

PD-ABT-291

Utilization and Restoration of Amazonian Forests

Semi-Annual Report

Submitted to

US Agency for International Development

from

The Woods Hole Research Center

with

The Amazon Institute of Environmental Research

(Instituto de Pesquisa Ambiental da Amazonia - IPAM)

and other collaborating institutions

for the period

October 1, 2000 through March 31, 2001

Date of this report: July 6, 2001

**Grant Award Number:
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1. Key Results

- Organized a two-day congressional seminar to discuss the infrastructure investments (road paving, railways, gas pipelines, river channelization) contemplated in *Avança Brasil*. The *Avança Brasil* director and staff spent ½ day with IPAM staff, discussing collaboration to reduce the environmental damages associated with these investments.
- Launched the Cuiabá-Santarém project with an 11-day expedition along this 1,000-km highway, soon to be paved.
- Conducted five município workshops along the Cuiabá-Santarém highway to assess local needs and proposals for economic development. Belterra município will use mapping process as basis for their município ecological economic zoning; Trairão decided to create a município accord restricting the establishment of new sawmills.
- Organized two international workshops to discuss road-paving to the Pacific in southwestern Amazonia (Acre/Bolivia/Peru).
- Held two international workshops of the Amazon Scenarios modeling group (Brazil, Bolivia, Peru, US)
- Held a dinner/seminar at COP-6, the international meeting to discuss the Framework Convention on Climate Change, in the Hague, to discuss the role of Amazon forests in climate change negotiations.
- Launched a climate negotiations newsletter, “Clima em Revista”, that is distributed to more than 400 members of congress, civil society, and researchers.
- Completion of proposal outlining a R\$28 million, 3-year program of investments in rural infrastructure, social services and agricultural extension in support of family farming and rural communities, submitted to the Municipal Development Council of Paragominas.
- Organized conference in Brasília to discuss the “Proambiente” line of agricultural credit, that includes compensation for environmental protection.
- Extended community fire management to the communities of the Tapajós National Forest.
- Completed a 20-minute video on techniques of accidental fire prevention.
- Established formal collaboration agreements with two recently-certified timber companies: Cikel and Juruá.
- Paragominas Education Secretary invited IPAM to develop municipal environmental education curriculum.
- Completed first field course in Santarém to stimulate Amazon undergraduate students to become involved in environmental science.
- IPAM moved toward greater visibility in Belém with a new, historical headquarters building in the downtown district.

2. Overview

History is in the making in Amazonia. The basic elements for governing the Amazon frontier—and for keeping most of the Amazon forest standing—are emerging in the region. IBAMA's application of fines to environmental despoilers, Mato Grosso's success in licensing deforestation, Acre's aggressive promotion of forest-based economic development, the growing capacity of município governments to recognize and address the need for environmental management, and the federal government crackdown on "grileiro" land speculators demonstrate that Amazonia is not necessarily destined to the fate of the world's other great tropical rainforests. The potential of these initiatives to grow into enduring frontier governance, in which forest-based economic activities and productive agriculture on small areas of land sustain economic prosperity indefinitely, will depend upon a vigorous and agile network of non-governmental organizations. This network must advance the goal of environmental management through education, through the promotion of public dialogue, and by fostering case studies of successful natural resource management at the level of the farm, the logging operation, the município and the economic corridor. The USAID environmental program can be credited with initiating and sustaining many of the institutions and processes that led to this historical moment. In the years to come, this program has the potential to consolidate these successes, and promote large-scale frontier governance in the region.

It is in the context of this important historical moment in Amazonia that we report on achievements of the last six-month funding period. During this period, IPAM successfully deepened the national discussion of infrastructure investments contemplated in *Avança Brasil*, and the environmental costs of these investments. The FNO Proambiente proposal for agricultural credit reform is refined, and under negotiation. The Brazilian delegation to the Kyoto Protocol negotiation process has accepted IPAM as a legitimate scientific voice on these negotiations, demonstrating greater openness to discussion of Amazon forests. Intensive case studies in agricultural intensification, community-based fire management and integrated agricultural production and forest management have been translated into município-level planning processes, and have been expanded into new regions. And we have embarked on an ambitious campaign to foster integrated economic and ecological planning of the Cuiabá-Santarém highway corridor, which will soon be paved.

