areas much larger than the 20% of their farms currently permitted by law.

What Must be Done?

On March 15th, Brazil's President Luis Inácio (Lula) da Silva announced a major new "Action Plan to Prevent and Control Deforestation in the Legal Amazon".¹⁴ The Action Plan commits the government to spending 394 million reais (approximately \$135 million dollars US) on activities designed to reduce deforestation. These include: land use planning, greater enforcement of laws concerning deforestation and the illegal occupation of government lands, deforestation monitoring, reviews of public infrastructure investments, support for indigenous territories and community forestry, support for sustainable agriculture, and greater control over credit for ranchers, among others.

The government's approach goes in the right direction. However, any strategies to effectively tackle the deforestation problem will require a number of additional measures, as well as more funds, greater coordination between and within the key ministries and regular high level attention. The international and domestic market forces currently promoting livestock-driven deforestation in Brazil described in this report are much stronger than ever. Even with the most determined policy response, decisively curbing deforestation may be difficult. To limit the negative impact on Brazil's Amazonian rainforests will require a massive effort in response. Unless urgent action is taken, the Brazilian Amazon will probably lose an additional area the size of Denmark over the next eighteen months.

Figure 5a. Increase in Gross Deforestation (1990-2001) and Cattle herd size (1990-2002), at the State level.



Source: Brazil's National Institute of Space Research (INPE), 2003; Instituto Brasileiro de Geografia e Estatísticas (IBGE)/Pesquisa Pecuária Municipal (PPM), 2004. Regression coefficient $R^2=0.787$. Refer to table 2 for initials of states.

¹³ MAPA, 2000. Enlargement of the foot and mouth disease free zone, where vaccination is practiced. Animal and Plant Health Secretariat, Ministry of Agriculture and Food Supply, Federative Republic of Brazil (PNEFA) 2003.

¹⁴ Republic Presidency. Civil House. Permanent Interministerial Working Group for Reducing Legal Amazon Deforestation Rates. "Action Plan for Preventing and Controlling Deforestation in Legal Amazon" 2004 Brasília.

CIFOR's Recommendations

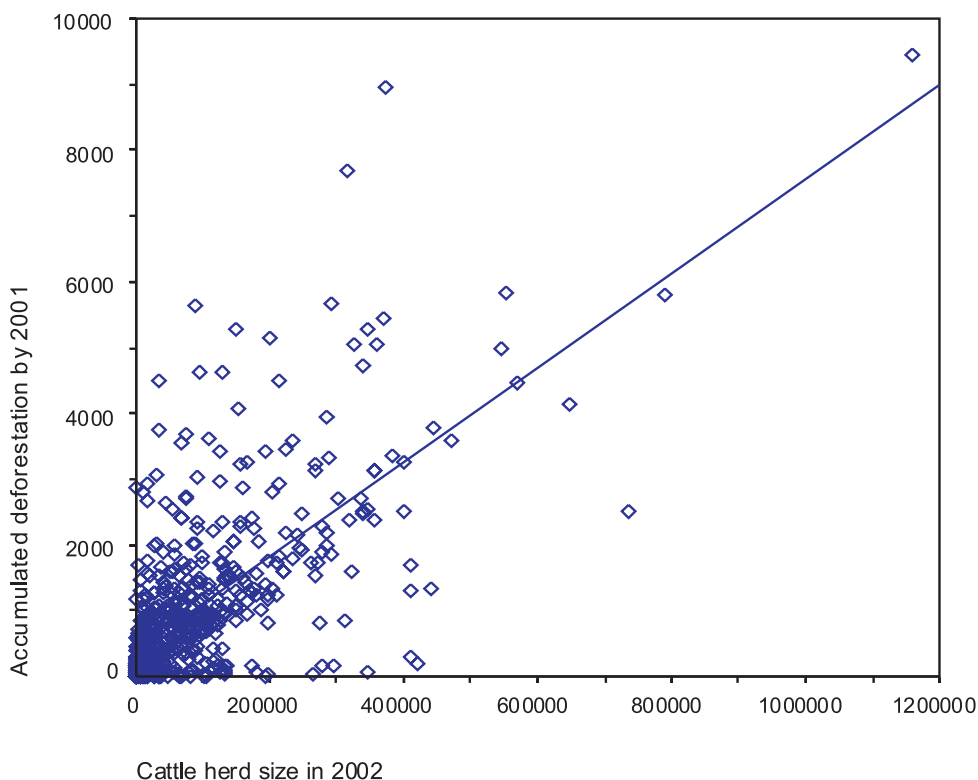
CIFOR recommends the following four policy areas as vital to the sustainable future of Brazil's Amazon forests:

