

The text that follows is a PREPRINT.

Please cite as:

Fearnside, P.M. 2009. Science and carbon sinks in Brazil. *Climatic Change* (in press)

ISSN: 0165-0009

Copyright: Springer.

The original publication is available at www.springerlink.com [<publisher link>](#)

Science and carbon sinks in Brazil

Philip M. Fearnside

Instituto Nacional de Pesquisas da Amazônia (INPA)

Avenida Andre Araujo, 2936

C.P. 478

69011-970 Manaus, Amazonas

BRAZIL

Tel: +55-92-3643-1822

Email: pmfearn@inpa.gov.br

(editorial comment for *Climatic Change*)

9 Sept. 2009

I remember well when Myanna Lahsen first showed up at an LBA Science Conference to study the “sociology of science” in LBA (the Large-Scale Biosphere-Atmosphere Experiment in Amazonia). I told her she would find plenty to study, and of course she did (Lahsen, 2009). LBA has involved over 2000 scientists from 261 institutions and produced over 1400 publications since it began in 1998 (see <http://lba.inpa.gov.br/lba>). In addressing the question of whether standing Amazonian forest is a net sink for significant amounts of atmospheric carbon dioxide, LBA results are highly relevant to ongoing negotiations on climate change. The question of whether diplomatic forces influenced, or tried to influence, scientific conclusions therefore merits particular vigilance in this case.

Lahsen raises the question of how research groups from the various countries distributed their studies over the different study sites in Amazonia. She believes that cultural differences between the US and European scientific communities are the critical factor, for example in explaining the concentration of US research in Santarém. However, it should also be remembered that during the five years of negotiation and preliminary work for LBA (1993-1998) the so-called “Ozório effect” played an important role in shaping the geography of LBA studies. As the launch of LBA was being prepared, José Ozório Fonseca, then director of INPA (the National Institute for Research in the Amazon), gave a speech during a cocktail for LBA scientists at the Tropical Hotel in Manaus. As he began to drone on about INPA’s long and glorious history since 1954 the assembled scientists either began to doze off or to discretely continue their cocktail conversations. Then he launched into a virulent attack on foreigners, condemning Germany, France the UK and the US for their past scientific endeavors in Amazonia, which he claimed had no benefit for the region and only served to rip off local scientists and exploit Brazil’s scientific institutions as a source of labor to supply data for analysis and publication elsewhere. The cocktail chatter fell silent. The participants perceived the level of directorial resistance to LBA and other international programs, a personal factor that would affect these programs in myriad ways until the next change of INPA’s directorship (in 1999). The result was that various research groups that had intended to base their work in Manaus opted instead to concentrate their efforts in Santarém. Scientifically this was fortunate, as Santarém was both less studied and has a drier climate

that makes the results more relevant to answering questions about the potential impacts of projected future drying of the climate in Amazonia.

I hasten to make clear that the cocktail-party speech represents an injustice to most of the foreign scientists who have worked in Amazonia over the years, including those in LBA. While scientists everywhere are widely varied in their ethical standards, the great majority make sincere efforts to benefit the people in the places where they work and are fair in their relations with collaborators. LBA has consistently worked to maximize these benefits.

A factor complicating international cooperation in LBA was the fact that NASA only funds US institutions—a restriction imposed by the US Congress. This means that researchers at Brazilian institutions could not propose and head research projects, but could only be co-investigators in projects lead from the US. NASA made a symbolic gesture in an attempt to soften this by including a paragraph in its calls for proposals allowing Brazilian groups to propose projects, but without any budget. Needless to say, it was not a very attractive option for Brazilian scientists to do all the work of preparing a proposal and having it reviewed by NASA just to have the honor of being able to say that they have an approved project. European financing was more flexible, which may help explain the wider range of sites studied with European funding.

