Updated Project Information Document (PID)

Report No: AB1653

Project Name	BRAZIL - RF Support of Scientific Research for the Amazon II
Region	Latin America and Caribbean Region
Sector	General agriculture, fishing and forestry sector (100%)
Theme	Biodiversity (P); Other environment and natural resources management (P); Participation and civic engagement (S)
Project	P068730
Borrower(s)	FEDERATIVE REPUBLIC OF BRAZIL
Implementing Agency(ies)	MINISTRY OF SCIENCE AND TECHNOLOGY (MCT) AND CNPQ MINISTRY OF SCIENCE AND TECHNOLOGY (MCT) Secretaria de Políticas e Programas de Pesquisa e Desenvolvimento Coordenação Geral de Políticas e Programas Ambientais Address: Esplanada do Ministérios, Bloco "E", 2º Andar CEP 70067-900 Brasília, D.F. Brazil Contact Person: Luiz Carlos de Miranda Joels Tel: (+55 61) 317-8112 Fax: (+55 61) 317-7766 Email: joels@mct.gov.br National Council for Scientific and Technological Development (CNPq) Diretoria de Programas Temáticos e Setoriais Coordenação Geral do Programa de Pesquisas em Ciências da Terra e do Meio Ambiente Address: SEPN 509 Bloco "A", Ed. Nazir I, 3º Andar CEP 70.750-501 Brasília, D.F. Brazil Contact Person: Helena Luna Ferreira Tel: (+55 61) 2108-9281 Fax: (+55 61) 2108-9313 Email: hluna@cnpq.br
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1. Country and Sector Background

Brazil's current S&T policy goals are to: (i) increase the number of highly qualified Brazilian scientists (by means of training up research groups); (ii) strengthen the complex research and development infrastructure comprised of universities, technology centers, research networks, laboratories and libraries; and (iii) coordinate the actions of federal and state governments, the scientific community and the private sector. As such, the specific objectives of Brazilian S&T policies are to: (i) increase and stabilize funding for the sector; (ii) provide incentives for business technology development via R&D (research and development); and (iii) decentralize research from the South and Southeast to bolster research in all regions.

[1] The average for OECD countries is 2.2%

To meet these goals, the Government's current multi-year plan calls for raising the percentage of GDP investments in science and technology to a level more comparable to that of economically advanced countries (from about 0.7% in 1997 to about 1.5%)[1] Furthermore, Sectoral Funds, established along with the process of privatization and deregulation of infrastructural activities in Brazil, are designed to increase and stabilize S&T investments via extra-budgetary revenues generated from variable percentages paid by industries and earmarked to support S&T in designated sectoral areas. Since 1999, fourteen Sectoral Funds for S&T have been created.

To address the third objective, the Ministry of Science and Technology (MCT) is seeking to further decentralize federal S&T funding by earmarking at least 30% of available federal funding to the traditionally underfunded regions of the North, Northeast and Central-West. Knowledge areas are also being targeted, such as biotechnology, nanotechnology and environment, as well as further attention to areas in which knowledge remains incipient, including marine sciences, and study of the semi-arid and Amazon ecosystems.

MCT's specific strategy, reflected in this project's design, emphasizes: (i) the interaction between researchers and stakeholders and end users in the definition of priority research topics; (ii) greater S&T investments; (iii) the formation of research networks as a means to increase the efficiency and effectiveness of S&T activities; (iv) strengthening of local centers of technological innovation to serve as regional R&D hubs; and (v) consolidating partnerships between the scientific community and the productive sector.

With respect to the Amazon region, MCT's Secretariat of Policies and Programs of Research and Development (Secretaria de Políticas e Programas de Pesquisa e Desenvolvimento - SEPED) has responsibilities, among others, for Amazon Biosphere-Atmosphere Large Scale Experiment (LBA), the Japanese funded Amazon Forestry Research Project (Jacaranda-2), and Pilot Program activities. MCT's specific S&T regional strategy for the Amazon includes: (i) better integrating diverse Amazonian programs and projects within the context of national S&T policies; (ii) supporting research groups and themes relevant to the Pilot Program to Conserve the Brazilian Rain Forest based on lessons learned to date; (iii) addressing the research needs of the Pilot Program; (iv) promoting better integration among research projects, research groups and research needs of regional stakeholders and end users; (v) strengthening strategically targeted knowledge areas; (vi) increasing support for regional research institutions; (vii) prioritizing the search for scientific and technological knowledge oriented toward the economic exploitation of regional resources; (viii) stimulating the training up of qualified scientists for and of the region; and (ix) supporting regional development.