1. Stop the land grabbing. The government's focus on land tenure regulation in its new Action Plan is fully justified. Making progress in this area will require substantial political will, appropriate levels of funding, and more efficient institutional mechanisms for keeping ranchers from illegally occupying government lands.
2. Restrict road projects outside already developed regions. The plans for new infrastructure, in particular road construction and improvement projects, need to be revised or reversed if deforestation really is to receive a high priority. Extensive studies on deforestation underline not only the absolutely key role roads play, but also the difficulty in implementing measures to control land speculation and deforestation close to roads.

3. Formally register government owned lands as National Forests (FLONAS) to stop the further incursion of ranching into these areas. For this purpose the Brazilian government should prioritize forested areas facing the greatest danger of being converted to pasture.
4. Provide economic incentives to maintain land as forest. Brazil already has a small compensation program to promote more intensive and eco-friendly agriculture (PROAMBIENTE), but it should also experiment with direct payments for forest conservation.

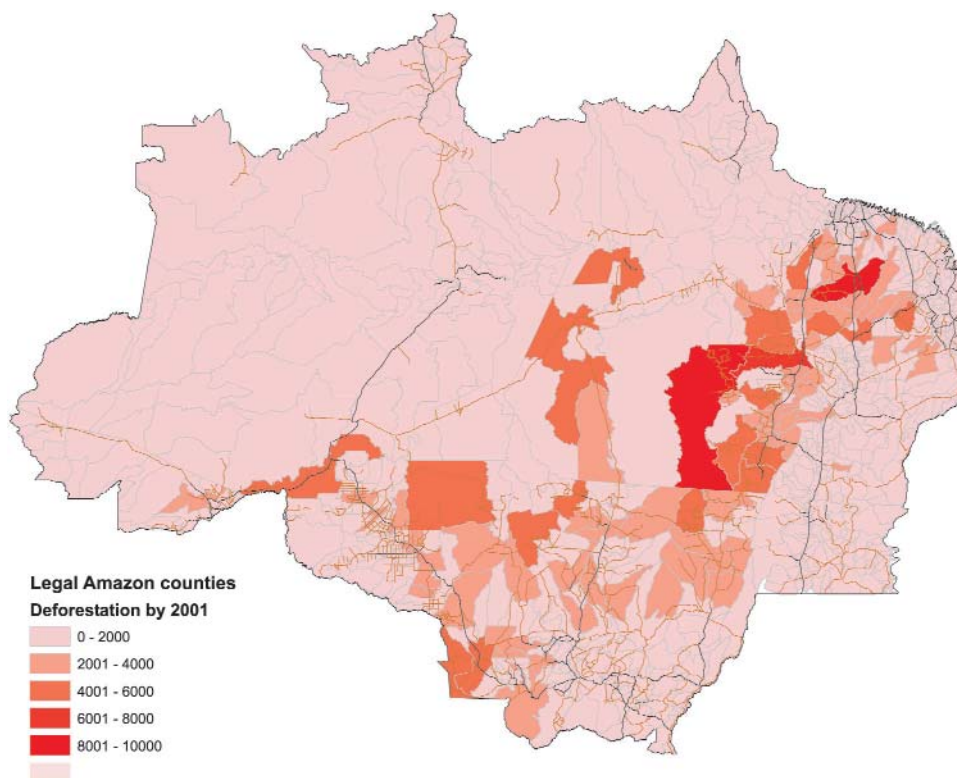
Implementing the measures needed to effectively reduce deforestation will require more resources than the Brazilian government has so far been able to commit. Unfortunately, given the current recession in the Brazilian economy, it will be very difficult for the government to allocate the level of resources needed to save the Amazon. The international community must be prepared to provide additional support to the Brazilian government's efforts.