Lahsen raises the question of how LBA and climate policy are handled in the Brazilian government. It is important to add that Brazilian agencies have a very long tradition of overlapping attributions, and that what happens in practice depends on the outcome of struggles among the various individual actors, be they ministers or bureaucrats at lower levels. This feature of the sociology of the Brazilian bureaucracy has been compared to struggles over land in the almost feudal interior of Brazil's semiarid Northeast Region, where government authorities stand aside while claimants fight among themselves, the authorities only stepping in after the fighting is over to grant land title to the victor (Bunker, 1979). The Ministry of the Environment (MMA) long supported inclusion of carbon credit for avoided deforestation in the Clean Development Mechanism (CDM). This support was most public with an incident in 1999 at a Latin American environment ministers' meeting in Cochabamba, Bolivia involving an MRE representative and then minister of the environment José Sarney Filho (see Fearnside, 2005). Lahsen states that the current minister of the environment, Carlos Minc, is in the process of assuming "control" of domestic climate policy. The international aspects of climate continue to be under the Ministry of Science and Technology (MCT), while real power lies with the Ministry of External Relations (MRE).

The Ministry of Science and Technology was, in practice, directly subordinate to the Ministry of External Relations during these critical years for LBA, as Lahsen acknowledges. In fact, The Minister of Science and Technology from August 1999 to January 2002 was a diplomat from the MRE – and not just any diplomat, as indicated by his next post as Brazil's representative in the United Nations. The minister took a personal role in pursuing what he interpreted as a foreign conspiracy to make deforestation in Brazil look bad, supposedly as a means of undermining Brazil's positions in climate negotiations. This came to head in January 2001 with the publication in *Science* of a simulation of Amazonian deforestation to 2020 incorporating the effect of proposed infrastructure projects in the region (Laurance et al., 2001). MCT distributed a press release attacking the authors of the paper, but press reaction was not sympathetic to MCT's conspiracy theory (*Folha de São Paulo*, 2001). MRE posted a similar attack on its website at the Brazilian Embassy in London (available, together with a reply, at <http://philip.inpa.gov.br> under "Amazonian controversies"; Brazilian

Embassy, London, 2001; Fearnside and Laurance, 2001). The *Science* paper was written by a group at INPA (including myself) as part of a project funded by LBA; the same group's proposal to continue work on simulating deforestation had been approved by LBA on its technical merits, but was then explicitly blocked by MCT. Following tense negotiations, LBA was essentially forbidden to work on human problems (Mateus Batistella, pers. comm.), but at least the remainder of LBA was saved. It is ironic that, today, results on social issues are constantly being demanded of LBA, and LBA is often criticized for the "human dimensions" component always being less in evidence than biological and atmospheric science.

Negotiations over LBA could not help but be influenced by the political agendas of the foreign ministries of the various countries involved, including Brazil. While scientists are not mere pawns serving their countries' diplomats, one would be naïve not to recognize that some of this high-level influence can be passed on to scientific participants by means of carrots and sticks from funding agencies. The question of whether or not standing Amazon forest is a major carbon sink bears directly on the willingness of both the US and the European governments to finance LBA research. When LBA was being planned, early eddy correlation measurements indicated large uptakes of carbon (*e.g.*, Fan et al., 1990; Grace et al., 1995). However, this claim did not jive with what could be observed from measurements of tree growth and mortality, despite controversies over the data on forest monitoring (see Fearnside, 2000a). As I pointed out at several LBA conferences, the LBA researchers were acting in an inherently biased atmosphere. As long as Amazonia was seen as a major carbon sink, NASA and other agencies were generously funding the research, but as successive results indicated that the region absorbed much less carbon than previously thought, the money was already beginning to dry up.

The question of climate policy in the US is confounded with other high-level influences. For example, much of NASA's research in the areas studied under LBA was gutted under the presidency of George W. Bush, who made clear that going to Mars was his top priority for NASA. NASA's mission statement was altered to eliminate mention of studying the Earth. In addition, this was concurrent with the well-known attempts to suppress global warming related research and freedom of speech on the subject for NASA scientists (*e.g.*, Kennedy, 2006; Revkin, 2006).

Lahsen implies that national positions in climate negotiations might explain differences in the perceptions of US and European scientists on the question of carbon absorption by standing forest. However, I think it more likely that differences can be explained by other factors. While the logic of locating natural sinks in a global zero-sum game leads in the direction Lahsen describes for national interests, the logic for avoided deforestation leads in the opposite direction. From the point of view of Brazilian diplomats' interest in the debate, this factor would have been more important. The difference Lahsen emphasizes between European and US findings on the Amazon carbon sink did not coincide with the split between Europe and the US governments (and between US-based and Europe-based NGOs) over "sinks" in the CDM (see Fearnside, 2001). Europe wanted to rule out tropical forests in the negotiations. If the forest were a major carbon sink in their undisturbed state, then the climatic value of applying international funds to keep these forests standing should be even greater than it would be without the sink effect. Lahsen also suggests that within Brazil the prevalence of pro-sink positions among scientists correlates with widespread support among these scientists for inclusion of avoided deforestation in the CDM, implicitly as a result of the parallel policy implications regarding what Brazil should be supporting in the negotiations. However, I would point out that in my case this generalization

breaks down: I was both one of the first to propose credit for avoided deforestation (Fearnside, 1995, 1999) and to question the high initial estimates for the carbon sink (Fearnside, 2000a).