With respect to better defining strategically targeted regional research priorities for the Amazon, MCT convened in 2000-2001 a High Level Advisory Committee (Comitê de Alto Nivel -CAN), a blue-ribbon panel of eminent national scientists, to review and make recommendations for the region. For the Amazon, the CAN strongly recommended: (i) the adoption of a system of research networks as an appropriate mechanism to promote better integration of various research groups around specific themes and stimulate the generation and dissemination of knowledge; and (ii) a sharper S&T research focus on strategic themes to benefit the conservation and sustainable development of the region. CAN recommendations were further reinforced and endorsed by a series of broad stakeholder consultations held by MCT throughout the region in 2001.

2. Objectives
Project Background

Although tropical rain forests contain most of the earth's biodiversity, and perform a range of important environmental services, such as carbon sequestration to offset the effects of global climate change, they remain one of the least understood ecosystems in the world. This is especially relevant in the case of the Brazilian Legal Amazon [1] which encompasses about 5 million square kilometers (an area larger than western Europe), represents 61% of Brazilian national territory, and comprises 30% of the world's remaining tropical forest. The Amazon, with its 23 distinctive ecoregions, is the repository of some of the greatest genetic diversity on earth. The Amazon region is also home to 17 million people both rural and urban, including indigenous people, rubbertappers, nut gatherers, fishermen and small farmers, as well as hosting an increasing number of enterprises in agribusiness, cattle ranching, and other industries – comprising a pattern of expanding economic and demographic occupation and use of the region's natural resources.

The Pilot Program to Conserve the Brazilian Rain Forest supports a set of projects aiming to optimize the environmental benefits offered by rain forest ecosystems in a way that is consistent with the development goals of Brazil. With about US$340 million of financial and technical assistance pledged to date by the G-7 countries, the Commission of the European Communities and the Netherlands, this program is the largest multilateral donation for environmental conservation in a single country. Its 16 projects include twelve currently under implementation with 3 closed, as well as this project. These include initiatives in Brazil's Amazon and Atlantic forest regions designed to (i) help strengthen the capacity of the public sector to set and enforce sound environmental policy; (ii) improve management of special protected areas, including parks, extractive reserves, national forests, and indigenous lands; and (iii) increase the knowledge base on conservation of the rain forest and sustainable utilization of its resources. The Pilot Program is managed by the Brazilian Government in coordination with the World Bank. The Bank administers the Rain Forest Trust Fund in accordance with agreements reached by the program participants, Brazil and donor countries, as well as administering other donor specific Program trust funds such as the USAID Trust Fund that would finance the operation which is the subject of this Project Appraisal Document (PAD) for the Science and Technology Subprogram-Phase 2 Project (Science-2).

The Pilot Program's specific objectives have included: (i) demonstrating that economic and environmental objectives can be pursued at the same time in tropical rain forests; (ii) preserving the huge genetic resources of the rain forests; (iii) reducing the Amazon's contribution to global greenhouse gas emissions; and (iv) providing a model of international cooperation between developed and developing countries on global environmental issues. Over the past four years, the Program has undergone an intensive mid-term evaluation, a revision of its governance structure, and process of planning for a possible future second phase (still under debate) to scale up and mainstream its activities. In addition, the "mission" of the Program has been refined as follows: to contribute to policies that promote conservation and sustainable development of Brazil's Amazon and Atlantic rain forests, including due attention to the livelihoods of local populations, by pursuing the following objectives: (i) generating, validating and disseminating knowledge within Brazil and the Amazon and Atlantic Forest regions; (ii) catalyzing the adjustment of policies and mobilizing political support for their adoption and their effective implementation; (iii) promoting and

[1] The Legal Amazon is defined under Brazilian law as the area comprised of the States of Acre, Amapá, Amazonas, Pará, Rondônia, Roraima , Mato Grosso, Tocantins and parts of Maranhã

selectively supporting the mainstreaming and scaling-up of successful experiences and models; and (iv) strengthening capacity in public, private and civil society institutions to implement such policies and apply new knowledge.