3. Progress by Intermediate Result

3.1. IR 1 - Systems for sound land use identified, promoted and adopted in target areas

Indicator 1.1. Sustainable management systems developed and validated:
Agricultural Intensification, Community-Based Fire Management and Integrated
Community-Based Forest Management

A. Agricultural Intensification

Over the last year and a half the agricultural development project has expanded from work with smallholders to develop a strategic plan for addressing the needs of smallholders for the Paragominas municipality as a whole.

A.1 Extension. The project continues to work with approximately fifty members of COVARI (the farmer's cooperative of Paragominas) and the Cantina of Nazaré to diversify household production systems by increasing cultivation of perennial crops. Several species are being cultivated by farmers, including black pepper, cupuaçu, coconut, acerola, coffee, oranges and pupunha. While several species have begun to yield, production thus far is only sufficient for domestic consumption.

Project staff worked with the Rural Workers' Union of Paragominas to develop a strategic plan for the Union. The plan evaluates the situation of smallholders in the municipality, that of the Rural Workers' Union and presents a work plan for the period 2001 to 2004.

A.2. Capoeira enrichment

The study of capoeira enrichment seeks to develop more intensive agricultural systems by reducing fallow cycles and simultaneously increasing crop production per hectare. In December, 2000, tree growth in three experimental treatments—now 22 months old—was measured. *Acacia mangium* continues to show the highest growth rate, followed by *Inga edulis* and natural regeneration. Those plots in which fertilizer was applied to annual crops continue to show higher growth rates than those in which crops were not fertilized. All plots are being invaded by grasses and weeds, though growth is less in the *Acacia mangium* plots, perhaps due to the greater shade produced by the larger trees. Treatments will be cleared and planted this coming year to evaluate enrichment effects on crop production.

A.3. Strategic Plan for Paragominas

Over the last year major progress was made in scaling up from the community to the municipal level. Several activities contributed to this process. In March, 2001, the Workers' Union and IPAM established the Forum for Family Agriculture which brings together representatives of rural communities and seeks to defend the interests of smallholders in the municipality. One of the first activities of the Forum involved obtaining representation on the Municipal Development Council of Paragominas which is responsible for defining public policies for the municipality. A second part of this effort involved conducting needs assessments in 9 of 22 smallholder communities in the municipality. These needs assessments, together with our work in agricultural extension and community fire prevention, formed the basis for a strategic plan in support of smallholder communities in the municipality of Paragominas entitled: "Subsídios para a Elaboração do Plano de Desenvolvimento da Agricultura Familiar de Paragominas." This plan outlines investments in community infrastructure and social services for the rural communities of the municipality, totaling R\$28 million over a three year period, 2001 to 2004, for the 22 communities, involving 3,000 families and covering an area of approximately 167,000 hectares. The plan is intended as an alternative to the municipal government's program to promote mechanized agriculture in smallholder communities.

The plan was submitted to the Municipal Development Council for approval in May. If approved it will be submitted to the municipal council (Câmara de Vereadores).

A.4. Proambiente

IPAM continues to act as technical partner to the FNO Proambiente agro-ecological credit line proposal that is being advanced by members of the Amazonian FETAG's (Farm Worker Federations) and FASE. Five pilot projects have been developed to exemplify how the credit line might work. An environmental fund, created by investors in carbon credits, would pay off farmers' loan obligations as they demonstrate progress in re-establishing forest along streams, reducing accidental fire, and shifting to secondary forests for slash-and-burn crop production. In March, 2001, the Proambiente working group organized a workshop in Brasilia to discuss the proposed program, which included representatives of Amazonian FETAG's, NGO's, BASA, BNDES, the Ministries of Environment and Regional Integration and various other government agencies.