Brazil's climate policies are determined by a small coterie of diplomats that is largely guided by fears about perceived threats to Brazil's sovereignty over Amazonia. Despite MRE being the epicenter of this view, its reach extends far beyond this ministry. A key piece of background information that is often not appreciated by people outside of Brazil is that a significant part of the Brazilian population believes that Amazonia is under constant threat of "internationalization" or even of outright invasion and annexation by foreign powers, particularly the United States. A survey using standard sociological methods found that 71% of the population in Brazilian Amazonia agreed with the statement that "I am afraid that Amazonia will be internationalized," and 75% agreed that "Foreigners are trying to occupy Amazonia" (Barbosa, 1996). The fear among Brazilian diplomats that accepting carbon credit for avoiding Amazonian deforestation would expose Brazil to pressures to relinquish sovereignty over Amazonia is at the root of the country's otherwise incomprehensible opposition to what could be a major source of revenue (Council on International Relations Independent Task Force, 2001; Fearnside, 2001, 2002, 2003). It also explains the Brazilian government's long history of understating the full extent of Amazonian deforestation and emissions (see Fearnside, 1997, 2000b). Brazil's first National Communication under the climate convention (Brazil, MCT, 2004) also greatly underestimates emission from deforestation, as well as from logging, hydroelectric dams and other Amazonian sources (*e.g.*, Fearnside, 2008).

Xenophobic fears have long resulted in exaggerated restrictions on foreign research in Brazil, with the result that the country has not only lost large quantities of potential financial investment in science but has also lost the intellectual investment of much of the world's scientific community that works on tropical forest (*e.g.*, Fearnside, 1989). Tropical forest researchers from northern countries tend to go to less difficult destinations, such as Costa Rica or Panama, creating an invisible brain drain from Amazonia. The advent of LBA was a major step in efforts to "open" Brazil to international research. As Lahsen's account shows, this has not always been easy. Fear of internationalization continues to be a factor permeating any discussion of Amazonia. The waning of international financing for LBA has now led to the program being "nationalized," meaning that the money will now come strictly from Brazilian sources (obviously in smaller and less-reliable amounts, and with less flexibility in how it is spent). LBA has created an impressive base of information on the region, and the continuation of these lines of research is essential to gaining the understanding of the region's ecosystems, their alteration by both human and "natural" forces, and their global role. Without this information, Brazil runs a much greater risk of discovering too late that "tipping points" have been crossed, and thereby lose the country's most valuable resource: the Amazon forest.

ACKNOWLEDGEMENTS

I thank Conselho Nacional do Desenvolvimento Científico e Tecnológico (CNPq: Proc. 305880/2007-1), Rede GEOMA and Instituto Nacional de Pesquisas da Amazônia (INPA: PRJ13.03) for financial support. I thank W.F. Laurance for comments.