Brazil has a long tradition of supporting science and technology, but, until relatively recently, its investments for environmental research on and in the Amazon have represented only a small fraction of total S&T funding. Furthermore, cutbacks in national S&T funding during the 1980s and early 1990s further restricted the availability of resources for supporting research on environmental issues in the Amazon and contributed to deterioration of the region's scientific infrastructure. This was the context in 1994 for the Pilot Program's two interrelated projects under the Science and Technology Subprogram-Phase 1 -- Emergency Assistance and the Science Centers and Directed Research -- which sought to promote the generation and dissemination of scientific knowledge relevant to conservation and sustainable management of the Amazon. These two projects, which provided total funding in the amount of about US$27 million (US$17.43 million equivalent in grants from RFT, USAID, EC and DfID, and about US$9.23 million equivalent from GOB) and closed in June 1999 and December 1999 respectively, were largely successful in rehabilitating the region's two premier science centers, the National Institute for Amazon Research in Manaus (INPA) and the Emílio Goeldi Museum of Pará (MPEG), as well as supporting 23 competitively bid interdisciplinary research projects at multiple institutions focused on the Amazonian ecosystems' structure and function; sustainable natural resource management and socio-economic and cultural systems (see ICR for Phase I and Emergency Assistance Projects). An additional ECU 5 million was provided by the EC bilaterally in 1998 through the Pilot Program to fund a second round of 30 directed research projects under the same themes (plus a fourth theme of low environmental impact infrastructure) which were completed in early 2003.

In addition to the jump start provided to S&T in the Amazon by the Pilot Program, in recent years the situation has improved somewhat with S&T policy changes targeting and earmarking resources for the region (see PAD, Section B.2) and the advent of a number of national and international initiatives (see PAD, Sections D.2 and D.3) designed to address some of the limitations affecting research in the Amazon. Outstanding among recent initiatives, the Brazilian government is currently coordinating a large international multidisciplinary research program entitled "The Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)" that seeks to understand how the Amazon functions as a regional entity, and how changes in land use and climate affect the biological, chemical, and physical functions of the Amazon, including the sustainability of development in the region and the influence of the Amazon on the global climate. LBA is funded by the US National Aeronautics and Space Administration (NASA), the EC and the Government of Brazil.

The proposed second phase project under the Pilot Program's Science and Technology Subprogram (Science-2) has initially pledged financing of US$10 million from USAID of which US$5.8 million is already committed and available in a World Bank trust fund (the remaining funds are under discussion) as well as eleven percent counterpart financing. The new project is designed to build on the accomplishments and lessons learned from the subprogram's first phase, as well from other ongoing and planned Pilot Program projects and related S&T initiatives in the region. A major criticism of the first phase was the degree of perceived disconnect between support for S&T and the interests of the Pilot Program overall and regional end users in particular. Hence, Science-2 was prepared with significant and broad stakeholder participation, and its design enhances the incorporation of Pilot Program and regional concerns in the targeting of S&T research priorities as well as emphasizing dissemination to end users. The new project also seeks to enhance the synergies between research groups at diverse institutions with special emphasis on strengthening regional research groups and increasing the regional scientific cadre via the formation of

research networks described in detail in the PAD, Sections C.1.2 and Annex 2. Furthermore, Science-2 has been firmly integrated into the Ministry of Science and Technology's (MCT) strategic policies for Brazil that seek to provide for the long-term consolidation, maintenance and expansion of the nation's S&T, as well as MCT's specific strategic policies with respect to the Amazon that include, among others, strengthening and fostering regional S&T capacity and infrastructure, linkages to the Pilot Program, and improved dissemination of its results to benefit regional end users.

Project development objective
The development objective of the proposed project is to promote and disseminate targeted and coordinated scientific and technological research on key questions contributing to the conservation and sustainable development of the Amazon region.

To accomplish this objective, the project would support (i) targeted research subprojects in science and technology in priority thematic research areas as well as capacity building of regional human resources; (ii) the selection and use of innovative dissemination methods to augment the applicability and transfer of scientific and technical knowledge to conservation and sustainable development end users in the Amazon; and (iii) the development and use of an effective and efficient system of project and subproject coordination, including an integrated system of monitoring and evaluation of project outcomes and impacts.

3. Rationale for Bank's Involvement
Bank involvement in this project would add value on the basis of the Bank's experience with:

- Science and technology projects, worldwide, including those related to tropical natural resource management;
- Science and technology lending and grant-financed operations in Brazil;
- Promoting decentralized management and brokering partnerships in Brazil;
- Innovative methods of providing technical assistance to poor populations.