B. Community Fire Management

B.1. School monitoring

Programs were established in three schools in two communities to monitor environmental conditions and especially the danger of accidental fires. Rainfall gauges and thermometers were provided to the schools and workshops were conducted to train teachers and students in their use and in recording data on rainfall and temperature. A convênio was established with the Municipal Secretary of Education and discussion is now underway with the state Secretary of Education to integrate the program into the state curriculum. Monthly tables of daily rainfall and temperature measurements are prepared by the schools and passed on to the Municipal Secretary of Education (SEMED) and to IPAM to facilitate município-level fire risk monitoring. A manual is also being prepared for schools to guide class discussions of the problem of accidental fires and fire prevention and for monitoring local climatic conditions.

B.2. Community Fire Management in Del Rei

A study of the efficiency of different fire prevention techniques was undertaken last year involving seven properties in the community of Del Rei. The study provided important information on the optimal time of day for burning for each type of vegetation cleared, the best month for burning (after 2-3 rains) and the costs and benefits of different combinations of techniques. One of the main results of the study is that by combining different techniques it is possible to significantly reduce the total cost of fire prevention. Hence, fires conducted late in the afternoon, and after the 2 to 3 rains are less effective at converting cut and dried biomass into soil-fertilizing ash, but are much easier to contain against accidental escape. A workshop was held in the community in January in which the results of the study were presented for evaluation. A 20 minute video on fire prevention techniques has also been prepared and is part of the tool box for rural extension workers addressing the problem of accidental fires.

B.3. Collaboration with ProManejo-FLONA Tapajós

At the request of the Santarém office of PPG7's ProManejo program, IPAM submitted a proposal to expand its fire prevention program to include twelve communities within the Tapajós National Forest. Educational materials for the program are now being developed. IPAM will begin by working with schools to monitor rainfall and teach about the conditions under which accidental fire risk increases.

C. Integrated Management of Forest Resources: Furniture Production in the Tapajós

Projeto Tapajós in the Arapiuns-Tapajós Extractive Reserve has made significant progress over this reporting period in all four major areas of the project and has attracted a considerable amount of attention from those interested in community-based forest management. The project offers a model for community based management of forest timber resources which is potentially of wide applicability in the Amazon as it relies on simple technology. It is very intensive in its use of wood so that relatively small areas of forest are sufficient to provide a sustainable supply of raw material. The project offers a viable alternative to the prevailing approach of promoting forest management of forests for timber and processing of timber into boards, which has thus far met with considerable difficulties.

C.1. Forest management

In January, 2001, ecologist Charles Peters of the New York Botanical Garden visited two of the three RESEX communities participating in the project. He conducted training sessions in forest inventory techniques for members of the Nuquini and Nova Vista work groups. As part of the training exercise transects were inventoried in both communities. The exercise provided important preliminary information on the timber resources available in the communities. Peters calculated that a one hectare plot in Nuquini contained sufficient wood of desired species for 6,000 stools or 1,500 coffee tables, while a similar tract in Nova Vista contained wood for 46,500 stools or 12,000 tables. Given the abundance of wood, it was decided that each community would set aside a two hundred hectare tract for management. Inventories of these tracts is scheduled to begin in August, 2001, when Dr. Peters returns to Santarém. We hope to complete development of community management plans by the end of 2001.

C.2. Furniture production and marketing

Furniture making workshops have been held regularly over the course of the year and groups are increasingly developing their own distinctive styles of furniture involving different designs and different species of wood. The furniture has been exhibited in a series of fairs and exhibitions in Santarém held over the course of the year and has been well received. The next step is to hire a marketing consultant to help us develop a marketing strategy and business plan for the project.

C.3. Agricultural intensification

The third component of the project involves development of agroforestry systems to increase and diversify household production of annual and perennial crops. This

component complements forest management activities and is based on the agricultural methodology developed in Paragominas.

C.4. Collaboration with ProManejo, Flona-Tapajós

In January the project was invited to submit a proposal to ProManejo for working with communities of the FLONA-Tapajós. ProManejo was interested in the project's approach to forest management and furniture production, especially use of downed trees. The community of Pini in the FLONA Tapajós was contacted and a proposal developed and submitted to ProManejo at the end of March. A series of furniture making workshops are scheduled to be held in the community over the coming year.

