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9 780821 347614 14761

ISBN 0-8213-4761-6

OED

Brazil: Forests in the Balance: Challenges of Conservation with Development

The World Bank

20788

WORLD BANK OPERATIONS EVALUATION DEPARTMENT

OED

Brazil

Forests in the Balance: Challenges of Conservation with Development

Evaluation Country Case Study Series

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WORLD BANK OPERATIONS EVALUATION DEPARTMENT

Brazil

Forests in the Balance: Challenges of Conservation with Development

Evaluation Country Case Study Series

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2000
The World Bank
Washington, D.C.

www.worldbank.org/html/oed

ISBN 0-8213-4761-6

Library of Congress Cataloging-in-Publication Data has been applied for.

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Foreword

This case study is one of six evaluations of the implementation of the World Bank's 1991 Forest Strategy. This and the other cases (Cameroon, China, Costa Rica, India, and Indonesia) complement a review of the entire set of lending and nonlending activities of the World Bank Group (IBRD, IDA, IFC, and MIGA) and the Global Environment Facility (GEF) that are pertinent to the Bank Group's implementation of the forest strategy. Together these constitute inputs into a World Bank Operations Evaluation Department (OED) synthesis report entitled *The World Bank's 1991 Forest Strategy and Its Implementation*. This forest strategy evaluation was carried out under the overall direction of Uma Lele.

The purpose of each of the six country studies has been to understand the implementation of the 1991 Forest Strategy in Bank operations and to obtain the views of the various stakeholders in the country about the involvement of the Bank. In doing so, the study team has not only examined the Bank's forest program but also endeavored to place the Bank's activities in the broader context of what the country and other donors have been doing in the forest sector. Therefore, each country study examined the overall development of the country's forest sector. While this naturally includes environmental impacts on forests, such as degradation, biodiversity loss, and deforestation, it also encompasses the economic uses of forests, including the management of forest resources for production, the role of forest development in poverty alleviation, and the impacts of forest research and development.

The evaluation of the Bank's performance in these studies, as always in OED studies, seeks to judge whether the Bank has "done the right things" and "done things right." Here, OED also seeks to judge whether the Bank has lived up to the commitments made in its 1991 Forest Strategy. The case studies do this by examining how the Bank, using the various lending and nonlending instruments at its command, has interacted with the sector's development processes, with other donors, and with the broader government objectives of economic growth, poverty alleviation, and environmental sustainability. Thus, the studies focus on policy in the post-1991 period, but they also recognize that the Bank does not operate in isolation from its historical interactions with a country and its needs. These interactions include the Country Assistance Strategies or their predecessors, Economic and Sector Work, as well as all investments in all sectors and all policy dialogue that is pertinent to the Bank's actions and their outcomes in the forest sector. Together, these activities constitute the Bank's implementation of its forest strategy in a country.

The important questions these country studies address are as follows:

- How have the forces of development effected change in the country's forest sector?
- Did the Bank's 1991 Forest Strategy make a difference to its forest strategy in the country, or was this strategy largely a result of the Bank's historical relationship with the country, the needs articulated by the government, or a combination of both?
- Regardless of how the Bank's forest sector strategy evolved, how consistent was it with the Bank's 1991 Forest Strategy?
- How consistent was the country's own forest policy/strategy with the Bank's 1991 Forest Strategy?
- Was the Bank's overall and forest sector strategy in the country relevant to the country's needs in the forest sector, as identified by the country?
- Were the Bank's overall and forest sector activities effective from the viewpoint of the intentions of its 1991 Forest Strategy?
- Were the Bank's activities efficient?
- Did the Bank's activities achieve policy and institutional development pertinent to forest sector management?
- Are the Bank's impacts likely to be sustainable?

- What impact has the Bank's overall and forest sector strategy for the country had on forest cover and quality, poverty alleviation, and other key issues? What are the prospects for future Bank-country interactions in the forest sector, and for outcomes in the sector?

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Acknowledgments

This study is a collaborative effort between Uma Lele and Brazilian researchers Virgilio M. Viana and Adalberto Verissimo, with contributions from Claudia Sonda, Eugenio Arima, Carlos Souza Jr., Diogenes Alves, Isabel Strada, Sandra Faillace, Carlos Bacha, and Marcelo Marquesini, a bioeconomic modeling team (Chantal Carpentier, Stephen Vosti, and Julie Witcover), and Karin Perkins and Syed Arif Husain of the Operations Evaluation Department (OED) of the World Bank. The report was prepared under the editorial direction of William Hurlbut. The OED Review of the *1991 Forest Strategy and Its Implementation*, of which this study is part, has been conducted under the direction of Uma Lele.

In conducting this study, the Brazil team prepared a number of background papers (many of which are listed in the bibliography) and consulted extensively with a range of stakeholders. The team interviewed more than 30 representatives of NGOs, academic, governmental, and private institutions. These interviews included top government officials, NGOs leaders, and grassroots organizations. The team also used the Internet to reach more than 260 NGOs, academic, governmental, and private institutions. As this approach yielded a low response rate (5 percent), a number of field activities were used to present preliminary findings to people directly involved in projects in the Amazon and Atlantic forests. This proved to be a more efficient method for collecting input. In addition, the team held more than 10 meetings with Bank staff

in Brasilia and Washington. All contributions were incorporated into the various versions of the manuscript. The views expressed in this report of the Brazil team are those of the authors and not necessarily of those who participated in the process.

EMBRAPA (Empresa Brasileira de Pesquisa Agropecuaria), Brazil's national agricultural research institute, financed a number of background studies in support of the OED review. The modeling team has had a long-standing collaboration with the Acre and Rondonia research centers of EMBRAPA. Uma Lele visited Brazil in August 1998 and October 1998 and held discussions with government, NGO, and donor (World Bank, GTZ, DFID, European Union) representatives, EMBRAPA, and the World Wide Fund for Nature. Ms. Lele and Karin Perkins also interviewed the World Bank's Brazil country team and various task managers.

OED would like to thank Dr. Alberto Portugal, President of EMBRAPA, and Dr. Francisco Reifschneider, Head of the International Cooperation, for their research support as well as for facilitating a number of stimulating discussions between Uma Lele and EMBRAPA, university research scientists (in Curitiba, Sao Paulo, Manaus, Belem, Brazilia, Rio de Janeiro, and Santa Catarina), and land managers.

An earlier draft of this report has benefited from detailed comments by Dennis Mahar and Robert Schneider, the two lead environmental economists in the Brazil country team, and David Kaimowitz of the Center for International Forestry Research (CIFOR). The views expressed in this report are, however, those of the authors alone and not of those assisting in the conduct of this study. Background reports produced for this study by the Brazil and bioeconomic modeling teams are available on request.

OED, in collaboration with the Government of Brazil, EMBRAPA, and the World Bank country office, held a workshop in Brasilia on November 18-19, 1999. The purpose of the workshop was to discuss the contents of this evaluation with the various in-country stakeholders including representatives from Government of Brazil, the forest industry, NGOs, EMBRAPA, indigenous peoples, and the World Bank. The workshop was inaugurated by World Bank Country Director Gobind Nankani and the Brazilian Secretary of Environment José Carlos Carvalho. The results of the workshop are summarized in Annex F.

The case study was discussed at the global meeting on the Preliminary Synthesis Report of A Review of the 1991 Forest Strategy and Its implementation held in Washington during January 27-28, 2000. The country study was also placed on the web as part of the OED-ESSD

web based consultations during January and June 2000, including the regional consultation for Latin America and the Caribbean Region held in Quito during May 3-5, 2000. A separate country workshop to consult on the World Bank Forest Policy Implementation Review and Strategy led by ESSD was held in Brasilia on March 15, 2000. The results of this latter workshop are presented in Annex G.

This report was produced as part of the OEDPK publication series by a team under the direction of Elizabeth Campbell-Pagé (Task Manager). Caroline McEuen (editor), Kathy Strauss and Aichin Lim Jones (graphics and layout), Diana Qualls (editorial assistant), and Juicy Qureishi-Huq (administrative assistant) comprise the publishing team.

Acronyms

ABNT	Brazilian Association of Technical Standards (*Associacion Brasileira de Normas Technicas*)
ANFPC	National Association of Paper and Pulp Producers (*Associacion Nacional dos Fabricantes de Papel e Cellulose*)
APL	Adjustable Program Loan
BNDES	*Banco Nacional de Desenvolvimento Econômico e Social*
CAS	Country Assistance Strategy
CIFOR	Center for International Forestry Research
CVRD	Rio Doce Valley Company (*Companhia Vale Do Rio Doce*)
DFID	Department for International Development
EMATER	Technical Assistance and Extension Corporation (*Empresa de Assistencia Tecnica e Extensao Rural*)
EMBRAPA	Brazilian Corporation for Agricultural Research (*Empresa Brasileira de Pesquisa Agropecuaria*)
ESSD	Environmentally and Socially Sustainable Development Network
ESW	Economic and sector work
FAO	Food and Agriculture Organization
FASE	*Federação de Órgãos para Assistência Social e Educacional*
FSC	Forest Stewardship Council

FUNAI	National Foundation for the Indigenous (*Fundacao Nacional do Indio*)
GDP	Gross domestic product
GEF	Global Environment Facility
GNP	Gross national product
GOB	Government of Brazil
GTA	Amazon Working Group (*Grupo de Trabalho Amazonico*)
GTZ	German Agency for Cooperation (*Deutsche Gesellschaft fuer Technische Zusammenarbeit*)
IBAMA	Brazilian Environmental Institute (*Instituto Brasileiro do Meio Ambiente*)
IBRD	International Bank for Reconstruction and Development
ICMS	Value-added tax
ICR	Implementation completion report
ICV	*Instituto Centro e Vida*
IDA	International Development Association
IFC	International Finance Corporation
IMA-FLORA	Institute for the Management and Certification of Forests and Agriculture (*Instituto de Manejo e Certificacao Florestal e Agricola*)
IMAZON	Amazon Institute of People and the Environment (*Instituto do Homem e Meio Ambiente da Amazonia*)
INCRA	National Institute of Resettlement and Agrarian Reform (*Instituto Nacional de Colonizacao e Reforma Agraria*)
INPE	National Institute of Space Research (*Instituto Nacional de Pesquisas Espaciais*)
IPR	Intellectual property rights
IRR	Internal rate of return
ISA	*Instituto Socioambiental*
ISO	International Standards Organization
ITERON	Rondônia State Land Institute (*Instituto de Terras de Rondônia*)
IUCN	International Union for the Conservation of Nature
KfW	German Bank for Reconstruction (*Kreditanstalt für Wiederaufbau*)
MIGA	Multilateral Investment Guarantee Agency

MMA	Ministry of Environment
NEP	National Environment Project
NGO	Nongovernmental organization
NTFP	Non-timber forest product
OED	Operations Evaluation Department
OP	Operational policy
PAIC	Program of Support to Community Initiatives (*Programa de Apoio as Iniciativas Comunitarias*)
PLANAFLORO	Rondonia Natural Resource Management Project
POLONOROESTE	Northwest Regional Integration Program
PPAR	Project Performance Audit Report
PPG-7	Pilot Program to Conserve the Brazilian Rain Forest
PRODEAGRO	Mato Grosso Natural Resource Management Project
PROMANEJO	Project to Support Forest Management in the Amazon
PRONABIO	National Biodiversity Project
PTMF	Primary tropical moist forest
QAG	Quality Assurance Group
R$	Brazilian dollars (Rials)
SBS	*Sociedad Brasileira de Silvicultura*
SEDAM	Rondônia State Secretariat of Environmental Develop ment (*Secretaria de Estado de Desenvolvimiento Ambiental*)
SGA	Environmental Management System
SUDAM	Superintendency for the Development of the Amazon (*Superintendencia do Desenvolvimento da Amazonia*)
TJLP	Long-term interest rate tax (*Taxa de Juros de Longo Prazo*)
TMF	Tropical moist forest
UNDP	United Nations Development Program
USAID	US Agency for International Development
US$	U.S. dollars

US$M	U.S. dollar millions
WTO	World Trade Organization
WWF	World Wide Fund for Nature

Summary

Brazil contains some 3.7 million km^2 of tropical moist forest—almost 27 percent of the remaining global stock. Its tropical forest endowment and its importance to global biodiversity are unparalleled in the world. Brazil is also the world's largest consumer of tropical wood products and consumes about 86 percent of its own production. Further, Brazil has been one of the World Bank's largest borrowers, with loans totaling US$9.3 billion between 1992 and 1999 (average US$1.2 billion/year), although relative to Brazil's annual GNP of US$760 billion, this sum is still a small amount.

The environmental aspects of the World Bank's lending to Brazil in the 1980s were assessed in OED's seminal 1992 study, *World Bank Approaches to the Environment in Brazil: A Review of Selected Projects* (Redwood 1992). This report, among others, shaped the World Bank's thinking on primary tropical forests, including its 1991 Forest Strategy. Bank studies, however, have had little impact on Brazil's forest policies until recently. The future of the Amazon continues to be debated, while other Brazilian forests are more threatened and need urgent attention.

The debate over the future of the Amazon, in light of Brazil's 500th anniversary, was vigorous at the time of this review's publication. The National Environment Council (CONOMA) approved the proposal of a forestry law in March 2000, which was to be presented to the National Congress by the Ministry of Environment. This draft law resulted from numerous meetings attended by organizations representing an array of stakeholder groups. Earlier, a congressional committee had presented an alternative version of this legislation to the Ministry. The

committee's version differed considerably from CONOMA's. For example, according to the committee's proposal, 50 percent of the Amazon and 20 percent of the Cerrados region would be set aside as legal reserves; according to CONOMA's proposal, 80 percent of the Amazon would become a legal reserve and 35 percent of the Cerrados region. On May 17, the National Congress shelved the committee's bill in exchange for a pledge from President Cardoso to oppose any reduction in the legally protected Amazon reserve area. The outcome of this debate and its consequences for the Amazon's future are too early to predict.

Changes in Brazil's Forest Cover

Analysis of Brazil's forest cover shows that while average annual forest loss in the Amazon (some 13,000 km^2/year in the post-1991 period) has slowed compared to the pre-1991 period, the precise extent of the loss, as well as the causes of these changes, remains ambiguous. Subsidies for agricultural expansion have declined, but other factors contributing to deforestation persist, including strong domestic and international demand, continued agricultural expansion, and investment in extensive transportation networks. Globalization, liberalization of trade policy, currency devaluation, and technological advances have led to a booming agricultural sector, including a substantial increase in exports and increased profitability of agriculture. Improved agricultural prospects, including new technologies, in combination with the country's historically acute income and land inequalities, continue to provide strong incentives for agricultural expansion in the Amazon. At the same time, democratization and decentralization of power to the state level, the growing economic and political influence of the logging and agricultural interests at the local level, and the increasing importance and value of forest-sector revenues all contribute to intensifying political and economic pressure on the Amazon's forest resources.

In fact, Brazil's biodiversity-rich Atlantic Forest is far more threatened than the Amazon, with as little as 7 percent of the original forest remaining, and is in urgent need of attention and conservation efforts. Nevertheless, concern for this highly fragmented and degraded forest tends to be eclipsed by the international attention to the massive Amazon to its north. Important similarities exist between the processes that have caused the loss of the Atlantic Forest and those currently degrading the Amazon.

The growth of Brazil's plantation forest sector, one of the most advanced in the developing countries, has slowed since 1988, when credit

subsidies were eliminated as part of economic reforms and general reductions in subsidies. This study explores the potentially synergistic relationship between plantation forests and natural forests, as a majority of Brazil's wood consumption is domestic and a large portion is used in the urban manufacturing sector, creating a continued demand stimulus. Unlike other countries with tropical moist forests, Brazil exports a small share of its annual harvest, about 14 percent. Increased investment in plantations in the southern part of Brazil would provide an important supply substitute for wood from natural forests.

Potential Impacts of Policy Reform

Two quite different themes emerge from the analysis of Brazil's forest sector in this report. One, which analyzed the profitability of smallholder agriculture in the Western Amazon, emphasizes the extent of tradeoffs between the developmental and environmental objectives in the short and medium term at the farm level, highlighting the central issue of the presence of externalities acknowledged but not addressed in the Bank's 1991 Forest Strategy. It concludes that reform in forest policies would marginally slow deforestation—*but not stop it altogether.* Indeed, returns to managed forests (on which the 1991 Forest Strategy itself contained three widely different definitions, with no clarity as to which one of those was to be applied in Bank operations) do not compare with the prevailing interest rates or with the opportunity costs of alternative land uses. Returns to agriculture in the Western Amazon are so powerful that land conversion is likely to continue even if forest policies are modified to improve the profitability and sustainability of forest management.

Government investments in Brazil's transportation infrastructure reinforce these returns. Economic and sector work discussed with the government in the early 1990s had reached a similar conclusion and suggested that only "economic protection" of forests, caused either by remoteness or inaccessibility or both, would result in forest protection, stressing the need for an intensive rather than an extensive transportation network.

The extent of payments to landowners not to convert forests (in return for the globally beneficial environmental services of carbon sequestration and biodiversity conservation), and the mechanisms to achieve this remain a matter of much debate. Similarly debated is whether the Brazilian government or other agents within Brazil can afford the annual per-hectare payments, or if the international community would

have to provide the necessary funds. Even if funds for such payments were to materialize, it would be, institutionally, a highly demanding effort in a remote and inaccessible area, where monitoring and enforcement are difficult. Others have argued that, in any case, it would be in the interest of the global community to pursue such transfers.

The OED study's Brazilian team suggests a second, complementary interpretation. They make the case for a far more proactive forest strategy in the Amazon, including a more "hands-on" role for the World Bank. The team's work emphasizes a growing environmental consciousness in the Brazilian civil society, increased NGO capacity, and an active and progressive private sector as assets that offer promise for future World Bank involvement in Brazil's forest sector. They suggest that the Bank may have a strategic role in the design of appropriate development policies for the Amazon while that forest is still in early stages of degradation or conversion. They also recommend that the Bank become involved in developing financial incentives to conserve forests; work with the Government of Brazil to promote forest conservation through sustainable management and use of forest products; work with the government to legalize existing land tenure regimes (a recommendation others say may not necessarily lead to a slowing of deforestation); and support research and extension in managed forests.

The Brazilian study team urges the Bank to reconsider the logging ban component of the Bank's 1991 Forest Strategy, since it appears to have prevented the Bank, GEF, and IFC from getting involved in the Brazilian forests. They argue that the cautious approach charted by the 1991 Forest Strategy has inhibited the Bank from promoting conservation of Brazil's forests by, for example, not supporting experiments in improved forest management. Bank staff, however, say that the lack of Bank involvement in the tropical moist forests of Brazil has primarily resulted from a lack of government demand for such involvement.

The Bank's Approach and Involvement

The World Bank has largely skirted the issue of deforestation in Brazil since 1991, although some of the best economic and sector work on the economic and political causes of tropical deforestation has been conducted by Bank staff working on Brazil. The Bank has learned some of its most important lessons on the economics and politics of deforestation through its project experience in Brazil. The Bank has deployed some of its most qualified and dedicated sector strategists to work on Brazil. There has been greater continuity of Bank staff input at the stra-

tegic level in Brazil than in other countries, or even at the project level within Brazil. But this has not led to a sustained productive dialogue with the Brazilian government on the future of the Amazon. The Government of Brazil has perceived the Bank's and the international community's objective of conserving the Amazon forest without commensurate financial transfers as being fundamentally at odds with national economic and political development objectives. It has therefore preferred to keep the Bank and the international donor community at arm's length on issues that, for understandable reasons, it considers to be of internal concern.

The interests of indigenous populations do not always coincide with those of non-indigenous populations, nor do those of the poor non-indigenous coincide with those of the well-off, even within the Amazon. The same applies for the Amazon vis-à-vis the rest of Brazil, making these interactions even more complex and highly dynamic. At the same time, however, the government has been keen to project a "greener" image, particularly since agreeing to host the high-profile 1992 Earth Summit, when it began making policy changes. Macroeconomic difficulties also made it necessary for the government to remove subsidies. The Government of Brazil has recently become more proactive in enforcing laws with regard to forest protection. In this context, the Bank's non-lending activities may have helped move along processes of policy reforms that were underway in Brazil for other reasons.

In project financing, the World Bank has largely taken a less direct approach since 1991. It has financed poverty alleviation and land reform projects in northeast Brazil that might slow migration to the Amazon, but these are pilot efforts. The Bank has not proactively involved itself directly in addressing the issues of poverty or land tenure in the Amazon. Indeed, the Bank has consciously avoided covering the Amazon region in its land tenure and rural development activities. This may be because it is not clear that security of tenure or increased access to rural credit, even to small farmers, would help slow deforestation. The Bank has been out of the business of giving credit to large farmers and ranchers altogether. The Bank's project experience with regard to zoning in coping with the powerful political and economic forces at the municipal and state levels in Rondonia and Mato Grosso has prompted it to operate more cautiously. The Rondonia project, PLANAFLORO, has built on lessons learned in the POLONOROESTE projects of the 1980s, but has had problems of its own.

Since the Bank's 1991 Forest Strategy went into effect, the strategic victory for the Bank has been to avoid criticism for doing the "wrong" things. The Bank is not convinced, for example, that road investments such as those undertaken in the 1980s can be avoided altogether if land reform and the associated credit were to be undertaken in the Amazon without deforesting land. This "hands-off" approach is consistent with the 1991 Forest Strategy's prescription regarding the treatment of areas with primary tropical moist forests. The World Bank's natural resource management projects in southern Brazil have included small forest components. By neglecting this area, the Bank may have missed important opportunities to divert the demand for forest products away from the Amazon and to reforest the devastated Atlantic Forest.

The one successful forest plantation project, in Minas Gerais, did not lead to a follow-on project. Unexpected macroeconomic instability had led to a drop in the demand for credit for plantations except from a few very large planters that the Bank was not willing to support. Given the higher risks of investing in plantations compared to annual crops (similar to those articulated in OED's China case study), stimulating demand from small planters in a period of high inflation and economic uncertainty would have required subsidies (or what have increasingly been called "payments for environmental services") to small producers. It would have also required dealing with complex issues of tenure, market information, and marketing for small farmers. Investment in such a project would have had to be justified largely on grounds of national and international externalities and would have complicated project processing. In the meantime, fiscal difficulties of the state rendered further discussion of such investments fruitless even though the state was interested in a follow-on project and had strong leadership.

The post-1991 period has, in some ways, witnessed a clear shift in approach for the World Bank, moving away from direct involvement in forest-related projects as in the 1980s to acting as an implementing agency. The thrust of the Bank's forest-related activity in Brazil now is centered on the US$300 million Rain Forest Trust/Pilot Program (PPG-7) to Conserve the Brazilian Rain Forest and on the Global Environment Facility funded by international donors. The World Bank is also participating in an alliance with the World Wide Fund for Nature (WWF).[1] The alliance is encouraging countries, including Brazil, to set aside a global total of 50 million hectares of tropical forests by 2000, and bring an additional 200 million hectares under sustainable management.

A recent evaluation of the PPG-7 by a blue-ribbon external panel concludes that while many interesting ideas have been piloted at the micro level (for example, in agroforestry, fire prevention, and certification), the PPG-7 had failed to articulate the strategic objectives of the program. The review criticized the program and the World Bank as its coordinator for its lack of an agreed pilot program strategy, weak program management, inability of the participants to address fundamental program issues, complex project design and financing plans, and slow coalition building with Brazil's civil society and private sector. It also criticized bilateral donors for failing to take an active part in project management. The review argued for stronger government ownership of the program as being a key to its success. It outlined three options for strengthened institutional operation and recommended the creation of a "managed partnership," which it argued would establish an enabling framework for government leadership and ownership of the program, with donors and the World Bank joining as partners to manage the PPG-7 as members of a Joint Program Steering Committee. While discussing lack of Brazilian ownership of the program, the report pointed out that the PPG-7 was an entirely donor-driven exercise involving small amounts of money (US$62 million disbursed through March 1999) at a time when the government faced major macroeconomic and fiscal problems, and had very little interest in engaging the international community in strategic issues. It is difficult for the World Bank to craft a successful strategic agenda for the Amazon without government invitation for such an undertaking. Steps have already been taken to increase government ownership by involving it in the program's management.

Likewise, the World Bank/WWF alliance is driven by the two external institutions. Although Brazil's President Cardoso pledged to protect an additional 25 million hectares of forest, progress has been slow. The president's rather sudden pledge generated widespread internal debate in Brazil. Many Brazilian NGOs opposed the idea because of the lack of consultation with important domestic constituencies and the possible adverse effects on protected areas and the communities that depended on them for their livelihoods. They also criticized the move as a source of budgetary competition at a time of severe fiscal pressure. The financial crisis and budget cuts of 1999 raised further questions about priorities between developmental and environmental expenditures. The government was much criticized for cutting allocations to the Ministry of Environment, and the World Bank helped restore some of the cutbacks. But administrative constraints within the Ministry do not typi-

cally enable it to spend the existing allocations and international grants fully. Implementation of the World Bank/WWF alliance is reportedly on track once again, with greater consultation and involvement of both the Bank's country office in Brasilia and the local institutions than occurred initially. Preparation is under way for a possible US$165 million project, partially funded by the GEF, for a larger policy and strategy-oriented program. This program is currently being discussed between the World Bank and Government of Brazil, and its preparation includes local NGOs and the WWF. The lessons learned from these initiatives is leading to a more active involvement of Brazilian civil society, the private sector, and NGOs in the debate about the forests. Some of this activity has also been stimulated by the Bank's Forest Strategy review.

But basic questions remain: Who will pay to save the Amazon and Atlantic Forests, and how much are they willing to pay? Will the international community help Brazil preserve the rainforest for the global benefits of climate change and biodiversity conservation, as the 1991 Forest Strategy acknowledged? Will the Government of Brazil demonstrate the political will to make long-term investments in conservation? Will it be able to do so when the perceived benefits, including environmental benefits, are so small and distant? Will it be able to do so when the private sector and municipal and state governments have strong incentives to deforest? Will it be able to resist its own strong incentive to maintain the existing fragile political balance of power between the federal and state governments and bring the macroeconomy back on track through budget cuts? How much external involvement will the Government of Brazil wish the international community to have in these issues, particularly if the amounts of funds coming through such efforts as PPG-7, the World Bank/WWF alliance, and even the GEF are a trickle compared to the expectations of the international donor community in terms of outcomes? These are questions the international community must face if it is interested in "saving" the Amazon and what is left of the Atlantic Forest.

OED, in collaboration with the Government of Brazil, EMBRAPA, and the World Bank country office, held a workshop in Brasilia on November 18–19, 1999, to discuss the contents of this evaluation with stakeholders. Participants, who included representatives from the Government of Brazil, forest industry, NGOs, EMBRAPA, indigenous peoples, and the World Bank, generally agreed with the conclusions drawn in this study. A summary of the workshop, together with detailed comments from representatives of the government, industry, and the NGOs are presented in Annex F.

In the year 2000, the Government of Brazil intends to issue a major forest policy. That policy will likely include an improved conservation effort, improved enforcement of forest regulation to address the extent of "irregular" harvesting of forests, a plantation strategy focused on small farmers to reduce pressure on natural forests, as well as an export strategy that proposes to meet the growing import demand for tropical timber in Asia. The response of the Government of Brazil (see Annex F) also makes it clear that the government does not approve of international compensatory mechanisms that the OED review suggests as a way of meeting the gap between the global and national (including local) benefits because they would place an "unnecessary burden on Brazil's national forests."

At the Brasilia workshop, Brazil's Executive Secretary of the Ministry of Environment stated that the Bank's presence in the country's forest sector is limited not by the Government of Brazil but by the Bank's forest strategy, which is conservation-oriented and does not support production activities. The Bank's policy against financing production activities, he said, has left little room for negotiations in the forest sector and resulted in widening the gap between modernization/development and conservation activities. Brazil's forest policy targets the economic use of resources and the government could use assistance with funding sustainable development in the context of conservation. The Government of Brazil is willing to accept help in the development and implementation of such a model. The Executive Secretary concluded by saying that Brazil's efforts in the forest sector are not just on paper but have actually become a part of the fiscal budget and that the Bank can help in several aspects of the country's forest sector but has chosen to "keep its hands clean."

A representative of the National Confederation of Industry also emphasized the need to find a balance between conservation and development. Sustainable forest management, he said, is essential for the survival of the forest industry—and the Bank can play a very important role. He considered the potential shortage of raw material, the fact that market prices do not include reforestation prices, and the high interest rates as some of the key issues facing the forest industry.

An NGO representative said at the workshop that the key issue is the sustainability of the forests and the risks involved in forest management. She further said that NGO contributions have been very effective in terms of coordination between various agents in the forest sector.

The EMBRAPA representative emphasized the need for development of an interface between environment and agriculture involving a holistic

approach that can ensure sustainable development. He argued that the so-called conflict between conservation and development can be used in better ways to create win-win situations.

The OED Workshop in Brazil was followed by an ESSD Workshop on March 15–16, 2000 to discuss the Bank's future involvement in the forest sector. It involved many of the same participants (see Annex G). The various stakeholder groups had begun to coalesce and the certification debate had advanced considerably with several private operations having already entered into the process. The Government of Brazil has engaged in a program of macroeconomic stabilization involving major fiscal retrenchment to keep its macroeconomy in balance. Therefore, whether the government would request a forest sector loan from the Bank remained unclear at the time of the publication of this review.

1

Introduction

Brazil contains some 3.7 million km^2 of tropical moist forest—almost 27 percent of the remaining global stock. The country's tropical forest endowment and its importance to global biodiversity are thus unparalleled in the world. Brazil is also the world's largest consumer of tropical wood products. It has been one of the World Bank's largest borrowers, with loans totaling US$9.3 billion between 1992 and 1999.[2] Finally, lending, the rate of deforestation, and policy analysis in Brazil have heavily influenced not only the World Bank's 1991 Forest Strategy (box 1.1) but also its lending and guidelines on environmental protection, indigenous peoples, and involuntary resettlement (Redwood 1992).

This review will argue that, while World Bank learning and policy analysis has shaped Bank policy in the forest sector, it has had limited influence in Brazil until recently. The situation may now be changing. Endowed with abundant forest resources and competing demands on resources for development, the state and provincial governments, ranchers, and loggers have viewed forests and land conversion as sources of income and employment to be exploited for profit rather than preserved. The Government of Brazil has been too preoccupied with other pressing domestic economic and political issues to translate its environmental concerns into a concrete, actionable program. And when there are tradeoffs between immediate income or financial benefits to state and local actors and long-term environmental benefits to the nation that are difficult to detect and that either require fiscal resources or sacrificing revenues, the Government of Brazil has opted for the former. The government has also

Box 1.1. Bank Forest Strategy: The 1991 Forest Paper and the 1993 Operational Policy Directive

The 99-page World Bank publication *The Forest Sector: A World Bank Policy Paper* was published in September 1991. This paper (henceforth referred to as the 1991 forest paper) represented the initial comprehensive statement of a new direction for the Bank's forest strategy. A two-page Operational Policy directive (OP 4.36, produced in 1993) reflected the policy content of the paper, and a Good Practices summary (GP 4.36) provided operational direction to Bank staff. The 1991 forest paper, the OP, and the GP are together the subject of OED's evaluation.

In today's Bank terminology, the 1991 forest paper sets out a Bank strategy and the OP defines the policy. The 1991 forest paper gave guidance on policy directions, programmatic emphases, and good practice, and it specified principles and conditions for Bank involvement in the forest sectors of its client countries. It was the first instance of significant outside stakeholder participation in the formulation of a Bank sector strategy, and it is this document which the public considers the embodiment of the new direction for the Bank's forest strategy. Both the Bank's Board and civil society were referring to this document, as well as OP 4.36, when they asked OED for an independent evaluation of the Bank's forest policy. Although the Foreword for the 1991 forest paper was signed by then Bank President Barber Conable, the Board was not asked to, nor did it, comprehensively approve the 1991 forest paper. However, it did discuss the paper and endorse specific aspects of it.

The Board-endorsed principles contained in the 1991 forest paper included the ban on financing commercial logging in primary topical forests; incorporation of forest sector issues into the general policy dialogue and country assistance strategy; and promotion of international cooperation, policy and institutional reform, resource expansion, and forest preservation. The endorsed principles also included the statement that "in tropical moist forests the Bank will adopt, and will encourage governments to adopt, a precautionary [sic] policy toward utilization…. Specifically, the Bank Group will not under any circumstance finance commercial logging in primary tropical moist forests. Financing of infrastructural projects … that may lead to loss of tropical moist forests will be subject to rigorous environmental assessment as mandated by the Bank for projects that raise diverse and significant environmental and resettlement issues. A careful assessment of the social issues involved will also be required" (p. 19). The Board also approved a specific section on conditions for Bank involvement.

Both the 1991 forest paper and the OP emphasize that the Bank will not finance commercial logging in primary tropical moist forests, and in addition, the 1993 OP adds that the Bank "does not … finance the purchase of logging equipment for use in primary tropical moist forests" (para. 1a). The OP also states that "in areas where retaining the natural forest cover and the associated soil, water, biodiversity, and carbon sequestration values is the object, the Bank may finance controlled sustained-yield forest management" (para. 1f). The 1991 paper, however, had stressed a lack of agreement on what constitutes sustainable forest management and offered three different definitions of it. However, all definitions of sustainable forest management typically include management of forests for *multiple uses* as distinct from timber production alone, to which logging normally refers. Although this provision in the OP to finance forest management under controlled sustained-yield conditions allows forest management under specific conditions (and the drafters of the OP thought this introduced some flexibility for the Bank), a survey indicates that the staff have not considered the OP to be flexible on this point. The Bank will need a clearer policy if its future lending and non-lending activities are to address issues of improved forest management relative to current logging practices in many countries, which this report argues often tend to be environmentally destructive and socially inequitable. What constitutes "sustainable" forest management will, in all likelihood, remain unresolved and specific to each location.

Based on the larger policy statement, the OP also states that "the Bank distinguishes investment projects that are exclusively environmentally protective … or supportive of small farmers … from all other forestry operations." It goes on to say that projects in the latter category "may be pursued only where broad sectoral reforms are in hand, or where remaining forest cover in the client country is so limited that preserving it in its entirety is the agreed course of action" (para. 1c). The main report for this study finds that the Bank could more usefully and proactively work with stakeholders sympathetic to reforms in borrowing countries in ensuring that reforms are in hand, rather than wait for them to occur before getting engaged in the forest sector.

been reluctant to engage donors as partners in this complex and sensitive area. Only recently has the general populace become conscious of the implications of reconciling the management of Brazil's rich heritage with other priorities. The government, too, has perhaps become more proactive in the enforcement of laws and receptive to outside initiatives, albeit of a limited scope. The World Bank may have also become risk averse, and by being consistent with its strategy may have avoided active engagement in the forest sector and missed opportunities to help Brazil manage its huge forest resources more effectively for fear of being criticized. But the government's reluctance to be engaged, which may itself have been prompted by the Bank's strategy, makes it difficult to identify the more overwhelming factor. From this larger perspective, the ban on Bank financing of logging was irrelevant, given the extent of illegal logging, but the Brazilian authors of this study consider it to have constrained useful involvement by the Bank, the International Finance Corporation (IFC), and the Global Environment Facility (GEF).

The protection of Brazil's Amazon forests beyond the short term requires three fundamental conditions: an increase in the value of standing forest; an increase in the costs associated with unsustainable logging practices; and an increase in the incentives for and profitability of sustainable (or improved) forest management. That is, it must become profitable to keep trees and other forest products in the forest and to improve management practices, and the predatory exploitation of timber must become unprofitable. In evaluating measures that might address these challenges, it is useful to distinguish between the processes taking place at and beyond the forest-agriculture frontier. At the frontier, agriculture, logging, and road building create a mutually reinforcing system of forest conversion. Beyond the frontier, deeper in the forest, illegal logging of higher-value tree species threatens protected areas and the livelihoods of indigenous communities and extractivists.

At the frontier, the value of standing forest can be increased in part through restricting access to it. This can be addressed through reforming road-building strategies to avoid extensive road networks that open forests to new economic pursuits and by improving environmental assessment and mitigation procedures associated with road building. The value of standing forest also can be increased through promotion of nontimber forest products and agroforestry systems among smallholders, though neither activity on its own will likely have a large impact on forest conservation under current circumstances. Transfer schemes that essentially pay people to keep their land in trees is another important av-

enue of increasing the value of standing forests, one to which smallholders will respond (Carpentier et al. 1999). But this will require large transfers, which neither federal nor state governments of Brazil can afford. Increasing the value of standing forest by managing for timber production combined with non-timber forest products can have an impact on forests, particularly for indigenous communities which do not farm.

This study explores the processes of land use changes associated with forest degradation and conversion to other uses. It is not the first contribution the World Bank's Operations Evaluation Department (OED) has made to understanding the environmental aspects of the Bank's activities in Brazil. In a 1992 study (Redwood 1992), OED examined deforestation, forced resettlement, and the impacts of infrastructure development on indigenous and other vulnerable populations. It is in the tradition of such in-depth and independent assessment of topics of direct relevance to the review of the Bank's 1991 Forest Strategy (box 1.2) that this case study has been undertaken.

Scope of the Study

The focus in this report on the Amazon, the Atlantic Forest, and plantation forestry is partly a matter of availability of time and resources. But there are also several other reasons for choosing this scope:

- The Bank's 1991 Forest Strategy gave particular attention to deforestation in the Amazon for reasons of global environment (box 1.3).
- Some of the pressures and causes of the loss of forest cover in the Amazon are the same as those encountered earlier in the Atlantic Forest. The lessons of the earlier experience should prove useful in shaping the future strategic approach to the Amazon.
- The Atlantic Forest is severely depleted and therefore currently in more urgent need of attention than the Amazon.
- The synergistic relationship between the development of plantation forestry and the protection of natural forests has been ignored by Bank operations in Brazil. Interestingly, although the 1991 Forest Strategy also ignores this relationship, Bank operations in China have successfully addressed it (Rozelle et al. 1999). Understanding how the relationship operates in Brazil can help improve both the Bank's Brazilian operations and strengthen its overall forest strategy.
- Plantation forests serve many of the same functions as natural forests, particularly with respect to carbon sequestration,[3] soil and moisture conservation, and other environmental services. But they

Box 1.2. The Operations Evaluation Department Review of the 1991 Forest Strategy and Its Implementation

OED's review of the Bank's 1991 Forest Strategy[1] has been undertaken to assess Bank experience in the forest sector—particularly since 1991—to gauge its policy intentions, implementation, and impacts. The review also examines whether the Bank's strategy remains relevant and can embrace a strategy attuned to the current realities of the forest sector. In addition to briefing the Bank's Board of Executive Directors, the review will be used as an input to an ongoing Bank-wide review of its forest sector activities being lead by the Bank's Environmentally and Socially Sustainable Development Network (ESSD).