Figure 5b. Accumulated Gross Deforestation by 2001 and Cattle Herd Size in 2002, at the municipal level.



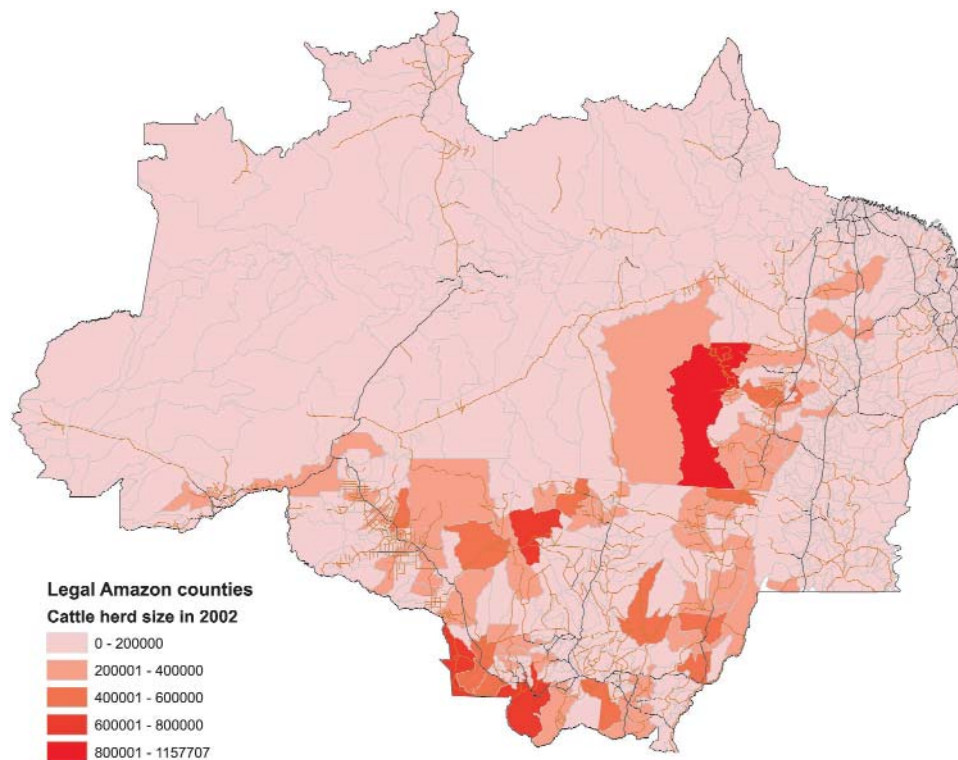
Source: Brazil's National Institute of Space Research (INPE)/Monitoramento sistemático do desflorestamento da Amazônia (PRODES project), 2003; Brazilian Institute of Geography and Statistics (IBGE)/Pesquisa Pecuária Municipal (PPM), 2004. Regression coefficient R²=0.465.

Figure 6. Accumulated Gross Deforestation by 2001 at the municipal level.