3.2. Indicator 2.2: Number of persons trained (those with and without a high school diploma).

A. Engaging Undergraduates in Environmental Studies:

15 undergraduate students from three Santarém universities participated in an intensive field course, "Despertar para a Ciência" (Wake-up To Science), designed to stimulate interest environmental studies. The course was taught at our research site in the Tapajós National Forest, from December 11 to 14. The best student was awarded with a scholarship to do an internship within our rainfall exclusion experiment.

B. Other Training Activities:

- Paragominas Secretaria de Educação invited IPAM's SOMA program to develop a municipal environmental education curriculum to be used in the region's primary and middle schools.
- IPAM/SOMA provided a short course in environmental education at SECTAM's first state-wide meeting of environmental educators.
- 5 Doctoral theses in progress on logging and forest fire effects on forest mammals and biomass, performance of community-based resource management projects in the Brazilian Amazon, econometric analysis of rancher and farmer investments in fire prevention, bamboo forest dynamics, and carbon accumulation by secondary forests.
- 8 MSc theses in progress on themes that include (1) effects of logging on fauna composition, feeding habits, seed and seedling predation, (2) forest flammability, (3) on-farm research to develop agricultural innovation among small-holder communities, (4) Acre logging industry, (5) land use in extractive reserves.
- One MSc completed during this period on the effects of traditional and reduced-impact timber harvest techniques on forest ant communities.
- 6 undergraduate theses completed

3.3. IR 2 INDICATOR 3: Number of persons trained who are now trainers or have training/extensionist functions/roles

Will be summarized in indicator Tables of year-end report.

3.4 IR 3 - Target policies adopted and/or implemented that support environmentally sound land use

3.4.1 IR 3 INDICATOR 1: National and local policies which support biodiversity conservation and natural resources management implemented and/or policy implementation improved

A. Infra-structure investments (Avança Brasil):

On April 9 and 10th, IPAM and the Instituto Socio-Ambiental (ISA) organized a seminar in the Brazilian senate to discuss the impact of the road paving, river channelization, railways and other infrastructure contemplated in the Avança Brasil program. Several key policy players participated in the event, along with representatives from diverse backgrounds (agricultural workers, scientists, unions, local associations and NGOs). Present were senators Tião Viana and Marina Silva from the state of Acre, Senator Jarbas Passarinho, from Pará, the general coordinator of the Avança Brasil infrastructure plans, João Silveira, from the Ministry of Budget and Management (Ministério de Orçamento e Gestão), Mary Allegretti, Amazon Coordination Secretary, Ministry of the Environment, Sérgio Margulis (World Bank). More than 100 representatives from government agencies, state government and grassroots organizations were represented in the meeting.

As a result of the seminar, the coordinator of the Avança Brasil Infrastructure segment—Dr. José Silveira—and six other Ministry staff spent a ½ -day with IPAM researchers to discuss the findings of our research on the impact of Avança Brasil projects. Dr. Silveira has requested IPAM's assistance in reducing the negative environmental impacts of the planned infrastructure, and in implementing participatory planning processes in Avança Brasil's target regions. The seminar allowed WHRC and IPAM to present the results of their analyses to a very broad audience and has helped establish a policy dialogue on the issue with the involvement of diverse segments of society. The proceedings from the meeting are being organized and will be released as a report soon. A film of the seminar will be played on the Brazilian congressional cable TV channel. IPAM was also invited to participate in a one-day seminar held in the Brazilian Congress two weeks prior to the Senate seminar, and to present a seminar on this topic at the annual meeting of the Sociedade Brasileira pelo Progresso da Ciência, held in Manaus.

B. Frontier Governance Along the Cuiabá-Santarém Economic Corridor:

The Brazilian environmental movement in Amazônia must move beyond its traditional role as critic of government efforts to plan and police economic activities in the region, and become involved in the design of frontier expansion. We have initiated a process to foster participatory planning of frontier expansion along the Cuiabá-Santarém highway, beginning in October with an 11-day expedition involving eight WHRC and IPAM researchers. This expedition provided us with an overview of the challenges that are faced by communities and villages along the highway, revealing, for example, that most farmers are more concerned with secondary road maintenance to access local markets than with paving of the Cuiabá-Santarém highway. A synthesis of the results from this expedition were recently submitted

to Science, in which we argue that properly designed frontier expansion could maintain most of the region's forests standing.