Brazil was selected for evaluation because it has the largest tropical moist forest in the world and the future of that forest has been at the heart of the Bank's 1991 Forest Strategy. The strategy recommends that Brazil should be among the 20 countries with threatened tropical moist forests that should receive attention from the Bank.

All of the case studies in this review consist of two parts—the first focusing on the extent and causes of changes in the forest sector, and the second on how the entire set of Bank instruments has interacted with the processes of the changing forest cover, and with what impact.

To the extent possible, the performance of the Bank has been assessed based on outcomes and impacts. Six classes of outcome are considered:

- Improvement in country policies and strategies with direct and indirect impacts on forests
- Institutional development including improvement of the legal framework, a redistribution of roles between the public and private sectors, and participatory approaches to decisionmaking
- Improvements in technologies
- Capacity building and human capital formation
- Improvement in the incentive structure
- Improved information, monitoring, and evaluation systems.

1. The strategy is summarized in Annex B.

are not efficient in other functions such as the conservation of biodiversity, cultural diversity, and ethnoecological knowledge (especially of traditional forest peoples).

- Although plantations are poorer in biodiversity, by relieving pressure on natural forests, they can help conserve biodiversity.
- Brazil has vast tracts of degraded forest land that are prime candidates for reforestation.
- The plantation forest sector in Brazil is among the most advanced in the world in research and technology and has a progressive, well-established private sector that is ready to address some of the problems in the natural forests.

Box 1.3. The 1991 Forest Strategy and the Amazon

The World Bank's 1991 Forest Strategy, concerned about the rapid loss of tropical primary moist forests, emphasized the necessity of maintaining the forest cover in the Amazon. In making its case, the strategy not only stressed the global benefits of carbon sequestration and biodiversity, but also recognized the difficulty of achieving this objective given the divergence between global and national benefits. While benefits such as soil and water conservation accrue to the nation, the benefits of biodiversity and climate change are global. Global interests, the paper argued, generally call for greater preservation of forests than national interests. This makes it difficult to incorporate global interests in national decisionmaking without a transfer of payments to compensate the agents involved for their lost profits. The strategy outlined the difficulties in estimating an appropriate level of compensation and the absence of a delivery mechanism—except for the nascent Global Environment Facility. Since 1991, the international community has formally recognized the loss of biodiversity as a serious cause by ratifying the Convention on Biodiversity. Discussion of these issues has advanced considerably through the Kyoto conference of the UN Convention on Climate Change, the Clean Development Mechanism, and a variety of other avenues. But financial mechanisms to save biodiversity remain minuscule. The experience the Bank has gained by implementing its 1991 Forest Strategy in Brazil offers important lessons that are pertinent to the future Bank policy and strategy in the forest sector, as well as for its global role.

- It may be possible, through improved policies and strategies, to slow the rate of deforestation in the Amazon and the consequent loss of livelihoods for the poor and the indigenous peoples, but because selectivity, priorities, and a focus on realistic targets for implementation are of utmost importance in conservation efforts, the analysis presented in this report will show that deforestation cannot be stopped altogether.
- The World Bank/WWF alliance poses a variety of problems. As currently conceived, it is unlikely to be a viable strategy for the protected areas by itself. But it can become an important part of an integrated land use strategy considered here.
- A far more integrated strategy toward forest sector management is essential both in Brazil and in the Bank's interventions in Brazil than is envisaged by the Bank's 1991 Forest Strategy.

Organization of the Report

This report is divided into two parts. Part I focuses on the factors, processes, and stakeholders affecting Brazil's forest cover. Part II examines World Bank operations vis-à-vis the findings of Part I, evaluates whether and how the Bank's 1991 Forest Strategy has influenced Bank activities, and assesses whether it has promoted forest conservation in Brazil.

PART I: THE FORESTS AND FOREST SECTOR IN BRAZIL

2

How Much Forest Is There?

Brazil is richly endowed with forest resources. Forests cover more than 65 percent (5.51 million km^2) of the country's total land area of 8.5 million square kilometers. This vast resource accounts for 59.8 percent of the forests of tropical South America and 26.6 percent of the world's tropical forests.[4] About 90 percent of the country's remaining forest cover is in the Amazon and the *cerrado* (World Bank 1994a), a broad savanna in central Brazil where much of the agricultural development of the past decade has taken place. The rest of the country's forest resources are located in several areas. Stretching along Brazil's Atlantic coast are the remains of the Atlantic Forest, as well as coastal *restinga* and mangrove vegetation. Behind portions of the Atlantic Forest are deciduous seasonal forests, and in northeastern Brazil lies the semi-arid *caatinga*. In addition to these natural resources, Brazil has about 55,000 km^2 of plantation forest.

The Amazon

The Legal Amazon has an area of 5 million square kilometers.[5] About 75 percent of that area is under forest, representing a commercial stock of 60 billion cubic meters (Kaufman et al. 1990). About 87 percent of the Amazon's original forest cover is thought to remain, though estimates vary. Savannas and natural grasslands occupy about 14 percent of the territory, while some 13 percent has been deforested for cattle pasture and agricultural pursuits (Alves and Escada 1999; Fearnside and Ferraz 1995). The Amazon's forests are endowed with vast timber

resources, large stocks of carbon (140–350 tons/hectare), and possibly more than 50 percent of the world's biodiversity (Kaufman et al. 1990; Fearnside 1999).

The forests of the Amazon basin contain at least half of the world's species, thought to be between 5 and 30 million, of which 1.5 million have been classified. Within Amazonian forests reside an estimated 2.5 million species of arthropods, more than 60,000 plant species, over 2,000 fish species, and more than 300 species of mammals. The number of microscopic organisms is unknown (Government of Brazil 1997).

The Atlantic Forest

The Atlantic Forest has among the highest levels of biodiversity recorded globally, and a large number of its native species are in danger of extinction. It includes several unique tropical and subtropical forest formations, according to the International Union for the Conservation of Nature (IUCN 1988). The level of species endemism is high, particularly for mammals, birds, amphibians, reptiles, and butterflies. For example, 39 percent of the estimated 130 mammal species in the region are endemic. Mammalian fauna is still relatively poorly known, other than the primates, of which 80 percent are endemic. The Atlantic Forest is unusually rich in endemic bird species, with at least 146 bird species and 68 subspecies being endemic. The Atlantic Forest is thus one of the most threatened tropical forest ecosystems in the world, and has become a top priority for conservation in the American tropics. What remains of the forest is highly fragmented, with most remnants in areas unsuitable for agriculture due to steep slopes, poor drainage, or high transportation costs (Viana et al. 1997). It is generally believed that 7.3 percent (SOS Mata Atlantica, INPE and ISA 1998) of the original 1.3 million km^2 of forest still remains. According to one estimate (SOS Mata Atlantica 1998), more than 5,000 km^2 of Atlantic coastal forest was lost between 1990 and 1995.

Despite heavy deforestation and fragmentation, the Atlantic Forest nevertheless maintains rich biological and cultural diversity, including indigenous populations, and has a high capacity for CO_2 storage. This forest also provides environmental services, particularly watershed protection, to more than 100 million Brazilians and is a potential candidate for reforestation under the newly emerging carbon credit schemes.

Conservation efforts have made the Atlantic Forest a priority not only because of the extent of its degradation but also because of its high level of biodiversity and high degree of species endemism.

Changes in Forest Cover

Brazil has one of the most advanced satellite monitoring systems in the developing world, and the aggregate data published by the National Institute of Space Research (INPE, Instituto Nacional de Pesquisas Espaciais) on forest cover changes are widely accepted. This is a major improvement over the situation in the 1980s and needs to be built upon. However, information on the sources and causes of those changes is much less clear and hampers policy formulation (box 2.1).

Box 2.1. Availability and Quality of Data on Changes in Brazilian Forests

Information concerning the causes of changes in natural forest cover is limited in Brazil. While various studies, including many referred to in this paper, discuss factors influencing deforestation, it remains difficult to draw more than a few concrete conclusions. For example, it is still not known with certainty whether land conversion is being undertaken largely by small- or large-scale agriculturists. The answer would clearly have strategic implications.

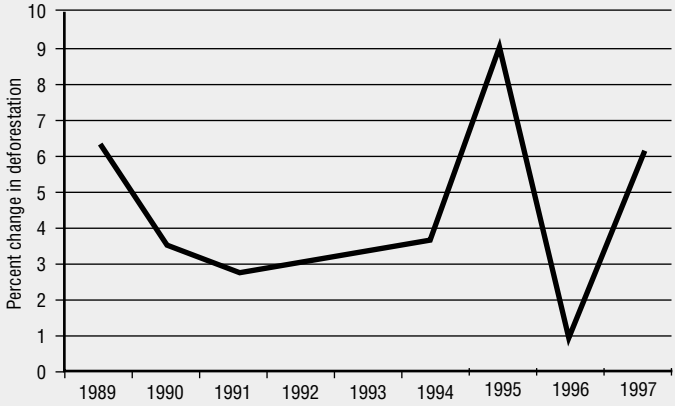
Much of the data on causes of deforestation is out of date or inconsistent, making analysis of the current situation difficult. Brazil conducts excellent agricultural and demographic censuses, however, and two data sets are now available from the mid-1980s and the mid-1990s. Analysis of these sets would provide insights that could inform the debate in the parliament and the country on the extent to which continued deforestation is a result of agricultural frontier settlement, the role of large and small farmers in that process, and the extent to which policy factors (such as easy availability of credit for agriculture, land settlement policies, and investment in infrastructure) are causing deforestation. Had these issues been at the center of a government policy for the Amazon region, such analysis would already have been conducted. Although Brazil has the human capital and financial resources to conduct such analysis, there apparently has been no demand for it from the government; therefore, none has been conducted.[1]

1. OED commissioned such an analysis of the data, which was to be funded by EMBRAPA (Empresa Brasileira de Pesquisa Agropecuaria), but the analysis could not be completed in time for this study.

Amazon Forests

Deforestation was proceeding rapidly in the Amazon in 1978 (Annex A, table A.1). The loss of 20,000 km^2/year coincided with ambitious government-sponsored regional development programs for the Amazon region and wide availability of credit and other financial incentives. After a substantial decline over the period 1989–1991, deforestation appears to have shown a sharp upward trend, with a "spike" in 1995. There is some debate, however, about whether deforestation rates did indeed "spike" in 1995. Economists argue that forest losses

Figure 2.1. Deforestation in the Amazon, 1989–97



Source: INPE, 1989.

that had taken place over the previous two years or so did not register on aerial images due to cloud cover or other complexities of interpretation. If this is the case, then what is perceived as a rapid rise in deforestation in 1995 would instead be a cumulative effect. Officials in charge of satellite monitoring in INPE, on the other hand, stand by their observations and say that the rapid increase in deforestation in 1995 was a consequence of the 1994 Real Plan for economic stabilization. If this is the case, then the stabilization effort merits further study. Another explanation is that the increase in deforestation during 1993–95 was mainly due to accidental forest fires (POLEX 1999).

Annual deforestation rates in the Amazon have oscillated in the 1991–98 period. In 1991, 11,000 km^2 of forest was converted to other uses; in 1995, some 29,000 km^2 was deforested. The annual average loss of forest for 1991–98 was 13,000 km^2, well below the 21,000 km^2 reported between 1979 and 1981 in the World Bank's 1991 Forest Strategy. In 1997, total deforestation exceeded 530,000 km^2, or more than 13 percent of the original forest cover of 4 million square kilometers. Most of this deforestation has occurred in an arc on the southern Amazon basin, since the agricultural frontier is shifting northward (INPE 1999).

Table 2.1. Deforestation in the Atlantic Rainforest, 1990–95 (km²)

State	Area	Area mapped	Area of AF1 mapped	Forested area 1990	Forested area 1995	%²	Deforestation Area	Deforestation %
Rio de Janeiro	44,081.11	44,081.11	44,081.11	10,692.30	9,288.58	21.07	1,403.72	13.13
Mato Grosso	357,424.10	47,573.15	18,428.21	437.52	395.55	2.15	41.97	9.59
Goias	340,165.90	39,187.11	30,556.77	71.19	64.71	0.21	6.48	9.1
Minas Gerais	587,172.00	433,391.65	275,397.09	12,140.59	11,251.08	4.09	889.51	7.33
Espirito Santo	46,115.22	46,115.22	46,115.22	4,097.41	3,873.13	8.4	224.28	5.47
Rio Grande	278,946.64	161,286.95	87,585.33	5,352.55	5,064.62	5.78	287.93	5.38
Parana	198,086.03	198,086.03	193,156.64	18,151.37	17,305.28	8.96	846.09	4.66
Santa Catarina	95,716.47	95,716.47	95,716.47	17,291.60	16,662.41	17.41	629.19	3.64
Sao Paulo	241,752.11	241,752.11	195,958.99	18,589.59	17,915.59	9.14	674.00	3.63
TOTAL	2,189,459.58	1,307,189.80	986,995.83	86,824.12	81,820.95	8.29	5,003.17	5.76

1. The Atlantic Forest (AF) domain is defined legally.
2. Percentage of remaining forest area in 1995 relative to the area of AF mapped.
Source: SOS Mata Atlantica, INPE & ISA, 1998; Viana et al. 1998.

Atlantic Forest

Deforestation of the Atlantic Forest has been going on much longer than it has in the Amazon. The area has continued to lose tree cover into the 1990s; however, between 1990 and 1995, more than 5,000 km² of land (5.76 percent of the total) was deforested in the nine-state area (table 2.1).

Most deforestation in the Atlantic Forest occurred several decades ago, with the rate varying among states and following different phases of agricultural frontier expansion (Dean 1997). Where economic returns to agriculture were higher, deforestation was more rapid. This was particularly the case in areas suitable to coffee plantations in Sao Paulo, Minas Gerais, and Parana. Where economic returns to agriculture were lower, as in Espirito Santo and Bahia, logging helped finance agricultural expansion.

Plantations

In addition to vast natural forests, there are 55,000 km² under plantation reforestation in Brazil, primarily comprised of eucalyptus and pines. Demand from major industries is a major driving force in the plantation sector in Brazil. The pulp and paper industry, and the iron and steel industry (which requires large quantities of vegetable charcoal) have been particularly active in reforestation (table 2.2). In recent years, the Bank-funded Minas Gerais reforestation program has also made a major contribution to plantation development.

Table 2.2. Major Plantation Reforestation Efforts in Brazil

Year	Pulp and paper	Iron and steel	Minas Gerais reforestation program	Subtotal
1982	775.03	-	-	
1983	654.03	-	-	
1984	772.95	-	-	
1985	832.82	-	-	
1986	815.97	-	-	
1987	834.24	58.49	-	141.91
1988	991.35	54.35	3.37	156.86
1989	1,160.04	88.36	9.99	214.35
1990	1,319.25	125.00	12.38	269.30
1991	742.33	51.31	7.98	133.51
1992	826.53	80.07	13.24	175.96
1993	892.03	46.65	7.56	143.42
1994	837.03	37.03	6.50	127.23
1995	945.40	30.35	6.32	131.21
1996	1,125.42	32.75	5.83	151.13
1997	1,017.23	30.76	6.54	139.02

Source: Bacha and Marquesini 1999.

3

The Economic Importance of Brazil's Forests

The Bank's 1991 Forest Strategy identified smallholder farming as the most important source of deforestation. This was based on an assumption that much of the urban industrial demand for wood products would be met by imports from temperate countries. Unlike the Bank's 1978 forest strategy, this assumption underestimated the power of domestic urban and manufacturing demand for wood products and its implications for forest policy. Most of Brazil's domestic needs for wood products have been filled from its own forests.

Size of the Forest Sector

Brazil is a larger consumer of timber than all of western Europe, with much of the timber going to the manufacturing sector. In 1997, Brazil was the largest consumer of tropical wood in the world (34 million m^3 in logs), followed by Japan (28 million m^3), Indonesia and Malaysia (19 million m^3), and China (11 million m^3). The forest sector, though, is only 6.9 percent of Brazil's GNP. This figure includes silviculture and extraction from natural forests (0.32 percent), processed wood and furniture (0.86 percent), iron and steel (0.89 percent),[6] and pulp and paper (1.06 percent). The overall forest sector (forest production, services, equipment, and industry) generated an estimated annual revenue of US$53 billion in 1993–95 (Bacha and Marquesini 1999).[7]

Forest-based industry represented 10.79 percent of the total revenue from the Brazilian transformation industry in 1994, down from 13 percent in 1970. Within the sector, iron and steel production has the highest revenues, followed by the pulp and paper segment, timber, and finally, the furniture industry. In 1985, these activities generated 62.6 percent, 21.3 percent, 9.5 percent, and 6.6 percent, respectively, of total forest-based revenues. In 1994, these proportions were 45 percent, 31.2 percent, 11.6 percent, and 12.2 percent, respectively, indicating a decrease in the importance of production for the iron and steel industry relative to the furniture and pulp and paper segments. Until the early 1980s, annual revenues from natural forest extraction were greater than those from plantation forests; this relationship has since reversed (IBGE 1997).

Brazil's forest sector employed 1.5 million people in the 1993–95 period, most of whom were involved in the extraction of natural forest products. From 1970 to 1985, the forest-based industry employed roughly 14 percent of the total transformation industry; in 1994, forest-based employment had dropped to 11 percent of that total (Bacha and Marquesini 1999). Within the forest sector, timber milling generates the most employment, followed by iron and steel, furniture, and pulp and paper. In 1985, these segments accounted for 30.5 percent, 29.3 percent, 21.6 percent, and 18.6 percent of employment, respectively. In 1994, these figures were 29.2 percent, 24.2 percent, 25.6 percent, and 21 percent, respectively.

International Trade

Macroeconomic policies and development strategies have had a profound impact on Brazil's forests. (Annex C describes the macroeconomic situation in Brazil.) From an economic standpoint, Brazil pursued an aggressive postwar policy of import-substitution industrialization, in which industrial and manufacturing sectors were promoted and protected to the disadvantage of other economic sectors, including agriculture. This strategy, based as it was on unsound fiscal and monetary policy, led to impressive economic growth through the 1970s but ultimately left Brazil highly vulnerable to the oil shocks of that decade, leading to stagnating economic growth and rampant inflation in the 1980s (Maddison and Associates 1992).

In the 1990s, under the administration of President Fernando Collor, rapid trade liberalization began. Almost all non-tariff barriers to trade were removed in four years. Import tariffs were lowered, reducing the

cost of inputs and machinery, and leading to rapid forest conversion. Trade liberalization has supported Brazil's comparative advantage in agriculture and livestock, and has stimulated expansion of the service and durable goods sectors (EIU 1999b) as well as growth of agriculture along the forest margin.

International trade has been a small share of the market for forest products, unlike in Indonesia.[8] Although forest-related exports in Brazil grew from US$100 million in 1985 to about US$500 million in 1997, Brazil currently supplies only 4 percent of the global market for tropical wood (Barreto et al. 1998). Since 1980, the relative importance of the forest sector to Brazil's international trade has increased only slightly. In that year, it accounted for 5.42 percent of total exports and 1.2 percent of imports. In 1998, these values had risen to 7.14 percent and 1.98 percent, respectively.[9] About 50 percent of exports are cut wood, 25 percent are plywood, and 12 percent are laminates (Verissimo and Lima 1998). The modest size of the export market, therefore, may mean that certification, which has begun to attract much attention in Brazil and internationally will have less impact than its proponents hope. However, this situation could well change in the future.

Trade liberalization, which began in earnest in the early 1990s and received a major boost with the 1995 implementation of Mercosul and recent currency devaluations, has already boosted exports, including the export of forest products. Brazil is therefore poised to increase its supply of wood products on the global market as other traditional suppliers of tropical timber, such as Indonesia and Malaysia, exhaust their resources.

4

Pressures on the Forests

There are three major pressures on the forests of Brazil: logging, agricultural expansion, and development (particularly roads). But the causes of deforestation are highly intertwined, and it is difficult to distinguish their relative impacts. Moreover, the impacts vary geographically. To fully understand forest cover changes, it is necessary to look at both sides of the forest margin. While forests are cleared as a result of agricultural frontier expansion and land-extensive agricultural activities, unsustainable logging practices within the forests also contribute to net forest loss. Bridging and facilitating the two processes are roads, from major highways to small, unimproved logging roads, which open the forest to development and settlement.

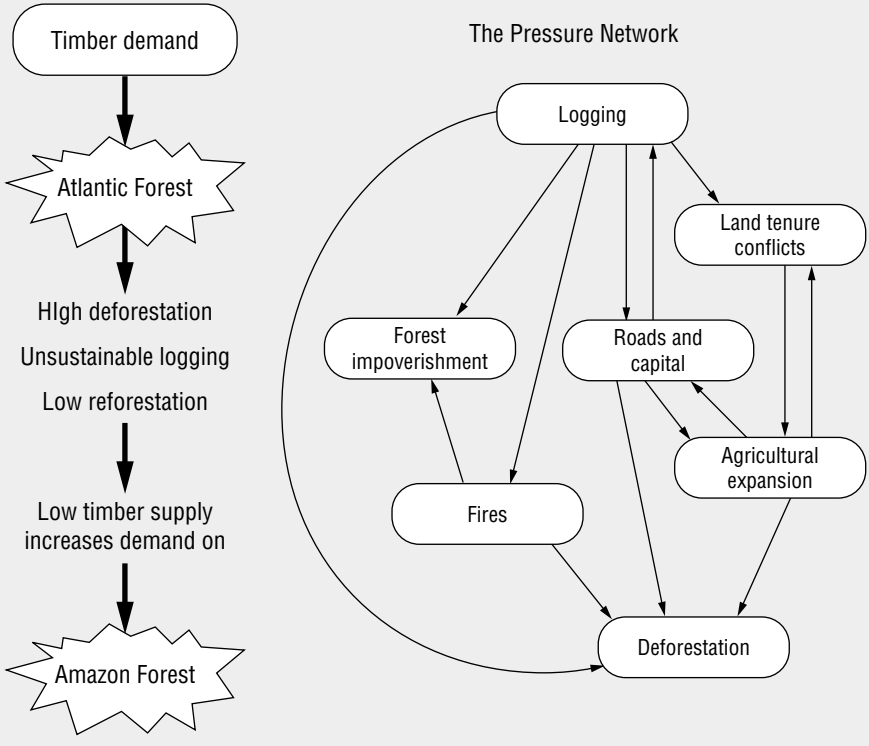
The *direct* contribution of logging to deforestation is significantly less than the effect of agriculture and cattle-raising, but the *indirect* contribution of logging is large. Roads opened for logging stimulate colonization, which in turn brings agriculture and subsequent deforestation to the area. Furthermore, farmers who sell extraction rights to the logging industry invest this money in agriculture, typically extending the agricultural frontier rather than intensifying existing agriculture (Arima et al. 1999). Logging, therefore, is a critical link in the network of pressures to deforest. Logging is becoming much more intensive and less selective than it was 20 years ago.

Until the 1980s, most domestic wood consumption was met by logging in the Atlantic Forest. In the 1970s and 1980s, timber production from the area declined sharply due to high levels of deforestation, low

reforestation rates, and unsustainable management practices. This began to increase the demand pressure on Amazonian timber supplies. Today, nearly all the original forest cover in the Atlantic Forest has been altered, but the processes driving forest cover change will continue to affect the Amazon for some time to come. As many of the processes currently affecting the Amazon mimic those that transformed the Atlantic Forest several decades ago, it is essential to understand the interplay of logging, development, and agricultural expansion. The interplay between the various forces of deforestation is illustrated in figure 4.1.

In fact, timber extraction in the Amazon is predominantly (97 percent) done without management due to poor enforcement, low technological availability, and high economic returns. Only in a few cases are management plans approved by the Brazilian Environmental Institute (IBAMA, Instituto Brasileiro do Meio Ambiente) actually implemented.

Figure 4.1. Deforestation Pressures in Brazil



Independent verification has found only a few operations that can be qualified as "well-managed forests."

In 1996, Brazil's federal government placed a moratorium on new authorizations for mahogany exploitation. At the same time, IBAMA conducted a review of all forest management plans in Amazon. However, some 70 percent of these management plans were rejected—50 percent suspended and 20 percent cancelled. A "mahogany oligopoly" formed by five companies in Para controls 81 percent of the timber activity authorized under the management plans. These companies also have a history of noncompliance. However, stopping the authorization of additional concessions will only raise the value of those already in possession and may open the door for corruption within governmental agencies, since it will determine which companies can continue to operate legally (GTA 1998).

Deforestation and Government Policies

Underlying the infrastructure development and economic activity that has taken place in the Amazon since the 1960s is a set of government-instituted policies and programs that have systematically sought to open the Amazon to settlement and economic activity.[10] Public policies and legislation historically have been biased against forests in favor of other land uses for obvious reasons. Forested areas are considered "undeveloped" and generate few revenues compared to other activities that are associated with the investment in physical and social infrastructure of the type that the non-indigenous populations living in the Amazon desire. Compounding this issue, the seemingly endless supply of cheap land in the Amazon has made land-extensive activities economically more attractive than land-intensive investments. Studies show that relatively forest-friendly pursuits such as agroforestry and extractivism based on non-timber forest products cannot match the profitability of agriculture on smallholdings (see, for example, Carpentier et al. 1999).

A result of the policy environment and the Amazon's endless supply of cheap land has been what Schneider (1994) terms "nutrient mining," or the process by which a progression of economic activity exhausts the natural resource base. Schneider notes that "the process of nutrient mining varies from region to region along the frontier, depending on the quality of soils, ease of forest access, availability of labor, credit, and land tenure relationships. As long as forest access is not limited and land prices do not reflect the true value of forest resources (biodiversity, carbon sequestration, etc.), intensification of land use and more sustainable management practices will not be economically attractive."

In addition to a policy environment that encourages development in the Amazon, an insufficiently targeted and unclear regulatory environment and lax enforcement of restrictions governing logging have long served as strong disincentives against more ecologically sound logging practices. Indeed, over 80 percent of logging in the Brazilian Amazon is illegal. Brazil's thriving plantation forest industry can relieve pressure on the country's natural forests only when access to natural forests is restricted through careful policymaking, road planning, and enforcement of forest regulations.

The Brazilian government has recently shown signs of taking a stronger stance on enforcement[11] and has become increasingly sensitive to ecological issues concerning development of the Amazon's resources, reversing or eliminating many of the policies and programs contributing to deforestation and taking important steps to increase forest protection. Nevertheless, the government continues to view the Amazon as an opportunity for economic growth that can aid in its fight against poverty. As a result, current government efforts, such as the "Brazil in Action" plan,[12] which includes significant road building in the Amazon, will continue to threaten the region's forests. Many of these investments in transportation are undertaken with little or no consultation with the Ministry of Environment, in much the same way that agricultural expansion generally involves little attention to the issues of zoning called for by the Bank's 1991 Forest Strategy, an activity from which the Bank has learned valuable lessons (box 4.1). Trade liberalization and a devalued currency have already driven increased exports of primary products, including soybeans, whose production is rapidly expanding into the Amazon, adding to pressure on the forests. Thus, the situation appears to be stacked against Brazil's forests from all sides.

While changes in policy might be expected to reduce pressure on the Amazon, background papers for this study (Carpentier et al. 1999 and Sonda 1999) found that the dynamics of farm-level decision-making cast doubt on the efficacy of current approaches. These studies are discussed below in the section on agricultural expansion.

Forest Regulation

Brazil's forest sector is extensively regulated, both upstream and downstream. Regulations governing the exploitation of natural forests generally fall into six areas: environmental impact assessments, burning and clearing permits, property-specific cutting restrictions, geography-specific cutting restrictions, forest management requirements, and restric-

Box 4.1. Zoning and its Potential Consequences

Many regions, including the World Bank's projects in Rondonia and Mato Grosso, use some type of agroecological zoning to avoid conflicts between agricultural development and biodiversity conservation. Agroecological zoning tends to push development in areas of high agricultural potential, while restricting land use in ecologically sensitive areas. However, zoning regulations can be inefficient when they do not allow for any substitutability between plots in meeting conservation goals; when assessment of the opportunity cost of conservation is based on technical soil quality measures rather than market values; when they tend to reduce private land values therefore faces landholder opposition; and when there is simply noncompliance because the government is reluctant or unable to enforce regulations. Chomitz (1999) argues that in many ways agroecological zoning is reminiscent of command-and-control approaches to industrial pollution control.

Chomitz (1999), therefore, examines an approach that is similar to zoning but not as rigid. It takes biodiversity conservation as an intrinsically valued goal and allows for substitutability between areas used to meet these goals and provide incentives for compliance. Transferable development rights (TDRs) are used to meet the objectives in a cost-effective and incentive-compatible way. In comparison to the command-and-control approach of zoning, the flexibility of the TDRs' approach in achieving conservation goals makes it possible to encourage conservation on lands with low agricultural opportunity costs, while providing appropriate incentives to the affected landholders.

tions on exports of forest products (World Bank 1994). These regulations have evolved, in part reflecting attempts by the Brazilian government to incorporate growing knowledge about the ecological and social nature and the importance of tropical forests.

The Brazilian government's commitment to preserve forests is evident from its 1965 Forest Code,[13] which requires that each property maintain a reserve of native forest. In southern Brazil, the law states, each property must have at least 20 percent in reserves. Also, no primary forest can be cleared in the developed parts and no more than 50 percent of primary forest may be cleared in undeveloped areas of the region.

However, in the northern (Amazonian) region,[14] the minimum requirement for the reserve ranges from 50 percent to 80 percent depending on the local vegetation cover. In addition, property owners must also maintain "areas of permanent protection" on riverbanks, steep slopes, hilltops, and around lakes and ponds. In the past few years, enforcement of this regulation appears to have intensified. The increase in enforcement may be related in part to a revamping of the property tax law (*Imposto Territorial Rural, ITR).* New regulations require land-

holders to file a declaratory statement with federal authorities. The declaration includes a statement of the area of the forest reserve, which is exempt from property tax.

The government attempted to expand its Forestry Code in 1977 with the Pandolfo Proposal by the Superintendency for the Development of the Amazon (SUDAM, *Superintendencia do Desenvolvimento da Amazonia*). This was the government's first attempt to develop a forest policy for the Amazon based on the idea that the region's poor soils were better suited to timber production than agriculture. This initiative resulted in the eventual creation of a 500,000 km^2 network of national forests in the Amazon for managed timber concessions. Despite the availability of SUDAM-backed fiscal incentives, investor interest was low.[15] Nascimento (1985, cited in Schneider 1992) suggests that this was due to the relative attractiveness of fiscal incentive programs for cattle ranching as an alternative investment. Schneider also points out that it was unlikely that investors in this program could compete under managed conditions with those extracting timber without management constraints.

Following more than two decades of development in the Amazon, in 1988 the government launched Nossa Natureza ("Our Nature"), an environmental policy initiative aimed at fortifying forest protection efforts. Finally addressing environmental concerns of government policies, this program, among other things, suspended fiscal incentives for agro-ranching activities in forested parts of Amazonia and intensified government efforts to monitor and control burning (Redwood 1992).

Then, in 1996, the government instituted an ecological package of legislation (GTA 1998). This initiative consisted of Provisional Measure (MP) 1511 and Decree 1963, both of which directly affect the logging of natural forests. MP1511 modified the original Forestry Code and required that 80 percent of forested area on private lands must now remain under forest cover, as opposed to 50 percent of total land. However, in states with approved zoning plans, smallholders are exempt from this requirement. Decree 1963, on the other hand, in recognizing the seriousness of illegal harvesting of mahogany, called for a two-year moratorium on new forest management plans for exploitation of mahogany and *virola*. Under the decree, IBAMA also was to investigate existing concessions and anticipated canceling 70 percent of them. The decree also established priorities for the use of financial incentives and required IBAMA to submit proposals for new national forests (GTA 1998).

Weak Institutional Environment and Enforcement

Regulations governing the natural forest sector, while well intentioned, have been problematic and largely ineffective. A 1994 World Bank study summarized the principal shortcomings of regulatory policies:

- The objectives underlying the regulations are often unclear.
- Regulations are often designed to serve two conflicting purposes: protection and production.
- Regulations that are appropriate in one region of the country may be inappropriate in other regions.
- Regulations are seldom targeted at specific externalities.
- Regulations are frequently in direct conflict with the economic incentives driving the private sector, making them difficult to enforce.
- The government has few incentives or rewards to offer. Other than incentives for forest plantations used in the past, there are no other market-based incentives that could help bring private sector actions in line with public objectives.

In addition to the challenges of clearly and appropriately defining regulatory measures, enforcement has been difficult historically. Indeed, according to Schneider (1992), "the most consistent encouragement to all sectors of the lumber industry … has been the relative freedom with which it has been allowed to exploit the public forest resources through near total absence of forest management guidelines or enforcement of existing regulations. This situation has been exacerbated by the numerous agencies (state and federal) charged with different aspects of forest supervision and management as well as the low levels of human and capital resources allocated for the task."

Schneider (1992) suggests that issues of local political economy are partly to blame. Regulations governing the logging of natural forests are an implicit tax on the industry. Given the mobility of the industry in Brazil, local governments—keen to attract and maintain investment in their jurisdictions—therefore have an incentive to be lax on enforcement of any restrictions on such economic activity. Further, given the typical time horizon of local political careers, politicians may have additional incentive to maximize economic activity over the short term, rather than promoting longer-term, more stable logging practices. In some instances, local politicians have directly allied themselves with the logging sector, for example, to protest the moratorium on new concessions for *virola* extraction. The increased political power of the forest sector is further evident in the election of loggers to local posts (Arima et al. 1999). The combination of disincentives on the part of local governments to

enforce regulations and the gross understaffing of enforcement agencies has made evasion of regulations in the timber industry, and of taxes, commonplace.

Tax evasion in the forest sector is very high. From the US$2.2 billion in annual production, the sector paid taxes of US$340 million, with ICMS (i.e., a state tax on production) representing the bulk of these taxes. For example, an estimated 88 percent of taxes went uncollected in the state of Para between 1984 and 1987. If tax evasion occurs on this level in the entire Amazon, 1998 losses would be on the order of US$225 million (Barreto et al. 1998). Most businesses are exempt from income taxes. Only about 13 percent of the value of fines assessed for noncompliance with environmental laws in the Amazon were actually collected in 1996 (i.e., R$4 million from a total of R$31.2 million; Arima et al. 1999). Reasons underlying tax evasion include corruption and a system structure that represents low risk for tax evaders.

The development of appropriate policy instruments to improve monitoring and tax revenue collection in the forest sector is important. The state green tax, "ICMS ecologico," a success story from southern Brazil, merits further attention and refinement. This initiative allows a small percentage of state taxes (the percentage varies from state to state, but averages about 5 percent) to be distributed to municipalities on the basis of the existing forest cover. The tax serves as an incentive, at the local level, for forest protection. This study's Brazilian team recommends that this and other policy instruments should be improved and widely disseminated. The World Bank can play an important role here (Nascimento et al. 1999).

What can be done to address the situation? Nascimento et al. (1999) suggest that taxing unmanaged timber operations might improve the situation, promoting forest conservation and increased public revenues simultaneously. The practicality of this, given the already high incidence of tax evasion and the disinclination of local governments to impose restrictions on logging, is questionable, however. Is there a role for the World Bank?

Logging

Exhaustion of Brazil's southern forests, the opening of roads and other infrastructure, plus lax environmental oversight all have contributed to rapid growth of the timber industry in the Amazon (Verissimo and Amaral 1998): Between 1976 and 1998, forest production (in logs) in the Amazon increased from 4.5 million m^3 to 28 million cubic meters.

Growth is expected to continue at a rate of 5 to 7 percent yearly, due to continuing increases in domestic and international demand (Barreto and Verissimo 1999; Stone 1997) and declining supply from the Atlantic Forest (Arima et al. 1999).

Timber Production

Most of the production—86 percent—goes to the domestic market; only 14 percent is exported.[16] The states of Rondonia, Mato Grosso, and Para provide 93 percent of the production. Amazonian wood accounted for 38 percent of total wood exports in 1997, with 71 percent of Amazonian exports originating in the states of Para, Mato Grosso, Amazonas, Rondonia, and Amapa, each of which account for 6 percent to 8 percent of remaining Amazonian wood exports. About 90 percent of wood exported leaves from the port of Belem (Arima et al. 1999). Predatory extraction is widespread, and the intervals between extraction cycles are getting shorter and shorter, leaving about 41 species currently at risk of extinction due to poor management (Verissimo et al. 1998; Martini et al. 1994).

High-value timber, some of it destined for the export market, is extracted from deep inside the forest, well beyond the agricultural frontier. Timber feeding the domestic market, on the other hand (primarily less valuable species used in processed products, see box 4.2), generally is logged from the frontier, where the synergistic processes of logging, road building, and agriculture compound forest loss.

Politics and Wood

The rapid growth of timber production in the Amazon and the increasing economic importance of the Amazonian timber industry, in turn increased the political influence of the timber sector at the municipal, state, and federal levels

Box 4.2. Where the Timber Goes

About 2,500 businesses among 75 production centers produce approximately 9.7 million m^3 of processed wood annually, 63 percent of which goes to civil construction and the remaining 37 percent to the higher value-added products: wood laminates (18 percent); plywood (10 percent); and flooring, doors, room dividers, and other improved wood products (9 percent). Capital investment costs can be as low as US$3,000 for a micro sawmill, increasing to US$300,000 for a mill with a band saw, and as much as US$1.9 million for plywood and laminates operations (Verissimo et al. 1992; Barros and Uhl 1995).

For every cubic meter of log, some 32 to 40 percent is transformed into sawn wood, plywood, or laminate, representing wastage of 60 to 68 percent. Obsolete equipment, storage of cut logs, as well as a thin market for short/small pieces of wood all contribute to this low productivity. However, there are indications that, as wood becomes regionally scarce, productivity is improving by means of investments in better processing technology (Arima et al. 1999).

(box 4.3). Mahar (1999) points out, for example, that timber industry interests play an increasingly important role in state politics in Rondonia and thus are influencing the design of state policies. These influences, in turn, have affected the efficacy of World Bank projects, including land-use zoning undertaken through the PLANAFLORO project.

Implications of Tree Species Diversity for Degradation

The Amazon forest has a far greater diversity of tree species than, for example, the forests of Indonesia. The diversity of species leads not only to more selective harvesting than in Indonesia but also to the harvesting of larger areas. The Amazon has a commercial stock of 350 tree species of an aggregate 60 billion m^3 (Kaufman et al. 1990). The number of species exported from the Amazon has increased from just a few (principally mahogany and *virola*) in the 1980s to more than 20 species in 1995 (Bareto et al. 1998). This appears to be associated with the depletion of natural populations of mahogany and *virola* in the Amazon. About 90 percent of the commercial species have values of less than US$60/$m^3$, compared with mahogany (*mogno*), which has a value of more than US$200/$m^3$ (Verissimo et al. 1998).