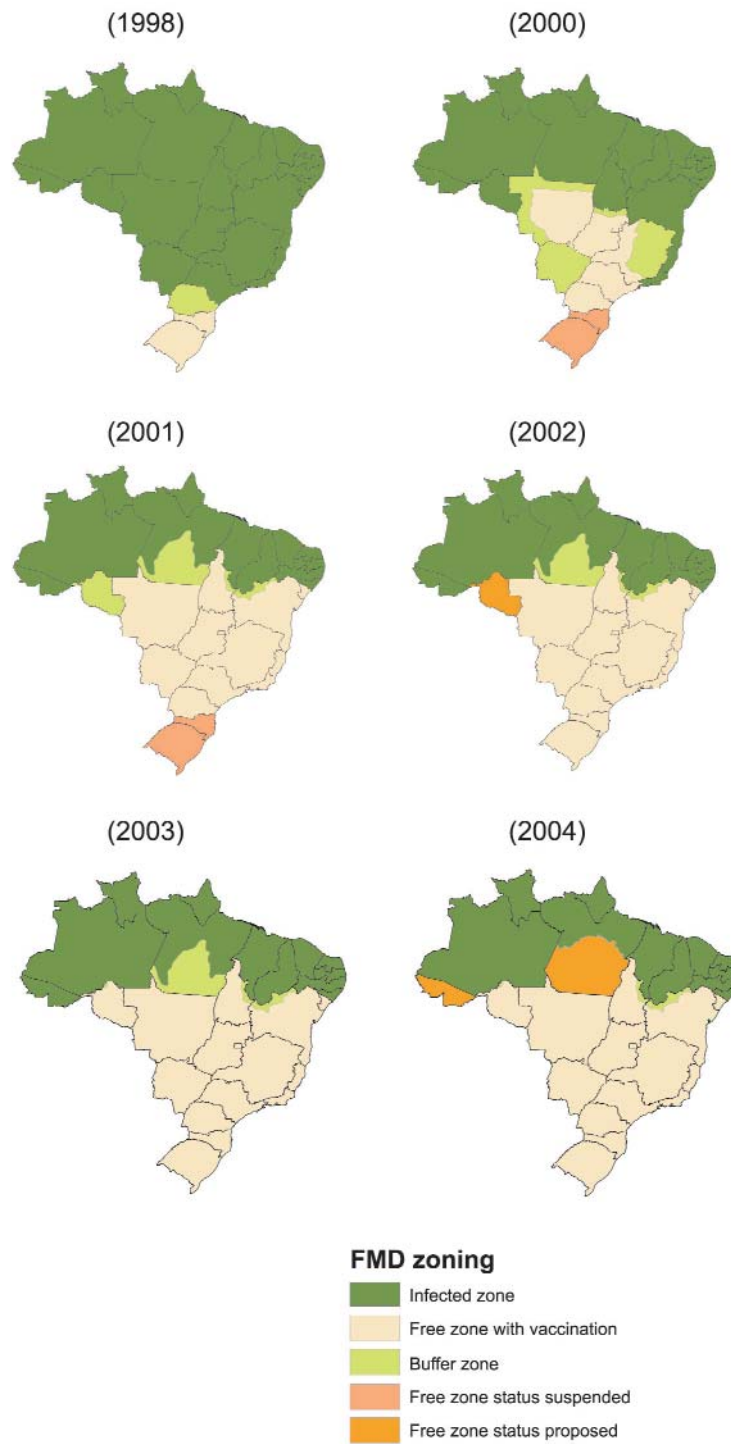
Source: Brazil's National Institute of Space Research (INPE)/Monitoramento sistemático do desflorestamento da Amazônia (PRODES project), 2003.

Figure 7. Cattle herd size in 2002 at the municipal level.



Source: Brazilian Institute of Geography and Statistics (IBGE)/Pesquisa Pecuária Municipal (PPM), 2004.

Figure 8. Evolution of foot and mouth disease (FMD) free zone since 1998.



Source: Programa Nacional de Erradicação da Febre Aftosa (PNEFA), Ministério da Agricultura, Pecuaria e Abastecimento (MAPA), 2004.

Table 3. Brazil's beef exports in metric tons (Product weight) showing major destinations.