4. Description

Component 1: Support for Targeted Research Subprojects
Component 2: Dissemination of Information and Results
Component 3: Support for Project Management and Network Activities

5. Financing
Source (Total (US$m))
BORROWER/RECIPIENT ($0.70)
US: AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID) ($5.10)
LOCAL GOVTS. (PROV., DISTRICT, CITY) OF BORROWING COUNTRY ($0.00)
LOCAL SOURCES OF BORROWING COUNTRY ($0.00)
RAIN FOREST ($0.70)
Total Project Cost: $6.50

6. Implementation

General project coordination and supervision as well as oversight of project monitoring and evaluation would be the responsibility of MCT's Technical Secretariat for the Science and Technology Subprogram, under the Unit for the General Coordination of Environmental Policies and Programs of the Secretariat for Policies and Programs of Research and Development (SEPED). The direct implementation of project activities, project monitoring and evaluation, and coordination of the research clusters would be the responsibility of MCT's premier research agency, the National Council for Scientific and Technological Development (CNPq) through its General Coordinating Unit for Earth and Environmental Sciences (CGCTM).

MCT would establish a **Project Coordination Unit (PCU)** within the Technical Secretariat (SEPED) to oversee the project. The PCU's responsibilities would include (i) overseeing/supervising project activities in coordination with CNPq, the Consultative Committee, other participating entities, and project donors; (ii) coordinating/analyzing project progress and financial management reports for submission to the Bank; (iii) reviewing annual work plans; (iv) managing the flow of project funds in coordination with the Bank and the National Treasury Secretariat; (v) integrating coordination of the Science 2 project with other Pilot Program projects; (vi) conducting strategic analysis of project results for regional policy purposes; and (vii) overseeing the implementation of the project monitoring and evaluation plan. The establishment of the Project Coordination Unit within MCT with staff in adequate numbers and qualification under Terms of Reference satisfactory to the Bank, is a condition of Grant effectiveness.

CNPq would establish a **Project Implementation Unit (PIU)** responsible for: (i) carrying out the bidding process regional dissemination and selecting and contracting targeted research subprojects; (ii) coordinating, managing and supervising the research networks, clusters and research subprojects, including provision of administrative and technical assistance; (iii) preparing the dissemination strategy and mechanisms, and identifying, selecting and contracting targeted dissemination subprojects; (iv) implementing the project monitoring and evaluation strategy, including subproject level monitoring and evaluation; (v) preparing annual work plans for MCT review; (vi) preparing project progress and financial management reports for MCT review; and (vii) day to day management of project funds. The establishment of the Project Implementation Unit within CNPq with staff in adequate numbers and qualification under Terms of Reference satisfactory to the Bank, is a condition of Grant effectiveness.

The project would also establish a project **Consultative Committee** which would, among other things, facilitate effective and efficient inter-institutional coordination; help resolve implementation problems that may arise; and provide oversight assistance for the project. Membership on the Consultative Committee would include one representative each from: MCT's Secretariat for Policies and Programs of Research and Development (SEPED); CNPq's General Coordinating Unit for Earth and Environmental Sciences (CGCTM); the Technical Secretariat of another Pilot Program project; and a representative of the scientific community with previous experience in research networks similar to the one to be implemented in the Science 2 project. The Consultative Committee would invite representatives of other organizations or institutions to meetings as needed. Each institution or program would select their representative and the representative of the scientific community would be selected by MCT from a short list of six candidates to be prepared by CNPq.

7. Sustainability

1.1 **Financial**. The future financial sustainability of science and technology investments in the Amazon region appear to be more promising than ever before due to recent major policy shifts in the Ministry of Science and Technology (MCT) including the approval of major long-term sectoral and infrastructural S&T investment programs which for the first time will be allocated in part by percentages to specific regions of Brazil. The second phase project is expected to greatly benefit from execution by CNPq, Brazil's most experienced and effective research oversight institution, by the network approach, and by the inclusion of scholarships to strengthen regional S&T human resources. The research networks to be established by the project are likely to be sustainable in terms of the more favorable S&T national investment program, as well as the emphasis Government is placing on improving S&T in the Amazon region. Furthermore, it is expected that exchanges among research institutions would be maintained by other means after the project.

8. Lessons learned from past operations in the country/sector

Lessons from previous Bank lending for science and technology, including the Brazil-PACDT, include the need to: (i) assess current and future science and technology needs for development in order to plan resource development and allocation among research priorities; (ii) promote opportunities for inter-institutional and interdisciplinary collaboration of the extended local scientific community; (iii) monitor and evaluate project implementation and outcomes; (iv) introduce incentives related to efficient, appropriate productivity, primarily by basing access to resources on demonstrated performance; (v) promote access to information resources; (vi) provide basic infrastructure and equipment needs in order for science and technology projects to prosper; (vi) support the vital role of the private sector in science and technology education and research; (viii) link research and teaching to assure relevance, and (ix) move to decentralized self-management of education and research.