In a second phase, we are now conducting one-day workshops in each of the towns along the unpaved portion of the highway to produce maps of land use, and to discuss economic development priorities. The workshops are attended by local government officials, loggers, farmers, ranchers, and businessmen. The Belterra municipal government has decided to use the resulting map as the basis for its economic/ecological zoning. In Trairão, the workshop led to a decision to place a moratorium on new sawmill construction in the município. Workshops in five municípios have now been completed (Santarém, Belterra, Rurópolis, Trairão and Itaituba).

We chose the Cuiabá-Santarém corridor as the first target of this work because it will probably be the first paved highway into the core of Amazonia, and because we have a long history of research and education at the northern end of this corridor. This road was first cut through the Amazon rainforest in 1974, linking central Brazil to the city of Santarém on the Amazon River. One thousand kilometers of the highway were never paved, however, and forest logging and conversion to cattle pasture has proceeded slowly. Only 4% of the forests within 100 km of the road have been cleared, for example, compared to 26-55% of the forests along roads that were paved 20 to 30 years ago (4-6). An expanding agroindustrial sector in northern Mato Grosso, which produced 7.4 million tons of soybeans in 1999 (15), is now pushing to complete pavement of the highway. Once completed, the highway would allow Mato Grosso soybean producers to export their grain to world markets through the international port in Santarém, saving \$100-150 million per year in shipping costs (16). Highway pavement would also reduce wood transport costs to both international and domestic markets for the 114 sawmills established in the region, stimulating further expansion of the timber industry (Fig. 1) (17).

C. Climate Change:

In November, 2000, IPAM organized a national meeting to discuss "Criteria for the Inclusion of Forests in the Clean Development Mechanism", which resulted in the Declaration of Belém, signed by 14 Brazilian organizations. The Brazilian Delegation to the Kyoto Protocol has been opposed to allowing projects that avoid deforestation into the Clean Development Mechanism, but has not opened up this discussion to public debate. (Deforestation is currently responsible for 25% of annual carbon emissions worldwide and would "erase" the gains made under Kyoto through a mere increase of 20%). Brazil's position carried considerable influence in The Hague (at the sixth Conference of the Parties—COP6), where avoided deforestation within the CDM was removed from the negotiating table early in the meeting. IPAM organized a parallel dinner/seminar at the COP6 meeting, where the Declaration of Belém was presented, and where leaders of the National Council of Rubber tappers, COIAB (the Brazilian Indigenous group organization) and the Amazon working group (GTA) presented their position on the climate change negotiations. Ecológica (NGO leading the carbon sequestration project in the Ilha do Bananal) and SPVS (NGO who, together with TNC, is leading the carbon sequestration project in Guaraqueçaba) also made presentations. The dinner was attended by members of the Brazilian delegation (e.g. Fabio Feldman, Thelma Krug), several international

organizations (e.g. Union for Concerned Scientists, TNC, Climate Action Network—Latin America), and the New York Times.

D. Forest policy:

Two Amazon timber companies recently certified by the Forest Stewardship Council—Cikel and Juruá—have invited IPAM to act as technical partner as they develop techniques for monitoring and mitigating timber harvest impacts on forest fauna and forest flammability. IPAM will also train each companies staff in the use of biological indicators of logging impacts on fauna. We are using this opportunity to develop cost-effective methods for reducing the risk of forest fire, as well, testing the idea that a cheap proxy of logging-induced forest flammability is the detection of logging scars in Landsat TM satellite images (which are now available for \$50 apiece). Are hope is that the disappearance of these scars from the satellite images is correlated with the recovery of forest resistance to fire and, perhaps, the recovery of other aspects of forest impoverishment.