Box 4.3. The Economic Power of Amazonian Timber

In the Amazon region (i.e., Para, Mato Grosso, and Rondonia), even though a very small share of the revenue generated goes into public coffers, the forest industry generates 15 percent of GDP and 5 percent of employment. In 1998, the forest sector in the Amazon generated an estimated US$2.2 billion in sales. The timber sector contributes about 10 percent of total taxes collected in the Amazonian states of Para and Mato Grosso (Barreto et al. 1998). Overall, direct and indirect employment in forest activities amounted to 510,000 in 1998, with the majority of these receiving from R$240 to R$420 monthly in 1998 (US$218 to US$381). For each direct job created, another two indirect jobs also are created (e.g., transport, service, and forest consultants). About 70,000 people work directly in extractive activities, with another 107,000 working in the processing subsector. Sawmills comprise 70 percent of industrial employment in the region, followed by plywood manufacturers (16 percent), laminate production (8 percent), and processors (6 percent) (Verissimo and Lima 1998).

Agricultural Expansion

Large-scale migration into the Amazon began in the 1960s following the government's regional development efforts and resulted in the establishment of large ranches based on generous subsidized credit schemes (Dean 1993). From the beginning, these development schemes included major agrarian reform and resettlement programs that sought to address the country's regional disparities in wealth and land distribution. Resettlement continues in the 1990s. According to one report, the Government of Brazil claims to have met a target

of resettling 280,000 families between 1994 and 1998, at a cost of US$7 billion—nearly double its total spending on agricultural reform in the previous three decades (*The Economist* 1999).

Based on the World Bank's economic and sector work in the 1980s, the World Bank's 1991 Forest Strategy identified agricultural expansion, facilitated by misguided policies, as the principal driving force behind deforestation in the Amazon. Changing the dynamics that influence expansion, therefore, should reduce pressure on the forest. Two recent studies focusing on small-scale farmers—one study in the Western Amazon and the other in the state of Parana—suggest that farm-level decision making is influenced by structural factors and less responsiveness to policy reforms than was assumed in the 1991 Forest Strategy. This suggests limitations on what policy changes can accomplish in containing deforestation.

Smallholder Agriculture in the Western Amazon

Carpentier et al. (1999c)[17] sought to identify the links between smallholder agriculture and deforestation in the Western Amazon; assess the potential for modifying these links via changes in technology or policy; and assess the importance of these links to past, ongoing, and proposed World Bank activities in Brazil. The study focused on small-scale agriculturalists, in part because of their sometimes impoverished state, but primarily because the Bank was instrumental in settling many of these smallholders, and because of their critical current and future roles in deforestation. The effects of policy/technology changes on deforestation, agricultural growth and poverty alleviation, and the tradeoffs among these objectives, were all examined using a farm-level bioeconomic linear programming model developed for this purpose. The model takes into account patterns of land and labor use, herd dynamics, extractive activities of timber and non-timber forest products, changes in transportation costs, and other factors, and outlines implications for the forest sector and other policies.

The Western Amazon is a frontier area characterized by the absence of strong government, lack of effective policy instruments, lack of knowledge regarding the natural resource base and its possible uses, high transportation costs, and the predominance of private property, especially among smallholders.

The study yielded several important policy messages:

- **Deforestation will persist under current economic, biophysical, and policy conditions because the per-hectare returns to agricultural**

activities are greater than those generated by forest extractive activities currently practiced. So, while current small-scale farming systems can generate sufficient income to sustain farm households and contribute to regional growth, given a choice they will not retain natural forests over the longer term.

- **Once smallholders are established on their farms, the harvesting of nutrients from the forest (via slash-and-burn agriculture) is not the primary motivation for clearing forests.** Rather, it is the demand for cleared land for agriculture that drives deforestation. Therefore, efforts to slow deforestation by identifying alternative and cheaper sources of nutrients (especially nitrogen) will probably not succeed.
- **The land use patterns of smallholders are not particularly sensitive to changes in relative prices or technological advances that do not affect labor requirements.** There are four explanations for this. First, extensive livestock production systems continue to be the most attractive to smallholders because they are more flexible and require less labor, though *not* always offering the highest returns to land. Second, seasonal labor bottlenecks preclude the broad expansion of labor-intensive production systems, for example, agroforestry systems, which are precisely the types of systems needed to brake deforestation. Third, market and other risks are high for many of the products of agroforestry systems. Fourth, switching from pasture to most other land uses can be complicated and, hence, costly and slow. This financially and agronomically induced stability of current land use patterns will challenge policymakers, who will have to increase the amounts by which, and the time frame during which, they modify farm-gate incentives if large and sustained farmer responses are to be expected.
- **The social gains from saving forests may outweigh private profitability forgone by not deforesting, but no mechanism for realizing transfers exists.** However, the volume of savings to society is large enough to suggest that investments in establishing such mechanisms could be worthwhile. And, if credible and sustainable mechanisms for compensating farmers for forest (or carbon) retained can be developed, smallholders will respond.
- **Technological stagnation will reduce deforestation, but at the expense of poverty and regional growth.** To increase incomes and preserve forests, technology and policy packages need to improve profitability on already cleared area *without* raising farmers'

incentives to clear more land for that profitable use. Investments in technologies are needed that explicitly target recuperation of cleared areas for intensive use *and* supplemental measures that make it more costly for the farmer to convert forest.

- **Although they have food security, some farm households are too poor to make investments to sustainably increase agricultural activities, especially during the early stages of colonization.** However, in the absence of major increases in the value of forests to smallholders and/or more effective enforcement of forest regulations, such investments, even if made, are not likely to halt deforestation and may even speed it up if they increase cash flow available to hire labor.
- **The uncertain future for smallholders will determine rates of deforestation.** A wholesale replacement of smallholders by large farm enterprises might contribute significantly to regional agricultural GDP, but the environmental and poverty consequences would be dire. This wholesale replacement is currently most likely to occur in Rondonia along major overland transport routes with soil and topographical characteristics conducive to mechanized soybean production. Displaced, well-capitalized smallholders that move closer to the forest margins will deforest more quickly than their poorer counterparts migrating from other areas.
- **But a new wave of migrants may be coming.** Small-scale agriculture in the region can be profitable, and may be much more profitable (now or in the highly uncertain future) than rural or urban opportunities outside the region within Brazil. Major economic shocks, such as the recent devaluation of the rial, could make the returns to agriculture even more attractive. Therefore, the financial incentives for migrating from other regions to the western Brazilian Amazon still exist, though the policy incentives to do so have been greatly reduced. Regional integration may reduce relocation costs of potential migrants and plans to resettle additional smallholders have not halted altogether.
- **Smallholder cattle production systems (dual-purpose systems oriented to dairy) are on the rise, because they can fulfill multiple objectives of smallholders (profitability, liquidity, food security, and risk avoidance) simultaneously.** New technologies can dramatically improve productivity and profitability, and increased profitability will likely speed deforestation.
- **Some smallholder experimentation has begun in simple agroforestry systems involving fast-growing timber species and using profitable**

perennials or other crops as "launching pads." Other more complex systems involving tropical fruits are also the focus of much debate and hope. Financial analysis shows that these systems can be profitable, but their labor needs place them beyond the reach of most smallholders, the markets for some of their products are not yet well established, and it may be several years before they start to pay off. This makes these ventures risky for smallholders. Moreover, because the labor costs required to establish and maintain these systems is so high, even if adopted they will only occupy small areas on farms and will probably *not* halt the extensification caused by other land use systems, such as cattle ranching.

- **If farm households had access to all the labor they desired, deforestation would occur much more quickly.** Thus, labor market imperfections put a brake on the rates of deforestation. Furthermore, farmers with greater initial cash balances (available for hiring labor) deforest much faster than cash-constrained farmers. Although farmers with poorer soils have somewhat slower deforestation rates than those with good soils, the result is the same in both cases, although incomes of farmers with good soils are much higher.
- **The current rule for small farmers—that they retain 50 percent of the land in forest—is often broken because enforcement is lax and, since the policy prohibits the off-take of timber products (sustainably or otherwise), it dramatically reduces the potential value of standing timber to smallholders**. The model assumes that no agricultural credit is available to small farmers (which is close to reality), so that they cannot borrow to invest in agriculture. Such a farm shows average annual profits at prevailing market prices to be about R$6,000, compared to the per capita income in 1995 of R$3,640. This suggests that even in the relatively unsubsidized policy environment that now prevails financial incentives to migrate to establish small-scale agriculture in the Amazon are high and expansion of roads and colonization efforts would induce migration.
- **Allowing farms to conduct small-scale timber extraction, even if practiced sustainably, will not halt deforestation.** Over the long run and given a choice, the amount of forest the farmers are likely to retain will be the same—zero. The real gain from changing this particular forest policy is slowing down the rates of deforestation and gaining time to devise policies to address the deforestation issue. The report also argues that farmers would select and harvest

according to a Von Thunen-type algorithm: All the most valuable species would be harvested first, followed by less valuable ones, meaning that the ecological integrity of such forests would be quickly undermined. In their view, the likelihood that farmers would extract sustainably is not high. Rather, the profitability of schemes to promote sustainable harvesting may promote excessive logging instead. Therefore, important institutional investments in extraction monitoring and verification systems will need to ensure that the extraction of timber is done sustainably.

- **Economies of scale exist in "managed" timber extraction, suggesting that forest management will be more profitable for groups of farmers working together rather than individual households—posing both benefits and complications.** Pooling capital would reduce start-up costs to individual households but would require the establishment and implementation of long-term agreements regarding off-take, cost-sharing, and monitoring, all which tend to be activities with high transaction costs even in areas with high population densities, and particularly so in the frontier areas.
- **Sustainable timber extraction schemes are still experimental.** The long-term integrity of forests under these schemes remains unknown and large and perhaps species-specific modifications to harvesting volumes and methods are needed.
- **Only very high levels of annual cropping intensification would reduce deforestation, but in the early years of such technology development, deforestation rates again would increase dramatically.** The types of factor intensification alone do not determine if deforestation would increase or decrease. Rather, it is the factor intensity of the new technology that is being introduced. Interregional flows of labor and capital play a significant role in all this. Technical change can reduce deforestation if it occurs in a balanced manner across all agricultural regions. But technical change is not fully predictable. Transportation links allow transmission of economic effects between regions, and how macro-policies and transportation together influence migration flows of capital and labor can crucially determine outcomes in the Amazon (box 4.4).
- **Adding value to forests held by small-scale farmers will be fundamental to slowing deforestation.** Current legal restrictions on sustainable timber extraction from private forest reserves and bureaucratic obstacles to overcoming them are costly to farmers. Hence, farmers have every reason to disobey these restrictions. If

Box 4.4. Modeling the Effects of Infrastructure and Agriculture on Deforestation

Andrea Cattaneo (1999) used a CGE model to investigate the impact of policies and investments in technologies and roads. The Brazil in Action program involves building a road through the Amazon to the Pacific going through Rondonia and a port facility is being constructed to open access to the markets for exporting soybeans by reducing transportation costs. The Cattaneo model shows that the incentives that influence current land use patterns in the area would result in considerable deforestation—a 20 percent reduction in transportation costs for all agricultural products from the Amazon increases deforestation by 33 percent. Devaluation similarly shifts production in favor of exportable products. Logging increases lead to greater deforestation for agricultural purposes. But the effect of devaluation on agricultural incentives in different regions is highly dependent on the migration flows. If migration takes place only among rural areas then a 30 percent devaluation increases deforestation rates by 5 percent. On the other hand, if urban labor is willing to migrate to the Amazon to farm, then the deforestation rate increases to 35 percent.

There is significant tradeoff between forest conservation objectives and agricultural growth. As in the case of Carpentier/Vosti studies, the Cattaneo study concludes that livestock technology improvements appear to have the greatest returns to all agricultural producers in the Amazon. By increasing incomes and employment related to production it not only increases food security in the region but also increases deforestation dramatically. Perennials improve equity since they benefit small farmers as well, but food security would suffer and risks would increase. Even if they were adopted only in part, however, deforestation rates would be reduced.

forest policy that (practically) prohibits the extraction of timber products by small-scale farmers on the 50 percent of their holdings reserved as forest are reviewed and modified, important institutional investments (such as timber extraction monitoring and verification systems) will need to be made to ensure that the extraction of timber products is done sustainably. This will be expensive and may outweigh the gains of such schemes for smallholders. Increasing the value of non-timber forest products (NTFPs) will probably only make a marginal contribution to saving the forest. Expanding and improving markets for particular NTFPs to increase profitability will be challenging; policy efforts should focus on improving information exchanges on products, product quality, and product prices, and on identifying gaps in marketing and management skills along NTFP market chains and filling them. In any event, making the forest more profitable through NTFPs *or* timber extraction in the absence of effective monitoring could mean more damage to standing forests: Profitability may encourage the development or practice of unsustainable or excessively damaging extraction techniques.

- **Paying small-scale farmers to retain forest (and the array of ecological services it can provide, especially carbon) will reduce deforestation rates, but since agriculture is profitable in these areas, the costs to policymakers in the aggregate will be high.** More important, preserving forest via small-scale farmers may be less efficient than doing so through extractive reserves or large farm enterprises since transaction costs in these cases may be lower. Tapping local organizations as a means of reducing transaction costs should be explored.
- **Speeding up formal processes of securing formal land tenure will likely increase the rate of smallholder deforestation as access to credit becomes easier.** The Brazilian authors of this report, on the other hand, argue that secure land tenure reduces the likelihood of invasion by loggers and increases the chances of natural forest management of both timber and non-timber production. But the security of land tenure affects smallholder land use via access to information, extension services, and especially formal credit, and not via threat of expropriation (see box 4.5). These tradeoffs are simply not fully understood, mainly because agriculture and forest researchers have been working in isolation from each other. More integrated multisectoral research is needed.
- **On balance, large increases in wage rates will reduce deforestation and increase incomes, and reductions in labor flows (especially onto farms) will save forest but come at some cost to farm income.** Regional integration may drive wage rates down in rural areas of the Western Amazon. The current recession has followed this trend, putting additional pressure on forests. Some improvements in labor market performance seem to be underway, especially for particular tasks such as coffee harvesting. Such improvements foster investments in labor-absorbing production systems that reduce the pressure on forests. However, there is no reason to be optimistic about the impacts of trends on labor market performance or real wage rates on deforestation overall. Labor flows are expected to increase (onto and off farms) and real wage rates will likely decline (at least vis-à-vis urban wages over time)—both of which could put additional pressure on forests in the foreseeable future.

Technology and policy changes, as well as increases in the stock of knowledge regarding ecosystem resilience, are increasing the number and types of policy tools available to policymakers and acceptable to smallholders. In the past, most policies aimed at protecting the forest did

Box 4.5. Land Tenure

Unclear land tenure is characteristic throughout Brazil, especially in areas with high forest cover, both in the Atlantic and Amazon forests. In the Amazon, unclear tenure is one of the factors that drives deforestation and serves as a disincentive to sustainably managed forests. People can claim land in the Amazon based on the area they have "improved." Historically, clearing trees has been considered an improvement by the National Institute of Resettlement and Agrarian Reform (INCRA, Instituto Nacional de Colonizacao e Reforma Agraria). Deforestation is thus a rational decision for those seeking land ownership. One of the authors of this report argues that often, unclear land tenure also promotes short-term profit maximization (Nascimento et al. 1999).

But there is no consensus on the impact of tenure security on rates of deforestation. Violence resulting from land conflicts is common and tenure security can affect decisions regarding investment in the land. In general, occupancy and use of the land has constituted tenure in the Amazon. For the most part, agriculturalists without formal title to their land do not fear being displaced. Where conflicts do take place, they are the result of premature settlement of the frontier. Beginning in the 1960s, large-scale agriculturalists with the greatest access to formal incentive programs generally settled the frontier first—and largely prematurely, given the lack of infrastructure at the time. Many abandoned their lands, with small-scale farmers taking over on their heels. Once government and infrastructure arrived at the frontier, some of the original settlers returned to reclaim their land, with conflict and ensuing violence sometimes occurring. Land conflict rarely takes place in formal INCRA settlements, despite the fact that many of the landholders do not have formal title.

It is often argued that tenure security leads to increased investments in land. Kaimowitz (1999 personal communication) points out, and Vosti confirms, however, that this applies equally to investment in reforestation and forest management and investment in forest clearing for subsequent agricultural establishment. Thus, whether policies designed to improve land tenure security are good or bad for forest conditions is not clear and is, in any case, somewhat location-specific. Carpentier et al. (1999c) suggest that in the Western Amazon, giving formal title to smallholders may in fact *increase* forest conversion, as farmers will become eligible for credit to finance agricultural expansion. Within the various agricultural systems, however, some of the agroforestry systems mimic many of the ecological benefits of maintaining natural forests, although their profitability vis-à-vis alternatives is location-specific and, in any case, agroforestry systems are less acceptable to those for whom maintaining the biodiversity of natural forests is of paramount importance.

This paper's Brazilian contributors are firm in their call for tenure rights as a critical prerequisite for forest conservation through management. They assert that investment in long-term activities such as low-impact logging requires clear tenure, though this alone is not sufficient to promote sustainable management practices (Nascimento et al. 1999). Recognizing and protecting land tenure in regions with high forest cover should be accompanied by policies that promote forest conservation, either by paying for environmental services or promoting sustainable harvests of timber and non-timber products. They suggest that longstanding settlement along rivers offers an opportunity for World Bank action to assist the government to legalize existing land tenure regimes, which could result in a significant contribution to forest conservation in the Amazon. A US$1 billion World Bank loan for land reform currently under preparation may be an appropriate vehicle for such an initiative in their view (see Part II for details).

so via regulation, taking something away from farmers (i.e., effectively removing their right to completely deforest lots and convert them to agriculture) without giving them anything that had income-generating potential in return. The emergence of an active market for fluid milk and the potential for sustainably managing smallholders' legal reserves of forests, for example, may allow policymakers to support such privately profitable activities in exchange for reductions in deforestation, and also to generate the funds necessary to monitor and enforce such schemes.

Agriculture Expansion in Parana

A second study (Sonda 1999),[18] carried out in Parana, explored the relationships between agricultural expansion, farmer category, agricultural productivity, and deforestation. Because the process of agricultural expansion and forest conversion currently underway in the Amazon is similar to that which took place in the Atlantic Forest, the Parana study offers insights into policy implications concerning land use patterns. Additionally, this region has several World Bank projects (see Part II). Their study illustrates what seems to be a general phenomenon in Brazil, and the Atlantic Forest region in particular: Farms with favorable soil and topographic conditions and lower transportation costs end up with high levels of deforestation. This pattern can be found in most western plateaus of the Atlantic Forest, notably in the states of Parana, Sao Paulo, and Western Minas Gerais. Not surprisingly, then, in areas along the coast, where topography tends to be unfavorable to mechanized agriculture—and where soils are poorer and transportation costs higher—forest cover is higher. As in the study of the Western Amazon, Sonda finds that returns to agriculture—even on barren soils—are an incentive to migrants to deforest.

Stakeholders vary significantly among and within regions of the Atlantic Forest. In the study region, for example, there are five classes of farmers: subsistence producer, small producer of commercial crops, family entrepreneur, non-technified large producer, and technified large producer. Four municipalities located in different socioeconomic and edaphoclimatic regions were compared: Guaraquecaba, Cruz Machado, Pato Branco, and Bela Vista do Paraiso.

The study found major forest cover differences among regions, ranging from forest-rich (e.g., Guaraquecaba, 60.9 percent of forest cover) to forest-poor (e.g., Bela Vista do Paraiso, 3.6 percent of forest cover). Forest-rich Guaraquecaba is characterized by subsistence agricultural systems comparable to many areas in the Amazon. Agricultural yields

are low, due to edaphic and topographic constraints, and transportation costs are high. Traditional populations, including Guarany Indians, live off what they can extract from the forests.

There is a high concentration of landholdings within Guaraquecaba, with remaining forest cover in very few hands. The 3.6 percent of total landholdings that are large (over 250 ha) represent 90.8 percent of all remaining forest cover. Of these landowners, nearly all (93.1 percent) have title to their land, and the majority (65.5 percent) are "technified" producers. In contrast, 39.2 percent of landholdings are small subsistence farms (less than 10 ha) that together control less than 1 percent of total remaining forest cover. Of these, 35.5 percent do not have title to their land.

On the other extreme, forest-poor Bela Vista do Paraiso has high yielding agricultural systems, good transport and storage infrastructure, less land concentration, and intense relation to markets.

Empirical evidence from the Parana study illuminates several issues and suggests several recommendations (box 4.6):

- *Increasing agricultural productivity.* Parana offers a good example of how increasing productivity is associated with increasing deforestation. With one of the best state agricultural research and rural extension systems, Parana has increased its agricultural productivity steadily over the past decades. Productivity gains accompanied conventional agricultural development (e.g., new genetic material and appropriate soil management). As a consequence, agricultural frontier expansion has been fueled by growing gains from intensive farming systems. Soybean production, for example, has increased from 2,446 kg/ha in the 1986–90 period to 3,189 kg/ha in the 1997–98 period. Forest cover decreased over the same periods. Increased soybean productivity, combined with increases in other crops, appears to have created growing incentives to expand agricultural lands in Parana.

Box 4.6. Recommendations from the Parana Study

- A "green tax" is being implemented with great success in Parana. It should be examined for replicability elsewhere, as fiscal incentives to conserve Brazil's forests should be expanded.
- There is a need to develop location-specific policies for afforestation and reforestation, which vary depending on whether areas are forest-rich or forest-poor.
- The World Bank has missed an opportunity to give greater emphasis to afforestation and reforestation components in its activities in Parana, despite its agriculture and natural resource management projects in the state. Part II of this paper, which discusses the World Bank's operations in Brazil, will discuss this in more detail.

Increases in agricultural productivity appear to affect deforestation in forest-rich and forest-poor areas differently. In forest-poor regions, where agricultural productivity is already above the national average, further productivity increases are likely to have a small impact on deforestation. Remaining forest patches are either too small or are located on land too marginal for agriculture. Increasing productivity might, however, render current reforestation efforts an even less attractive land use alternative. In forest-rich areas, on the other hand, increasing agricultural productivity is likely to have a larger impact on deforestation. As in Acre/ Rondonia (Carpentier et al. 1999a) and Santa Cruz, Bolivia (Kaimowitz 1999), increasing yields is likely to further encourage farmers to deforest.

- *Transportation costs.* Regions with better road infrastructure (Pato Branco and Bela Vista) and lower transportation costs have had higher deforestation levels. This also coincides with findings in Santa Cruz, Bolivia (Kaimowitz 1999).
- *Relative prices of agricultural crops.* Deforestation in Parana occurred in spurts, following the economic cycles of export crops. In the Bela Vista region of the northern part of the state, expansion of the agricultural frontier was driven first by coffee and later by soybean prices.
- *Incentives to protect forests.* In Parana, a "green tax" (ICMS Ecologico) has been implemented successfully, amounting to about 5 percent of total state taxes. The proceeds of this tax are distributed to municipalities with high forest cover, in effect compensating them for the opportunity costs of not deforesting and instead protecting forests. Municipal governments began to see their forests as assets and have launched environmental education campaigns, fire prevention and combat programs, etc. Citizens have begun to realize the benefits of their forests as they have provided funds to improve health and education programs.

  Incentives to protect forests can include promotion of good forest management practices, including timber production. The state of Parana has one of the few examples of natural forest management in the Atlantic Forest. It is an agroforestry system practiced by small farmers in eastern Parana that is based on the natural regeneration of Mimosa scabrela (*braccatinga*), which is intercrossed with annual crops and used as firewood for domestic and industrial purposes. Natural agroforest management of this

Table 4.1. Relationship Between Factors Driving Land Managers' Behavior and Public Policies

Driving factors	Instruments of public policies	Problems	Alternatives
Capital availability	Public credit to private operations, both rural and industrial	Existing credit provides weak support for forest conservation Low credit availability to forest management, agroforestry, and reforestation	Improve efficacy in the implementation of existing "green" guidelines to link credit to forest conservation Increase credit availability to forest management, agroforestry, and reforestation
Land tenure regime	Land tenure regularization	Large number of producers without land title, especially in forest-rich areas	Land tenure regularization, especially in forest-rich areas
Available technology	Rural extension	Virtual absence of technical extension services for forest management in forest-rich areas with high potential for management Virtual absence of technical extension services for reforestation and agroforestry systems in forest-poor areas Very little orientation and support for reforestation and restoration of environmentally critical areas Technical assistance directed almost exclusively to agriculture and pasture	Orientation and support for forest management in forest-rich areas with high potential Orientation and support for reforestation and agroforestry systems in forest-poor areas Orientation and support for reforestation and restoration of environmentally critical areas Support training programs for rural extension agencies and implement policy instruments directed at agroforestry, reforestation and forest management
	Research	Research directed almost exclusively to agriculture and pasture Virtual absence of research into agroforestry, reforestation, and forest management	Support research programs for rural research institutions for agroforestry, reforestation and forest management
Environmental monitoring	Legislation and regulations	Government regulations makes deforestation permits easier and cheaper than those for forest management	Make permits for forest management simpler and less costly than those for deforestation
	Monitoring	Ineffective governmental monitoring of deforestation and predatory logging creates incentive for illegal activities	Improve governmental monitoring Use alternative monitoring systems such as independent certification
Infrastructure	Roads, railroads, and navigation systems	Improvements of road networks without due consideration to necessary measures to avoid undesired deforestation	Implement an institutional framework and policies to promote forest conservation before improving transportation infrastructure

Source: Viana et al., 1999.

species has allowed the maintenance of a high forest cover compared to other regions where agricultural monocultures prevail. Several other species also have high ecologic and economic potential. An example is Tabebuia cassinoides (*caixeta*), a freshwater swamp species that re-sprouts after logging and has a well-defined management system (Viana et al. 1997). *Caixeta* forests are under pressure from banana plantations, which usually result in soil drainage and major changes in water quality (Waldoff 1998).

- *Non-Timber Forest Products. Erva mate* (a native forest tea crop) production is common in regions such as Cruz Machado, where forest cover is about 25 percent. Among the native non-timber forests products with high social and economic importance is *Euterpe edulis* (palm heart), which was once abundant in most Atlantic Forest areas of Parana. As a result of predatory logging, however, palm heart is becoming increasingly scarce. Several medicinal plant species are also produced commercially.

Development

The forces for development in the forests of Brazil are shaped by several economic factors: a highly unequal distribution of land and income, and significant imbalances between Brazil's five major regions, which influence rates of rural-urban and interregional migration. These regional imbalances continue to be an incentive for poor Brazilians to explore the land-abundant, forested northwest. Although subsidies for such migration, which were sizeable in the 1970s and 1980s, have declined, the migration pressure continues and creates a conflict between the poor and indigenous populations (box 4.7) living in the forested areas and the new entrants.

Development is also strongly associated with the construction of roads, which in turn is one of the principal causes of deforestation. For that reason, this section concentrates on the construction of roads in the Amazon, most of which are now funded either privately or by the local and state governments with little or no involvement by the Bank (see Part II).

Avenues through the Amazon

The geographic isolation of the Amazon ended in 1964 with the completion of the Belem-Brasilia highway. As a result of the access provided by the road, in conjunction with tax and credit incentives, some observers estimate that total population in the highway's zone of influence ballooned from 100,000 in 1960 to two million 10 years later. In a

Box 4.7. Population in the Amazon

While absolute population has continued to grow in the Amazon since the 1960s, rate of growth has declined overall since 1970. Only in Roraima and Amapa did growth rates increase after 1980, with population growth in the rest of the region slowing noticeably. Tocantins and Maranhao, where the annual rate of growth from 1980 to 1991 was below the 2.5 percent rate of natural increase, actually experienced a net out-migration.

In analyzing the causes of the decline in total population growth in the Amazon, the Amazon Working Group (GTA, Grupo de Trabalho Amazonico) notes that the migratory component represents 30.7 percent of overall growth. The remaining two-thirds of population growth can then be attributed to high fertility rates in the region. Thus, if trends persist, the population of the Amazon will be increasing at a rate of 4.8 children per woman, compared to 2.7 children per woman in the south and southeast regions. In the 1980s, the net in-migration to the Amazon—an area constituting half of the national territory—represented only 1 percent of Brazil's total population.

The latter half of the 1980s witnessed a shift in trends, with migration declining. The economic crisis of the 1980s may underlie the decline in migration. Increased economic activity in the urban informal sector, lack of resources necessary to migrate, and a decrease in available credit and other economic incentives in frontier areas are likely contributing factors. Further, the pool of potential migrants (rural men between 20 and 39 years of age) declined in both absolute and relative terms in the 1980s.

One analysis suggests that the population of the Amazon will reach 27 million by 2010, increasing its share of the total national population from 11.6 percent in 1991 to 13.9 percent in 2010. As with the rest of Brazil, albeit to a somewhat lesser extent, the Amazonian population is increasingly urban, with 55.2 percent of inhabitants residing in cities in 1991. Although cities, villages, and small-scale mining sites grew very rapidly during the 1980s, the greater part of this growth was due to migration within the Amazon region rather than migration originating in other regions.

Source: GTA 1998

study carried out as part of the World Bank's economic and sector work, Mahar (1988) observed that the cattle population likewise increased from negligible levels to nearly 5 million.

Then, in 1968, the Cuiaba-Porto Velho highway (BR-364) was completed, opening access to the previously isolated territory of Rondonia for a wave of migrants. In contrast to the state's original settlers, the new migrants were primarily small-scale farmers from the southern state of Parana. Many also arrived from Mato Grosso, Minas Gerais, Espirito Santo, and Sao Paulo. Word of the discovery of fertile land in Rondonia prompted massive migration to the state. By the late 1970s, Rondonia's

population had quadrupled, and the government faced growing demand for infrastructure and services. In response, the government initiated the Northwest Regional Integration Program (POLONOROESTE) in 1981, with support from the World Bank (see Part II). Unlike the Transamazon experience, where the government had actively recruited prospective settlers, in Rondonia the National Institute of Resettlement and Agrarian Reform (INCRA, *Instituto Nacional de Colonizacao e Reforma Agraria*) primarily provided lots, roads, and other basic infrastructure to a population that had moved to the region spontaneously. The demand for space in official projects quickly exceeded the supply. In 1980–83, before the paving of BR-364, the average annual number of migrants entering Rondonia was 65,000. From 1984–86, however, an average of 160,000 migrants per year entered the state. The POLONOROESTE experience is the foundation of the World Bank's subsequent interventions in Rondonia and Mato Grosso and a part of the World Bank's 1991 Forest Strategy (see Part II).

Deforestation by Roads

A detailed study of 624 municipalities throughout the Amazon between 1991 and 1994 determined that 81 percent of all deforestation occurred within 50 km of major road networks along the "deforestation arc" in the southern part of the Amazon region (table 4.2 and figure 4.2).

The connection between road building and deforestation appears quite clear. Indeed, the decline in annual deforestation in the Amazon, from an average of 21,000 km^2/yr in the 1980s down to an average of 13,000 km^2/yr in the 1990s, coincides with a reduction of road building in the region.[20] This could in part be the result of the government's economic retrenchment and therefore cannot be expected to continue when Brazil emerges from its current economic woes and recession.

Road-Building Rationales and Strategies

Transportation costs play a key role in decision-making at the frontier, where land tenure is unclear and government institutions are weak. Additionally, lower transportation costs in the "deforestation arc," coupled with technology, credit, and abundant and cheap land, have favored major export crops such as soybeans. Lower transportation costs also fuel expansion of uncontrolled logging. Timber extraction in turn finances secondary and smaller roads that facilitate encroachment in forested lands by small-scale farmers and large ranchers (Arima et al. 1999). Deforestation and increased frequency of fires ensue, resulting

Table 4.2. Deforestation along Major Road Networks in the Amazon, 1991–94

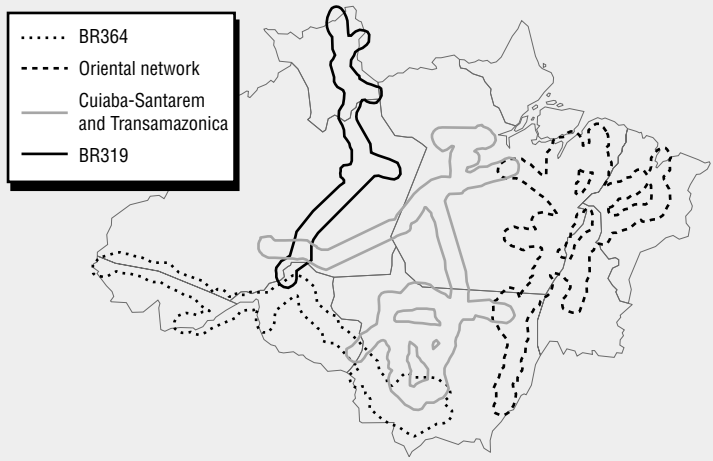
Road networks in the Amazon	Deforestation 50 km along roads (% of Amazon's total)
BR364 (Cuiaba-Porto Velho)	18.8
Oriental network (Barra do Garcas-Belem-Sao Luis)	32.7
Br 230 (Transamazonica) e Br 164 (Cuiaba-Santarem)	26.9
BR319 (Porto Velho-Manaus-Boa Vista)	2.7
Total	81.1

Source: Alves and Escada 1999 in Viama.

in forest impoverishment (Nepstad et al. 1999). Road construction is thus a key factor in deforestation, as it sets in motion a process that acquires a dynamic of its own, ultimately resulting in a scenario quite similar to what has taken place in the Atlantic Forest.

Schneider (1992, 1994), in the World Bank's economic and sector work discussed with the government, argued for a road-building strategy for the Amazon that is based on the recognition that forest protection will only arise through restricted access: "An extensive road network erodes incentives for sustainable agriculture and silviculture. An intensive network of farm-to-market roads is the most important deter-

Figure 4.2. Deforested Areas Along Major Road Networks in the Amazon



Source: Alves and Escada 1999.

minant of economic viability of small farmer agriculture." "Where timber is concerned, logging patterns become more selective the greater the distance from roads. Where forest access is limited by lack of roads, once high-value trees have been removed, the remaining forest is of less economic interest to loggers, and the forest has a chance to regenerate" (Schneider, personal communication 1999).

World Bank experience through such initiatives as POLONOROESTE and PLANAFLORO, discussed in Part II of this paper, has yielded important lessons concerning the social and environmental impacts of road building in the Amazon, including the need to move cautiously in promoting road building in tropical areas. These lessons, however, do not seem to have been incorporated into more recent government initiatives, such as Brazil in Action (box 4.8).

The Brazil team suggests that policies aimed at improving existing road networks need to be clearly evaluated since they are likely to promote deforestation. Road construction should be accompanied by other policies conducive to sustainable land uses. Intensive rather than extensive road networks may be more appropriate in promoting sustainable land uses. Does the World Bank have a role to play in this area? Nascimento et al. (1999) suggest that the World Bank could help foster institutional strengthening and policy dialogue aimed at avoiding the undesirable consequences of lowering transportation costs and improving access to forested areas. They acknowledge, however, that the Bank would not be able to influence the proliferation of privately built roads in the Amazon, except perhaps through helping to improve Brazil's own decision-making processes in this regard. Unlike in Indonesia, where the Bank's transportation lending has played an important role in improving Indonesia's environmental impact assessment capacity, the Bank's transportation investments have not done the same in Brazil as far as OED could determine, although the Bank clearly withdrew from financing transportation in the Amazon, apart from some road improvement. The Bank is discussing how interministerial cooperation in implementing the "Brazil in Action" program to achieve environmental and developmental goals simultaneously with the Government of Brazil could be helpful but may be considered "interference" by the Government of Brazil.

Forest Fires

Fires are a problem not only for their direct destructiveness but also for the carbon they release into the atmosphere (box 4.9). Most fires occur during the dry season and are caused by farmers and ranchers

Box 4.8. Brazil in Action

In 1996, the government launched *Brasil em Acao* (Brazil in Action), a development initiative that includes ambitious infrastructure and transport development. Several components of Brazil in Action or associated projects are particularly relevant to the Amazon:

- Paving BR-174, linking Manaus to Venezuela, crossing the State of Roraima
- Extraction of natural gas from the Urucu fields in the Jurua River basin of Amazonas state. The projected output of 4 million m^3 per day would benefit both the Manaus industrial region and the states of Acre and Rondonia
- Navigability of the Madeira river to permit the shipping of grain from Rondonia and Mato Grosso to Amazonas and, from there, to the Atlantic
- Recovery of BR-364/163 linking Cuiaba to Rio Branco, and ultimately providing an overland link to Peru
- Installation of an energy transmission line from Tucurui to benefit the west and south of Para
- Creation of the Tocantins-Araguaia Waterway to enable transport of grain from the center-west to the Maranhao port of Itaqui
- Recuperation of the Santarem-Cuiaba highway
- Still undefined roads and bridges for the State of Amapa (GTA 1998).

Brazil in Action is an important initiative from the standpoint of opening and integrating the Amazon into the Brazilian economy, a process that has already been taking place over the past decade. Many of these undertakings would facilitate exports and regional integration with neighboring countries. If carefully carried out, GTA acknowledges that it could provide important opportunities for regional development.

Along with the economic development that is foreseen by the government, however, Brazil in Action poses some significant environmental concerns. GTA's principal concern is the construction of roads in the State of Acre. "The paving of federal roads in Acre completely modifies the conditions for access and exploitation of natural resources of the state and of many border areas, opens up possibilities for population movements, accelerates the sale of land, and places previously rather isolated indigenous populations in contact with non-Indians" (GTA 1998). The road, by opening a link with Peru, may also lead to international labor flows into Brazil, relieving labor constraints on forest clearing for small-scale agriculture in the Amazon.

Additionally, the Brazil in Action initiative is intended in part to facilitate an increase in soybean exports. Expansion of soybean cultivation, which is now possible in the Amazon due to technological advances through EMBRAPA research (Kueneman and Camacho 1987), will replace important natural habitats in the country's center-west region.

who burn off cleared land for planting crops or pastures. Since the 1970s, huge areas have been converted to pastures, plantation crops, and infrastructure. Given the high costs of mechanical clearing, fires were considered the most cost-effective way to clear land. However, each

Box 4.9. Carbon Emissions and Fires

Managed natural forest areas that incorporate reduced-impact logging practices produce less dead biomass than conventional logging, and therefore can reduce biomass loss and offset carbon emissions (Putz 1995). In 1996, logging released approximately 4 percent to 7 percent of the net annual carbon release estimated for deforestation in the Brazilian Amazon (300 metric tons per year; Nepstad et al. 1999). Implementing reduced-impact logging systems can thus result in significant gains in CO_2 balance. There are other associated environmental benefits as well, including biodiversity protection and watershed conservation.