LITERATURE CITED

- Barbosa, L.C. 1996. The people of the forest against international capitalism. *Sociological Perspectives* 39(2): 317-332.
- Brazil, MCT (Ministério de Ciência e Tecnologia). 2004. *Brazil's Initial National Communication to the United Nations Framework Convention on Climate Change*. Ministry of Science and Technology (MCT), Brasília, DF, Brazil, 271 pp.
- Brazilian Embassy, London. 2001. Plans for the Sustainable Development of the Amazon. Brazilian Embassy, London, U.K. 4 pp. (posted on embassy website from 2001 until ~2005; available at: http://philip.inpa.gov.br/C:/SITE/publ_livres/Other%20side-outro%20lado/Future%20of%20the%20Amazon/RESPONSE%20TO%20THE%20BRAZILIAN%20EMBASSY%20IN%20LONDON.pdf)
- Bunker, S.G. 1979. Power structures and exchange between government agencies in the expansion of the agricultural sector. *Studies in Comparative International Development* 14: 56-76.
- Council on Foreign Relations Independent Task Force. 2001. A letter to the President and a memorandum on U.S. policy toward Brazil. Council on Foreign Relations, New York. (available from: <http://www.cfr.org>).
- Fan, S.M., S.C. Wofsy, P.S. Bakwin, D.J. Jacob and D.H. Fitzjarrald. 1990. Atmosphere-biosphere exchange of CO₂ and O₃ in the central Amazon forest. *Journal of Geophysical Research (Atmospheres)* 95(D10): 16851-16864.
- Fearnside, P.M. 1989. A Amazônia brasileira no contexto do Programa Internacional Biosfera-Geosfera. *Boletim IG-USP* 6: 105-111.
- Fearnside, P.M. 1995. Global warming response options in Brazil's forest sector: Comparison of project-level costs and benefits. *Biomass and Bioenergy* 8(5): 309-322.
- Fearnside, P.M. 1997. Monitoring needs to transform Amazonian forest maintenance into a global warming mitigation option. *Mitigation and Adaptation Strategies for Global Change* 2(2-3): 285-302.
- Fearnside, P.M. 1999. Forests and global warming mitigation in Brazil: Opportunities in the Brazilian forest sector for responses to global warming under the "Clean Development Mechanism." *Biomass and Bioenergy* 16(3): 171-189.
- Fearnside, P.M. 2000a. Global warming and tropical land-use change: Greenhouse gas emissions from biomass burning, decomposition and soils in forest conversion, shifting cultivation and secondary vegetation. *Climatic Change* 46(1-2): 115-158.
- Fearnside, P.M. 2000b. Effects of land use and forest management on the carbon cycle in the Brazilian Amazon. *Journal of Sustainable Forestry* 12(1-2): 79-97.
- Fearnside, P.M. 2001. Saving tropical forests as a global warming countermeasure: An issue that divides the environmental movement. *Ecological Economics* 39: 167-184.

- Fearnside, P.M. 2002. A globalização do meio-ambiente: O papel da Amazônia brasileira. *Museu Paraense Emílio Goeldi Boletim Temático - Antropologia* 18(2): 167-181.
- Fearnside, P.M. 2003. Conservation policy in Brazilian Amazonia: Understanding the dilemmas. *World Development* 31(5): 757-779.
- Fearnside, P.M. 2005. Global implications of Amazon frontier settlement: Carbon, Kyoto and the role of Amazonian deforestation. pp. 36-64. In: A. Hall (ed.) *Global Impact, Local Action: New Environmental Policy in Latin America*. University of London, School of Advanced Studies, Institute for the Study of the Americas, London, U.K. 321 pp.
- Fearnside, P.M. 2008. Deforestation in Brazilian Amazonia and global warming. *Annals of Arid Zone* 47(3-4): 1-20.
- Fearnside, P.M. and W.F. Laurance. 2001. Response to the Brazilian Embassy in London. (available at: http://philip.inpa.gov.br/C:/SITE/publ_livres/Other%20side-outro%20lado/Future%20of%20the%20Amazon/RESPONSE%20TO%20THE%20BRAZILIAN%20EMBASSY%20IN%20LONDON.pdf)
- Folha de São Paulo. 2001. Paranóia Amazônica. 23 January 2001, p. A-2.
- Grace, J., Lloyd, J., McIntyre, J., Miranda, A. C., Meir, P., Miranda, H. S., Nobre, C., Moncrieff, J., Massheder, J., Malhi, Y., Wright, I., and Gash, J.: 1995, 'Carbon dioxide uptake by an undisturbed tropical rain forest in southwest Amazonia, 1992 to 1993. *Science* 270: 778-780.
- Kennedy, D. 2006. The new gag rules. *Science* 311: 917.
- Lahsen, M. 2009. A science-policy interface in the global South: The politics of carbon sinks and science in Brazil. *Climatic Change* (this issue)
- Laurance, W.F., M.A. Cochrane, S. Bergen, P.M. Fearnside, P. Delamônica, C. Barber, S. D'Angelo and T. Fernandes. 2001. The future of the Brazilian Amazon. *Science* 291: 438-439.
- Revkin, A.C. 2006. Climate expert says NASA tried to silence him. *The New York Times*, 29 Jan. 2006, p. 1.