The design of current project incorporated many of the above lessons, as well as lessons learned from the initial operations under the Pilot Program's Science and Technology Subprogram Phase 1, including the Emergency Assistance and Science Centers and Directed Research Projects, as well as the second round of Directed Research Projects (PPD2) supported bilaterally by the European Commission. Lessons learned from Phase 1 include the need to: (i) better target directed research; (ii) improve integration of the subprogram with the Pilot Program as a whole; (iii) better disseminate results to possible users of scientific knowledge; (iv) screen research for innovation since previous operations tended to finance the continuation or repetition of existing or previous work; (v) improve attention to emerging institutions and S&T capacity building in the region (beyond the flagship institutions); (vi) design monitoring and evaluation systems in advance; and (vii) improve the administrative, financial and procurement arrangements. Lessons learned from PPD2 also emphasized the need for better coordination and integration of research groups; improved dissemination of research results both to scientific and to broader stakeholder audiences; improved administrative assistance to research groups to facilitate the timely procurement of necessary equipment; and the provision of scholarships to facilitate the involvement of regionally based students in the directed research projects.

The new project is based on an updated assessment and more targeted prioritization of regional research needs that was also broadly discussed with Pilot Program and regional stakeholders. Science-2 is more explicitly linked to addressing the focal interests of the Pilot Program in the conservation and sustainable development of the Amazon's natural resources, as well as improving dissemination to regional end-users. The new project seeks to specifically encourage interdisciplinary and inter-institutional collaboration and synergies by means of the proposed formation of research networks designed to include emerging research groups and build S&T capacity. Revised criteria for the selection of research subprojects should help target both innovative research, and research considered more relevant to Pilot Program needs. In addition,

Science-2 includes a well-designed monitoring and evaluation system, with a requirement that each research subproject proposal include its expected results and its goals in terms of products, which would be useful to the monitoring and evaluation, since the impact of scientific research, especially in relation to biodiversity conservation or natural resource management, can generally only be adequately captured in the long-run. Furthermore, the new operation's administrative, financial and procurement arrangements have been thoroughly redesigned. Finally, the second phase project will support the provision of scholarships to train regional S&T resources.

In addition, the new operations incorporates lessons learned from the implementation of other research networks in Brazil and the Amazon region, such as PROSAB (Programa de Saneamento Básico), PRONEX (Programa Núcleos de Excelência), the Long-Term Ecology Program (Programa de Ecologia de Longa Duração) and the Millenium Institute. Under PROSAB, for example, CNPq has effectively coordinated the establishment of four thematic research networks involving about six institutions each for the development and application of appropriate technologies for water/sanitation management. The experience thusfar has demonstrated how the effective integration of diverse research groups in a cooperative effort can foster the development of innovative and complementary methodologies to address targeted issues in water and sanitation management.

Lessons learned from the PROSAB and other experiences include that: (i) establishing research networks can dynamize research synergies and optimize the use of financial and human resources; but (ii) often necessitate some cultural change on the part of the scientific community more accustomed to more individualized and isolated research endeavors; and (iii) require strong and respected scientific leadership for such networks to be successful including that the coordinators must be highly respected active researchers with a broader vision of the interrelationship of scientific questions as well as a strong interest in the applied aspects of results. Other key elements of successful research networks are the need to: (iv) clearly formulate research questions; (v) form strong inter-regional and international partnerships; (vi) ensure satisfactory individual institutional support for research groups; (vii) avoid groups assuming more responsibilities than they can operationally handle; and (viii) ensure adequate monitoring and evaluation. In addition, it is clear that in the Amazon region, (ix) previous research experience has largely been of a more isolated nature; (x) many Amazon region research groups are emerging groups with less experience and/or less educational qualifications; and (xi) to date there has been a dearth of more programmatic approaches emphasizing inter-institutional exchanges and linkages.

The new project has targeted and well defined research priorities and questions, intends to actively disseminate the research network approach prior to the Request for Proposals, as well as providing extensive implementation support and supervision to ensure success. It is designed to select outstanding scientific leadership, promote partnerships including with less experienced groups or institutions, ensure operational assistance to participants, and would require individual institutional counterparts.

9. Environment Aspects (including any public consultation)

Issues :

The project retains a "C" for environmental assessment purposes. It is not expected to produce any negative environmental effects.

In terms of general environmental impacts, the proposed project is expected to increase capacity in the environmental sciences in the Amazon and in Brazil, and improve the technological knowledge needed to sustainably utilize the resources from the rain forest.

Key stakeholders include the national and regional science and technology community, the PPG7, national

and international NGOs, grass-roots based organizations, and local end users.

10. List of factual technical documents:

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Note: This is information on an evolving project. Certain components may not be necessarily included in the final project.