Reduction of forest fires can make a significant contribution to a decrease in carbon release. Estimates of carbon emissions from Amazon forest surface fires (excluding fires associated with deforestation) in 1998 more than double current estimates for the region, rising to a total of 10 percent of the net annual carbon emissions stemming from human activities worldwide (Nepstad et al. 1999). As with reduced-impact logging, controlling forest fires has similar additional environmental benefits.

year escaped fires accidentally burn a significant amount of land, resulting in large economic and ecological damage. Since 1998, annual rainfall in the Amazon has declined and there is some evidence that the Amazon may be more fire-prone in the years to come. In 1998, a series of large-scale wildfires burned some 40,000 km^2 or approximately 20 percent of the state of Roraima, including 9,254 km^2 of closed-canopy forests and extensive savanna, agricultural, and Indian reserve areas.

Escaped fires are a substantial risk at the beginning of the dry season in the southern Amazon because of the abundance of highly flammable debris. This is exacerbated by the increasing extent of cleared, logged, or previously burned areas. The areas with the highest fire risk in 1998 were in a region of the southern Amazon that is 200-600 km wide and 3,000 km long. Meteorological data show that some parts of this so-called Deforestation Arc have experienced large rainfall deficits and low soil moisture.

A "Fire and Deforestation Control Project" (PRODESQUE) is under preparation under the PPG-7 Pilot Program. This five-year, US$30 million project will help both the federal and the state environmental agencies in the Amazon region develop and implement a uniform surveillance system for monitoring deforestation, forest degradation, and fires. It will also strengthen local capacity to control illegal deforestation and fire. The World Bank is also funding an Amazon Emergency Fire Prevention and Control Project (see Part II).

Agricultural Credit

In the 1980s, the volume of official subsidized credit in Brazil contracted significantly in an effort to create internal balance in the Brazilian economy. Additionally, real interest rates moved to positive or near-positive levels in the mid-1980s, with the subsidy element eliminated altogether in 1987 (World Bank 1990).

Unfortunately, agricultural credit can have a negative impact on the forests whether it is given or withheld. The tightening of credit after the mid-1980s may have had a negative impact on the Amazonian environment. First, the abrupt decline in credit volume is thought to have disrupted some smaller-scale agriculture in the region. For example, under POLONOROESTE in Rondonia, some farmers had undertaken farming of government-promoted high-input production systems based on tree crops. Given the long-term nature of investments in tree crops, these systems were predicated on the availability of cheap credit. When that credit was no longer available, farmers were unable to afford the inputs required to cultivate tree crops (particularly on the poorer soils on which many had settled). Instead, they reverted to less sustainable practices such as swidden farming and extensive ranching (Mahar 1990). The rapid pace of pasture formation observed in Rondonia in the 1990s might in part be the result of this tightening of the credit supply. Further, with little credit available to them, small-scale farmers also may have resorted to cutting trees in order to finance their agricultural pursuits. Vosti (1999 personal communication), on the other hand, argues that availability of credit to small farmers will increase their conversion of forest for agricultural pursuits. In the case of small farmers, it appears that both arguments lead to the conversion of the forest. It may be that the small farmers decide to convert based on the perceived potential of agriculture, and whether it is financed by credit or by cutting trees becomes a secondary issue. This important topic requires additional research.

While credit has tightened, it remains available (Vosti 1999 personal communication). There are still a number of government-sponsored programs for subsidized credit that affect forests both directly and indirectly. Such credit programs totaled about R$1 billion in 1998 (FUNBIO 1998). A description of the largest programs is provided in table 4.3.

Banco da Amazonia (BASA), an important player in the forest sector, is one of the agencies that manages Fundo Constitucional do Norte (FNO), a constitutional fund allocated to the Amazon. As of June 30, 1998, FNO had liquid assets of R$1.7 billion and had provided fund-

Table 4.3. Descriptions of Largest Government Financing Programs that Have Direct Impact on Forests

Program	Description	Resources
Constitutional fund to finance the north region of Brazil (FNO)	Created in the 1988 Constitution in conjunction with similar funds for the northeast and center-west regions, this fund finances the full spectrum of rural and industrial activities, with 70 percent and 30 percent of resources, respectively, with interest rates of up to 6 percent + TJLP tax[a] per year.	R$253 million (1998)
National program to strengthen family agriculture (PRONAF)	Program structured in 1995 for rural producers with income lower than R$8,000; has attended more than 200,000 producers with up to R$5,000 per producer; operated by Banco do Brasil, with interest rates of 6.5percent per year.	R$200 million (1998)
Special credit programfor the agrarian reform (PROCERA)	Program designed to assist agrarian reform projects, up to R$2,000 for operational expenses and R$7,500 for investments, operated by Banco do Brasil, Banco da Amazonia and Banco do Nordeste, with interest rates of 6.5 percent + 50 percent of TJLP tax[a] per year.	R$140 million (1998)

a. Long-term interest rate tax (Taxa de Juros de Longo Prazo) of approximately 13 percent.
Source: FUNBIO 1999 cited in Nascimento et al. 1999.

ing to more than 76,000 beneficiaries. An analysis of the guidelines for 1999 shows a strong message from its president concerning environmental protection. The 1999 program is divided into "creation of work and income opportunities" and "conservation and sustainable use of the environment," and it includes guidelines for "use of technologies compatible with environmental conservation/preservation" (BASA 1998).

However, interviews with BASA's staff in Manaus and Maues and with NGOs revealed that the effective implementation of the program's environmental guidelines is weak. First, there are no objective guidelines to measure environmental impacts of projects, the result being that officers tend to make judgments based on subjective criteria. Sec-

ond, BASA's staff lacks familiarity with non-conventional rural technologies, and borrowers are subsequently encouraged to opt for conventional land-use systems that cause deforestation. In the absence of training, officers tend to promote the same types of projects that historically have been funded, primarily oriented toward cattle production. Changing this pattern requires developing objective procedures and methods to assess environmental impacts of projects, and training of Bank staff.

Brazil now has a very clear policy linking public credit lines to environmental standards. The Green Protocol, signed in May 1995, requires all financial institutions controlled by the federal government (notably, Banco do Brasil, Banco Nacional de Desenvolvimento Economico e Social, Banco da Amazonia, Banco do Nordeste) to follow a generic set of guidelines to promote environmental protection. Unfortunately, enforcement of the guidelines is weak and has had a relatively small impact on lending (Prada and Costa 1997). A significant portion of approved projects still involves deforestation and other activities with significant environmental impacts. Nascimento et al. (1999) argue that the situation must be improved, including better monitoring of projects approved by participating institutions, because effective implementation of the Green Protocol can have major positive impacts on forests.[21] The report also suggests that the World Bank might be a catalyst in the implementation of such policies.

5

Protecting Brazil's Forests: The Role of Parks and Plantations

While the World Bank and many of its clients have given a great deal of attention to the sustainable management of natural forests, the real key to protecting what remains of Brazil's forests may lie elsewhere. Thus far, too little attention has gone into managing demand and finding alternative sources of supply. For example, the plantation sector in Brazil is among the strongest in the world, and has vast tracts of land available for creating new plantations. However, the social and environmental issues associated with large-scale plantation industries must be recognized. The rich mineral resources in the Amazon mean that there is a continuous threat to forest extraction. The Bank-funded CVRD project, while making numerous mistakes, has offered important lessons on how to incorporate environmental concerns in mineral extraction, lessons that have been incorporated in a subsequent environmental project involving CVRD (*Companhia Vale Do Rio Doce*; see Part II). Brazil also has one of the largest networks of protected areas in the world, but as this section will show, its efficacy is undermined by weak enforcement.

In Brazil and other developing countries, most of the investments are directed toward the plantation sector and very little goes to natural forest management, which obviously creates an imbalance. The same disparity also exists in the case of applied research. The Bank's 1991 Forest Strategy, for that reason, focused on conservation. But it is time to reach for

greater balance and linkages between the policies of the Bank and developing countries. Indeed, the time seems to be ripe to achieve this balance.

A recent forest management workshop in Brazil noted several encouraging facts:[22]

- Rural communities, including Indians, rubber tappers, and colonists, have carried out more than 19 promising initiatives in natural forest management.
- These initiatives are recent and they are growing in number.
- There seems to be a broad consensus—among leading Brazilian environmental and social NGOS, social movements, universities, international NGOs based in Brazil, and donors—on the role of natural forest management (including timber production) by rural communities to promote forest conservation and poverty alleviation.
- Securing land tenure is one of the most important steps in promoting community forestry.

Protected Areas

Brazil has several classifications of protected areas: national parks, ecological stations, biological reserves, national forests, extractive reserves, and environmental protection areas. Additionally, states and private landowners may set aside areas for protection. The federal government has 86 conservation areas under strict preservation, covering almost 160,000 km^2 (table 5.1). Of these, 36 are national parks, 23 are ecological stations, 23 are biological reserves, and four are ecological reserves (WWF 1999). In addition, Brazil has set aside over 900,000 km^2 as protected indigenous reserves, which are home to more than 300 indigenous groups. As of 1994, state governments, largely in the Amazon, had protected another 140,000 km^2, though in some cases there is overlap with federally protected areas (World Bank 1994).

While a significant amount of land is under protection in Brazil, these protected areas do not necessarily represent Brazil's biological diversity. There is minimal protection of land in the *cerrado* and the northeast's semiarid *caatinga*. The endemic *araucaria* forests of the south and the Atlantic Forest are also in need of greater protection (World Bank 1994).

Management of Protected Areas

A 1994 World Bank study discussed several critical shortcomings of Brazil's protected area system. These have not changed. First, severe understaffing of management agencies limits effective policing and pro-

Table 5.1. Federal Protected Areas in Brazil

Category/Units	Number	Total area (km^2)	% of country territory
Strict preservation	103	158,895.43	1.87
National parks	36		
Biological reserves	23		
Ecological stations	21		
Ecological reserves	5		
Areas of relevant ecological interests	18		
Sustainable use	81	231,786.68	2.72
Environmental protection areas	24		
National forests	46		
Extractive reserves	11		
TOTAL	184	390,682.11	4.59

Source: Brazil 1998.

tection of these areas. Amazonian parks, for example, have only one park field agent for every 6,000 km^2, as compared to one agent for every 82 km^2 in the United States (Peres and Terborgh 1995). A WWF analysis suggests that 23.2 percent of Brazil's protected areas are under extreme risk and 19.7 percent are under high risk. Illegal logging is an important source of such risk (WWF 1999). Effective policing is therefore essential to the ecological security of the protected areas. Second, the government has to confront the complexities of populations residing within the boundaries of protected areas. As of 1994, about 20 percent of the lands within national parks, biological reserves, and national forests was in private hands. Further, few alternative strategies have been pursued for management of protected areas without removal of human populations (World Bank 1994). Mamiraua State Park and Jau National Park, both in the state of Amazonas, are two success stories of achieving forest protection with resident communities (Verissimo, personal communication 1999).

The critical issue with respect to Brazil's protected area system is the lack of necessary funding and implementing capacity to sufficiently protect and manage conservation units. There is a movement within IBAMA to give greater administrative autonomy to conservation units, allowing managers the opportunity to use part of the revenues that are generated locally through, for example, ecotourism. The government, through

the Ministry of Environment and IBAMA, also is developing a strategy to improve protected area management through partnerships with the private sector. Some NGOs have expressed concern about private participation in conservation units insofar as it may result in conflicts with populations residing in the protected areas. NGOs themselves are likewise increasingly involved in the preparation of management plans for and in the management of protected areas. In Jau National Park, for example, the nongovernmental organization Fundacao Vitoria Amazonica is quite successfully assisting IBAMA in this manner. Brazil has parks that have high potential for tourism (Iguassu, Orgaos, and Itatiaia) and many that do not. Mobilizing domestic and international expertise would be very helpful in bringing to bear experience in making parks financially viable and determining the roles of the private sector and NGO partnerships based on concrete examples of successful experiences elsewhere. The World Bank can be helpful in disseminating such success stories from inside and outside Brazil (Nascimento et al. 1999).

Management Issues and the World Bank/WWF Alliance

The poor management of protected areas in Brazil is important to the future of the World Bank/WWF alliance. In December 1997, the Government of Brazil pledged to join the alliance, which aims to bring 50 million hectares (500,000 km^2) of natural forest throughout the world under protection by 2000. An additional 200 million hectares (2 million km^2) of forests are to be certified as being sustainably managed by that time. In early 1998, Brazil's president signed a decree creating new protected areas in the Amazon region and Atlantic Forest and pledged to work with the alliance to bring 10 percent of the area in the Amazon under protection. Brazil's pledge is important for the alliance to meet its global targets. The total area to be converted into preservation units under this new initiative is to reach 250,000 km^2—the size of the state of Sao Paulo—and would constitute half of the World Bank/WWF initiative's total global target. But given the poor management of the existing protected areas, should additional areas be brought under protection? Clearly, there is no global consensus on this issue. The Brazilian institutions feel strongly that the Bank should not define a strategy for Brazil involving only one institution (i.e., WWF) but rather through a truly participatory process. Otherwise, in their view it would be the "right thing" not "done right."

The government's pledge to the alliance was highly controversial in Brazil and stirred intense debate. The move was seen as externally conceived and driven and announced without sufficient consultation within the country regarding its appropriateness. Rubber tappers were concerned that the already-stretched resources supporting existing protected areas and improved livelihoods of forest-dependent people would be diverted to the new parks. The measure received support from some conservationists who view strict preservation areas as the solution to deforestation and environmental degradation in the Amazon. Other conservationists, however, and social activists who support forest peoples criticized the move because they believe that strict preservation is an imported conservation model that is not appropriate for the Amazon's vast landscape, which has been inhabited for centuries by traditional populations. They believe that traditional forest people have rights that must be respected and that these communities represent a greater chance of protecting the forest than "paper parks." The controversy has not yet been resolved.

Plantation Forestry

The plantation industry in Brazil is of interest not simply because it is one of the most dynamic among developing countries, but also because of the relationship between plantation forests and the protection of natural forests. Because plantation forests serve the same market as do natural forests along the frontier, they represent a potential supply substitute. The plantation industry is showing impressive results, and time will tell whether it can become a cheaper source of timber than the exploitation of natural forests. If so, the logging factor may come to be separated out of the synergistic logging-agriculture-roads phenomenon at the frontier, resulting in reduced pressure on Amazonian forests.

It is therefore puzzling that the Bank has not supported the plantation sector, despite a successful forest project in Minas Gerais. The IFC, on the other hand, has supported the plantation sector in Brazil. However, the interactions between the Bank and IFC are weak on these issues, in contrast to the growing Bank-GEF partnership. In part, however, this is because plantations have brought about significant concentrations of landholdings, and reforesting large-scale plantations is more costly than small-scale plantations (Bacha and Marquesini 1999). Moreover, plantations cannot match the biodiversity of natural forests. While socially beneficial, small-scale plantations are organizationally more demanding.

Brazil has more than 20 million ha of degraded pastures in the Atlantic Forest that could be reforested for environmental or commercial purposes (Ab'Saber 1995). Reforested, these areas could serve as enormous carbon sinks. However, some observers are concerned about the use of large-scale, commercial reforestation (eucalyptus and pine plantations) because of its perceived negative social and environmental impacts. There also are doubts about whether commercial plantations would result in net incremental carbon sequestration, a prerequisite to qualify for the Clean Development Mechanism. This needs to be clarified. These issues might be overcome if reforestation were limited to small-scale plantations or based on high-diversity agroforestry systems for which there is also substantial potential. Funding of small-scale plantations may not be feasible, however, without a subsidy in much the same way as the U.S. Conservation Reserve Program started in the 1980s.[23] Such payments are called "payments for environmental services" in the developing countries, since "subsidies" have been questioned even by the Bank's 1991 Forest Strategy.

Management in the Plantation Sector

Brazil's strong forest plantation industry provides raw material for timber, pulp and paper. The country produces 6.2 million m^3 of pulp, representing 3.5 percent of global production and 6.9 percent of global exports (FAO 1999). With 50 percent of global production, Brazil is a major producer of fiber cellulose (short and long), and it is the world's largest producer of the short-fiber variety. Little of this production is in the Amazon. Indeed, only two Amazonian states produce cellulose: Para (5.81 percent) and Maranhao (0.41 percent), with a combined production of 6.22 percent of total national production (GTA 1998).

The plantation forestry industry has had three distinct phases in Brazil. Before 1965, the industry was dominated by railroad and other state companies. From 1965 to 1988, fiscal incentive programs spurred rapid growth in private sector involvement. According to the Banco do Nordeste do Brasil, during this period, a total of US$10.86 billion was invested through fiscal incentive programs (Bacha and Marquesini 1999). Between 1968 and 1988, productivity in eucalyptus plantations rose from 29 m^3/ha/year to 67 m^3/ha/year. Over the same period, pine plantations increased productivity from 33 m^3/ha/year to 54 m^3/ha/year. Productivity in Brazilian plantations is among the world's highest. Since 1988, when the fiscal incentive programs ended, most reforestation has been carried out by private farmers themselves, particularly in the pulp

and paper and iron and steel industries. The cutoff in incentives resulted in a decline in plantation area, from 59,660 km^2 in 1985 to 53,959 km^2 in 1996. Despite the absence of fiscal incentives, private industry—particularly the pulp and paper segment—has not scaled back its investment, which currently stands at about 1,300 km^2/year. Nevertheless, there was a substantial peak in investment when incentives were available (Nascimento et al. 1999).

Some plantation forestry companies, particularly in the pulp and paper segment, are making significant investments in increasing their environmental performance. The National Association of Pulp and Paper Producers (*Associacion Nacional dos Fabricantes de Papel e Cellulose*, ANFPC) created a working group to address environmental issues and is actively involved in discussions on public policy matters. Likewise, the Association of Charcoal Producers is engaged in many public policy forums. Several companies have set aside over 25 percent of their lands to total environmental protection. Such environmental policies have direct impact on carbon sequestration and biodiversity conservation.

Since transportation costs are a substantial part (30-40 percent) of the total forest product production costs, it may be advisable to invest in "close to market" intensive forest management. Such intensively managed forests with fast-growing hybrid species are economically attractive to the forest industry, and may be instrumental in reducing pressure on more distant and intact forests.

6

Important Issues in the Forest Sector

Costs and Benefits of Managed Forests in Brazil

The definition of "sustainable forest management" has been debated for at least a decade without arriving at a single, acceptable definition.[24] In fact, the Bank's 1991 Forest Strategy offered three definitions of sustainability:

- The continuous flow of timber products and services, some of which may be essential for sustaining the livelihood of indigenous people
- The continued existence of the current ecosystem
- The long-term viability of alternative uses that might replace the original ecosystem—each is considered to be highly site-specific in the extent to which it can meet any of these criteria.[25]

The policy paper concluded that it is prudent to be highly skeptical about proposals to develop forests. In view of the diminishing area of forestlands, especially tropical moist forests, highly demanding environmental and policy analyses should precede any significant new development or utilization efforts. These analyses should include assessments of soils, hydrology, the institutional and incentive framework, and the value of conservation for all concerned, particularly indigenous people. This was the basis of the strategy's dictum that the Bank "will not under any circumstance finance commercial logging in Primary Tropical Moist Forests (PTMFs) as a precautionary policy toward utilization." The strategy paper states that the "policy is motivated by un-

certainties toward full valuation of the environmental services, the inadequacy of knowledge regarding forest management systems, and the irreversibilities associated with the loss of Tropical Moist Forests." The ban covers both the financing of commercial logging and the purchase of equipment in support of logging. The subsequent OP 4.36, however, considerably diluted this provision. While the strategy paper tends to emphasize what the Bank will do, OP 4.36 states that where the primary moist tropical forests are being logged, Bank lending is conditional on borrower commitment to move toward sustainable management of these forests, and until then, lending is to be limited to ancillary services such as planning, monitoring, and field control of forest operations. This leaves vast scope for interpretation of "move toward sustainable management."

The design paper for the current study argued that the ban could be construed in several ways. The Bank would:

- Not lend directly in support of harvesting activities in PTMFs
- Not support any aspect of production forestry in countries where significant logging is occurring in PTMFs
- Use its policy dialogue with affected countries to minimize, if not terminate altogether, lending in non-cooperating countries.

In Brazil, the Bank has complied with all of these interpretations, and attempted to hold policy dialogue and slowly tried to get involved in the research and development aspects of sustainable management.

An extensive search for evidence of the financial returns to managed forests in the Amazon turned up very little, in part because those efforts have been so few (box 6.1). What evidence the Brazil team was able to find suggested returns that were barely adequate relative to interest rates. If returns are compared with the opportunity cost of capital, in clearing the land for agriculture, for example, they seem singularly unattractive. Most research on managed forests, including that of EMBRAPA (Empresa Brasileira de Pesquisa Agropecuaria), has focused on technical issues and has not assessed financial and economic returns. Add to this the limited enforcement of laws and rules, and it becomes clear that the cost of breaking them is so small relative to the benefit of converting the land to alternative uses—with far fewer regulations, for example, in farming—that the incentives seem to be loaded against managed forests.

Forest conservation in Brazil ultimately boils down to the issue of externalities—that is, the extent of divergence between private and social values. There are costs associated with forest conversion at every level, from soil erosion and watershed degradation to global warming

Box 6.1. Managed Forests

Neither the private nor the public sector has made many attempts at forest management. Private sector investment in the forest sector has been characterized by low investments in managing the forest resource base. Typically, private sector investment is directed toward improving timber processing (e.g., sawing and milling). Consequently, there are very few promising examples in Brazil of natural forest management on a commercial scale.

One of the few research efforts on the effects of reducing production waste, Barreto et al., shows that the present value of managing forest in the Amazon can be increased if more efficient technologies are used which could substantially reduce production waste. They show that such wastes can be reduced from 26 percent to about 1 percent. Efficient production would also result in the reduction of trees needed for commercial operations and therefore, improve canopy cover from 18 percent to 45 percent. Further investment, pubic or private, in forest management can also provide job security for many of the poor in the Amazon.

Currently, public institutions fund only a small number of forest management projects. The Banco da Amazonia in the state of Amazonas, for example, has no forest management projects in its portfolio. The reasons for this situation are unclear. The low demand for loans in this area may result from low rates of return to forest projects. Because forest management is so rare in Brazil, there is a lack of good financial analysis of forest management compared to other land uses.

Mil Madereiras, an 80,000 ha Swiss operation in Itacoatiara, near Manaus, is the first commercial-scale forest sector operation that has invested significantly (over US$20 million) in natural forest management in the country.

and loss of biodiversity. The 1991 Forest Strategy recognized that some of these are national costs, others are global (see box 1.1). The question is: How much is the national government willing to compensate local, municipal, and state actors to preserve the forest related to the alternative uses of land as seen from the viewpoint of those actors? Furthermore, what share of the costs would the global community need to pay vis-à-vis the cost to the national government? The World Bank–funded Rondonia and Mato Grosso projects demonstrate the intense local pressure from powerful economic and political interests to defy zoning, even when the state governor supports the idea. In Brazil's current fiscal situation it is not clear how much the federal government can pay to slow rates of deforestation. It is even less clear how much it should pay.

In evaluating the domestic benefits of forest conservation, Chomitz and Kumari (1996) caution against "expecting uniformly significant levels of net domestic benefits … from the preservation of tropical moist forests." They go on to note:

There are certainly classes of domestic benefits, such as sedimentation prevention and sustainable production of nontimber forest products, which are significant and documentable. These benefits, however, are specific to limited geographic and economic circumstances—perhaps more limited than is generally supposed. Other benefits, such as local climate regulation, are plausible and conceivably large, but subject to large scientific uncertainty. Still other supposed benefits, such as flood prevention in large watersheds, and maintenance of dry season water flow, are largely contradicted by available scientific evidence.

Thus, it may be difficult to make the case for federal funding of forest conservation on the basis of such domestic benefits alone, making the issue of global externalities more important still.

Since the benefits and costs of forest conservation accrue to multiple stakeholders, the challenge lies in balancing the costs and benefits associated with forests in a manner acceptable at the individual, municipal, state, federal, and global levels. But the costs and benefits depend on a large number of complex factors. Lopez (1999) has argued that the value to the world of conserving 650 million hectares of tropical forests in South America—at least half of which will likely be in Brazil—amounts to US$713 billion of net present value.

Conservation Solutions

Two themes have emerged repeatedly in evaluating Brazil's forests:

- In order to offer any meaningful protection for the Amazon, access must be restricted, as prohibitive costs of activity in inaccessible areas are the only dependable means of forest protection. This necessarily means limiting roads in remote forested areas.
- Policies must be developed that make it economically desirable to conserve forests. This is important at every level, from the individual farmer to the federal government, as there are conservation/development tradeoffs throughout the chain of actors. Individuals seek to maximize their economic well-being; local politicians confronted with growing influence of logging interests often value short-term revenues over long-term investment; and the federal government is concerned with poverty alleviation and other pressing development objectives.

Brazil's limited experience with conservation incentives, such as the "green tax" in Parana, Minas Gerais, and Sao Paulo, must be evaluated and expanded. But such internal transfers likely will not be sufficient on their own to address the issue. Instead, there is increasing discussion of the need for financial transfers from outside Brazil to compensate the country for protecting its forests. Innovative programs based on carbon

and biodiversity credits and the like are based on the premise that countries like Brazil should not alone bear the financial burden of protecting forests which provide global benefits, in terms of carbon sequestration and biodiversity.

Carbon Sequestration Payments

The Brazilian government's position toward forests and climate change is evolving. Early on, the government's position was that the export of pollutants, including CO_2, to other countries was unacceptable. Brazil did not sign the agreements for implementation. Since then, however, with the negotiations over the Clean Development Mechanism, Brazil appears to be moving in the direction of accepting payment for carbon sequestration.[26] This may have profound effects on reforestation and forest management (box 6.2) given that Brazil has large tracts of degraded land which are prime candidates for reforestation. Several studies have been conducted concerning payments for carbon sequestration. Carpentier et al. (1999), for example, examined the implications on forests of paying farmers not to cut trees. The findings suggested that significant transfers would be required in order to provide sufficient incentive for farmers to maintain their land in trees as opposed to other land uses. Schneider (1994) estimates that the carbon sequestration value of Amazon forestland is between US$600 and US$7,000 per ha (compared with a market value of US$250 to US$300 per ha). He goes on to note that the inability of people in Sweden, who pay a carbon tax of US$45 per ton of carbon released, to transact with farmers preparing to clear land in Brazil represents a global welfare loss of more than US$4,500 per ha of Amazonian forest cleared for ag-

Box 6.2. Sound Legislation, Weak Implementation: The Special Case of Riverbanks

Brazilian legislation holds that forest strips along riverbanks (*matas ciliares*), because they are important as biodiversity corridors, food sources for aquatic animals, and protection against soil erosion, must be preserved in forest with no human intervention. All harvest of timber and non-timber products is prohibited. Despite this legislation, a significant amount of riverbank habitat has been deforested in the Atlantic Forest. A pilot study in an area of 1,700 km^2 in the Corumbatai River Watershed in Sao Paulo state found that some 10,000 ha needs to be reforested, with a potential to sequester over 1,000,000 tons of carbon worth US$10 million (Mannfrinato et al. 1997). Brazil has developed an advanced technology for riverbank forest restoration through a cooperative program between universities and power companies. Restoration costs range between US$1,000/ha and US$1,500/ha. Can the Bank help improve implementation of river bank reforestation?

riculture. In the context of proposed carbon taxes, Schneider (1992) concludes that "on a global scale, prevention of deforestation in the Amazon may be one of the lowest-cost ways to reduce greenhouse emissions," with both donors and Brazil benefiting from transfers.

The estimates of carbon emissions vary among various uses of forests. However, the extent of these emissions and their relative economic cost in terms of global warming is a much-debated subject. The current literature on the damage value of carbon emissions ranges anywhere from US$10 to US$40 per Carbon-ton (Ct).

Pearce and Brown (1994) calculated the net carbon storage effects of converting tropical forest—closed primary, closed secondary, or open forest—to shifting cultivation, permanent agriculture, or pasture uses (table 6.1). These figures represent the one-time change that will occur in carbon storage as a result of the various land use conversions. They show that carbon released from the deforestation of secondary and primary tropical forest would be between 100 and 200 tons per hectare when carbon fixation by subsequent land uses is also taken into account. Pearce et al. (1999) applied a US$20 per carbon ton released to the estimates in table 6.1 and found that converting an open forest to agriculture or pasture would result in an estimated damage of about US$600–1,000 per hectare, while the conversion of closed secondary forest would cause damage of US$2,000–3,000 per hectare, and conversting primary forest to agriculture would result in a damage of about US$4,000–4,400 per hectare.

Table 6.1. Changes in Carbon Stored with Forest Land-Use Conversion (Carbon tons per ha)

	Original Carbon	Shifting cultivation	Permanent agriculture	Pasture
Original Carbon	–	79	63	63
Closed primary forest	283	-204	-220	-220
Closed secondary forest	194	-106	-152	-122
Open forest	115	-36	-52	-52

Note: Shifting agriculture represents carbon in biomass and soils in second year of shifting cultivation cycle.
*Sour*ce: Brown and Pearce 1994.

- Pearce et al. (1999) also notes that stopping deforestation or logging activities may not be the most cost-efficient way of reducing carbon emissions, since the opportunity cost of conserving forests would depend on the forgone benefits associated with other land-use activities. In many cases, however, the value of the

forgone benefits may be very low. For instance, Schneider (1992) reports upper-bound land values in Rondonia at US$300 per hectare, but the carbon credit values based on table 6.1 would be 2–15 times higher. But given that the land is worth US$300 per hectare in an alternative use, the cost of conservation on global warming grounds should be around US$3 per Carbon-ton (US$300 divided by 100 tons/ha). However, if the land was worth US$2,000 per hectare, then carbon conservation costs would be US$20 per Carbon-ton. The latter cost is certainly not the cheapest way of conserving carbon, but US$3 per Ct may be attractive. Existing carbon trades under joint implementation initiatives range widely, but the typical price is about US$5–10 per Ct (Pearce et al., 1999).

Kramer et al. (1994) estimated the average willingness to pay (WTP) of U.S. households for protecting an additional 5 percent of the world's tropical forests. Their results show that each household would be willing to make a one-time payment of US$29–51 for a total of US$2.6–4.6 billion. However, if WTP was extended to all OECD households, a one-time payment would increase to US$11–23 billion. Given that tropical forests account for 1.7 billion hectares, the 5 percent would be 85 million hectares, and the annual willingness to pay would range from US$13 to US$27 per hectare.

In a recent paper on why Latin America should participate in global trade in carbon emissions as a source of funding for sustainable development, Lopez and Ocana argue in favor of the region's participation. In Peru, they find that using an annual plausible value in the range of US$100-500 per ha as cost (used by Schneider for the Amazon) of forgoing conversion of 100,000 ha from natural forests to agriculture or other land uses would range between US$10 million and US$50 million. However, when carbon sequestration at a rate of US$25/ton is also included in the analysis then the net present value of CO_2 trading is estimated at US$3 billion over 24 years, assuming a 50 percent reduction in annual deforestation (100,000 ha) and a reforestation rate of 100,000 ha annually.

Another study, done by Roger Sedjo (1999), showed that regions with good soils and rainfall for plantation forestry but are relatively distant from the market may not be able to justify plantation forestry on economic or financial terms. For Argentina (Patagonia Region), Sedjo estimated that the net present value from timber harvest alone on a biological rotation of 36 years would be a minus US$546/ha, and on a financial rotation of 27 years would be a minus US$419/ha. However, when the value of carbon sequestration is also added as a tradable good

(US$20/Ct), plantation forestry becomes a viable financial option. The biological rotation would then yield a net present value of US$48/ha and the financial rotation would give US$99/ha. It can be shown that the length of optimal financial rotation tends to increase as the carbon prices increase. Furthermore, if carbon prices are sufficiently high, then it will not be financially optimal to harvest and, hence, the rotation will become infinite.

Kishor and Constatino (1993) showed that the international community enjoys over 60 percent of the benefits of these environmental services and should, therefore, pay for them. They estimated per hectare transfers needed for small farmers were US$717/ha and US$1,573/ha for large farmers. It is this kind of an underlying logic that led to the World Bank sector report for Costa Rica to recommend transfer payments to farmers for environmental services equivalent to the opportunity cost of income forgone.

Certification

A campaign to promote timber certification in Brazil is growing (Smeraldi et al. 1999) and efforts to set standards have begun (box 6.3). International donors have been working with local NGOs to support pilot initiatives on forest management of both commercial and community-based operations.[27] Additionally, the arrival of ecologically and socially sound forestry on a commercial scale, through Mil Madereiras, has had important impacts within the private sector.[28]

The attitude of the forest industry concerning certification can be divided into three broad categories. The highly professional, export-oriented, plantation-based pulp and paper segment views certification as a potential market benefit with relatively low costs. For example, Klabin, the largest Latin American pulp and paper producer, certified its main forest operations in 1997. Taking an intermediate position is the steel industry, which uses vegetable charcoal. Those enterprises that are export-oriented and depend mostly on charcoal from plantations see certification as a benefit. Companies that are not export-oriented or that depend primarily on charcoal from natural forests and *cerrados* find the (indirect) costs of certification too high relative to potential benefits. Finally, the sawn timber segment generally has resisted certification, the prevailing rationale being that the change from current predatory logging to well-managed forest systems is too costly for the potential gains. Again, this view has begun to change as a result of the Mil Madereiras experience.[29]

Box 6.3. Home Grown Certification

Brazil is actively developing national standards of good forest management within the framework of the Forest Stewardship Council (FSC). A working group of the FSC, currently chaired by the WWF, includes participants from the private sector and environmental and social movements plus observers from government and academia. This broadly consultative process is initially focused on developing national standards for natural *terra firme* forest management in the Amazon and for plantation forestry.

Brazilian NGOs participated extensively in the structuring of FSC International in 1993 (Virgilio Viana, one of the authors of this study, was also involved in this effort) and, more recently, the Brazilian FSC working group. A Brazilian NGO representative currently is the vice-president of FSC's board of directors. Many NGOs view independent certification as a positive step in encouraging good forest management and discouraging predatory logging.

In addition to FSC certification, the forest industry sponsored a certification program known by the acronym CERFLOR, through the Sociedade Brasileira de Silvicultura (SBS). This program has had difficulties at first, partially over its credibility. Very few NGOs support the initiative, as it is perceived by many as being industry-oriented. SBS recently handed over the CERFLOR program to the Brazilian Association of Technical Standards (Associacion Brasileira de Normas Technicas, ABNT), which is attempting to revitalize it. The program's future depends largely on the perception by key stakeholders—particularly NGOs—of its independence.

In addition to these Brazil-based efforts, the International Standards Organization (ISO) has been quite successful in disseminating its certification programs in Brazil. ISO and FSC certification are not mutually exclusive, and the choice between them will depend on market demand.

Outside of the timber industry, a growing number of private initiatives in palm heart production are effectively implementing forest management plans. This is directly related to market signals indicating potential benefits in terms of access to financing mechanisms such as Banco Axial's investment fund and improved market access from certified operations. However, the indirect costs of certification (e.g., improving management systems, safety of working conditions, etc.) can be high, depending on how far below standards an enterprise falls.

There are three types of benefits that producers may derive from certification—namely, improved market access, premium prices for products, and improved access to credit and investment funds (Viana 1996). Besides giving signals to consumers, certification can aid in government monitoring of the industry, as it serves as independent verification of private operations. Further, certification can be a stimulus for change in employment practices.[30] However, it is unclear whether domestic or international consumers will pay premium prices for certified products.

Attempts to influence the timber sector via international trade (e.g., boycotts) are likely to have little impact in Brazil, as domestic consumption of timber, as opposed to exports, is a key element driving the behavior of the logging industry. The domestic market consumes 86 percent of Amazon timber production, although exports could grow. Therefore, the promotion of certified timber in large urban centers such as Sao Paulo can have a greater effect than promotion of certification in foreign markets. Certification is still a new phenomenon in the Brazilian domestic market. Nevertheless, demand for certified timber in this market is growing rapidly, albeit from a low base (Smeraldi et al. 1999). It is too early, however, to assess the ultimate impacts of certification on predatory logging practices. Ultimately, the importance of independent certification to timber production in the Amazon will depend on the growth of a domestic market for certified products or public policies encouraging certification.

In a 1998 workshop held at IBAMA headquarters it was agreed that certification could improve public monitoring efforts. Additionally, the Brazilian government has formally recognized the importance of widely accepted criteria and indicators of sound forest management. This is evidenced by its strong position in crafting the Amazon Treaty's Tarapoto Criteria and Indicators of Forest Management (TCA 1995). The government also has an official representative closely following the development of the Forest Stewardship Council (FSC) certification criteria and indicators. Despite its support for certification, however, the government has expressed concerns in several international forums that forest certification does not become a barrier to free trade.

The economics of certification raise several questions: What share of domestic consumers would be willing to pay a premium for certified timber? How effective and credible will the certification program be, and how well will it be monitored, or will certification become yet another source of bribery and corruption? What standards will it use? Will they be only FSC standards? And what criteria and indicators will be used, given that there has been very little practical research and extension on managed forests in Brazil's highly diverse forest conditions, e.g., in the Amazon? Will it need new capital investment by loggers to do the least harm to the forests? What would be the cost to small loggers? Mil Madereiras, because it had ready access to capital, did not have to concern itself with making such new investments and it could afford not to make high profits to develop a new "green" image and establish reputation as a "clean" enterprise. Who will pay the costs of

certification for small producers? Is there a need for premium prices, or can improved market access provide sufficient incentive? How can certification contribute to improved monitoring of the industry? What are the capital and technological needs to make the transition from predatory to well-managed logging?

In terms of certification also there is also no global consensus on the definition of "sustainably managed forests." Each institution—the Forest Stewardship Council, International Timber and Trade Organization (ITTO), African Timber Organization (ATO), Indonesian Ecolabeling Institute (LEI), and the governments participating in the Montreal and Tarapoto process—has its own set of criteria and indicators related to certification. Recently, the Center for International Forestry Research (CIFOR) sent teams of local and international experts to various countries (Austria, Brazil, Cameroon, Côte d'Ivoire, Gabon, Germany, Indonesia, and the United States) to have them evaluate the validity and usefulness of different criteria and indicators used by various groups. They found that there was general agreement about the main components of sustainability. The team identified six basic principles and about 25 points related to policy, ecology, social aspects, and production as useful. It was also observed that as one goes down the hierarchy of indicators and criteria, they become more site-specific. This means that evaluators will have to adapt criteria and indicators in accordance with site-specific characteristics (Polex 1999).

It is clear that certification is by no means a panacea and is being opposed by a number of small and medium operators. However, if the movement is helping to generate domestic debate and awareness within Brazil and to lead to improved forest management, then it should be encouraged, without excessive expectations of what certification can achieve in the short to medium term. Since the base costs of developing internal institutional and technical capacity are large relative to the original costs of certifying wood once the capacity exists, the Bank should support research and training in this area as a public good, allowing domestic and international markets, including the WTO, to rule on its merits in the marketplace.