3.5. IR 4 - Sound land use systems disseminated beyond target areas

3.5.1 IR 4 INDICATOR 1: Number of persons reached and amount of environmental material disseminated

A. Printed Material:

Climate newsletter: IPAM launched its bi-monthly climate newsletter, called *Clima em Revista*, which is distributed to about 400 members of the Brazilian congress, NGOs, scholars, and concerned citizens. The document has received praise from diverse sectors of Brazilian society, such as the Ministry of the Environment and the Climate Prediction Center (INPE-CPTEC).

Articles in *Folha de São Paulo* about IPAM meeting on the Kyoto Protocol (“Criteria for the Inclusion of Forests in the CDM”), there were also several newspaper articles about IPAM’s agricultural intensification work, community fire management work, and the evaluation of the *Avança Brasil* plans published throughout the year. These articles appeared in the *Jornal do Brasil*, *Gazeta Mercantil*, *O Liberal* and *Diário de Cuiabá*.

(Other publications completed during this period summarized below.)

B. Television

IPAM has been provided with a 6-minute time slot each week on a regional television news program during prime time. We are using this time slot to present analyses of Brazil’s role in climate negotiations, infrastructure contemplated in *Avança Brasil*, fire, the código florestal, and many other issues.

C. Summary of New Publications with AID Support Submitted, Accepted, or Published in the October 1, 2000 – March 31, 2001 period:

- Azevedo-Ramos, C. and H. M. K. Krause. 2001. Educação Ambiental em um polo madeireiro na Amazônia. *Ciência Hoje* 29:70-73.
- Azevedo-Ramos, C. 2001. A importância das florestas em pé na Amazônia. Instituto de Pesquisa Ambiental da Amazônia, Belém, PA, Brazil. (cartilha)
- Azevedo-Ramos, C. and G. Galatti. In press. Patterns of Amphibian diversity in Brazilian Amazonia: Conservation Implications. *Biological Conservation*.
- Barros, A.C.B. In press. Sustentabilidade e Democracia para as Políticas Públicas na Amazônia. - Rio de Janeiro: Projeto Brasil Sustentável e Democrático: FASE, 2001. 128 p.(Série Cadernos Temáticos, n. 8)
- Carvalho, G. 2000. Metallurgical Development in the Carajás Area: A Case Study of the Evolution of Environmental Policy Formation in Brazil. *Society and Natural Resources*, 14(2) 615-632.
- Carvalho, G., A. C. Barros, P. Moutinho, D. Nepstad. 2001. Sensitive development could protect Amazonia instead of destroying it. *Nature* 409: 131.
- Carvalho, G. In press. A historia dos planos de governo para a Amazonia. (In, AC Barros)
- Kalif, K.A.B., S. A. O. Malcher, C. Azevedo Ramos, P.R.S. Moutinho. Accepted. Logging effect on ant community. *Studies of Neotropical fauna and Environment*.
- Kalif, K.A.B. and P.R.S. Moutinho. 2000. Comparison of three sample methods of ants in a logged area. *Boletim do Museu Paraense Emílio Goeldi* 16:75-81.
- Moutinho, P.R.S., C. Azevedo-Ramos. 2001. Desmatamento e ciclos de empobrecimento da floresta. In, AC Barros, Ed.
- Nepstad, D., G. Carvalho, A. C. Barros, A. Alencar, J. P. Capobianco, J. Bishop, P. Moutinho, P. Lefebvre, U. L. Silva Jr. In press. Road paving, fire regime feedbacks, and the future of Amazon forests. *Forest Ecology & Mgt.*
- Nepstad, D. and K. Ramakrishna. In press. O Mundo de Olho na Amazonia: Mudança Climática. In Projeto Brasil Sustentável e Democrático. Instituto de Pesquisa Ambiental da Amazônia (ed). Belém, PA
- Nepstad, D., P. Moutinho, M. B. Dias-Filho, E. Davidson, G. Cardinto, D. Markewitz, R. Figueiredo, N. Vianna, P. Lefebvre, D. Ray, J. Chambers, L. Sternberg, M. Moreira, JB Guerreiros, L. Barros, FY Ishida, E. Belk, K. Schwalbe. Accepted. The effect of rainfall exclusion on canopy processes and biogeochemistry of an Amazon forest. *J. of Geophysical Research*.
- Pereira, C. 2001. Subsídios para elaboração do plano de desenvolvimento sustentável da agricultura familiar do município de Paragominas, Pará. IPAM, Sindicato dos Trabalhadores Rurais de Paragominas, 60 paginas.
- Restom, T. and D. Nepstad. Accepted. The role of vines in the recovery of transpiration in Amazonian secondary forests. *Plant and Soil*.
- Schwartzman, S., A. Moreira, D. Nepstad. 2000 Rethinking conservation of tropical forests: perils in parks. *Conservation Biology* 14: 1350-1358.