	1995	1996	1997	1998	1999	2000	2001	2002
FRESH/CHILLED								
Chile	0	22	520	661	10,077	18,536	40,167	55,723
European Union	5,333	5,641	6,653	7,505	16,930	23,963	37,507	41,275
Lebanon	0	0	0	206	2,254	3,584	2,616	4,606
Saudi Arabia	0	0	0	0	0	0	1,428	3,135
Others	1,045	823	766	2,500	1,828	2,741	3,423	4,219
Total	6,378	6,486	7,939	10,872	31,089	48,824	85,141	108,958
FROZEN								
European Union	23,326	31,780	33,466	45,631	72,381	76,360	77,701	84,382
Egypt	0	0	946	2,122	277	2,392	49,561	47,228
Saudi Arabia	100	912	0	75	1,906	2,345	24,719	40,663
Russia	0	0	0	0	0	0	2,013	39,025
Chile	0	0	370	1,672	8,794	13,118	16,405	20,238
Israel	991	1,701	4,134	7,112	5,704	12,436	34,376	19,083
Philippines	0	0	0	0	25	990	6,829	17,010
Hong Kong	4,204	2,648	2,559	3,332	12,662	11,204	13,476	14,031
Singapore	1,475	1,603	1,477	1,654	6,212	6,254	7,346	9,830
Iran	0	0	0	3,953	5,249	1,580	27,151	8,374
Others	1,033	1,525	1,552	4,427	6,440	13,154	23,569	21,421
Total	31,129	40,169	44,504	69,978	119,650	139,833	283,146	321,285
PROCESSED								
European Union	60,139	49,401	47,778	54,173	67,100	63,985	66,431	72,740
United States	17,198	22,270	24,694	25,556	26,246	25,909	26,233	46,286
Others	20,417	16,391	15,481	27,065	46,094	35,086	33,200	28,743
Total	97,754	88,062	87,953	106,794	139,440	124,980	125,864	147,769
Grand Total	135,261	134,717	140,396	187,644	290,179	313,637	494,151	578,012

Source: United States Department of Agriculture - UN Statistical Office for 1995-1996; Brazil Secretariat of Foreign Trade for 1997-2001.

Recent research publications involving CIFOR staff and associates related to Amazon deforestation.

1. Contrasted land use and development trajectories in the Brazilian Amazon: the cases of Uruará (Transamazon) and São Félix do Xingú (South of Pará). Bois et Forêts des Tropiques, (In press) Mertens, B., Piketty, M.G., Venturieri, A., Tourrand, J.F. 2003.
2. Crossing spatial analyses and livestock economics to understand deforestation processes in the Brazilian Amazon. AGRICULTURAL ECONOMICS, 27,3,269-294. Mertens, B., Pocard-Chapuis, R., Piketty, M.G., Venturieri, A., and Lacques, A.E. 2002.
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4. Amazon deforestation revisited in Latin American Research Review, Vol. 37, No. 2 pg(s) 221-235. Kaimowitz, D. 2002.
5. Municípios e Gestão Florestal na Amazônia: Introdução e Marco Teórico. Rio Grande do Norte: Universidade Federal do Rio Grande do Norte. Fabiano, T.; Kaimowitz, D, eds. 2003.
6. The dynamic of deforestation and economic growth in the Brazilian Amazon. Andersen, L.E., Granger, C.W.J., Reis, E.J., Weinhold, D., Wunder, S. Cambridge, Cambridge University Press. 2002.
7. Causes of Deforestation of the Brazilian Amazon. World Bank Working Report, No 22. World Bank, Washington, D.C. Margulis S. 2004.

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About CIFOR

The Center for International Forestry Research (CIFOR) was established in 1993 as part of the Consultative Group on International Agricultural Research (CGIAR) in response to global concerns about the social, environmental and economic consequences of forest loss and degradation. CIFOR research produces knowledge and methods needed to improve the well-being of forest-dependent people and to help tropical countries manage their forests wisely for sustained benefits. This research is done in more than two dozen countries, in partnership with numerous partners. Since it was founded, CIFOR has also played a central role in influencing global and national forestry policies.