Indigenous Communities

Brazil's indigenous population is distributed across all five geographic regions of the country and all but two states. Comprised of 206 ethnic groups speaking some 170 languages, the indigenous population totaled 325,652 in 1995, representing 0.2 percent of the country's total

population. These groups inhabit 561 areas covering 972,450 km^2 (about the size of France and England combined), or 11.38 percent of total national territory.

The government has taken significant steps in securing land tenure rights for indigenous populations. In December 1998, the Justice Ministry signed the official demarcation of 22 indigenous reserves and officially recognized the limits of 13 others, largely through PPG-7 funding (see Part II). Between January 1995 and December 1998, the Cardoso administration recognized 58 indigenous reserves across nearly 26 million ha and demarcated 115 reserves representing an area of over 311,000 km^2. Sixty-two percent of the country's indigenous reserves are now fully demarcated, representing 78 percent of total area in such reserves (FUNAI/DAF 1999; Santilli 1999).

Of the 561 indigenous areas recognized by the National Foundation for the Indigenous (FUNAI, Fundacao Nacional do Indio), 352 (63 percent, with an area of 760,000 km^2) are either demarcated, ratified, or registered (table 6.2). Forty-one additional areas have been "delimited," 23 are identified, and 145 are still to be identified.[31]

Several challenges are associated with indigenous lands and their demarcation:

- Indigenous lands are invaded by large landowners, timber companies, mineral prospectors, and sharecroppers, as well as by the

Table 6.2. Indigenous Territories as of July 1999

Situation of indigenous lands	Stage	Number	Area (km^2)	Percentage of area of indigenous lands in relation to total
Demarcated	-	352	759,753.36	78.13
	Registered	300	721,943.09	74.24
	Ratified	31	34,929.08	3.59
	Demarcated	21	2,921.19	0.30
In demarcation	-	64	212,656.65	21.87
	Delimited	41	174,948.54	17.99
	Identified	23	37,708.11	3.88
To be demarcated	-	145	0	0.00
	To be identified	145	0	0.00
Total		561	972,450.01	100

Source: FUNAI/ DAF- Diretoria de Assuntos Fundiarios, July 1999.

public sector, for such activities as construction of roads and hydroelectric plants and the creation of new municipalities.
- The public sector is inefficient in punishing invaders, leaving the indigenous communities with little power to confront land invasions.
- Corruption within government institutions permits a vicious cycle of land invasions and extraction of natural resources and compromises natural ecosystems and social organizations (Viana 1997).
- Public resources for the demarcation of indigenous lands are scarce. To date, the government has undertaken demarcation partly using external resources obtained from bilateral and multilateral sources, such as the World Bank, with few resources coming from the federal government. This creates particular problems for indigenous communities outside the Amazon, which have to rely exclusively on ever tighter federal funds.
- Regional economic and political interests exert constant pressure against federal demarcation of indigenous lands, leading to conflict and even violence (see Part II).
- There is a need for economic alternatives to secure the requirements of the indigenous people, particularly to cover health costs (the case of Xikrin can be a first attempt to link timber production to protection of indigenous rights and forest conservation).

High-value mahogany stocks are a principal reason underlying invasions of indigenous lands. South America's major remaining mahogany stocks are located in the forests of Brazil and Bolivia. In Brazil, the "mahogany belt" comprises a *terra firme* forest area of about 800,000 km^2 concentrated in Acre, southern Para, and parts of Rondonia, Amazonas, and Mato Grosso and coincides with numerous indigenous lands and areas of ecological conservation (Viana 1997; CEDI 1993; Greenpeace 1992).

Methods of illegally obtaining timber from indigenous lands are numerous and include: pure and simple robbery; contracts between timber companies and indigenous communities; direct negotiation with indigenous communities, usually without a formal contract; declaration of bankruptcy in order to escape financial penalties; extraction of timber by a third party agent; and abuse of the IBAMA-approved management plans.

While Carpentier et al. suggest that formal land title for small-scale agriculturalists may increase forest conversion, demarcation of and clear title for indigenous lands is generally beneficial to forest conservation. The process of demarcating indigenous lands has received strong support from the World Bank–implemented PPG-7 program.

In the search for appropriate relationships with surrounding social and economic environments, indigenous societies will continue to face many challenges. For many, forest management is a critical issue, representing both a source of problems and a potential solution for sustainable land uses. Where illegal logging is concerned, forest production acts as a source of social disintegration and economic and ecological impoverishment.

Nascimento et al. (1999) suggest that forest management, on the other hand (both timber and non-timber production), may become a source of economic alternatives for these communities. In most cases, indigenous societies have a comparative advantage in forest management over agriculture and cattle farming, given their rich resource base and skilled labor. Only a few experiences with natural forest management in indigenous reserves exist, however, and very few professionals have the necessary skills to work effectively in this area. The Brazilian authors of this report believe that this may offer attractive opportunities for future World Bank involvement.

Extraction of Non-Timber Forest Products

Extraction of non-timber forest products (NTFPs) from natural forests in Brazil has declined over the past few decades. In the Amazon, this decline is predictable and easily explained by a combination of factors: low productivity per unit of land; competition with more economically attractive plantation-based products; competition with chemical substitutes; and government policies, including import tariffs. This same general pattern of decline has been documented in the Atlantic Forest as well (Homma 1995; Reserva da Biosfera 1999).

A noteworthy example is Amazonian rubber production. Rubber production in the north region of Brazil (which includes most of the Amazon), based largely on extraction from natural forests, declined from 16,968 tons in 1989 to 5,338 tons in 1996. Over the same period, rubber production in plantations in southeast Brazil rose from 3,918 tons to 28,657 tons. Rubber imports increased as well from 88,817 tons to 107,329 tons (Agrianual 1999). These changes largely reflect the lower production and transportation costs of rubber derived from plantations compared to natural forests. The lower costs result in part from a series of policy instruments promoting the plantation-based rubber industry. The Brazil team observes that there is an opportunity to explore the possibility of valuing other services provided by natural forests managed for rubber production such as carbon storage and

biodiversity conservation. Such instruments may stimulate forest conservation and reduce deforestation. A similar case exists for babassú oil coming from natural stands. As a result of lower tax for imported oils, traditional extractivist communities are facing an economic crisis that is fueling deforestation and depletion of the resource base.

In some areas, however, production of NTFPs is increasing. Medicinal plant extraction in Parana is an example. Klabin, a private pulp and paper company, maintains a public health program for the municipality of Telemaco Borba, which is supervised by a team of doctors and pharmacists and relies heavily on phytotherapy. This initiative is in the process of receiving finding from the Brazilian Biodiversity Fund (FUNBIO)—which itself is supported through a Global Environment Facility (GEF) grant—to establish a partnership with the Brazilian Foundation for Sustainable Development and prepare a business plan for the establishment of a company to market medicinal plant products (FBDS 1999). The results of this initiative will shed light on the economics of such enterprises. Brazil nut production in Amapa also is growing. There, a producers' cooperative, Cumaru, processes Brazil nuts to sell to state governments, which serve them as snacks in public schools. In April 1999, Cumaru launched a brand name under which it markets the nuts in supermarkets in Amapa. In another promising development, the government of the State of Acre is working on an aggressive forest policy promoting the management and processing of forest products. The World Bank is discussing forest conservation through sustainable use and other ideas with the government.

It is unlikely that extraction of NTFPs can be profitable on a scale large enough to significantly affect forest conservation on its own, and while Carpentier et al. (1999) show that NTFPs are not competitive with agricultural pursuits, extractivism is fundamental to the livelihoods of tens of thousands of Brazilians living in extractive reserves. Extractivists, according to Vosti (1999 personal communication), are among the poorest residents of the Amazon, with some in extreme poverty. This would seem to be a clear area for international assistance, for both poverty alleviation and environmental reasons.

Through the PPG-7 program (discussed in Part II), the World Bank and the international community are involved in promoting extractive reserves in the Brazilian Amazon on a pilot basis. PPG-7 is engaged in activities in extractive reserves Alto Jurua and Chico Mendes (both in Acre), Rio Ouro Preto (in Rondonia), and Rio Cajari (in Amapa). Together, these four reserves are home to more than 2,400 families.

Forest Research and Forest Technology

Most research programs and funding are directed to agriculture and husbandry rather than to agroforestry, reforestation, or forest management. EMBRAPA, Brazil's national agricultural research institute and one of the premier research systems in the developing world, for example, spends some R$70 million annually, 15 percent of its total budget for national agricultural research, on its six centers responsible for forest research and located in forest areas. But their budgets include lots of other activities, so the support for direct forest research is smaller.

Historically, EMBRAPA's research has emphasized agricultural development over management of natural forest and plantation forestry. The EMBRAPA center in Belem, in fact, has agricultural development as its stated mission, with managed forests conspicuously absent from its mission statement (Lele 1998). A combination of factors may explain the past state of forest research. First, because the Amazon has a deficit in food production but the potential for producing more food, EMBRAPA centers seem to see their mission as increasing food production and productivity. Another explanation may be that, unless products from the wild are domesticated, they do not have much future in terms of economic viability (Homma 1995). Further, as shown in this study, relative returns to agriculture are considerably higher than returns to forest management. Finally, there is some amount of political pressure to improve agricultural production and productivity. It would be fair to conclude that the imbalance in EMBRAPA's research resource allocations to managed forests also may have contributed to agricultural expansion in the Amazon, most notably through its impressive research work with soybeans and pastures. Future strategy should bring about a better balance, as the relative neglect of forests in research agendas creates a technological gap that increases agricultural productivity relative to forest productivity. An exception is plantation forestry in the south, where applied research carried out by EMBRAPA and universities and partially funded by the private sector has been successful in increasing forest productivity.

Over the past decade or so, EMBRAPA research stations in the northern region, in partnership with many other research institutions, NGOs, and universities, have dedicated increasing amounts of financial and human resources to understanding the "forest side" of the forest margins. Efforts generally have been collaborative in nature (sometimes with local or state research teams, but often with international partners) and have focused primarily on improving our understanding of forest eco-

system performance (especially regarding timber production). Important examples of such research include work on managed forests with Mil Madereiras and long-term collaboration with CIFOR. EMBRAPA has placed special emphasis on assessing forest ecosystem responses to timber off-take of different rates and using different extraction technologies, the aim of which has been to identify methods for sustainably managing forested areas, especially those held by groups of small-scale agriculturalists. Progress has been made on the biophysical front: For some types of tropical moist forests, sustainable management strategies have been identified and are in the pilot testing phase. Advancement has been somewhat slower on the socioeconomic front, but recent modeling efforts have demonstrated the potential profitability of small-scale managed forests in the context of the whole farm. However, important gaps remain in the knowledge base concerning how to monitor and control timber off-take, and these gaps will need to be filled, since unsustainable timber off-take is more profitable than sustainable off-take, and the pressure to open new land for agriculture remains strong. These are important areas of new research for EMBRAPA, INPE, and other organizations, including universities. A competitive research grants program funded by the World Bank with EMBRAPA to foster research partnerships among institutions is currently threatened with budget cuts, a victim of Brazil's fiscal situation.

Some argue that the availability of technology is not a problem; rather, it is now a question of technology refinement and dissemination (Uhl et al. 1998). Others argue that tropical forest management is too complex and will never be possible (Rice et al. 1998). However, if local forest managers, particularly the small ones, have no economically viable alternatives, and due to lack of enforcement, it pays to shift to agriculture, the deforestation pressures they exert are likely to consume a majority of the forest cover (Carpentier 1999a). The most important gaps are in the areas of economic, financial, and social science research, which is crucial to produce returns in the current forest management systems.

Extension services such as EMATER (*Empresa de Assistencia Tecnica e Extensao Rural*), which offers agricultural and livestock extension, also have little or, more often, no technical expertise in forest management. In the Atlantic and Amazon forests, technical extension services to forest management do not reach forest-rich areas with high potential for management. Similarly, there is an absence of technical extension for reforestation and agroforestry systems in forest-poor areas. Instead, technical assistance almost exclusively is directed at agriculture and pasture man-

agement. Moreover, the availability of forest management technology to small farmers is particularly problematic. This results from a combination of factors, the first of which is the fact that technical and university-level forest programs are much smaller, less well equipped and staffed, and less politically influential that their counterparts in agriculture. There are only two technical schools devoted to forests in the country, and in universities, agronomists far outweigh foresters. Most extension agents and decision-makers within extension institutions, then, take an agronomic view of rural production systems that sees forests as impediments rather than assets to sustainable rural development. A noteworthy exception is the World Bank–supported Minas Gerais Forest Service, which has the best forestry extension program in Brazil.

Only recently have manuals for forest management been published that are accessible to extension agents and professionals (e.g., Silva et al. 1997; Amaral et al. 1998). There are many challenges to disseminating small-scale forest management practices in Brazil. Existing printed, video, and Internet material must be made accessible, and new material must be produced.

The Changing Role of the Public Sector

Federal Government

In recent years, the government has made important progress in promoting forest conservation. The Cardoso administration has expanded protected areas although, as noted earlier, the existing protected areas are not being appropriately managed and/or protected. The government is also attempting to address many of the policies and practices underlying deforestation that are the legacy of decades of military rule and an economic growth model based on import-substitution-industrialization. Brazil also has signed two high-profile international initiatives aimed at forest conservation in the Amazon, the PPG-7 program and the World Bank/WWF alliance (see Part II).

The government has also been clear in its poverty alleviation mission. There have been few poverty alleviation programs with the Amazon. But since the 1960s, the government has viewed the Amazon as a potential source of economic growth and poverty reduction in other parts of the country through migration. It has sought economic and geographic integration of the region with the rest of the country. The current "Brazil in Action" program (see box 4.8) reinforces these efforts. In its 1997 publication *Agenda 21 for Amazonia* (Government of

Brazil 1997), the government asserted that "the key factor in the implementation of this Agenda is the correct deregionalization of the Amazonia issue which should be viewed from a converging viewpoint: as national need; as national responsibility; as national potential." The Brazilian government even took the World Bank to task concerning a 1992 publication that it felt presented "a bias with regard to environmental needs at the expense of other dimensions, such as, for example, the development needs of the local populations" (Schneider 1992). Since then, responsible stewardship of natural resources is generally more broadly accepted in developing countries like Brazil. The international community has expected the World Bank to exercise leverage over Brazil and engage in a policy dialogue. However, the Bank's leverage in large countries seems exaggerated, except in a period of crisis.[32] Besides, the use of leverage is often resented and can backfire. An important question is whether the Bank should have been doing more of its economic and sector work involving nationals, and building their capacity to exercise policy influence in domestic debates. It is only recently that the Bank has begun such a participatory approach to analysis.

Brazil has long resisted "internationalization" of the Amazon, considering the region's future an internal issue. As far back as the 1960s, the Brazilian military and other nationalist interests resented the efforts of multilateral development banks to include environmental and indigenous protection provisions in their Amazon projects. Ironically, at the same time, the military government's industrialization-based development model included large-scale foreign investment in the Amazon. Brazil's receptivity to engage in discussion with the international community on a variety of issues, including the environment, has increased in recent years, but this is a slow process. Besides, resistance to international involvement in the Amazon and aversion to the notion that the Amazon's forests and biodiversity somehow belong to the global community is still resented in Brazil and influences dialogue between Brazil and the international community (see Part II for discussion of World Bank/Brazil dialogue).

State and Local Governments

In just a few years, Brazil has emerged from military rule to become one of the world's largest and most vibrant democracies. Decentralization of power to the states, where over half of the public spending occurs (World Bank 1995), has followed the successful democratization process. The 1988 Constitution provided for a federal structure of governance and shifted federal resources to states and municipalities. More

recently, the government has shifted important regulatory and enforcement responsibilities to the states. Acknowledging growing power held by state governments, in its 1997 Country Assistance Strategy for Brazil, the World Bank placed increased emphasis on lending directly to states. The World Bank also recognized the need to be sensitive to Brazilian states' desire for growth while pursuing its environmental agenda (World Bank 1997).

While there are hopes that the decentralization of environmental protection will improve environmental management, there is also much skepticism. Schneider (1994) notes that decentralization worsens the prospects for coalition building for sustainable development, especially in those initiatives intended to reduce access to resources, such as zoning, land use planning, and logging or forest clearing restrictions. Decentralization is especially problematic if it increases untied transfers and reduces the leverage of the central government over states and municipalities.

Lack of coordination between federal and state agencies is another potential problem, and one that has already created problems, with INCRA (Instituto Nacional de Colonizacao e Reforma Agraria) ignoring state zoning plans in siting its federally backed settlements (Mahar and DuCrot 1998). The growing political power of logging interests at the local level also is cause for concern from a conservation standpoint.

It must be noted that decentralization is not a singular process. It carries different implications for the Atlantic Forest (where state and municipal institutions are relatively stronger and environmentally more progressive) than it does for the Amazon (where public institutions are weaker and view the forest as a resource to be exploited for economic growth). In some cases, especially in the highly industrialized states of the Atlantic Forest, decentralization results in clear gains as state governments are better equipped to carry out environmental monitoring than the federal government. There is often greater political will at the state level on these cases. On the contrary, in forest-rich regions such as the Amazon basin the opposite can be true. Decentralization can result in poor control and monitoring of deforestation and illegal logging since loggers and other groups have great power in state politics. It should be noted, however, that in the case of some Amazonian states (Acre and Amapa), there are state governments that are very active in promoting forest conservation and have built strong political alliances, especially with social movements such as the rubber tappers. They are taking rapid steps to articulate improved forest policies with support of NGOs and universities. The Bank currently has support for the State of Amapa under consideration.

Recent Government Initiatives

The environment minister at the time of publication of this review, Jose Sarney Filho, has made bold moves against illegal logging, including sending military units to patrol the Amazon. Further, forest management is slowly being integrated into development policies. The new set of guidelines for the Fundo Constitucional do Norte, mentioned above, is one such positive measure.

The Ministry of Environment (MMA) also launched a World Bank/FAO–funded initiative to develop a "positive forestry agenda" for Brazil. The "Project for Transformation of the Brazilian Forest Sector," which is being funded by a Japanese grant through the World Bank, seeks to identify constraints to and opportunities for forest management in the Amazon.

The government has increased the area identified as national forests. This was done in order to reduce the supply of low-cost timber from illegal sources in unclaimed lands (*terras devolutas*), and to create incentives for long-term investment by timber companies in forest management and local processing. Additionally, IBAMA, with funding from ITTO, has opened for competitive bid the harvest of some 3,500 ha in the Tapajos National Forest. While the action was highly criticized by NGOs and the Public Ministry due to conflicts with local populations and supposedly low technical standards, this "experiment" generated many lessons that are now being mainstreamed by the government. These include the need to train staff in conflict resolution and the importance of stakeholder participation in the formulation and implementation of concession policies.

The Influence of Nongovernmental Organizations

Nongovernmental organizations have become increasingly active in the 1990s, both in influencing public policies and in implementing field projects. Their activity has increased in the context of the government's formulation of its new forest policy. Indeed, Brazilian civil society is gradually becoming an important player in conservation and environmental issues. A group of 12 NGOs that act under the umbrella of the *Grupo de Trabalho sobre Politica Florestal* (Working Group on Forest Policy) has been influencing governmental decisions that directly or indirectly affect forests. This group, linked to a broader NGO network, the Brazilian NGO Forum, has also been one of the pillars of the process to develop Brazilian criteria and indicators for good forest management practices (see box 6.3).

Regional NGO networks specifically engaged in the Amazon and Atlantic Forests, the Amazon Working Group (GTA) and the *Rede Mata Atlantica*, respectively, also have been influencing a number of forest policy issues related to those biomes. The GTA, for example, has been a key player in the implementation of the World Bank-implemented PPG-7 Pilot Program (see Part II). Indeed, the PPG-7 program is in part responsible for the capacity and growing influence of the GTA and for the strengthening of the NGO movement in general. Rede Mata Atlantica, on the other hand, has been pivotal in the debate over legislation for the Atlantic Forest and a possible PPG-7 component for that biome.

International NGOs also have been active in Brazil, with their activities varying according to their respective missions and strategies. Some have developed strong links with Brazilian NGOs, improving the ability of the international organizations to adapt their agendas to Brazilian realities. Friends of the Earth and the GTA have formed one such partnership, and among the products of this alliance is the publication of a series of documents that have served as important elements in policy debates (Smeraldi 1996 and Smeraldi 1998).

NGOs have increasingly assisted in program design through their growing technical expertise. Several examples are particularly noteworthy. First, working under a World Bank contract, the Institute for the Management and Certification of Forests and Agriculture (IMAFLORA, *Instituto de Manejo e Certificacao Florestal e Agricola*) reformulated the forest component of the PPG-7 program. This component, known as PROMANEJO (Project to Support Forest Management in the Amazon) is a significant ongoing effort related to forest management in the Amazon. In drafting this project, IMAFLORA used a participatory approach that promoted active stakeholder dialogue. The second example is the "Project for Transformation of the Brazilian Forest Sector," being designed with strong input from IMAZON, again through a World Bank–funded contract. In both cases, the World Bank, through partnerships with NGOs, has made a breakthrough in promoting stakeholder dialogue related to forest issues, and perhaps enhancing the NGO role as facilitator of such interaction.

An important success story for both Brazilian NGOs and the government is the case of the Xikrin Indian Forest Management Project, carried out by the *Instituto Socioambiental* (ISA), one of Brazil's largest and most influential NGOs. ISA was successful in rallying political sup-

port within the government and the NGO community for forest management in Indigenous Reserves. Though implementation is facing a number of difficulties, the project is yielding important lessons (Viana 1999 personal communication).

After succeeding in a number of campaigns to establish protected areas, to change legislation to allow for their direct participation in protected-area management, and to establish mechanisms for national and international funding, several NGOs have become actively involved in the implementation of field projects in such areas as agroforestry, forestry (timber and non-timber production), fisheries, and land use planning, in both the Amazon and Atlantic forests. A number of initiatives have become landmarks in changing the concepts and conventional approaches of government agencies. A community forestry project in Acre, for example, has played a critical role in the debate over timber production in Amazonian forests.

NGOs are contributing in multiple ways to the integration of forest conservation efforts with community participation, including developing appropriate technologies to enhance participation and promote conflict resolution; on-the-job training for professionals in forestry, agronomy, biology, etc.; changing corporate views of public agencies; and reducing costs and improving efficacy of conservation and sustainable development efforts. They are exercising their muscle in the debate on the formulation of the new forest policy. The World Bank has increased the role of NGOs in developing solutions to conservation and sustainable development issues.

PART II: THE WORLD BANK AND BRAZIL

7

Overview

World Bank involvement in both the Amazon and Atlantic Forests reviewed in this report may be justifiable on several grounds. Given the Bank's comparative advantage in situations where global externalities, market failures, or government failures are present, many of the measures discussed in Part I would warrant its participation. The carbon storage, biodiversity, and cultural heritage of the Amazon and Atlantic Forests are of great global importance and value, with considerable apparent diversion between global and local benefits. Much of the work to conserve these resources is of a public goods nature. The private sector is unlikely to become heavily involved on its own. Government failure, likewise, is an issue. With 80 percent of all logging taking place illegally, governance and political economy are important factors in deforestation. This also increases the challenge of World Bank involvement in Brazil to contribute to forest conservation.

There are, however, three reasons why the Bank may have been less proactive in lending to the forest sector since 1991. First, the Government of Brazil has clearly and repeatedly asserted its sovereignty over the Amazon and its natural resources and resisted "internationalization" of the region. With an annual GNP of US$760 billion, Brazil is capable of financing many of its own development programs, including the kinds of large-scale infrastructure projects for which smaller developing economies often rely upon World Bank loans. The Bank's annual loan commitments are small, US$1 billion or so on commercial terms. Grants such as those from GEF are limited. Besides, the Bank has in-

creasingly become demand-driven in its programs, with Brazil largely determining the activities for which it borrows. Even if the Environment Ministry has some interest in a Bank loan, the all-powerful Finance Ministry has to seek Bank involvement in this sector. Thus, the Bank's leverage in Brazil is limited.

Second, a key to World Bank success in its recent forest-related programs in Brazil is promoting a sense of Brazilian ownership of those activities. Some Bank officials believe that because of the strong vested interests in development of the Amazon, combined with the country's fragile environmental constituency, aggressive positioning on the part of the World Bank would be counterproductive. Instead, they contend that the Bank must keep a low-profile in constituency building and facilitating the articulation of a Brazilian vision for the Amazon. This is a slow and unpredictable process; the pace of it can vary considerably depending on the external shocks, political changes, and personalities involved.

Third, the Bank's project experience before 1991 was less than encouraging, nor did the 1991 Forest Strategy encourage involvement in sustainable forest management. This occurred mainly because the Bank was uncertain about what sustainable forest management actually meant, and how it could be operationalized. The result was basically a hands-off approach in countries like Brazil, which have substantial quantities of primary tropical moist forests (see Part I).

While the Bank's forest sector lending program in Brazil has had some notable successes, the most important efforts have been in non-lending activities. The high quality of the economic and sector work produced in Brazil has benefited from continuity in Bank staff. In the past decade, the Bank's Brazil Country Office has had only two senior forest economists, Dennis Mahar and Robert Schneider, both of whom have made important contributions to analysis of the forest sector in Brazil.

8

The Bank Program in Brazil

Country Assistance Strategies

Of the two stand-alone Country Assistance Strategy (CAS) documents for Brazil in the post-1991 period (one in 1995 and the most recent in 1997), the earlier CAS outlined an anti-poverty thrust to Bank lending and policy advice, continuing the objective of the previous CAS. The strategy emphasized human capital formation and infrastructure development as the principal weapons against poverty. The 1995 CAS also marked a shift toward directing policy dialogue, advisory work, and lending programs at the state level, acknowledging the decentralization process taking place in Brazil. The strategy included three main components: attainment of stabilization and resumption of broad-based growth through key structural reforms at the federal level; state-level reforms, including privatization of banks, electricity distribution companies, and other enterprises, and strengthened expenditure planning and flexibility and monitoring of state indebtedness at the federal level; and, selected sector-specific policies, including human capital formation, infrastructure, environmental protection, and specific anti-poverty policies such as decentralized rural development programs.

In the environment sector, the Bank's objectives in the 1995 CAS were "under the newly decentralized systems [to] ensure that priority biomes are being protected [and to] assist Brazil with (a) strengthening federal and state environmental protection agencies; (b) reforming laws, regulations, and policies affecting tax and user fees, land ownership,

forest development, indigenous reserves and urban pollution; and (c) strengthening monitoring and enforcement capabilities." The CAS identified several "green" (natural resource management) and "brown" (environmental pollution) issues to be addressed. The "green" issues (box 8.1), which closely parallel those outlined in a 1994 World Bank report on the management of agriculture, rural development, and natural resources, included:

- Set tax rates for native forests equivalent to or below tax rates on agricultural land. Establish separate rules and regulations for native and plantation forests.
- Define a process for assigning *terra devoluta* to alternative private uses within five years, including a settlement policy that takes into account the full environmental impact of forest conversion.
- Design policies and regulations that allow conservation, agricultural development, and delivery of special services to be contracted out to the private sector, local communities, and NGOs.
- Decentralize to the states much of the responsibility for the implementation and enforcement of environmental protection.
- Provide incentives for collection of environmental user fees by allowing environmental agencies to retain a portion of the fees they collect.
- Streamline and clarify procedures for identification and demarcation of indigenous reserves. Strengthen and coordinate protection of these reserves to reduce encroachment and illegal exploitation of indigenous reserves.

The 1997 CAS differed from its predecessor in its movement to a long-term sectoral emphasis on basic education, based on the view that progress in education is central to achieving long-term growth, poverty alleviation, and greater income equality.

The 1997 CAS outlines its main thrusts:

- A policy of lending to individual states that focuses on portfolio performance fits with the sectoral and regional strategy, and has an adequate state fiscal program
- A primary focus on education assistance that extends beyond the CAS period, with the objective of supporting both equity and growth. Other key areas of Bank assistance are rural development and poverty alleviation, health reform infrastructure development, and environmental and natural resource management
- A private sector strategy focus on access to and cost of capital,

Box 8.1. A World Bank "Green" Portfolio in Brazil

This portfolio promotes biodiversity preservation and environmentally sound development, focusing on Brazil's Amazon and Atlantic Forest regions. Three Bank projects total US$600 million in loans: the Rondonia Natural Resource Management Project (PLANAFLORO), the Mato Grosso Natural Resource Management Project (PRODEAGRO), and the National Environment Project (NEP). The Bank also administers approximately US$300 million in grants provided through the Pilot Program to Preserve the Brazilian Rain Forest and the Global Environment Facility (GEF). Initial attempts to design projects in rainforest areas did not adequately take into account the complexities of promoting sustainable development in the Amazon. In particular, they involved the large-scale application of untested technologies such as land use zoning, and they failed to take fully into account the lack of broad local political support for measures that constrain economic activity. The implementation of two of these projects—PLANAFLORO and PRODEAGRO—has until recently also been impaired by complex designs coupled with fragile local administrative capacity.

Projects are now being designed, or have been re-designed to address these shortcomings:

- Many of the projects are now implemented as "pilots" on a limited scale, such as all of the Pilot Program and GEF projects, and important components of other projects in the portfolio.
- The projects support testing of promising technologies and approaches such as agroforestry, forest management, and decentralized management of protected areas
- Many of the projects—in particular the National Environment Project and the Pilot Program—have a strong focus on institutional strengthening of environmental protection agencies.
- All five projects have strong stakeholder participation mechanisms and encourage decentralization of decision-making to the local level.
- PLANAFLORO and PRODEAGRO have been subjected to participatory midterm reviews that have resulted in simpler project designs and greater ownership by the beneficiaries.
- Decentralization of project supervision is permitting more intensive monitoring of all projects in the portfolio.

Source: Brazil Country Assistance Strategy 1997.

infrastructure development, regulatory/institutional costs, and small and medium enterprise development to address the chief constraints to private sector competitiveness with IFC in the lead

- Further efforts to sustain and improve portfolio performance, including implementation of the recommendation of the report recently issued by the Joint Brazil-Bank Portfolio Commission
- Decentralization of the country management unit to the resident office to achieve a more effective response to country needs and implementation of the Bank's assistance strategy
- A graduated response of Bank assistance to key indicators of fiscal sustainability, portfolio performance, and adequacy of the private

sector development enabling environment, to ensure that Bank assistance will achieve its intended development impact.

The strategy contains activities in public sector reform; infrastructure and private sector development; environmental sustainability; rural poverty, rural development and regional growth (with a focus on alleviating poverty in the northeast); education; health; and basic urban services and urban poverty.

Within the environmental component, the Bank's strategy was to support, through lending and non-lending activities, environmental protection with actions to strengthen the following:

- Federal and state environmental protection agencies: Decentralize to states and local levels much of the environmental protection and mitigation responsibility.
- Private sector: Contract out conservation, agricultural development, and delivery of special services to private sector, local communities, and NGOs.
- Laws, regulations, and policies: tax and user fees, deposit refund schemes, tradable permits, land ownership, indigenous reserve and forest development.
- Develop and implement a biodiversity strategy focusing on priority ecosystems.
- Develop incentives for long-term financing of environmental initiatives.
- Strengthen institutions, promote environmentally responsible behavior among smallholders, issue legislation defining water rights and establishing appropriate incentives, and implement water resource management at community levels and between competing sectors, reflecting scarcity.
- Establish environmental management in the water sector, including a revision of the licensing procedures for sanitation projects involving utilities and environmental agencies.
- Focus on soil conservation and recovery in the south and southeast.

In its 1995 CAS, the Bank recognized that its lending would be small relative to overall needs in Brazil, and that policy advice should therefore always be a prominent element of the Bank's relationship with Brazil. Again in 1997, the CAS pointed out that "the Bank Group's value added to Brazil's developmental effort is driven much more by contributions as a catalyst for reform and for priority investments in areas where they Bank can convey its global experiences as well as innovation, and less by direct financial contributions to this large and dynamic economy."

New Environmental Strategy

The Bank is currently developing a new environmental strategy for Brazil that incorporates many of the issues discussed in this paper (Brazil Environmental Strategy, Revised Discussion Draft, August 26, 1999). This strategy recognizes that development in Brazil must be financially sustainable. This means that it must provide incentives, be affordable to government, be biologically and politically sustainable, and entail stakeholder analysis, including possibilities of compensation to "losers."

Strengthening support for the environment is an important objective of the strategy, and focuses on: developing an environmental information and education strategy to help the public more accurately weigh environmental priorities; strengthening partnerships with civil society and the private sector; and seeking international grants for global externalities. Where forests are concerned, the strategy is directed at eliminating the perception that there is excess forest through a credible system of production forests and concessions, national parks, and extractive reserves, and at implementing this within a fully articulated biodiversity strategy.

As with the CAS, the new strategy consists of "green" and "brown" objectives. Within the "green sector" the strategy outlines the following priorities:

- Protect watersheds, combining known high biodiversity with water supply or recreational values.
- Complete the biodiversity inventory and develop a cost-minimizing strategy to protect biodiversity.
- Rationalize timber harvesting to ensure the sustainability of the industry without unacceptable environmental and social damage.
- Begin to develop a national consensus on a development and protection plan (macro zoning) for the Amazon.

The World Bank seeks to promote the use of more strategic instruments, such as market mechanisms, taxes and subsidies, and environmental funds in Brazil. Market mechanisms to create incentives for landowners and municipalities to provide environmental services could include: transferability of Legal Reserve obligations; conservation groups compensating landowners for forgone development; landowners and/or municipalities selling carbon sequestration services internationally; and water markets at the basin level. Economic incentives through taxes and subsidies being explored include tax-free environmental land uses, the Green ICMS, a tax on unsustainably harvested timber, and royalties on land clearance.

Economic and Sector Work Since 1991

Both before and since the Bank's 1991 Forest Strategy was issued, the Bank has undertaken economic and sector work (ESW) relevant to Brazil's forests. Several reports have provided particularly good multisectoral treatments of the underlying causes of deforestation in Brazil. Other important publications evaluate Bank lending as it relates to Brazil's environment and forests. Additionally, OED conducted an exhaustive review of four projects in the Brazil portfolio, *World Bank Approaches to the Environment in Brazil: A Review of Selected Projects* (Redwood 1992). This document evaluates how the Bank has addressed environmental components of its work in four major Brazilian projects. According to the 1997 CAS, several other relevant reports are planned, including *A Participatory Approach to Sustainable Development in the Amazon, Biodiversity Strategy,* and *Wildcat Mining in the Amazon.*

In addition to the above reports, several issues investigated in this report drew on the work of Mahar, Binswanger, and Schneider. For example Mahar (1988) analyzed the impact of government policies on the magnitude and rate of deforestation in Brazil's Amazon region. The main hypothesis was that efforts to slow or stop tropical deforestation through fiat only will be much less likely to succeed if the overall policy and regulatory frameworks give people incentives to do just the opposite. The paper first reviews the most recent estimates of deforestation in the region, which indicate that almost 600,000 km^2 of Amazon forest had already been cleared. Moreover, 80 percent of this has occurred since 1980. The paper then traces the evolution of regional development policies for Amazonia over the past 25 years. It shows that policies and programs emphasizing road building, official settlement, and extensive livestock development have generally not been designed and carried out with due regard for their environmental consequences. The paper concludes with several recommendations on how current policies could be reformed in order to improve their environmental impact.

Binswanger (1989) showed that general tax policies, special tax incentives, the rules of land allocation, and the agricultural credit system all accelerate deforestation in the Amazon. These policies increase the size of land holdings and reduce the chances of the poor to become farmers. The following are the key provisions: (1) The virtual exemption of agricultural income from income taxation makes agriculture a tax shelter; (2) Rules of public land allocation provide incentives for deforestation because the rules used in determining the security of a claim and its land area encourage land clearing; (3) The progressive

land tax contains provisions that encourage the conversion of forest to crop land or pasture; (4) The tax credit scheme aimed toward corporate livestock ranches subsidizes inefficient ranches established on cleared forest land; and (5) Subsidized credit is available for SUDAM-approved ranches.

Schneider (1992) stated that in order to contribute to the development of appropriate and effective environmental policies for the Amazon, appropriate policies must be based on a correct diagnosis of the causes, nature, and magnitude of the environmental problem. Policies must realistically recognize the political and economic constraints facing implementation. This report describes the current state of deforestation, including its location, level, and rate, and reviews its underlying causes. Deforestation is, however, of interest only because it is an indicator of potential environmental problems, including species loss, global warming, local watershed damage, and microclimatic change, which are also described briefly. It discusses the most important types of economic activity in the Amazon, and their environmental implications. Some of these activities are a direct response to government policies and public investments, but others would be carried out without them. Future government policy must therefore clearly identify the strength of the forces underlying economic development in the Amazon. Finally, the report discusses the major economic and political factors governing the policy environment for the Amazon, and suggests an environmental strategy that addresses environmental objectives in light of the existing political and economic constraints.

Schneider (1994) investigated the special characteristics of the overall political-economic context confronting governments on the Amazon Frontier as the current pattern of development often results in violent conflict and wasteful environmental damage. The main messages of the report are: (1) Settlers in the Amazon do appear to be improving their standard of living compared to people with the same education and skills outside the Amazon; (2) Transience and farm turnover on the frontier are due to powerful and fundamental economic forces; (3) Transience, farm turnover, and even apparent land abandonment are not necessarily linked to degradation of the agricultural resource base; (4) More attention needs to be given to the importance of reconciling the needs of local politicians with externally designed projects; (5) Creating a political coalition to support policies for orderly frontier development is difficult; (6) Roads are the fundamental determinant of settlement; (7) Allocating land initially to small farmers is not only good policy

from an equity standpoint, but it is also the most efficient and orderly way to settle new lands; and finally, (8) National governments must define their objectives carefully with regards to establishing government beyond the economic frontier.

The Bank's economic and sector work since 1991 has been of high quality, but it has had only marginal impact on Brazil's forests. While a sizable amount of the environmental work has focused on multisectoral analyses of deforestation, including the impact of agriculture and infrastructure on the environment, the same cannot be said about the ESW agriculture and infrastructure. Some sectoral studies have not given deforestation sufficient attention. The 1995 Poverty Assessment for Brazil, for example, does not go far enough in discussing the linkages between poverty and deforestation. The report largely focuses on the northeast, where nearly half of Brazil's poor reside, and in doing so neglects important issues such as the impacts of migration on forests and poverty in the Amazon and its effect on deforestation. The Bank's agricultural sector reports have by and large included an annex on the Amazon typically emphasizing the impact of agricultural policies (land used, etc.) on deforestation. The transportation sector work, however, has not involved the impact of transport policies on deforestation.