Schwartzman, S. D. Nepstad, A. Moreira. 2000. Arguing tropical forest conservation: people versus parks. *Conservation Biology* 14: 1370-74.
Vera Dias, M. del C. In press. Estradas e Desenvolvimento na Amazonia. In, AC Barros, Ed.

4. Staffing

Woods Hole Research Center:

Daniel C. Nepstad, project coordinator
I Foster Brown, coordinates activities in Acre
Georgia Carvalho, Research Associate, policy analysis of Avança Brasil program, assists with climate project and community-based resource management project
Kilaparti Ramakrishan, advisor to climate change project
Richard Smith, anthropologist, coordinates comparative analysis of success of community-based resource management projects in Peru and Brasil.
Paul Lefebvre, GIS and remote sensing expert (Avança Brasil report, RisQue fire prediction model); general technical support
Peter Schlesinger, GIS expert, data management, assembled TM imagery for composite map of Amazon deforestation
Luis Solorzano, Amazon scenarios model, mathematical modelling
Karen Schwalbe, data management, administrative assistance
Wendy Kingerlee, literature searches and management, purchasing
Michael Ernst, graphic presentations, webmaster
David Ray, data management and analysis

Instituto de Pesquisa Ambiental da Amazonia:

Ana Cristina Barros, coordinator of state and municipal policy initiatives, member of COEMA (State Council on Environment)
David McGrath, coordinator of *Florestas e Comunidades* program, community-based resource management (Paragominas, RESEX Arapiuns-Tapajós), Amazon Scenarios project.
Paulo Moutinho, coordinator of graduate student training, publications, co-coordinator of logging impact studies, field studies of forest flammability
Márcio Santilli, Coordinator of Climate Change Program
Cláudia Azevedo Ramos, coordinator of SOMA/IPAM logging impact studies, environmental education in Paragominas
Cássio Pereira, co-coordinator of *Florestas e Comunidades* Program, community-based resource management work (Agricultural Intensification, Family Agriculture, RESEX Arapiuns-Tapajós Forest Management Project, community-based fire management)
Ane Alencar, coordinates IPAM's Remote Sensing/GIS laboratory; fire prediction modeling; logging
Larissa Chermont, economic impact of fire in Amazon farms and ranches; cost-benefit analysis of investments in fire prevention

Oswaldo Carvalho, studying effects of logging and forest fire on biomass and mammal populations

Urbano Lopes Silva, coordinates Amazon Scenarios modeling work

Frank Merry, logging model of the Brazilian Amazon.

Ricardo Melo, coordinates community-based fire management project

Lucimar Lima, community-based fire management

Jose Benito Guerreiro, field studies of forest flammability

Elza Lilia Silva, fire risk mapping in Del Rei community; remote sensing

Maria del Carmen Vera Diaz, economic costs of Amazon fire

Elza Mendonza, quantifying fire impacts in Acre State

Everaldo Nascimento, agricultural intensification project, analysis of mechanized agriculture in Paragominas

Rosana Costa, researcher, agricultural intensification project

Antonio Jose', organizational strengthening in RESEX Arapiuns-Tapajós

Jorge Oliveira, extension in RESEX Arapiuns-Tapajós

(this list does not include graduate students, undergraduate students, field technicians, or recent graduates who are doing internships)

Sub-contracts with other institutions:

IPEA (Rio de Janeiro, Ronaldo Seroa): Analysis of economic impacts of fire in Amazonia

IIED (London, Josh Bishop): Economic modeling of fire on Amazon farms and ranches (advisor to Larissa).