In general, however, the environmental ESW represents one of the Bank's most important contributions to understanding factors of deforestation. While Brazil has the data and human capital to undertake policy analysis on this level, it appears that up to now the Bank has been a leader in addressing these issues in a multisectoral, analytical framework. It could be argued that the Bank ESW should have stimulated similar analytical work by Brazilians. That the current study has had to rely so heavily on work undertaken by the Bank indicates that very little such policy work is taking place in Brazil. Could the Bank have done more to support analytical work by Brazilians that would more comprehensively incorporate issues related to the Amazon in its work in agriculture, demographic changes, or impacts of transportation?

World Bank Lending Portfolio

The Bank lending portfolio is evaluated below across two time periods, 1984–91 (before the 1991 strategy) and 1992–99 (after the strategy), in an effort to determine the effect of the 1991 Forest Strategy on lending to Brazil.

Before 1991, globally, Brazil was the third largest recipient of World Bank loans, with a total commitment of US$10.6 billion, some 7.1 percent of total Bank lending. Fully one-third of project funds went to agriculture sector projects, followed by electric power and energy, and transportation. Together, these three sectors represented almost two-thirds of the Bank's lending to Brazil during these years (table 8.1). The vast majority of loans (89 percent) consisted of various types of investment lending, with the remaining 11 percent of funds dedicated to three sectoral adjustment loans totaling US$1.2 billion (see table 8.2). According to the World Bank's categories of primary program objectives, 75 percent of the Brazil portfolio was concentrated in projects aimed at "environmentally sustainable development" and "poverty reduction and human resource development" (table 8.3).

Since 1991, lending to Brazil decreased by about 12 percent, with commitments over this period totaling US$9.3 billion. Lending to Brazil as a percentage of total Bank lending likewise declined. Loans to the agriculture and energy sectors dropped significantly from their 1984–91 levels, while transportation projects increased by 41 percent. The years since 1991 also saw a substantial increase in environment sector activity, with total commitments of US$936 million. Adjustment lending after 1991 rose to 19 percent of the portfolio. In terms of the Bank's primary program objectives, 37 percent of all loans involved "economic management," 35 percent concerned "poverty reduction and human resource development," and projects directed at "environmentally sustainable development" fell to 18 percent of the portfolio (table 8.3).

Two Bank projects that were implemented before the 1991 Forest Strategy are particularly noteworthy: the Minas Gerais Forestry Development Project and the Northwest Region Integration Program (POLONOROESTE). In evaluating the post-1991 period, this report will discuss several projects, including the Rondonia Natural Resource Management Project (PLANAFLORO) and the similar Mato Grosso Natural Resource Management Project, the Emergency Fire Prevention Project, the Land Management Project, the Pilot Program to Conserve the Brazilian Rain Forest (PPG-7), the two Brazilian Global Environment Facility (GEF) projects, and the World Bank/WWF alliance. Additionally, the Bank's transportation and land reform projects are briefly discussed.

Table 8.1. World Bank Lending to Brazil by Sector, 1984–99

	1984–91				1992–99				1984–91–1992–99	
Sector	No. of projects	Commit-ments (US$M)	No. of projects (%)	Commit-ments (%)	No. of projects	Commit-ments (US$M)	No. of projects (%)	Commit-ments (%)	Change in commit-ments (US$M)	Change in commit-ments (%)
Agriculture	28	3,539.9	38.89	33.40	15	977.6	22.73	10.46	-2,562.3	-72
Education	6	601.5	8.33	5.67	7	1,082.1	10.61	11.57	480.6	80
Electric power and energy	6	2,070.4	8.33	19.53					-2,070.4	-100
Environment	4	263	5.56	2.48	8	936	12.12	10.01	673	256
Finance	2	600	2.78	5.66	1	20	1.52	0.21	-580	-97
Multisector	1	352	1.39	3.32	2	755	3.03	8.08	403	114
Oil and gas	2	354	2.78	3.34	2	170	3.03	1.82	-184	-52
Population, health and nutrition	5	592	6.94	5.59	4	725	6.06	7.75	133	22
Public sector management	1	29	1.39	0.27	5	595	7.58	6.36	566	1,952
Social					2	1,010.1	3.03	10.80	1,010.1	
Transportation	7	1,214	9.72	11.45	11	1,714.5	16.67	18.34	500.5	41
Urban development	7	607.2	9.72	5.73	3	390	4.55	4.17	-217.2	-36
Water supply and sanitation	3	376.3	4.17	3.55	6	974	9.09	10.42	597.7	159
Grand total	72	10,599.3	100.00	100.00	66	9,349.3	100.00	100.00	-1,250	-12

Table 8.2. World Bank Lending to Brazil by Lending Instrument, 1984–99

		1984–91				1992–99				1984–91–1992–99	
Lending type	Major lending instrument	No. of projects	Commit-ments (US$M)	No. of projects (%)	Commit-ments (%)	No. of projects	Commit-ments (US$M)	No. of projects (%)	Commit-ments (%)	Change in commit-ments (US$M)	Change in commit-ments (%)
Adjustment	Sectoral adjustment loan	3	1,155	4.17	10.90	3	1,760.1	4.55	18.83	605.1	52
Adjustment total		3	1,155	4.17	10.90	3	1,760.1	4.55	18.83	605.1	52
Investment	Adaptable program Loan					3	340	4.55	3.64	340	
	Emergency reconstruction loan	2	275	2.78	2.59	1	15	1.52	0.16	-260	-95
	Financial intermediary loan	4	1,200	5.56	11.32					-1,200	-100
	Learning and innovation loan					2	10	3.03	0.11	10	
	Specific investment loan	49	5,514.7	68.06	52.03	43	5,128	65.15	54.85	-386.7	-7
	Specific investment & maintenance	12	2,409.3	16.67	22.73	12	2,046.2	18.18	21.89	-363.1	-15
	Technical assistance loan	2	45.3	2.78	0.43	2	50	3.03	0.53	4.7	10
Investment total		69	9,444.3	95.83	89.10	63	7,589.2	95.45	81.17	-1,855.1	-20
Grand total		72	10,599.3	100.00	100.00	66	9,349.3	100.00	100.00	-1,250	-12

Table 8.3. World Bank Lending to Brazil by Primary Program Objective, 1984–99

	1984–91				1992–99				1984–91–1992–99	
Primary program objective	No. of projects	Commit-ments (US$M)	No. of projects (%)	Commit-ments (%)	No. of projects	Commit-ments (US$M)	No. of projects (%)	Commit-ments (%)	Change in commit-ments (US$M)	Change in commit-ments (%)
Economic management	10	1,704.3	13.89	16.08	17	3,412.1	25.76	36.50	1,707.8	100
Environmentally sustainable development	26	2,671.2	36.11	25.20	15	1,684.6	22.73	18.02	-986.6	-37
Poverty reduction and human resource development	28	3,838.3	38.89	36.21	28	3,292.6	42.42	35.22	-545.7	-14
Private sector development	5	1,503	6.94	14.18	6	960	9.09	10.27	-543	-36
Not stated	3	882.5	4.17	8.33					-882.5	-100
Grand total	72	10,599.3	100.00	100.00	66	9,349.3	100.00	100.00	-1,250	-12

9

Evaluation of the Bank Program in Brazil

Minas Gerais Forestry Development

The Minas Gerais Forestry Development Project was the only stand-alone forestry project the Bank approved for Brazil in the 1984–91 period. The state of Minas Gerais is the largest producer and consumer of charcoal in the world, accounting for 85 percent of Brazil's output of charcoal for smelted pig iron and steel production. In 1985, the annual consumption of fuelwood in the state was about 115 million cubic meters, of which 77 percent was converted into charcoal. Some 85 percent of this fuelwood derived from native forests, resulting in widespread deforestation and loss of primary forest within the state. To address this situation, in 1991, the state enacted Law 10561 requiring all wood-using industries to become self-sufficient in wood from plantation sources by 1998. It is in this context that the Minas Gerais Forestry Development Project was conceived.

The Bank financed US$48.5 million of the US$100 million project, with the state government contributing US$8.2 million and the subborrowers providing US$43.3 million. Approved in December 1987, the project ran until December 1996. Its objectives were: increase industrial wood and charcoal production, reduce degradation of native forests, alleviate poverty, improve environmental protection, and strengthen the management capabilities of the State Forestry Institute.

The project provided credit to establish privately owned eucalyptus plantations on 165,000 ha; supported a smallholder reforestation program to establish 41,300 ha of eucalyptus and indigenous species; developed and supported various conservation programs such as improvements in forest management, fire control, technologies for charcoal production, conservation education and development of protected areas; and financed institutional development and project evaluation.

The project's Implementation Completion Report (ICR) gave the project a satisfactory outcome rating, as the project achieved most of its objectives. The project achieved the production of 22 million m^3 of industrial wood, conservation of 159,000 ha of native forests through product substitution, prohibition of logging in 390,000 ha of native forest, elimination of fires in and around newly created state parks, growth in the state's protected area system by 47,000 ha, and participation in the reformation of the State Forestry Institute. It contributed to rural poverty alleviation through the creation of about 25,000 person years of employment, additional employment as a result of growth in ecotourism, and diversification of small farmer income through farm forestry. Its contribution to increased environmental protection was the creation of additional protected areas, establishment of 11 environmental education centers, and implementation of environmental education programs and ecological research. The project also promoted an increase in private sector participation in industrial plantations. Through revenue sharing with the local municipalities, the project stimulated demand for setting aside land for conservation. The ICR acknowledged that sustainability of the project-initiated activities depends on the government's willingness to permit the State Forestry Institute to manage and retain the revenues generated from these activities.

The Bank commitment to the project was strong and it performed well in helping the state to convert a conceptually sound local initiative into a well-defined project proposal. It was fortunate to have as a counterpart the director of the State Forestry Institute who had strong political backing. The initial shortcomings of the SFI were identified and remedial measures were implemented quickly during the project, including decentralization. The Development Bank of Minas Gerais was capable of efficiently managing the credit line. Economic uncertainties tended to be a more serious problem for long-term borrowing than anyone had anticipated. In addition, the Bank failed to predict the negative trend in the demand for charcoal, which occurred throughout the project period.

Bank performance during implementation, however, was mixed and sometimes deficient. After making sure that the project got underway, supervision and decisionmaking during the economically turbulent period of 1992–93 seems to have been inadequate. For example, there was no mid-term review in 1993 which was a critical time for the project. This review could have shown that the credit component for plantations was not working and remedial actions could have been taken. A lack of continuity of task managers was a severe problem with five task managers involved in the project over a six-year period. With active mid-term supervision and fewer changes in task managers it would have been a more successful project.

The State Forestry Institute and the Minas Gerais Development Bank performed well throughout the project. The main problem faced by the SFI was a shortage of counterpart funds and a temporary freeze on recruitment. However, the SFI managed to keep the project activities going by allocating its own resources and by obtaining help from NGOs, private firms and universities. The project progress was temporarily impaired in 1990 due to the promotion and transfer of the director of the SFI. The BDMG had no substantial difficulties in managing the sub-loan portfolio. In terms of the legal covenants, the most obvious non-compliance was the insufficient allocation of counterpart funds by the state government, which continued to be the case throughout the course of the project. The states' financial difficulties help explain why the Bank was unable to proceed with the second phase of the project, despite strong state government interest.

The ICR also noted shortcomings in the project and lessons learned (box 9.1). First, the credit component for industrial plantations was problematic. Plantation establishment costs were underestimated, resulting in the reduction of the plantation target from 165,000 ha to 87,000 ha. Second, the unstable national economy and frequent changes in economic policies had severe impacts on loan disbursements. During the second year, the demand for credit sharply declined and not a single sub-loan application was approved during 1993–95. This, along with the fact that only two out of the 24 borrowers accounted for 85 percent of all borrowing, led the government and the Bank to cancel the credit component of the project in June 1995. According to the ICR, these problems caused a 27 percent decline in the amended plantation target. Furthermore, the fluctuation in the demand, supply, and prices for eucalyptus, charcoal, and pulp after the project became effective seriously affected the interest in reforestation and the demand for credit to finance it.

Box 9.1. Lessons Learned in Minas Gerais

- Tree planting can make important contributions to conservation, and economic incentives to small and medium farmers can be substantial, particularly on lands with low potential for crops.
- The economic incentives to small farmers are dependent on access to markets and product demand, therefore supporting the need to conduct a wood demand analysis as a component of project preparation.
- The project demonstrated the contribution of high-quality technical assistance to implementation performance, with evidence indicating that forestry extension is most effective when combined with agricultural extension.
- The introduction of fiscal incentives to create protected areas proved to be highly successful. In future projects, benefit-sharing mechanisms should be explored with local governments to encourage local interest in creating new protected areas.
- A shortage in supervision resources and forestry expertise in the World Bank as well as multiple changes of task managers contributed to an adverse effect on project implementation and the Bank-client relationship.
- Credit ended up benefiting a few large borrowers, supporting the idea that future projects should establish limits on the amount an individual or group can borrow.
- Developing a project in a situation of considerable economic uncertainty made it difficult to predict demand for credit. The project evaluation concluded that a credit component should be avoided when formulating a project under such circumstances.
- The need for midterm reviews was clearly demonstrated in this project as an opportunity to reassess project design.
- The project demonstrated the strong link between project performance and good leadership, including the overall quality of local management.

Source: Implementation Completion Report.

Nevertheless, the project was successful in several important areas. First, the revenue-sharing aspect of creating parks stirred demand for more protected areas. Second, the project involved many local institutions in monitoring and analysis, and in this way was genuinely multistakeholder in nature. Finally, the project had strong political support and leadership.

Despite the success of the project, it did not qualify for extension beyond its original time frame. The poor fiscal situation of the State of Minas Gerais made it a risky borrower. Further, the case for either extension or a follow-on project would have had to be based on the project's small farmer credit component, but this was at a time when the Bank was withdrawing from subsidized credit programs. A better approach, perhaps, would have been to highlight the global benefits of the project by helping to reduce the pressure on the Amazon.

The Minas Gerais Forestry Development Project is thus an example of successful World Bank involvement in Brazil's forestry sector. While the 1997 CAS put forth the Bank's intention to increase lending directly to state governments, it is unclear to what extent such projects will be funded elsewhere, as adequate state-level fiscal programs, which most states currently lack, are a prerequisite for such lending (World Bank 1997b). When small farmers are the intended project beneficiaries, as in this case, financial assistance to them is necessary. But state governments in financial crises, regardless of their political commitment to the endeavor, cannot afford such transfers. How, then, will projects addressing such central issues of externalities be funded?

Northwest Region Integration Program (POLONOROESTE)

During the 1960s and 1970s, the Brazilian government tried to integrate the Amazon into the country's rapidly growing economy. In its attempts to colonize the region, the government implemented mass settlement programs, developed a network of roads and other infrastructure and introduced fiscal incentives intended to attract private investments to the region. These initiatives attracted huge numbers of small farmers and rural workers from south-central and northeastern Brazil. Growing migration, increasing land disputes, and occasional violent conflicts between the settlers and Amerindian groups provided the basis for the Northwest Region Development Program (POLONOROESTE), established in the 1980s.

POLONOROESTE encompassed a total area of 410,000 km^2, including the entire state of Rondonia and the northwestern part of Mato Grosso. The main objectives of the project were to pave the BR-364 highway, provide the investments needed to achieve the harmonious socioeconomic development of the region influenced by the highway, and protect the physical environment and the Amerindian population.

POLONOROESTE, as created by the federal government, had an estimated cost of nearly US$1.6 billion. It was partially financed by six World Bank loans for a total commitment of US$434.4 million. In the first phase of POLONOROESTE, three projects were approved whose main components were improvement of the 1,500 km Cuiaba-Porto Velho highway and expansion of the regional feeder road network, consolidation of selected existing agricultural colonization areas in Rondonia, environmental protection in the region as a whole, and improved rural health services in Rondonia. In the second phase, a rural development project in existing small farmer areas in northwestern Mato Grosso was conducted.

The third phase was to support the establishment of several new settlement projects in Rondonia. All of these overlapping phases were expected to be completed within seven years. In addition to the above six projects, an Amerindian special project, not financed by the Bank, was included in all three phases of POLONOROESTE. Satisfactory implementation of the Amerindian project was a condition of the Bank loans.

The implementation of the physical components of the projects, such as infrastructure investments and the trunk road component, were very successful. Most of the Bank's financing was allocated for various transport components of the program, which were implemented earlier in the project than other program aspects. Most construction activities were implemented within the allocated budgets and in some cases, including the BR-364 highway, were ahead of schedule. However, the results of the nonphysical components of the project—agricultural support services, community facilities, and environment and Amerindian protection—fell so far short of initial expectations that the implementation of POLONOROESTE's various subprojects was seriously unbalanced. The unbalanced implementation posed several major problems. The Bank's resources were disbursed long before the full extent of the distortions in other program components were realized. With most of its financing expended early in the program, the Bank had little leverage to control the other components of the program.

Improvements in transportation opened access to the region's natural resources, allowing a variety of economic agents, including miners, loggers, and ranchers, to operate within the region with virtually no environmental controls. Improved access, particularly in Rondonia, also created new employment opportunities in agricultural and extractive activities, resulting in increased migration. The growing local demands of this population influx for productive and community support services could not by supported by the existing public sector.

The Bank overestimated Brazil's effective capacity to attain the program's social and environmental objectives. The coordinating agency, SUDECO, was institutionally, technically, and administratively weak. Program monitoring and evaluating activities were denied necessary financial and logistical support by the coordinating agency on various occasions. Lack of counterpart funding and the failure to provide agricultural investment credit were largely related to the severe economic recession and fiscal crisis experienced in Brazil at the time.

POLONOROESTE's initial strategy to protect the natural environment was threefold:

- Direct new rural settlements in areas considered to have good potential for agricultural development and away from those areas that were less fertile.
- Encourage an environmentally friendly form of agricultural production in existing as well as new farmer colonies through the promotion of agroforestry.
- Establish and maintain national parks, forest reserves, and ecological stations and carry out regional ecological research programs. These objectives were only partially achieved.

From the perspective of the forest sector review, it is interesting to note that the program was unable to consolidate the cultivation of perennial tree crops with many of the environmental benefits in official colonization and other small farmer areas, or to effectively discourage the expansion of annual crops and livestock production with fewer environmental values elsewhere in the region. This was partly due to the lack of investment credit, declining commodity prices, increasing transport costs, and the need for settlers to produce annual crops and raise livestock in order to guarantee their own livelihood.

POLONOROESTE had ambitious forestry development, environmental protection, and ecological research components. However, attempts to salvage potentially valuable timber cleared from the colonization plots and to introduce forest management techniques were largely unsuccessful. Commercial loggers progressively removed valuable species such as mahogany while in the process disturbing the surrounding forest and opening up additional areas for occupation by squatters and land speculators. National parks and ecological reserves, as well as smaller block reserve areas within official colonization schemes have occasionally been invaded by loggers and squatters, and for the most part, official efforts to limit these invasions and restrict illegal timber extraction have been largely ineffective. The program's ecological research component was relatively good, generating a variety of studies that can be useful in natural resource management and environmental control methods (Redwood 1992).

A midterm review found that the project's mitigating measures were "stunned by weak program coordination, institutional inefficiencies, and undisguised lack of political support for environmental and Amerindian protection" (Mahar and Ducrot 1998).

Although the precise level and rate of deforestation in the northwest is uncertain, satellite imagery shows that land clearing has proceeded sharply since 1985 and that there is a strong correlation between rural

settlement and areas experiencing deforestation. The role of road building is dramatically illustrated by these images, which show a fishbone pattern of land clearing along trunk, feeder, and connector road networks, particularly in Rondonia (see figure 4.2).

The loss of tropical forests such as those that once covered more than half of the northwest region in the late 1970s resulted in the destruction of sensitive nutrient cycling mechanisms, causing a loss of soil fertility and increasing erosion. The planting of perennial crops such as coffee, cocoa, and rubber reduces these problems to a certain extent. In northwest Brazil, due to declining output prices and increasing distances to markets, perennial crop production did not prove to be as profitable as anticipated by POLONORESTE. Much of the cleared forest is being used for annual crop cultivation using slash-and-burn techniques or has been turned into pastures and eventually to second-growth vegetation, all ecologically undesirable outcomes, though essential for livelihoods of the local populations. This supports the arguments of Carpentier, et al.

According to Mahar and Ducrot (1998), "The World Bank's decision to support POLONOROESTE was not an easy one. The Bank had to weigh the consequences of getting involved in an ongoing process over which the government had little control, against the consequences of standing by and letting the process run its course. In the latter case, it is virtually certain that the government would have allocated resources to pave the main overland artery BR-364, but it is doubtful under prevailing fiscal conditions whether adequate resources would have been made available for the health, nature conservation, indigenous protection, agricultural research and extension, and other components designed to mitigate the negative effects of the frontier processes already underway."

Despite the Bank's laudable intentions for social and environmental protection, POLONOROESTE became one of the institution's biggest environmental headaches. Deforestation in the wake of the Bank-financed paving of BR-364 prompted unprecedented reaction from NGOs and catalyzed the international NGO movement. Along with this organized public outcry, the Bank conducted its own evaluations of the environmental consequences of the project, including the 1992 OED environmental review of four Bank-funded projects in Brazil (Redwood 1992). The two parallel processes both contributed greatly to the Bank's development of its 1991 Forest Strategy and other social and environmental safeguard policies. At the same time, the Bank sought to learn from its mistakes with POLONOROESTE in its subsequent lending to Rondonia and Mato Grosso.

The lessons the Bank has said it learned (box 9.2) illustrate the dilemma: on the one hand, letting local and regional institutions take control, and on the other, introducing legal covenants to ensure that the borrower is meeting the environmental standards expected by the Bank's international constituents. The export evaluation recognized that ultimately, borrower commitment to these objectives is fundamental and was clearly lacking in POLONOROESTE.

Box 9.2. Lessons Learned from POLONOROESTE

- The 1992 OED evaluation concluded that it is necessary to move cautiously in promoting road building or agricultural settlements in tropical areas such as Amazonia. In any case, such investments should not be made without prior assessment of regional and local carrying capacities including a detailed evaluation of natural resource potentials and constraints. Equally important is the institutional and enforcement capabilities of the environmental management, protection, and control agencies (Redwood 1992).
- Developing explicit instruments and policies for population distribution and natural resource management at the national and regional levels is critical.
- There is a definite need to improve ex-ante and ex-post assessment of the social and environmental consequences of public investments such as roads and rural development projects that may directly or indirectly impact natural resource use or environmental quality.
- In tropical frontier areas, the Bank's project preparation and appraisal should be based on a sound understanding of the ecological, socioeconomic and political-institutional characteristics of the geographic areas when new investments are considered.
- Bank-supported interventions in tropical forest areas should be restricted to the rural sector or within the rural sector or to small farmers in directed settlement projects. Other small producers and nonpredatory extractivist groups such as rubber tappers; nut, fruit, and oil gathers; and tribal populations, should also be assisted.
- Programs like POLONOROESTE which are complex in nature and involve tropical frontier areas should be identified, prepared, appraised, supervised, monitored, and evaluated by multidisciplinary teams.
- Monitoring of ongoing projects and evaluation of completed projects should directly involve beneficiary populations, responsible NGOs, and public sector officials that are administratively independent of project coordinating and implementing agencies.
- In complex projects that are risky and involve environmentally sensitive operations, in addition to performing a comprehensive midterm review, the Bank should consider establishing its own permanent monitoring and supervision capability in the field (Redwood 1992).
- Projects that are likely to have significant ecological and social impacts and for which loan or credit covenants are used to ensure that adequate precautions or protection measures are taken, such covenants should be unambiguous and contain explicit timetables for borrower compliance. They should be closely monitored and enforced by the Bank. POLONOROESTE clearly shows, loan covenants and other forms of Bank pressure cannot truly substitute for the borrower commitment to the achievement of the project's social and environmental objectives.

Rondonia and Mato Grosso Natural Resource Management Projects

While the POLONOROESTE was reaching its end, the World Bank's next two major projects in the Amazon region, the Rondonia and Mato Grosso Natural Resource Management Projects, were already being processed. PLANAFLORO, as the project was called, and the Mato Grosso Natural Resource Management Project were approved in 1992. Both of these projects were intended to incorporate the lessons learned from the weaknesses of POLONOROESTE. They also were designed in accordance with the strengthened environmental and social policies and procedures introduced by the Bank in the late 1980s and early 1990s.

The proposed Bank loan of US$167 million constituted 73 percent of the US$228.9 million total cost for PLANAFLORO. The cost of the Mato Grosso project was US$285.7 million, of which the Bank financed US$205 million.

The objectives of both projects were essentially identical:

- Provide a coherent incentive framework for sustainable development.
- Conserve the biodiversity of the states while also promoting sustainable utilization of its natural resources to provide direct economic benefit to the local population.
- Protect and preserve the borders of conservation areas, indigenous reserves, public forests and extractive reserves, and prevent illegal deforestation, wood transport, and forest fires.
- Implement integrated farming systems suitable for permanent agriculture and agroforestry, and systems for managed forests and extraction of non-wood forest products from areas in natural forest cover.
- Promote the state's agro-ecological zoning by supporting priority investments in socioeconomic infrastructure and services.
- Consolidate the technical and operational capacity of state institutions, particularly those responsible for agricultural and forestry support services.

Implementation of PLANAFLORO

PLANAFLORO had a lengthy list of components, but a central component was land use zoning of the state of Rondonia, the outcome of which is relevant to understanding the implementation of the 1991 Forest Strategy in action. While prescriptive land use zoning was first proposed in the late 1980s as a means to impose rationality on land use in

the Amazon, PLANAFLORO was the first effort to implement land use zoning in the region on a large scale. The land use zoning underpinning PLANAFLORO's strategy aimed to promote the intensification of agriculture in already-settled areas, in the hopes that increased incomes would diminish the incentive to clear more land (Mahar and Ducrot 1998).

In their study of land use zoning in the Amazon, Mahar and Ducrot (1998) provide an important examination of the political economy surrounding PLANAFLORO. They point out that one of the biggest challenges faced by PLANAFLORO from the beginning was effective coordination between the federal and state governments on one hand, and between the state governments and local communities on the other. A striking example of such incompatibilities is that between 1992 and mid-1995, the federal resettlement agency, INCRA, attempted to establish seven settlements in areas that conflicted with Rondonia's zoning law. The authors assert that, indeed, the challenges associated with land use zoning are more related to political issues than to technical ones.

One lesson the World Bank took from the difficult POLONOROESTE experience was the need to include local stakeholders (box 9.3). Early complaints from NGOs about the lack of community involvement in project design led the Bank to condition its financing on the participation of NGO representatives in project management. Despite skepticism at the beginning of the project, according to Mahar and Ducrot, "many local stakeholders now believe that the existence of [land use zoning] helps to protect their interests." Environmental activists, indigenous communities, and extractivists are among the supporters of zoning. While local politicians support PLANAFLORO (largely owing to the influx of funds into their jurisdictions), they have been ambivalent about land use zoning more generally, for fear of disgruntling economic sectors and harming their chances for reelection. The influx of Bank funds was large indeed relative to the fiscal resources of the state government. But Mahar and Ducrot (1998) go on to point out that some of the strongest support for zoning in Rondonia comes from outside the state, and indeed from outside Brazil, as many of the benefits of zoning accrue at a national and international level. In discussing lessons learned from POLONOROESTE, the World Bank's country department notes that, while working with the state government closely, as POLONOROESTE failed to do, the project design of PLANAFLORO nevertheless had overlooked the importance of a number of interest groups within the state, including municipal governments and NGOs and the extent of their competing interests, and the project should have

Box 9.3. Environmental Consequences of Resettlement

The World Bank has long supported Brazil's resettlement programs, through such programs as POLONOROESTE and PLANAFLORO. But there has been increasing divergence between its environmental and agricultural activities since POLONORESTE. The Bank currently has an active project supporting agrarian reform in five states in eastern Brazil. These projects have developed innovative land acquisition mechanisms, such as the direct purchase of land by groups of farmers, that have resulted in costs three to eight times lower than government land reform programs.[a] But despite its achievements, the project has purposely avoided forested areas (such as the state of Para) because of the administrative hurdles that would be involved within the Bank in approving a project involving the Amazon.[b]

Findings by Carpentier et al. (1999) also provide important policy messages relevant to the World Bank's activities in the Amazon:

Colonization Projects: The World Bank has assisted the Brazilian government in establishing thousands of small-scale agriculturalists in the western Brazilian Amazon. By and large, these smallholders (many of whom arrived to the region quite poor) have escaped poverty (i.e., are now adequately fed) by converting forested land to agriculture. Once welfare poverty has been alleviated, though, this conversion process does not end, since the relative returns to agriculture vis-à-vis permitted forest activities remains high.

Land Use Zoning: Contrary to the lessons the Bank states it learned on POLONOROESTE regarding zoning, reported earlier, Carpentier et al. (1999) conclude that locating farms on better versus poorer soils will only marginally slow deforestation rates and slightly alter patterns of use of cleared land. Farmers on better soils will earn much higher incomes than those located on poorer soils, but incomes of the latter group will still be sufficient to induce settlement. Because agriculture on poorer soils is profitable, farmers will fight zoning efforts that limit access to areas with poorer soils. Establishing land use zones on the basis of land quality will be difficult in practice in the western Brazilian Amazon due to very high heterogeneity of soils within broad soil classes, and even on farms.

Infrastructure Projects: Reducing transport time to markets generally will increase deforestation, but doing so in ways that reduce seasonal fluctuations in transport time will not affect deforestation or use of cleared land. The volume and type of traffic on rural roads may have a greater impact on land use, and perhaps on deforestation, than road surfaces. Policymakers aiming to support markets for perennial tree crops should focus on increasing the volume of truck and bus traffic on rural roads. Reviewing and revising the monopoly status of some bus and truck routes would be a first important step in this direction.

a. The successes of this project are being challenged by the influential landless movement (Movimento Sem Terra) on the grounds that the project averts the government's agrarian reform obligations by requiring settlers to pay for their land.
b. See below for discussion of the land reform projects.

worked more closely with these groups from the outset. Other Bank officials suggest that, while PLANAFLORO has been considerably more participatory in nature than was POLONOROESTE, the Bank neglected to include private-sector economic actors such as loggers and ranchers at the discussion table. Given their powerful political position including in the state assembly their exclusion increased the resistance to the project as well as some useful solutions.

Mahar and Ducrot (1998) conclude that "land use zoning is a valid instrument for guiding land use on tropical frontiers, though it is far from being a panacea." Many of PLANAFLORO's difficulties result from the "prescriptive" nature of the zoning, which imposed land use rules that "often differed greatly from those that would have prevailed had economic agents been left to make their own decisions." Further, PLANAFLORO emphasizes the fact that zoning is inherently political and will not succeed in the absence of broad public support.

PLANAFLORO has had difficulties from the beginning. In June 1995, the intended beneficiaries, represented by local NGOs, requested an investigation of the project by the World Bank Inspection Panel. The claimants, though supporting the main objectives of PLANAFLORO, argued that the project's intended beneficiaries had been adversely affected by the Bank's failure to enforce and implement its loan agreements and policies, particularly regarding land tenure issues. Following its investigations, the Inspection Panel recommended that the Bank's Board authorize a full investigation, determining that material harm had in fact occurred and could be linked to policy violations. However, the Board decided against an investigation (Udall 1997). The Inspection Panel nevertheless made several recommendations for project improvement (see Annex D).

Most of the recommendations of the Inspection Panel were implemented in the July 1997 restructuring of the project. The project is two years behind schedule and continues to be at substantial risk, according to the Bank's Quality Assurance Group (QAG, see Annex E). The latest Project Status Report rates progress as satisfactory, however, because considerable accomplishments had been made in zoning, consolidation of the environmental components, and the decentralization Program of Support to Community Initiatives (PAICs, Programa de Apoio as Iniciativas Comunitarias). However, unilateral modification of the zoning law, introduced by the State Legislative Assembly, with the support of powerful ranchers and loggers, has considerably weakened this legal framework. The state government has committed itself to take immedi-

ate remedial actions to restore the credibility of the zoning law; however, the transfer of ownership from the federal government to the Government of Rondonia of those areas required for the consolidation of environmental activities already is well advanced. The Project Status Reports (February, June 1999) state that an interruption of the project at this stage would prevent the completion of the socioeconomic zoning and the consolidation of environmental and socioeconomic activities, therefore jeopardizing the returns of all the investments already concluded. The task manager recommended an extension of the project closing date.

From the outset, PLANAFLORO has involved a delicate balancing act of various political and economic interests. These lessons are fundamental to any Bank work related to the Amazon, as political economy issues are at the crux of the region's future.

Despite its failure to more fully include private sector interests and the delayed involvement of the Ministry of Environment, through its involvement in PLANAFLORO, the World Bank has perhaps increased its credibility as a facilitator of stakeholder dialogue. This may be an important future role for the Bank provided it builds upon lessons learned from projects such as this one and improves its conflict resolution/consensus building skills largely by drawing on Brazilian national institutions that can carry the credibility to be objective facilitators from the viewpoint of all parties concerned. The intensely political nature of land- and resource-related issues is crucial in forest projects, and the Bank has been quite weak in handling them both in Brazil and elsewhere, with a broad range of national institutions. However, this is changing very rapidly in recent years (see, for example, the OED reports on India, China, Cameroon, and Indonesia).

Implementation of the Mato Grosso Project

The Mato Grosso project faced the same difficulties as PLANAFLORO but did not go to the Inspection Panel. Like PLANAFLORO, the Mato Grosso project was restructured in February 1998, incorporating the recommendations of management and the Inspection Panel regarding PLANAFLORO. Currently, the Mato Grosso project is 12 months behind schedule. The latest Project Status Report indicates satisfactory progress toward consolidation of the environmental components, demarcation of indigenous areas, training assistants for indigenous health and education, and the implementation of the PAIC. However, extremely lengthy negotiations for the extension of the zoning contract, along with severe financial difficulties, suffered by the State

of Mato Grosso in relation to disbursement of project funds, have paralyzed the implementation of the zoning component. This issue has now been resolved by the intervention of the state government and the country director. The management of the project is considered satisfactory. Financial management has also improved since a new system of loan administration has been established. The project is therefore expected to return to its normal pace of implementation during 1999. A further extension of the project closing date may be required past December 1999 since the federal budget for fiscal year 2000 has been severely reduced and consequently the project is expected to suffer implementation delays.

Emergency Fire Prevention

The Emergency Fire Prevention Project, approved in 1998, has not yet become effective. The total project cost is expected to be US$27 million, of which the Bank component is US$15 million. The intent of the project is to prevent or control large-scale wildfires in the Brazilian Amazon during the dry season. The components of this project are risk assessment and monitoring of critical areas, forest fire prevention, forest fire suppression, and project coordination, monitoring, and evaluation.

QAG studies show that speed in declaring effectiveness is a good predictor of project success. The delay on this project, therefore, does not bode well for its future accomplishments. The main causes of the delay are legislative and administrative problems. The project is expected to be effective in 1999, but as of October, Brazil had yet to fulfill the effectiveness conditions stipulated in the loan agreement of April 1999.

Land Management Projects

The situation on project performance in southern Brazil tends to be far better. With substantial population interest and commercial agriculture, demand for resource management among the political beneficiary populations and state governments tends to be quite high. These projects could easily have incorporated agroforestry components but have missed the opportunity. The Bank has been involved in improved natural resources management and microwatershed development projects in southern Brazil since 1989, when it approved the Parana Land Management I Project for US$63.0 million. In July 1991, the Bank approved the Land Management II Project, for US$33.0 million, in the neighboring state of Santa Catarina. These projects, implemented with the full participation of local farmers, municipal governments, and the private sector, showed

that microcatchments can be effective units for planning and implementing improved natural resource management activities.

The Parana Land Management I project, which closed in March 1997, has effectively supported the effort of the State of Parana to reduce soil degradation and erosion and improve soil fertility, moisture, and storage capacity by introducing innovative technical approaches for economically viable investments in soil conservation and management. As a result, production of major crops and income of farm households improved significantly. More important, not only did participating farmers assimilate and integrate the project's soil management techniques but, through the demonstration effect of these techniques, farmers in the region followed their example and demanded that other states formulate similar projects. The Land Management I Project was identified as one of the 10-best projects financed by the Bank.

The implementation of the Land Management II Project, having suffered an initial two-year setback due to delays in loan effectiveness, accelerated once the project concept was disseminated at the local and microcatchment levels due to farmers' very positive response to the project strategy. The midterm evaluation, carried out in 1996, confirmed that a number of project-promoted soil and water conservation practices were substantially above appraisal estimates. Project achievements demonstrated that natural resources depletion processes resulting from inadequate land husbandry could be reversed in a relatively short period. The project methodology and its results have motivated the Secretariat of Agriculture and Rural Development to elaborate a sustainable, multisectoral rural development strategy, with participation of representatives of all sectors of society, at local, municipal, and regional levels. In spite of these advances, however, the project needed additional time to make up for the start-up delay and thereby fully achieve its objectives and make full use of available financial resources.

The Land Management III Project focuses on the state of Sao Paulo, the second largest of the four states in the southeast region, with a total area of 248,600 square kilometers. Sao Paulo is one of the wealthiest and most populous states in Brazil and currently generates 35 percent of the country's GDP and has 22 percent of national population. It is a highly industrialized state accounting for 45 percent of the national industrial output. Agriculture also remains an important aspect of the state's economy and contributes 15 percent to the national agricultural output and generates about 15 percent of the jobs within the state. Currently, about 9 percent—about 14.3 million—of the state's economi-

cally active population lives in rural areas. Agricultural intensification has resulted in increasing pressures on the state's natural resources and has had an adverse impact on forests. The forests in Sao Paulo, which once covered 65 percent of the state, now cover only about 11 percent. Of that, 7 percent is native forest found on the coastal ridges of the Serra do Mar and Serra Mantiqueria.

Land Management III is intended to benefit 90,000 farmers in about 1,500 microcatchment areas, of which 85 percent own less than 100 ha. The beneficiaries comprise about 30 percent of all of Sao Paulo's farmers. This project was approved in 1998, with total project costs estimated at US$125 million. The World Bank commitment is US$55 million, and the cost of the forest-related component in this project is US$8 million.

The intent of the project is to increase sustainable agriculture production, productivity, and farm incomes while conserving natural resources. The project has five major components:

- Technology and institutional development that will finance rural organizations and extension services and support agro-ecological mapping at the microcatchment level
- Adaptive agricultural research
- An incentive program for the management and conservation of natural resources through environmental education, incentive funds for soil management and conservation, pollution control, recovery of degraded lands, reforestation, and enforcement of soil use laws
- Erosion control works for the rural roads
- Training and dissemination of information; project coordination and administration unit that will finance monitoring and evaluation, including internal and external auditing.

In addition, the project provides US$8.2 million to encourage microcatchment communities to reforest either continuous protected strips along watercourses or small plots in steep areas or on soils that are unsuitable for agriculture, in order to improve the quality of water, regulate river flows, and reduce sedimentation.

The project has suffered from effectiveness delays from the very start. In fact, it was first appraised in November 1992 and negotiated in February 1994, but was not presented to the Board, mainly because of the financial difficulties faced by the state at that time. In September 1997, the project was renegotiated to reflect the changes resulting from the completion of the recent debt restructuring program, finally gaining Board approval in October of that year. However, because of federal

restrictions on the approval of new loans resulting from the latest financial crisis, the loan documents have not been approved by the Procuraduria General or by the federal legislature. Since early 1998, the project has proceeded according to the Project Implementation Action Plan, mainly concentrating on the training of the Project Coordinating Unit personnel and the regional and field staff. However, since late 1998, the project activities have stopped due to the lack of budget, as budgetary allocations were a condition for loan signature. In February 1999, the Bank asked the state government to affirm its interest in the loan and suggest a date for signing the loan.

Agriculture and Forestry Technology Development

The Agricultural Technology Development Project seeks to increase the efficiency and sustainability of resource use in the Brazilian National Agricultural Research System (SNFA). The total project cost is US$120 million out of which 50 percent is financed by the Bank (US$60 million). The remaining US$60 million is provided by the GOB (US$30.5 million), EMBRAPA (US$12.8 million), and other beneficiaries (US$16.7 million).The objectives of the project are to: (1) stimulate transition in the SNPA from its current heavy reliance on public sector research carried out by the national organization, EMBRAPA, to a more integrated and diversified system of Agricultural Research Technology Department and Transfer (ARTDT) led by EMBRAPA; (2) increase the role of clients in the definition of research and technology transfer priorities and implementation; (3) refocus on public sector research on quintessential public goods; and (4) help EMBRAPA to reorient its current structure to address issues of decentralization and diversification in the SNPA. The project components to achieve these objective are: (1) financing a Competitive Grants System for agricultural research, development, and technology transfer; (2) strengthening research management through technical assistance, training, satellite communications, and international collaborations at the federal level; (3) strengthening research and technology transfer activities at the state level; and (4) and monitoring and evaluating the project overall.

The focus of traditional agricultural research is changing to incorporate issues such as poverty alleviation, environmental sustainability, increased productivity, and an enhanced role of private sector. Therefore, the competitive grants component of the project focused on five essential areas: natural resource management, advanced technologies, agribusiness, family farms, and strategic studies.

According to the latest project status report (April 1999), one of the major constraints facing the project is the lack of a budget. EMBRAPA had requested a budget of US$14.6 million for calendar year 1999 (Brazil's fiscal year) for project implementation and will receive only US$4.1 million. Because of the current financial crisis and the resulting reduced counterpart funding, the disbursement figures have been downsized for FY99 to reflect the devaluation of the Real. This will limit project pace and impact unless the government improves the budget allocation. Furthermore, due to a major devaluation, EMBRAPA has to spend almost twice as many Reals to be able to obtain the same disbursement in dollars. This, too, is expected to slow down rates of disbursement.

The project has made substantial progress in a relatively short time toward achieving its objectives. However, progress has been slow in mobilizing private investments in agricultural research. Frequent refinements of the intellectual property rights (IPR) legislation passed in 1996 has created confusion about the terms on which the private and public sectors can cooperate. Agreements reached between the public and the private sectors under the competitive grants program for sharing of research benefits have had to be revised in light of legislative revisions. The response of the private sector to the competitive grants program has been less favorable than expected, leaving uncertainty as to the program's future role. In view of the budgetary constraints, EMBRAPA is exploring alternative sources of long-term financing for public sector research. The financing of the state research system remains even more uncertain due to budget limitations with huge gaps among states in terms of research funding.

Global Environment Facility

The post-1991 period has in some ways seen a paradigm shift for the World Bank, moving away from direct involvement in forest-related projects to acting as an implementing agency. The thrust of the Bank's forest-related activity in Brazil now is centered on the internationally funded Global Environment Facility (GEF) and US$300 million Rain Forest Trust/Pilot Program (PPG-7) to Conserve the Brazilian Rain Forest. The Bank also is participating in an alliance with the World Wide Fund for Nature (WWF). The alliance is encouraging countries, including Brazil, to set aside a global total of 50 million ha of tropical forests by 2000, and bring an additional 200,000 ha under sustainable management.

Presently there are two GEF forest projects in Brazil that are rather small relative either to Brazil's biological resources or its needs: the National Biodiversity Project (PRONABIO) and the Brazilian Biodiversity Fund (FUNBIO), both of which were approved in 1996.

The National Biodiversity Project (PRONBIO), supported by a US$10 million grant and an additional US$10 million in host country matching funds intended to: assist the Brazilian government in initiating a program for the conservation and sustainable use of biodiversity by identifying priority actions; stimulate the development of subprojects through the facilitation of partnerships between the public and private sectors; and disseminate biodiversity information. The key aspects of this project include defining clear biodiversity conservation strategies through stakeholder collaboration, developing strategic government financing decisions and policy recommendations, testing new models of biodiversity conservation and sustainable use, and developing alliances between rural and local groups and the government to improve the decisionmaking process for biodiversity conservation and use.

The implementation of PRONABIO has largely been satisfactory; however, a shortage of counterpart funds has been a problem. The Government of Brazil recently requested the Bank to prepare an amendment that reallocates the grant proceeds in order to deal with current lack of counterpart funds for project implementation.

The Brazilian Biodiversity Fund (FUNBIO) Project, financed by a US$20 million GEF grant, is intended to provide long-term support for conservation and sustainable use of biological diversity in Brazil by promoting and supporting partnerships among government, non-profit organizations, academic institutions, and the private business sector. The intent of the project is to create an efficient and transparent framework for funding critical biodiversity subprojects over the long run in Brazil, leverage financial resources from Brazil's private sector and from international donors so that FUNBIO can become a long-term financial source for Brazil's biodiversity conservation, and promote changes in the private sector's approaches to more sustainable use of biodiversity.

Though the FUNBIO project has been performing well, some problems have arisen with the host institution. Recently, the Foundation Getulio Vargas (FGV), the host institution for this project, informed the Bank of its decision to discontinue its support for FUNBIO's operation. The decision came about as a result of FGV's internal restructuring, which aims to help the institution to focus its attention on activities with higher rates of revenues. After consultations with the Bank, FGV

has agreed to continue to host FUNBIO in the transition period until its replacement is found. According to the project status report, these changes have not as yet affected FUNBIO's operational performance.

Pilot Program to Conserve the Amazon Rain Forest (PPG-7)

At a 1990 summit of the G-7 industrialized countries in Houston, Texas, German Chancellor Helmut Kohl proposed the establishment of a pilot program to reduce deforestation in Brazil's tropical forests. Its objectives are to:

- Demonstrate that sustainable economic development and conservation of the environment can be pursued at the same time in tropical rainforests.
- Preserve the biodiversity of the rainforests.
- Reduce the rainforests' contribution to the world's emission of greenhouse gases.
- Set an example of international cooperation between industrial and developing countries on global environmental problems.

Formally launched in 1992, the program became operational in 1994. Funded by the European Union, Canada, France, Germany, Italy, Japan, the United States, and the United Kingdom and administered by the World Bank, the 12 projects of the pilot program now have an estimated total cost of US$340 million (table 9.1). PPG-7 and its component pilot projects address issues of indigenous communities, extractive reserves, rainforest corridors, and forest fires and deforestation. Additionally, the increased emphasis on participation embodied in the projects has enabled the much-needed involvement of civil society. The innovative

Table 9.1. PPG-7 Projects, Status, and Cost

Projects	Total cost (US$M)
Ongoing	
Science centers and directed research	26.56
Demonstration project	29.54
Extractive reserves	9.69
Natural resources policy project	85.10
Indigenous lands project	23.96
Total	174.85
Starting	
Forest resources management project	19.61
Monitoring and evaluation project	4.41
Total	24.02
Under preparation	
Floodplain resources management	21.93
Fire and deforestation	9.53
Rainforest corridors	50.09
Municipal demonstration projects	14.31
Indigenous demonstration project	14.55
Total	110.41

Source: Review of Institutional Arrangements 1999.

program has raised expectations among the rainforest constituency both in Brazil and internationally and has made some important contributions, particularly in building a constituency of Brazilian NGOs and professionals that has acquired considerable voice in Brazil's "green" environmental policies. But a recent blue-ribbon panel review of the institutional arrangements is critical of the Bank and the other donors participating in the program. It concludes that:

> The (disappointing) state of affairs [within PPG-7] reflects lack of an agreed pilot program strategy, weak program management, inability of the Participants to address and resolve fundamental program issues, as well as complex project designs and financing plans which have led to costly and time-consuming project processing. Slow coalition-building with Brazilian civil society and with the private sector has deprived PP/G7 of needed support." The review further observes, "the existing institutional arrangements (of vesting responsibility for the program with the World Bank) have not succeeded in catalyzing the needed Brazilian ownership and leadership of the pilot program, and have allowed weak structure, poorly defined accountabilities and unclear and overlapping role assignments to compound the performance problems of most, if not all of the Participants. (Review of Institutional Arrangements 1999).

The review suggests that the Bank could have added greater value had it acted according to its comparative advantage rather than becoming bogged down in design and implementation of individual projects. Specifically, the report finds that the Bank was not effective in articulating an operational strategy up-front for the pilot program or in linking the PPG-7 to broader policy issues and building a policy dialogue with the government concerning the Amazon. The Bank prioritized project cycles and project formulation and preparation above overall program management. The Bank's interpretation of its fiduciary responsibilities also created a situation in which project managers confront triple supervision and clearances, from the Brazilian government, donors, and the World Bank.

The review finds that the donors, for their part, while agreeing to the project concept of the PPG-7, failed to actively engage in project management. Germany, the largest donor, delegated the implementation of its financial and technical assistance on a project-by-project basis to KfW (the German Bank for Reconstruction) and GTZ (the German Agency for Cooperation), respectively, and informally delegated program oversight to the World Bank. Similarly, the European Commission[33] left important issues to the government and the Bank to carry out. The review says that the United Kingdom and United States "stayed aloof" from program management and policy issues, also leaving these matters to be addressed by the Government of Brazil and the World Bank. The review

asserts that "overall, one is led to conclude that none of the Participants accepted program management responsibilities."

These institutional weaknesses within the donor community itself have been combined with the lack of ownership of the program by the Brazilian government. Moreover, fundamental program complexities have meant that as of 1999, only five of the program's 12 projects are under implementation, with two more poised to commence and five others in various stages of preparation. Overall, projects of strategic importance for the attainment of pilot program objectives have yet to be started while proposals for replenishment and second-stage development are already being entertained for the projects which had an early start and as yet the program has no learning strategy. To address these weaknesses the review recommends creating a Managed Partnership, in which the Government of Brazil as the "owner" of the pilot program, invites the major donors and the World Bank, as trustee for the Rainforest Trust Fund, to join it as partners to manage the PP/G7 as members of a Joint Program Steering Committee (Review of Institutional Arrangements 1999).

A particularly noteworthy feature of the PPG-7 program is not only its externally driven nature but also the trickle of resource levels committed by donors. The Brazilian government has not actively sought international involvement in the region, whereas the donors, while making small financial contributions, have expected the World Bank to pursue an ambitious environmental agenda they believe only the Bank can pursue with the Government of Brazil. The World Bank officials responsible for Brazil's country assistance have been concerned about being criticized in Brazil for pursuing the agenda of the international environmental community and therefore having the entire effort backfire if the Government of Brazil considers the discussion of sensitive internal political issues so internationalized as to suggest that the Bank and the international community get out of addressing these issues altogether. The Bank thus finds itself "between a rock and a hard place." It believes that the strategy of supporting Brazilian institutions and building the capacity of Brazilian professionals to take up the cause, while slow and unpredictable in yielding results, is the most effective approach in large countries like Brazil. One must question how ultimately successful or replicable an externally imposed strategy such as this can be as the World Bank moves toward a "demand-driven" country assistance strategy, particularly when it involves "a drop in the ocean" level of contributions by donors when the short- and medium-term economic

and political benefits of deforesting at all levels are immense, as this report indicates. The long-term environmental benefits, while considerable to the global community, are also difficult to detect in the short and medium term.

There is beginning to be an improved understanding of the importance of developing national consituencies and ownership of environmental objectives and strategies. At the time of the publication of this review, a multi-stakeholder group which participated in the second World Bank initiated or co-sponsored workshops had begun to coalesce at the national level. There is also a recognition among Brazilian environmental groups and their international counterparts that similar multi-stakeholder consultations are needed at the state level and below to develop domestic consensus and national ownership of environmental objectives.

Positive steps have also been taken in this direction in PPG-7 by getting the Government of Brazil actively involved in the program's management. While not meeting its original objectives, the program has demarcated more than 39 indigenous lands, some extractive reserves now serve as models for conservation and development, and 160 demonstration projects in natural resource management have been carried out, resulting in a stronger relationshiop between civil society, the Government of Brazil, and the Bank. The PPG-7 has also helped stimulate an active interest in certification issues.

Projects with Possible Impacts on Forests

As shown in the discussion of CASs earlier, in recent years, environmental issues have assumed increasing importance in the Bank's program in Brazil. Over the past decade, the Bank has supported environmental, forestry, and Amerindian protection programs under many of its projects not directly related to national resource management in Brazil. The Northwest Region Development Projects and the Carajas Iron Ore Project were the first of these projects in Brazil to include significant environmental mitigation components. Again, their results were mixed but provided important lessons regarding the design and execution of environmentally sound programs. Subsequently, more successful operations were developed and implemented: the First Electric Power Sector Loan (Loan 2720-BR), the Parana Land Management Project (Loan 3018-BR), the Amazon Basin Malaria Control Project (Loan 3072-BR), the Industrial Pollution Control Project Loan 2831-BR), the National Industrial Pollution Control Project (Loan 3480-BR), and the National Environmental Project (Loan 3173-BR).

Carajas Iron Ore Project

The Carajas Iron Ore Project (a US$304.5 million loan) was approved in 1982, and implemented by the Rio Doce Valley Company (Companhia Vale Do Rio Doce, CVRD). It supported the establishment of the mining facility at Carajas, and was notable at the time for the heavy emphasis it placed on limiting the environmental impacts of the mine. The project achieved its stated objectives. It was completed 10 months ahead of schedule, with substantial cost under runs (US$73.6 million was canceled), but while very efficiently managed by CVRD, it had a number of unforeseen environmental effects that gained international publicity. The Project Performance Audit Report (PPAR) for the Carajas project stressed that, while environmental management in the area directly under CVRD's control was excellent, and the Special Project for protection of nearby Amerindians did bring significant benefits, the Bank and CVRD failed to anticipate the impact of this project on the degradation of the physical environment and human conditions in the project's indirect area of influence. This was mainly due to the strong migrant inflows in the area facilitated by the construction of the Carajas railroad.

The major negative effects of this project were social problems, in particular deteriorating health conditions in rapidly growing frontier towns unable to provide basic sanitation systems; pressure on Amerindian communities from settlers, prospectors, and loggers; and rural violence. Physical deterioration of the environment in the Carajas corridor is evident in erosion and land degradation caused by deforestation, and was attributed to poverty (subsistence needs of poor migrants), government colonization schemes, fiscal and credit subsidies to unsustainable agriculture and livestock activities, land speculation, and logging. Although it is difficult to isolate the share of CVRD and other unrelated programs such as the Belem-Brasilia and Belem-Sao Luis highways, the Tucurui dam, the Colone colonization the Serra Pelada garimpo), the PPAR pointed out "a continuing moral obligation of CVRD to assist broader official efforts to provide needed infrastructure and services to the rapidly growing rural and urban populations—as well as to limit environmental degradation—in the region," and urged the Bank "to be open to the possibility of providing additional assistance for socially and environmentally sound development projects in this area." The report also stressed the importance of institutional strengthening at the federal, state, and local levels; increasing public awareness and active community participation in program design and monitoring activities; and the need for cross-sectoral approaches to solv-

ing the region's problems. The follow-on Environmental and Conservation project would seek to contribute to increasing basic scientific and ecological knowledge of the area; improve the restoration, conservation, and management of natural resources; monitor environmental quality throughout the Carajas corridor; promote urgently needed social infrastructure development in deprived frontier towns; and protect the Amerindian populations.

Environmental Conservation and Rehabilitation

The Environmental Conservation and Rehabilitation Project, which followed on the heels of the Carajas project and was implemented by the CVRD, was financed by a Bank loan of US$50 million.

The project is intended to support the entire environmental program of CVRD by financing high-priority investments throughout its operations; bring about changes in CVRD's policies, systems, and procedures needed to reinforce sound environmental policies and management and help ensure that further development schemes in which CVRD would participate in this area are planned and implemented in ways that are environmentally sound and socially fair; and correct some of the negative indirect environmental and social impact of CVRD's operations in sensitive portions of its area of influence, in particular in the Carajas corridor. The project is intended to correct and prevent further environmental and social degradation in the Carajas corridor by solving the pig iron plant issue; ensuring the continuity of efforts to protect and assist Amerindian communities while placing increased emphasis on self-reliance and community participation; contributing to the alleviation of poverty in communities near CVRD's facilities through the provision of clean water and sewerage systems; and improving knowledge of sustainable development in the Eastern Amazon and Mata Atlantica regions by using the strong research and implementation capacity of CVRD for the study and development of tropical forest management and agroforestry systems. The project would also allow the Bank to gain additional insight on how large industrial and mining concerns should identify and mitigate the indirect environmental and social impact of large projects in ecologically sensitive areas.

The project includes air, water, and soil pollution control and land reclamation investments in CVRD's mining, industrial, rail, and port operations throughout the country (58 percent of project cost); natural resource investments, which include reforestation and the conservation of natural forest and ecosystems in or around CVRD's installations;

and fauna and flora inventories and conservation (6 percent of project cost); investments for the alleviation of social problems in ecologically sensitive areas in CVRD's area of influence, including municipal improvements in towns affected by CVRD; and the continuation of the Amerindian program financed under the Carajas Iron Ore Project (19 percent of project costs). It also includes studies, research, training, and technical assistance, including a comprehensive impact assessment of the Tubarao industrial port, other pollution monitoring and impact studies and socioeconomic development studies (3 percent of project costs); implementation of a comprehensive corporate environmental information, control, monitoring, and auditing system (2 percent of project costs); and other subprojects and studies aimed at improving the welfare of communities in CVRD's area of influence.

It is hard to tell from the supervision mission reports exactly the level of progress on the project from an *environmental perspective* of this review, since there appear to have been obstacles to project implementation including restructuring of CVRD, resulting in differential rates of progress on the project's engineering aspects and other issues. However, progress—including on environmental impacts—generally appears to have been slow.

Implementation of Environmental Conservation and Rehabilitation Project

Catching up with past delays will require a major effort on the part of CVRD in 1999 and early 2000 to remain on schedule and procure and contract the remaining investment subprojects in the southern system. CVRD, however, is committed to improving project implementation. It has prepared an ambitious set of goals and a timetable for implementation under the Bank-financed project. A total of US$30.3 million is planned to be committed for investments in the southern system alone in 1999. Due to the privatization (April 1997) and the reorganization process that started shortly thereafter, implementation of CVRD's Environmental Management System (SGA) during 1997 was slow in almost all areas, particularly in the southern system. During 1998, implementation of SGA accelerated in the Carajas mine operation and resulted in its receiving ISO 14001 certification in December 1998. However, implementation of SGA in the southern system remained very slow until the last quarter of 1998. Therefore, it was agreed during the supervision mission that the directors of the northern and southern systems would issue formal instructions, emphasizing management's commitment to the implementation of SGA.

Amerindian Assistance Program

Due to privatization and the time needed by new management to take on responsibilities within the new structure, CVRD's approval of its policy toward its Amerindian Assistance Program was substantially delayed. The policy was finally approved in August 1998, incorporated in an internal instruction, and sent to the Bank. The 'CVRD agreed that it should reduce its emergency assistance to Amerindians and increase programmatic assistance such that it can lead to substantial self-reliance by indigenous groups. In particular, CVRD needs to gradually hand over responsibility for development activities in the indigenous areas under its influence to qualified NGOs or other private sector entities.

Studies and Indirect Impact Sub-Projects

The project, with the help of a grant from Japan, includes a number of studies supporting Amerindian local communities (Xicrin forest management and Gelado Environmental Protection Area) and conservation of natural forests (Linhares and Carajas/Tapirape). All four studies were reported to have been making good progress and should offer useful insight

Transportation Projects and the Forests of Brazil

Since 1991, the World Bank has financed 11 transportation projects, accounting for 18 percent of the total Bank commitments to Brazil. However, none of these highway projects have been located in forest-sensitive areas. Federal highway projects have been limited to the maintenance and rehabilitation of existing highways, whereas the state highway projects have mainly been on the east coast (Alagoas, Santa Catarina, and Rio Grande do Sul) and in the *cerrados* (Piaui, Tocantins, and Maranhao).

The project appraisal reports of the transportation projects in their environmental assessment sections state that the direct environmental impacts of the transportation projects reviewed will be primarily related to quarries and borrow pits, disposal of used pavement materials, other wastes, and the activities of the road crews, although it is possible that upgrading and paving of the roads could have indirect environmental impacts through increased settlement or intensified land use. Therefore, it would be advisable during project preparation for rural agencies to revise their norms and specifications for road engineering and works in order to incorporate appropriate requirements for environmental quality for the works and to make payments to contractors subject to compliance with these requirements. The road sections to be

upgraded or paved in the first year of the project should be in areas that are already developed or located away from environmentally sensitive areas. It is important to carry out environmental assessments for all such sections to be improved or paved in the first year of the project.

Land Reform Projects

Land reform is an important issue in Brazil, where land and income distribution are highly skewed. Brazilian members of this team have argued for increased involvement of the World Bank in ensuring secure land tenure. They believe that titling is central to improving smallholders' incentives to invest in sustainable forest management, although Schneider, Vosti, and Carpentier argue that titling will not necessarily result in improved forest management. Therefore, as with transportation projects, the World Bank has backed away from potentially controversial lending in the Amazon, such as infrastructure development and land reform.

The Bank is about to begin financing the first phase of a three-stage Adaptable Program Loan (APL) to support the Government of Brazil's long-term program of agrarian reform. The US$1 billion project has been preceded by two Bank-financed pilots that the Bank considered highly successful. The first was a component within the Ceara Rural Poverty Alleviation Project, and the second was the stand-alone Land Reform and Poverty Alleviation Pilot Project (known in Brazil as *Cedula da Terra*) under implementation in five states of northeast Brazil. These pilots have tested a market-based approach to land reform in which beneficiary community groups negotiate directly with willing sellers for the purchase of suitable properties, and then also obtain financing for complementary community subprojects and technical assistance to establish themselves and improve the productivity of the acquired land. The Bank investments are rather small relative to the magnitude of the landless people. The ongoing Loan 4147-BR is aimed to benefit 15,000 families in three years. Further, 8,000 families have been titled and the remaining 7,000 families will receive titles and settle in the next 4-6 months. Another 25,000 families have identified properties and negotiated sales with owners (but will not complete the transaction until financing is available).

The two pilots have led the government to establish a National Land Fund (*Banco da Terra*), with an initial capital of R$250 million, to finance land purchases for rural and peri-urban poor households.

10

Summary and Conclusion

The World Bank has clearly diminished its lending presence in the Amazon in the past decade. It has moved from the "big projects" era of the 1960s through the 1980s and strong economic and sector work to a more careful approach at the end of the century with attempts once again to focus on strategic issues and smaller projects, including pilot activities. This appears to be due both to the poor performance of earlier projects—which prompted a more risk-averse Bank strategy following the intense international scrutiny and criticism that contributed to the cautious approach urged by the 1991 Forest Strategy—and to a lack of demand in Brazil for Bank funds. Brazil's macroeconomic difficulties—its balance of payments and fiscal deficits—have led the government to be selective as well as to shift lending to quick-disbursing activities. This is evident in the most recent land reform programs.

Controlling deforestation is not easy given the large number and level of national and global forces and actors affecting it. The number and effectiveness of policy instruments available to national and regional policymakers' (and to the World Bank) to control these factors seem fewer than previously believed. This is in part because some policy instruments are not commonly used for political reasons, and in part because the impact of others can either be blunted by markets or even distorted by market imperfections.

If the Bank is to be a facilitator for balancing the needs of stakeholders (e.g., the poor and the indigenous people) and national and global interests, it must be seen as an objective bystander. The 1991 Forest

Strategy, however, clearly emphasizes the importance of slowing down rates of deforestation and protecting biodiversity in the tropical moist forests due to the *global benefits of maintaining the forest cover and biodiversity*. While it recognizes the national benefits, this review has demonstrated why to many (but by no means all) stakeholders, the national short- and medium-term costs of *not* deforesting seem higher than the benefits. The Bank's 1991 Forest Strategy acknowledged this risk but did not address it. Similarly, the strategy emphasizes the importance of protecting the rights of indigenous people, by implication emphasizing the primacy of the rights of the indigenous people over those of the local poor. The Brazilian government has at times seen the Bank's advocacy of these two objectives as presenting the international perspective and serving the international agenda. If so viewed, it compromises the Bank's ability to be seen as an objective bystander facilitating reconciliation of conflicting interests. Rather, the Bank appears to be an advocate for global objectives even if these are at the cost of national and local interests. The Bank cannot be a facilitator unless it is viewed by both parties as not serving the interests of only one party. This inherent dilemma in the strategy has not been resolved, as the Bank is, after all, a lender to Brazil and has not been able to bring to it any significant amount of "soft" resources.

Summary Evaluation

Relevance

The Bank's 1991 Forest Strategy devoted considerable space to the loss of forest cover, particularly of the tropical moist forest of the Amazon and its global implications for climate change and biodiversity. It also recognized the divergence between the private and social costs and benefits of forest conservation at the national and global levels. While it recognized the need for transfers to bridge the gap between the private and social costs and benefits, it did not offer a mechanism to do so, except to mention the Global Environment Facility.[34] Reflecting the differences among respected professionals regarding the meaning of sustainable forest management, the strategy could not offer an unequivocal definition and offered instead three different definitions. It skewed the importance of a multisectoral approach and internal returns, international cooperation, participatory approaches, and respecting the rights of indigenous people.

This report has demonstrated the existence of these externalities caused by a variety of factors: the generally weak to nonexistent, yet revenue-hungry state and municipal governments; lack of effective policy instruments and institutional capacity to influence, control, or monitor vast areas; lack of sufficient knowledge about the natural resource base to articulate its economic value and possible uses; transportation costs; and the predominance of "de facto" private property. Indeed, in the face of these circumstances there is intense conflict in the struggle to control forest resources. Perhaps more important, global economic forces beyond the reach of policymakers seem to dwarf even the mightiest of national policy instruments. Evidence of the force of some of these macroeconomic events, such as liberalization of trade and decentralization, is present today in Brazil and elsewhere. In the short and medium-term, they seem to offer powerful incentives to deforest even when perverse policies, such as subsidies identified in the Bank's 1991 Forest Strategy, are removed.

Additionally, the poverty of small farmers alone is perhaps a less important source of deforestation than such factors as the strong domestic urban demand for timber. This was not anticipated in the 1991 Forest Strategy. Where the cost of exploitative logging is small relative to the benefit, and enforcement of environmental law is lax, there is no incentive to manage the forests sustainably. The 1991 Forest Strategy failed to consider this. Rather, it emphasized the importance of land tenure security and the removal of subsidies as a way to maintain forest cover. This, too, is challenged by the evidence, suggesting that understanding the sources and causes of deforestation, while far more complex now than in 1991, is nevertheless insufficient to achieve the strategy's objective of slowing deforestation. On the contrary, the evidence suggests that the "optimal rates" of deforestation in the Amazon may be far higher for local and even national actors in Brazil than considered appropriate by the international community. The OED Review therefore concludes that the 1991 Strategy is not very relevant from Brazil's perspective.

Efficiency

In theory, there are numerous ways by which the process of deforestation can be made more efficient: by improving enforcement of laws and regulations, changing the incentive structure for the agents engaged in deforestation, and introducing improved technology, extension, marketing, and credit facilities. The Brazilian team of this study has argued that the Bank did not pursue these avenues because the 1991 Forest

Strategy discouraged the Bank from being so involved. Some Bank staff have made similar arguments. However, others have argued equally emphatically that the government has never sought Bank involvement in the Amazon. Besides, Bank-funded projects have had a mixed record. For these reasons, the Bank has largely skirted the issues and has not been very efficient in the approaches it has pursued.

Efficacy

For the same reasons, neither the Bank's own program nor its implementation of the PPG-7 project has been efficacious. It is too early to judge the impact of the GEF activities, but in a case like PPG-7, they are a "drop in the ocean." An important question is whether the international community can play a catalytic role in helping ideas and initiatives blossom and take hold as input into the government's and civil society's own forest-related efforts. The scant developments indicate that there is international recognition of the need for modest objectives commensurate with the resources available, with Brazilian society being ultimately responsible for the fate of its own forests.

Policy Impact

Even the Bank's high-quality economic and sector work (ESW) and the evaluation of its own projects have had a negligible impact on Brazilian policies. But this situation may be changing in view of the formation of a new national forest policy in Brazil.

Institutional Impact

The Bank's major institutional impact, including through PPG-7 and GEF, has been to spawn an environmental movement, including several NGOs in Brazil, that seems to be ready to take on the cause of environmental protection and influence domestic policy and institutions. Whether it will succeed soon enough to have a major impact on the future of the Brazilian forests remains to be seen. But in countries like Brazil this seems to be the most effective approach for the international community to pursue, short of providing huge sums of grant resources.

Sustainability

Sustainability of the Bank's impact is uncertain at this stage given the enormous political and economic pressures following democratization, decentralization, and the recurring economic crisis that Brazil has faced. Although the government has environmental policies and has clearly become much more receptive to dialogue with external actors than before,

forest management and conservation is simply not as high a priority for the government as it is for the international community. Significant international transfers would thus seem to be necessary if the attention of the Brazilian government is to be focused on protecting its forests. But the Government of Brazil questions the desirability of such transfers, and the precise magnitude of these transfers and their implementation remains a matter of debate. The Bank and the international community will also have to take a broader approach to protection in the Amazon geographically and developmentally, for example, the World Bank/WWF alliance. This approach should address issues such as the demand for forest products from the industrialized southern Brazil as well as internationally, and the provision of alternative sources of energy supply (including plantation forests and investments in gas pipelines), and initiatives like certification, the Clean Development Mechanism, and international agreements between developing and developed countries through the Kyoto Protocol and application of the Global Carbon Fund.

The Brazilian members of the study team point to several issues and lessons that have arisen from the various strengths and weaknesses of Bank-funded projects in Brazil and the 1991 Forest Strategy. They assert that the Bank should:

- Seek an integrated approach to forest sector and agricultural activities, with special attention to agroforestry, research, extension, credit, and marketing.
- Strengthen forestry expertise within the Bank to give greater weight to forest-related activities.
- Give rural communities a greater role in identifying, planning, and implementing their own subprojects.
- Include reforestation—including plantation forestry—and forest conservation components in development programs.
- Build on the success of the Minas Gerais project in developing other similar plantation conservation projects in southern Brazil.
- Based on lessons learned from PLANAFLORO, and on the Bank's credibility in facilitating stakeholder dialogue, improve performance through investment in training for both Bank staff and partner institutions in conflict resolution and negotiating skills.
- Support the experimentation and examination of low-impact logging practices.
- Take a much more active role in promoting participatory methods for project design and implementation, possibly in part through financial support to NGOs.

- Critically evaluate lessons emerging from PPG-7 and use them to improve success in subprojects, including bringing practical experience to bear from other countries.

Overall, the Bank's strengths, given its past performance and the realistic potential for its current and future involvement, lie largely in its economic and sector work through policy analysis and development; in institutional strengthening, including both in the public policy arena and NGOs; in promoting the development of sufficient international financial transfers for conservation of Brazil's forests as resources with international value to make it worthwhile for Brazil to pay serious attention to international concerns; and in facilitating stakeholder dialogue that focuses on the "real" issues. Nevertheless, project experience is what enables the Bank to fully understand and learn from the prevailing realities that in turn enables it to give sound and credible advice.

After examining the totality of the World Bank's activities in Brazil, it is apparent that the Bank historically has attempted and continues to attempt to address many, if not most, of the measures required to increase the value of standing forests, the costs associated with unsustainable logging practices, and the profitability of sustainable (or improved) forest management (as outlined at the conclusion of Part I of this paper).

Thus, generally speaking, *the objectives* of the World Bank's Country Assistance Strategy, economic and sector work, and lending programs have promoted forest conservation in Brazil, even though some projects prior to the 1991 Forest Strategy inadvertently contributed to deforestation in the Amazon.

Of utmost relevance to this study is whether and how the Bank's 1991 Forest Strategy has constrained the World Bank in pursuing its objectives in Brazil. It must first be established whether the Bank implemented its 1991 Forest Strategy in Brazil.

The 1991 Forest Strategy prescribes five broad principles for the Bank's work: a multisectoral approach; international cooperation; policy reform and institutional strengthening; sustainable resource expansion and intensification; and preservation of intact forest areas. Additionally, the strategy prohibited Bank involvement in logging activities in primary tropical forests.

OED finds that the forest strategy has been partially implemented through the Country Assistance Strategies for Brazil (see table 10.1). The strategy largely has been implemented where ESW is concerned, although there is scope for improving analysis of the environmental (including particularly the forest sector) impacts of the Bank's non-environmental ESW

Table 10.1. Summary Evaluation of the Implementation of the 1991 Forest Strategy in Brazil

	1991–94	1994–99
Strategy Implementation		
Did the Bank forest strategy for the country change from the pre-1991 period?[a]	Yes	Yes
Was change attributable to the 1991 Forest Strategy?[a]	Yes	Yes
Was the Bank's post-1991 Forest Strategy for the country responsive to the needs articulated by the country?[a]	Yes	Yes
Consistency of Bank strategy		
Was the Bank strategy consistent with the CAS?[b]	Partly	Mostly
Did the country have a forest policy consistent with the Bank's policy?[a]	No	No
Did the Bank follow the principles of its involvement in the sector?[b]	Partly	Mostly
Multisectoral approach	Partly	Partly
International cooperation	Negligibly	Partly
Policy reform	Partly	Partly
Institutional reform	Partly	Partly
Preserving natural forests	Partly	Partly
Resource expansion and intensification	Negligibly	Negligibly
Were participatory approaches Implemented?[a]	Negligibly	Partly
Was the 1991 Strategy implemented?[b]	Partly	Partly
Nature of Bank Interactions		
The forest sector strategy was implemented through:[b]		
CAS	Partly	Partly
ESW	Mostly	Mostly
Policy dialogue	Partly	Partly
Lending to forest sector	Not Applicable	Not Applicable
Lending to forest-related sectors	Partly	Partly
Forest conditionality in adjustment lending	Not Applicable	Not Applicable
Bank application of safeguards	Mostly	Mostly
Bank Outcomes		
Bank's forest sector strategy from country perspective:[c]		
Relevance	Negligible	Modest *
Efficacy	Negligible	Negligible
Efficiency	Modest	Modest
Is the impact of the Bank strategy in the country sustainable?[a]	Uncertain	Uncertain
The Bank's Impact		
Did the country improve its forest cover?[a]	Unclear	Unclear
Did the country improve the way it addresses forest sector issues?[b]	Negligibly	Partly
What degree of impact did the Bank strategy have on the poor?[c]	Partly	Partly
Relevance for Future Strategy		
Does the Bank's 1991 Forest Strategy seem relevant from the perspective of the country?[d]	Unclear	Unclear
Is there government demand for Bank involvement in the forest sector?[a]	No	Unclear
Is there demand from NGOs, the private sector, and professionals for Bank[a] involvement in the forest sector?	NGOs: No Private Sector: Yes (Amazon): No (plantation)	NGOs: Yes Private Sector: Unclear (Amazon): Yes (plantation)
How was the country's forest policy embedded in its overall growth and poverty alleviation strategy?[e]	Poorly	Poorly

* Because the Government of Brazil appears to have become slightly more receptive to discussions with the international community on the issues of forest cover

a. Ratings choices: Yes, No, Not Applicable, and Unclear.
b. Ratings choices: Predominantly, Mostly, Partly, Negligibly, Not Applicable, and Unclear.
c. Ratings choices: High, Substantial, Modest, Negligible, Adverse, Substantially Adverse, and Unclear.
d. Ratings choices: Substantially, Partly, Negligibly, No, and Unclear.
e. Ratings choices: Very Well, Well, Poorly, Very Poorly, Unclear.

Box 10.1. Safeguard Policies

In addition to the specific components of the strategy itself, the World Bank also elaborated several related safeguard policies. In fact, as has been mentioned elsewhere in this report, much of the push for social and environmental safeguards grew out of Bank experiences in Brazil.

The Bank's activities have generally conformed with these safeguard policies. Only in one instance has it appeared to circumvent a safeguard. According to a World Bank official, a subproject within PPG-7 that deals with forest management was classified as a "research" activity largely to circumvent the ban on logging in primary tropical forest.

The extent to which the Bank has been effective in upholding its safeguards is illustrated by the fact that the Brazilian government chose not to seek Bank financing of a portion of the otherwise Bank-financed Bolivia-Brazil pipeline, as it would have triggered the natural habitats safeguard. How effective the program of safeguards is in a country like Brazil, with an economy large enough to finance even large infrastructure projects without the help of the Bank, is a question that merits consideration.

in, for example, transport, poverty, land tenure, and taxes and subsidies. Implementation in the area of policy dialogue, while minimal in the early 1990s, has improved in the past few years. The forest strategy is not applicable to forest sector lending or adjustment lending, as there have been no such loans involving macro policy dialogue—except participation in the IMF package—since inception of the strategy. Finally, the strategy has been partly implemented in lending to forest-related sectors.

One aspect of the forest strategy that has not been well implemented in Brazil is international cooperation. International actors have expected to achieve unrealistically ambitious goals with limited levels of transfers and have not been able to get Brazil seriously engaged in the issues of maintaining its forest cover. The paper outlining the 1991 Forest Strategy defined the nature of the challenge to forest conservation as originating from the marked divergence between the private costs and benefits from national and global costs and benefits.

Three possible interpretations of the logging ban component of the 1991 Forest Strategy were also identified in the strategy paper:

- The Bank would not lend directly for the support of harvesting activities in primary tropical moist forests.
- The Bank would not support any aspect of production forestry in countries where significant logging is occurring in moist tropical forests.
- The Bank would use its policy dialogue with affected countries to

minimize, if not terminate altogether, logging in moist tropical forests. This interpretation can imply reduced or no lending in non-cooperating countries (OED 1998).

Indeed, the Bank has not lent directly to harvesting activities in Brazil. As for the second interpretation, the work of this study's Brazilian team suggests that the Bank has not been involved in production forestry as a risk-reducing strategy. The Bank has tried to use policy dialogue to affect logging but has succeeded only to a limited extent. This may be primarily because the Government of Brazil has distanced itself from the donor community with respect to its Amazon policy. Thus, this component of the strategy has been implemented in Brazil. In terms of the five underpinning principles, OED finds that the Bank also has upheld the strategy to the extent that Brazil's mixed perceptions and demand permitted.

Conclusion

That the forest strategy has not constrained Bank operations in Brazil is not to suggest that it is the most appropriate strategy for countries like Brazil. In fact, the Brazilian contributors to this study assert that the logging ban is causing the Bank to miss important opportunities to promote managed forests and ultimately, forest conservation, in Brazil (Nascimento et al. 1999).

Given the available evidence concerning both the Atlantic and Amazon forests, the situation seems to be stacked against Brazil's forests. As long as competing land uses remain more profitable than either protected or sustainably managed forests, land managers will opt to deforest. Moreover, the costs of illegal and predatory logging practices will have to become higher than improved forest management in order for more sustainable practices to take hold on a wide scale. This would require an institutional environment favorable to regulatory enforcement, which is currently lacking in Brazil and is not easy to institute. In the absence of effective policing of protected areas, enforcement of government regulations, and incentives that make conservation profitable and without simultaneously building domestic constituencies and their institutional capacity, which is inherently a long-term process, Brazil's vast forests will continue to be treated essentially as open-access resources or resources with multiple claims.

The World Bank's experience in Rondonia demonstrates the importance of political economy in determining incentives that lead to deforestation and degradation. Can enforcement and alternative tax systems

be introduced to alter the incentive structure, then, in favor of forests at the individual, municipal, and state levels?

Forest experts suggest that the Bank can work in many ways to improve the situation. The World Bank had begun, partially supported through a Japanese grant, to address the issues of forest strategy that would identify the ways to minimize the divergence between the private costs and benefits of forest conservation and the state and federal costs and benefits. This review had identified why such a sector approach needs to address such issues as demand, alternative sources of supply, and possibilities of certification. The Government of Brazil appears more open to this kind of partnership than it had been in the past. The time may be right for a mutually productive and mutually proactive relationship between Brazil and the World Bank.

The Government of Brazil had a new proactive and politically powerful Minister of Environment who vowed to improve enforcement of forest laws and regulations. At the time this volume went to press, the executive secretary of the ministry had earlier led the successful Minas Gerais Project and has a strong commitment to an overall environmental agenda and a history of a productive relationship with the Bank. The PPG-7, despite its limited effectiveness, has helped support a variety of environmentally conscious constituencies in Brazil and gotten them involved in the planning and implementation of the various projects. The Bank's low-key approach may have helped engage the analytical and advocacy work of these stakeholders, including the NGO community.

Annexes

A. Supplemental Tables

Table A.1. Deforestation in the Amazon, 1978–97 (thousands of km²)

	1978	1988	1989	1990	1991	1992	1994	1995	1996	1997
Acre	0.250	0.890	0.980	1.030	1.070	1.110	1.206	1.331	1.374	1.420
Amapá	0.020	0.080	0.100	0.130	0.170	0.174	--	0.178	--	0.185
Amazônas	0.170	1.970	2.170	2.220	2.320	2.400	2.474	2.663	2.743	2.814
Maranhão	6.390	9.080	9.230	9.340	9.410	9.524	9.598	9.776	9.934	9.979
Mato Grosso	2.000	7.150	7.960	8.360	8.650	9.117	10.361	11.215	11.914	12.502
Pará	5.640	13.150	13.930	14.420	14.800	15.179	16.036	16.901	17.614	18.123
Rondônia	0.420	3.000	3.180	3.350	3.460	3.687	4.206	4.615	4.865	5.053
Roraima	0.010	0.270	0.360	0.380	0.420	0.448	0.496	0.512	0.536	0.556
Tocantins	0.320	2.160	2.230	2.290	2.340	2.381	2.448	2.514	2.548	2.577
Total	15.22	37.75	40.14	41.52	42.64	44.02	45.62	49.71	50.15	53.21
Increase from previous period (%)	--	22.53	2.39	1.38	1.12	1.38	1.60	4.09	0.44	3.06

Table A.2. Total Population, by State, Amazon, 1960–91

	1960	1970	1980	1991
Rondonia	69,792	111,064	491,069	1,132,692
Acre	158,184	245,299	301,303	417,718
Amazônas	708,459	955,232	1,430,089	2,103,243
Roraima	28,304	40,885	79,159	217,583
Pará	1,529,293	2,167,018	3,403,391	4,950,060
Amapá	67,750	114,359	175,257	238,397
Tocantins	343,038	521,655	739,049	919,863
Maranhão	2,469,477	2,992,686	3,996,404	4,930,253
Mato Grosso	319,248	599,764	1,138,691	2,027,231
Total	5,693,545	7,717,965	11,754,412	16,988,040
Intercensal increment		2,042,420	4,036,447	5,233,628

Source: GTA.

Table A.3. Average Annual Population Growth, by State, Amazon

	1960–70	1970–80	1980–91
Rondonia	4.8	16.0	7.9
Acre	3.1	3.4	3.0
Amazônas	3.0	4.1	3.6
Roraima	3.7	6.8	9.6
Pará	3.5	4.6	3.5
Amapá	5.4	4.4	4.7
Tocantins	4.3	3.5	2.0
Maranhão	1.9	2.9	1.9
Mato Grosso	6.5	6.6	5.4
Total	3.1	4.3	3.4

Source: GTA.

Table A.4. Net Migration, by State, Amazon

	1960–70	1970–80	1980–91
Rondonia	9,607	334,946	478,620
Acre	-26,203	-9,244	7,584
Amazônas	-93,457	65,878	172,784
Roraima	-1,543	20,566	110,418
Pará	-9,243	381,563	447,477
Amapá	15,033	4,769	44,066
Tocantins	39,819	52,285	-11,515
Maranhão	-443,629	-152,632	-330,846
Mato Grosso	151,734	344,783	583,703
Total	-347,882	1,042,916	1,504,291

Source: GTA.

Table A.5. Degree of Urbanization by State, Amazon

	1970	1980	1991
Rondonia	53.6	46.5	58.2
Acre	27.5	43.8	61.9
Amazônas	42.5	59.9	71.4
Roraima	42.8	61.8	64.7
Pará	46.7	48.9	52.5
Amapá	54.7	59.2	80.9
Tocantins	25.4	40.2	57.7
Maranhão	25.1	31.4	40.0
Mato Grosso	38.8	57.5	73.3
Total	35.5	44.6	55.2

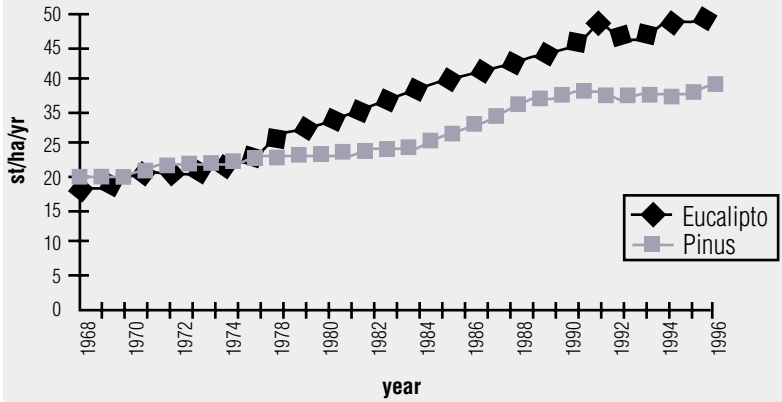
Source: GTA.

Table A.6. Total Area Reforested with Resources from Fiscal Incentive Policy

Year	Total area (ha)	Fiscal incentives[a] according to IBDF (US$M)	Fiscal incentives[a] according to IBDF and BNB (US$M)
1967	34,760	65.70	--
1968	102,910	276.47	19.28
1969	162,383	172.07	67.11
1970	222,005	447.84	128.22
1971	248,478	506.08	308.46
1972	304,357	551.17	345.08
1973	294,153	560.17	423.79
1974	324,379	415.69	522.87
1975	398,240	436.70	473.63
1976	449,249	617.16	831.99
1977	346,432	724.05	995.33
1978	411,737	894.55	1,193.96
1979	473,718	820.95	1,434.32
1980	435,575	686.96	818.17
1981	417,875	713.03	711.54
1982	430,985	675.06	673.97
1983	215,000	490.15	499.04
1984	286,200	378.67	365.59
1985	285,032	337.20	338.77
1986	409,015	--	427.49
1997	--	--	248.17
1988	--	--	31.64

a. As of December 1998.
Source: Bacha and Marquensini 1999 data from Instiuto Brasileiro de Desenvolvimento Florestal (IBDF) and Banco do Nordeste do Brasil (BNB).

Figure A.1. Evolution of Plantation Productivity in Brazil



Source: Bacha and Marquesini 1999.

Table A.7. Number of Rural Establishments and Area Reforested for Different Brazilian States

	1 Jul 1950	1 Sep 1960		31 Dec 1970		31 Dec 1985		31 Jul 1996	
State	Area (ha)	Establishments	Area (ha)	Establishments	Area (ha)	Establishments	Area (ha)	Establishments	Area (ha)
Rondônia	123	33	1,001	37	446	253	8,065	1,347	41,040
Acre	614	58	343	60	1,313	113	2,443	310	11,298
Amazonas	6,718	3,699	24,034	1,909	8,795	440	3,271	65	1,105
Roraima	20	1	1	22	360	10	414	35	1,414
Pará	9,100	1,732	31,560	860	33,955	1,315	90,507	2,119	114,369
Amapá	96	32	1,772	20	393	42	57,894	3	84,937
Tocantins						172	2,828	18	78
Maranhão	3,979	1,882	103,388	528	8,620	618	28,482	374	27,840
Piauí	18,872	1,029	27,460	509	6,824	418	5,287	106	3,006
Ceará	50,622	4,949	140,554	1,768	17,120	1,080	6,629	1,989	24,626
Rio G. do Norte	8,946	998	13,380	557	4,247	1,604	15,874	662	5,322
Paraíba	14,096	2,988	50,087	604	3,738	1,624	32,496	2,089	15,106
Pernambuco	34,040	3,930	52,728	1,146	13,105	1,341	15,763	1,295	13,537
Alagoas	10,126	842	16,439	287	2,925	295	1,065	202	2,239
Sergipe	7,011	851	10,851	299	2,488	305	2,854	344	2,915
Bahia	100,018	10,975	160,647	3,780	41,524	3,883	276,581	7,391	297,429
Minas Gerais	129,657	11,306	230,670	11,789	271,522	29,430	1,767,861	38,204	1,707,782
Espírito Santo	12,308	1,816	25,296	985	25,119	1,845	156,185	7,107	172,735
Rio de Janeiro	28,209	1,431	26,908	902	19,550	1,908	39,663	1,010	25,881
São Paulo	298,502	23,844	441,571	32,312	577,436	33,223	912,730	25,328	597,000
Paraná	87,909	9,613	188,075	12,810	205,163	58,383	819,556	55,323	713,126
Santa Catarina	41,505	11,898	97,414	9,392	128,333	37,223	564,124	66,861	561,549
Rio G. do Sul	172,848	40,472	234,512	73,276	245,764	151,549	567,848	184,543	630,138
Mato G. do Sul						519	454,251	900	181,080
Mato Grosso	44,519	1,028	73,806	728	14,618	316	26,171	239	67,751
Goiás	49,156	3,571	117,178	907	24,598	764	83,630	500	72,652
Distrito Federal		6	131	122	272	178	23,540	112	19,980
Brazil	1,128,994	138,984	2,069,806	155,609	1,658,228	328,851	5,966,012	398,475	5,395,935

Source: Agricultural Censuses.

Table A.8. Number of Trees Planted by State in Brazil

State	31 Dec 1970 Trees (thousands)	31 Dec 1970 % of total	31 Dec 1975 Trees (thousands)	31 Dec 1975 % of total	31 Dec 1980 Trees (thousands)	31 Dec 1980 % of total	31 Dec 1985 Trees (thousands)	31 Dec 1985 % of total	31 Jul 1996 Trees (thousands)	31 Jul 1996 % of total
Rondônia	0	0	0	0	0	0	8	0	3,159	0.04
Acre	0	0	0	0	0	0	0	0	31	0
Amazonas	3	0	1,283	0.02	475	0	0	0	69	0
Roraima	0	0	0	0	0	0	500	0	5	0
Pará	69	0	75,112	1.40	66,240	0.72	88,131	0.91	86,153	1.22
Amapá	0	0	0	0	28,373	0.31	84,446	0.87	127,114	1.80
Tocantins	--	--	--	--	--	--	3,499	0.04	58	0
Maranhão	15	0	339	0	945	0	27,116	0.28	13,246	0.19
Piauí	2	0	12	0	0	0	5	0	1,489	0.02
Ceará	102	0	945	0.02	157	0	16	0	1,871	0.03
Rio G. do Norte	40	0	1,415	0.03	188	0	462	0	2,585	0.04
Paraíba	26	0	889	0.02	469	0	1	0	3,281	0.05
Pernambuco	8,318	0.32	16,457	0.31	10,988	0.12	3,557	0.04	5,250	0.07
Alagoas	90	0	7	0	331	0	14	0	1,130	0.02
Sergipe	617	0.02	72	0	564	0	1,681	0.02	227	0
Bahia	111	0	8,597	0.16	186,711	2.02	447,680	4.62	172,017	2.43
Minas Gerais	467,239	18.07	1,049,053	19.53	2,959,508	32.07	3,011,201	31.07	2,269,065	32.12
Espírito Santo	26,204	1.01	161,180	3.00	203,450	2.20	171,718	1.77	214,626	3.04
Rio de Janeiro [a]	13,632	0.52	59,158	1.10	70,605	0.77	65,883	0.68	33,120	0.47
São Paulo	937,778	36.26	1,589,686	29.76	1,686,065	18.27	1,679,537	17.33	939,765	13.30
Paraná	282,178	10.91	828,742	15.43	1,235,367	13.39	1,331,033	13.74	879,054	12.44
Santa Catarina	185,553	7.18	396,342	7.38	775,663	8.41	769,679	7.94	814,548	11.53
Rio G. do Sul	643,526	24.89	700,506	13.04	1,005,289	10.89	1,203,052	12.41	1,108,990	15.70
Mato G. do Sul [b]	605	0.02	439,751	8.19	790,593	8.57	607,698	6.27	188,253	2.66
Mato Grosso	--	--	4,415	0.08	33,671	0.36	19,982	0.21	45,272	0.64
Goiás	20.699	0.80	27,876	0.52	137,426	1.49	142,532	1.47	145,278	2.06
Distrito Federal	179	0	497	0	34,334	0.37	31,027	0.32	11,199	0.16
Brazil	2,585,984	100	5,371,340	100	9,227,460	100	9,690,493	100	7,065,381	100

a. Includes data referring to Guanabara in 1970
b. The figures for 1970 are from the old state of Mato Grosso.
Source: Agricultural Annuals of Brazil and the states.

Table A.9. Reforested/Forested Area in Brazil by Different Groups, 1982–95 (in ha)

Year	Paper and cellulose industries [a]	Industrial steel with wood-based coal	Small- to medium-size rural establishments in state programs or with businesses in Minas Gerais	Subtotal
1982	77,503.0	--	--	--
1983	65,403.0	--	--	--
1984	77,295.0	--	--	--
1985	83,282.0	--	--	--
1986	81,597.0	--	--	--
1987	83,424.4	58,488	--	141,912
1988	99,135.2	54,352	3,374	156,861
1989	116,004.3	88,357	9,989	214,350
1990	131,925.0	125,000	12,378	269,303
1991	74,233.3	51,305	7,976	133,514
1992	82,653.1	80,067	13,244	175,964
1993	89,202.7	46,653	7,564	143,420
1994	83,702.9	37,026	6,502	127,231
1995	94,540.0	30,351	6,323	131,214
1996	112,541.6	32,752	5,831	151,125
1997	101,723.3	30,756	6,536	139,015

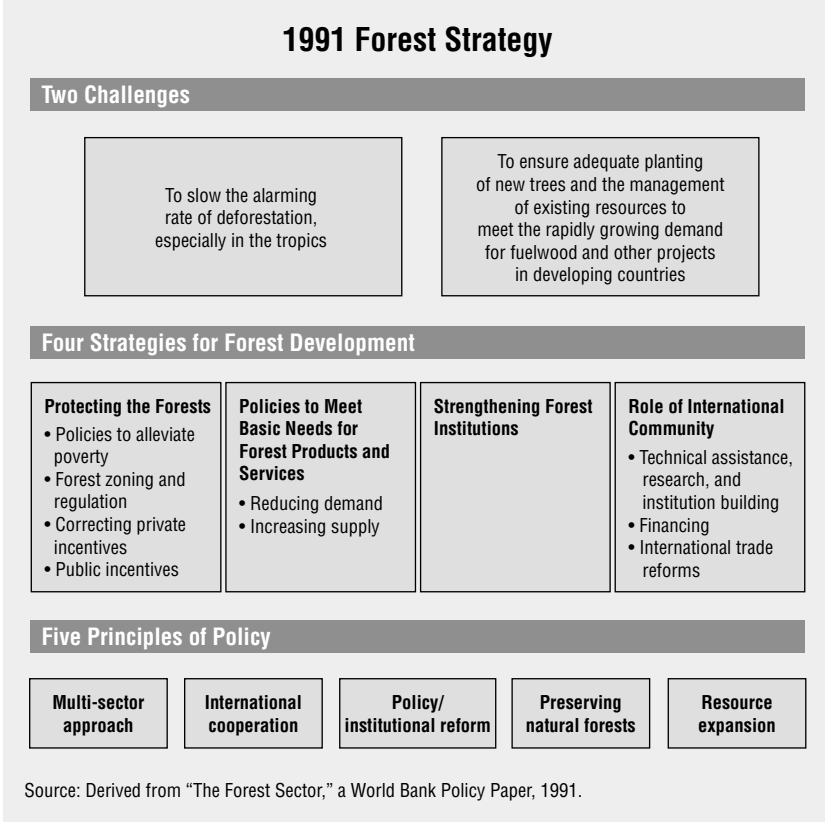
a. Annual data on reforested and forested area by paper and cellulose industries were obtained by considering major values (from 1982–89) of the area forested and reforested and in existence in each annual year.
Sources: Statistical Annual of the ANFPC 1982 to 1996; Statistical Annual of ABRACAVE 1996.

B. The 1991 Forest Strategy

The World Bank Forest Strategy sought to address rapid deforestation, especially of tropical moist forests, and inadequate planting of new trees to meet the rapidly growing demand for wood products. These twin challenges were the consequence of five forces:

- *Externalities* that interfered with the free interplay of market forces with the potential to bring about socially desired outcomes
- Strong *incentives* to cut trees
- Weak *property rights* in many forests and wooded areas
- High private *discount rates* for those encroaching on the forests, and
- Inappropriate government *policies*, particularly concession arrangements.

The Bank's strategy, therefore, promised to promote the conservation of natural forests and the sustainable development of managed forest resources. The strategy it outlined consisted of policies to alleviate



Source: Derived from "The Forest Sector," a World Bank Policy Paper, 1991.

poverty, improve forest zoning and regulation, correct private incentives, and increase public investments. The strategy also proposed reducing demand through investments in research and technology, increasing the supply of essentials through farm forestry, and increasing market efficiency. Government policies and programs, the strategy said, should aim to change the incentives and institutional structures that lead to excessive deforestation and inadequate tree planting and prevent the use of good practices in forest management. Under the strategy, international cooperation and assistance were to ensure that global externalities were internalized locally and that the efforts of governments and international organizations were to be coordinated.

Five principles were elucidated to underpin Bank involvement in the forest sector:

- Adopt a *multisectoral approach* in the design and implementation of forest operations.
- Support *international cooperation* in the formulation and adoption of legal instruments conducive to sustainable forest development and conservation.
- Promote *policy reform and institutional strengthening* by helping governments identify and rectify market and policy failures that encourage deforestation and unsustainable land use.
- Finance operations that lead to socially, environmentally, and economically sustainable *resource expansion and intensification*.
- Support initiatives that *preserve intact forest areas.*

Fulfilling this commitment required five things of Bank-financed projects:

- Adoption of policies and an institutional framework consistent with sustainability and a participatory approach to the management of natural forests
- Adoption of comprehensive and environmentally sound conservation and development plans based on a clear definition of the roles and the rights of the key stakeholders including local people
- Basing commercial use of forests on adequate social, environmental, and economic assessments
- Making adequate provisions to maintain biodiversity and safeguard the interests of forest dwellers, particularly indigenous peoples
- Establishing adequate enforcement mechanisms.

C. Economic Background

With a land mass of 8.5 million km^2, Brazil encompasses nearly half of the South American continent. The country is home to more than 160 million people, including upwards of 300,000 indigenous people (ISA 1996). Brazil has one of the world's largest economies, boasting a GNP of US$760.3 billion in 1998 (EIU 1999a). Agriculture accounted for 10.7 percent of GNP in 1996, with industry comprising an additional 39.3 percent and services the remaining 50 percent (EIU 1999b). Manufacturing is the largest component of export revenues. While the forest sector is large, it comprises a small percent of GNP and has not been a major component of Brazil's export revenue (table C1), with the vast majority of wood products being consumed domestically.

Brazil is highly endowed with natural resources. Its mineral reserves, much of which are located in the Amazon region, are worth an estimated US$3 trillion (Schneider 1992). Brazil holds one-third of the world's iron and Latin America's largest bauxite reserves. The Brazilian Amazon contains 78 percent of global niobium deposits (EIU 1999b). In addition to significant hydrologic and other resources, Brazil's forests are also of great importance. In the Legal Amazon, which has an area of 500 million hectares (ha), about 75 percent is under forest, representing a commercial stock of 60 billion m^3 (Kaufman et al. 1990).

Macroeconomic policies and development strategies have had a profound impact on Brazil's forests. From an economic standpoint, Brazil has pursued an aggressive postwar policy of import-substitution industrialization, in which the industrial/manufacturing sectors were promoted and protected to the disadvantage of other economic sectors, including agriculture. This strategy, based as it was on unsound fiscal and monetary policy, led to impressive economic growth through the 1970s but ultimately left Brazil highly vulnerable to the oil shocks of that decade, leading to a stagnation of economic growth and rampant inflation in the 1980s (Maddison and Associates 1992).

In the 1990s, under the administration of Fernando Alfonso Collor, rapid trade liberalization began. Almost all

Table C.1. Principal Exports, 1997 (US$ millions)

Export	Revenues
Manufacture	32,736
Transport equipment and parts	6,758
Soybeans, meal, and oil	5,729
Iron ore	3,061
Coffee	3,094
Total exports (including others)	52,990

Source: EIU 1999b.

non-tariff barriers to trade were removed in four years. Import tariffs were lowered, reducing the cost of inputs and machinery, and leading to rapid forest conversion. Trade liberalization has supported Brazil's comparative advantage in agriculture and livestock, and has stimulated expansion of the service and durable goods sectors (EIU 1999b) as well as growth of agriculture along the forest margin.

With the introduction of the Real Plan in 1994, crafted by now-President Fernando Henrique Cardoso, Brazil emerged from its period of hyperinflation to enjoy unprecedented economic stability in the recent past. However, by the end of 1997, the combination of an overvalued currency, the traditionally loose fiscal policy, and tight money had resulted in a growing public sector deficit and current account troubles. When the Asian financial crisis hit, the government raised interest rates and attempted to control fiscal spending. In late 1998, hoping to avoid an extremely pressured devaluation, the government signed an IMF-led US$41.5 billion loan package. Investors fled nonetheless, and economically powerful groups within Brazil protested the high interest rates. The government responded with what it intended to be a controlled devaluation in January 1999. However, the market quickly swept up the devaluation, and the value of the Real tumbled by 40 percent, making industrial and agricultural exports that compete with forests more competitive. With the economy now in recession, Brazil has raised interest rates and is pursuing greater fiscal austerity (*The Economist* 1999). It is within this context of economic seesawing that the government has been promoting development and poverty alleviation. While the Cardoso administration has made impressive progress toward general stabilization, the threat of instability persists with the urgent need to bring the large fiscal deficits, particularly those of the states, under control.

Of the six countries in the OED study, Brazil is the wealthiest and has the strongest economic indicators. With per capita GDP at US$4,800, Brazil ranks as a middle-income country. But this conceals striking inequalities in the country. While many Brazilians enjoy a standard of living much like that of industrialized countries, the 1995 Brazil Poverty Assessment estimated that 17.4 percent of the country's population (24 million people) fall below the international poverty line (World Bank 1995b). The World Bank (1997) notes that this is especially glaring for a country with Brazil's overall income, and results from one of the world's worst levels of land income inequality. This affects the incentives for deforestation.

A 1995 household survey found that the wealthiest 20 percent of Brazilians enjoy 63 percent of total income, while the poorest 20 percent of people garner only 2.5 percent (*The Economist* 1999). Land distribution historically is as skewed as income distribution. While the Gini coefficients for land distribution do not vary widely between regions, the high value across all regions is notable. Half of Brazil's farmland is occupied by under 1 percent of farms (*The Economist* 1999). As a result, almost half of Brazil's 330 million ha of farmland lies unused, while at least 2 million rural families are estimated to be landless (EIU 1999b). This has prompted major migrations to urban areas. While this reduces pressure on forests, it also attracts settlers to the land-abundant Amazon.

Significant imbalances between Brazil's five major regions also influence rates of rural-urban and interregional migration, with profound implications for maintaining the forest cover. In 1995, the southeast generated 57.2 percent of total national GDP, with the south (17.4), northeast (13.7), center-west (6.9), and north (4.9) far behind (EIU 1999b). The country's wealth is largely concentrated in the southeast and south, with staggering poverty in the northeast. About a third of the population in the northeast lives in poverty, compared with 11 percent in the southeast. Per capita GDP in the Federal District is seven times that of Piaui or Maranhão, the poorest states in the northeast (World Bank 1997). For the past several decades, successive government administrations have attempted to close that gap through regional policy and revenue transfers between states (*The Economist* 1999). The income gap had been narrowing until 1994. Since then, income disparities have been widening again, as wealthier regions have taken advantage of economic growth opportunities created by the Real Plan (World Bank 1997). This has again brought regional development issues to the forefront of poverty reduction efforts in Brazil (World Bank 1997). These regional imbalances continue to serve as an incentive for poor Brazilians to explore the land-abundant, forested northwest. Although subsidies for such migration, which were sizeable in the 1970s and 1980s, have declined, the migration pressure continues and creates a conflict between the poor and indigenous populations within the forested areas and the new entrants.

D. World Bank Inspection Panel Findings for the PLANAFLORO Project

The World Bank Inspection Panel determined that the objectives of PLANAFLORO were too ambitious and that the project had too large and widely diverse components. The project should have included indicators for land regularization and zoning such as the number of legally created protected areas and the transfer of the protected areas to the state. Furthermore, benchmarks should have been developed for the progress of the zoning component. Specific indicators for environmental monitoring and law enforcement, including the level of activity and results, should have been included from the outset.

A review of the progress in the implementation of PLANAFLORO was conducted by the Inspection Panel in March 1997. The panel concluded:

1. Based upon the satellite imagery under the project, contrary to the project's objectives, deforestation during 1993–96 had substantially increased. Continued monitoring of deforestation and use of methods to control deforestation on a real-time basis needed to be given priority under the restructured phase
2. Difficulties already experienced in achieving most of the environment goals of the project required that restructuring include conditions that provide for long-term solutions to existing environmental problems, including legal safeguards against the changing characteristics and reducing the size of the protected areas.
3. Border problems associated with indigenous and extractive areas must be addressed effectively to ensure the long-term sustainability of protected areas. Illegal settlements must be removed, an action which cannot be implemented unless the capabilities of institutions such as SEDAM (the Rondônia State Secretariat of Environmental Development) and ITERON (the Rondônia State Land Institute) are strengthened. The Panel was also informed that the restructured project would have a number of conditions related to indigenous peoples such as: the removal of illegal invaders from Uru-eu-wau-wau reserve by April 30, 1997, removal of invaders from the Mequens reserve by November 30, 1997, demarcation of the Massaco indigenous reserve by November 30, 1997 and announcement by FUNAI of its position on the legal dispute related to the Burareiro settlements. The panel also recommended that, in the development of economic alternatives and preparation of subprojects, special efforts should be made to ensure that

indigenous and other disenfranchised groups participate and have technical assistance. Otherwise, potential beneficiaries of the project component may be limited to those with access to funds and technical capacity.

4. It is essential that a realistic, sustainable health plan for indigenous people be part of the restructured project.
5. Management should be encouraged to continued with incentives to achieve effective project management and supervision.
6. In the restructuring phase, the Bank should build on its implementation capacity at the technical, accounting, and managerial levels.
7. Every effort should be made to achieve even the most modest objectives of the restructured project with respect to agro-ecological zoning and social/environmental objectives. Proper guarantees and conditionalities for critical missing or delayed actions should be established and amended to legal documents.

E. OED- and QAG-Evaluated Projects

OED-Evaluated Projects

All Brazilian Operations

OED evaluated a total of 53 projects in Brazil which exited the portfolio between 1992–98 in terms of their outcome, sustainability, institutional development impact, bank performance (project identification, project appraisal, and project supervision) and borrower performance (project preparation, project implementation and project compliance). These projects had net commitments of US$6.5 billion (1996 dollars).

OED determined that the outcome of 38 projects was satisfactory, based on their relevance, efficacy, and efficiency—72 percent of the total projects and 65 percent of the total commitments. Sustainability was rated as likely for 32 projects—60 percent of the projects and 61 percent of the total commitments. Institutional development impact was considered to be substantial for 25 projects—47 percent of the projects and 35 percent of the total commitments. The ratings for all OED evaluated projects by sector and subsector are presented in Tables E.1-E.3.

An overall look at the Bank's performance in terms of project identification, appraisal, and supervision shows that project identification was evaluated as satisfactory for 41 projects—77 percent of the projects and 75 percent of the commitments. Project appraisal was found to be satisfactory for 29 projects—55 percent of the projects and commitments. Project supervision was rated satisfactory for 34 projects—64 percent of the projects and 60 percent of the total commitments.

The borrower performance ratings in terms of project preparation, implementation and compliance indicate that project preparation was satisfactory for 31 projects—58 percent of the projects and 67 percent of the total commitments. Project implementation was considered satisfactory for 28 projects—53 percent of the projects and 46 percent of the total commitments. Finally, project compliance was found to be satisfactory for 31 projects—58 percent of the projects and 50 percent of the total commitments.

OED-Evaluated Agriculture Sector Operations

The ratings for the lending operations evaluated in the agriculture sector seem to be slightly above the entire portfolio ratings in terms of project sustainability and institutional development impact. However, the ratings for project outcome are comparable with the ratings for the entire

portfolio. A total of 22 operations with commitments of US$2.6 billion were evaluated in the agriculture sector. The outcomes of 16 projects were rated as being "satisfactory"—73 percent of the projects and 62 percent of the commitments. The sustainability rating was "likely" for 15 agriculture projects—68 percent of the projects and commitments. The institutional development impact was rated "substantial" for 14 projects—64 percent of the projects and 37 of the commitments.

Evaluating the Bank's performance in terms of project identification, appraisal and supervision of the agriculture sector operations shows that project identification was "satisfactory" for all 17 projects—77 percent of the projects and 64 percent of the commitments. Project appraisal was found to be "satisfactory" for 14 projects—64 percent of the projects and 56 percent of the commitments. Project supervision was rated "satisfactory" for 13 projects—59 percent of the projects and 60 percent of commitments. The project appraisal and supervision rating in the agriculture sector projects are slightly better than the ratings for the entire portfolio; however project identification ratings are comparable.

Borrower performance ratings in the agriculture sector for project preparation, implementation and compliance indicate that project preparation was satisfactory for only 6 operations—27 percent of the projects and 33 percent of the total commitments. Project implementation was satisfactory for 16 projects—73 percent of the projects and 69 percent of the total commitments. Finally, project compliance was considered satisfactory for 15 projects—68 percent of the projects and 59 percent of total commitments. It appears that the project implementation and compliance ratings for the agriculture projects were higher than the ratings for the entire portfolio, but project preparation ratings were significantly lower.

OED-Evaluated Forest Sector Operations

The only forest project which was evaluated by OED was the Minas Gerais Forestry Development project, with net commitments of US$40 million. The outcome of this project was rated satisfactory, institutional development impact was considered as substantial, and sustainability was rated as uncertain. In terms of the Bank's performance, both project identification and appraisal were considered satisfactory, but project supervision was rated as unsatisfactory. Borrower performance in project preparation, implementation, and compliance was rated as satisfactory.

Table E.1. Overall Performance Ratings for OED Evaluated Projects, 1992–98

	Evaluated projects		Outcome satisfactory			
Sector/Subsector	No. of projects	Net commitments (US$M)	No. of Projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)
Agriculture	22	2,584.64	16	1,611.77	73	62
Agricultural credit	2	550.82				
Agricultural adjustment	2	618.16	1	569.21	50	92
Forestry	1	39.67	1	39.67	100	100
Irrigation and drainage	3	368.12	1	66.07	33	18
Livestock	1	45.79	1	45.79	100	100
Other agriculture	10	737.92	10	737.92	100	100
Perennial crops	1	71.05				
Research	2	153.11	2	153.11	100	100
Education	4	349.64	2	232.13	50	93
Higher education	1	141.77	1	141.77	100	100
Vocational/teacher training	3	107.87	1	90.36	33	84
Electric power and other energy	4	1,011.56				
Distribution and transmission	3	1,011.56				
Electric power and other energy	1					
Environment	3	164.35	3	164.35	100	100
Natural resources management	1	66.35	1	66.35	100	100
Pollution control/waste management	2	98	2	98	100	100
Finance	1	186.37				
Financial sector development	1	186.37				
Population, heath, and nutrition	6	534.46	5	460.86	83	86
Basic health	2	75.89	1	2.29	50	3
Targeted health	4	458.57	4	458.57	100	100
Public sector management	1	28.35				
Institutional development	1	28.35				
Transportation						
Highways	2	425.08	2	425.08	100	100
Railways	2	356.18	2	356.18	100	100
Urban transport	1	126.11	1	126.11	100	100
Urban development	5	440.29	5	440.29	100	100
Other urban development	1	180.93	1	180.93	100	100
Urban management	4	259.36	4	259.36	100	100
Water supply and sanitation	2	381.37	2	381.37	100	100
Urban water supply	2	381.37	2	381.37	100	100
Grand Total	53	6,488.4	38	4,198.14	72	65

Table E.1. Overall Performance Ratings for OED Evaluated Projects, 1992–98 (cont'd)

Sustainability likely				ID impact substantial			
No. of projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)	No. of projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)
15	1,751.82	68	68	14	956.77	64	37
1	289.53	50	53				
1	569.21	50	92	1	48.95	50	8
				1	39.67	100	100
1	66.07	33	18	1	66.07	33	18
1	45.79	100	100	1	45.79	100	100
10	737.92	100	100	9	712.99	90	97
1	43.3	50	28	1	43.3	50	28
1	90.36	33	84	1	90.36	33	84
				1	141.77	100	100
1	90.36	33	84	1	90.36	33	84
2	696.62	50	69				
2	696.62	67	69				
2	115.56	67	70	1	66.35	33	40
1	66.35	100	100	1	66.35	100	100
1	49.21	50	50				
4	458.57	67	86	2	165.31	33	31
4	458.57	100	100	2	165.31	50	36
				1	278.35	50	65
2	356.18	100	100	1	244.00	50	69
3	482.29	60	53	3	648.46	60	71
4	259.36	80	59	3	230.76	60	52
4	259.36	100	100	3	230.76	75	89
1	86.44	50	23				
1	86.44	50	23				
32	3,941.02	60	61	25	2,299.78	47	35

Table E.2. Bank Performance Ratings for OED Evaluated Projects, 1992–98

	Evaluated projects		Identification satisfactory			
Sector/Subsector	No. of projects	Net commitments (US$M)	No. of Projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)
Agriculture	22	2,584.64	17	1,645.8	77	64
Agricultural credit	2	550.82				
Agricultural adjustment	2	618.16	2	618.16	100	100
Forestry	1	39.67	1	39.67	100	100
Irrigation and drainage	3	368.12	1	51.15	33	15
Livestock	1	45.79	1	45.79	100	100
Other agriculture	10	737.92	10	737.92	100	100
Perennial crops	1	71.05				
Research	2	153.11	2	153.11	100	100
Education	4	249.64	4	249.64	100	100
Higher education	1	141.77	1	141.77	100	100
Vocational/teacher training	3	107.87	3	107.87	100	100
Electric power and other energy	4	1,011.56	4	1,011.56	100	100
Distribution and transmission	3	1,011.56	3	1,011.56	100	100
Electric power and other energy	1		1		100	
Environment	3	164.35	1	66.35	33	40
Natural resources management	1	66.35	1	66.35	100	100
Pollution control/waste management	2	98				
Finance	1	186.37				
Financial sector development	1	186.37				
Population, heath, and nutrition	6	534.46	2	162.12	33	30
Basic health	2	75.89	1	73.60	50	97
Targeted health	4	458.57	1	88.52	25	19
Public sector management	1	28.35	1	28.35	100	100
Institutional development	1	28.35	1	28.35	100	100
Transportation	5	907.37	5	907.37	100	100
Highways	2	425.08	2	425.08	100	100
Railways	2	356.18	2	356.18	100	100
Urban transport	1	126.11	1	126.11	100	100
Urban development	5	440.29	5	440.29	100	100
Other urban development	1	180.93	1	180.93	100	100
Urban management	4	259.36	4	259.36	100	100
Water supply and sanitation	2	381.37	2	381.37	100	100
Urban water supply	2	381.37	2	381.37	100	100
Grand total	53	6,488.4	41	4,892.85	77	75

Table E.2. Bank Performance Ratings for OED Evaluated Projects, 1992–98 (cont'd)

Appraisal satisfactory				Supervision satisfactory			
No. of projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)	No. of projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)
1	1,435.89	64	56	13	1,552.93	59	60
1	569.21	50	92	2	618.16	100	100
1	39.67	100	100				
				1	250.9	33	68
1	45.79	100	100	1	45.79	100	100
10	737.92	100	100	8	567.03	80	77
				1	71.05	100	100
1	43.3	50	28				
3	247.28	75	99	2	232.13	50	93
1	141.77	100	100	1	141.77	100	100
2	105.51	67	98	1	90.36	33	84
1	314.94	25	31				
1	314.94	33	31				
1	66.35	33	40	3	164.35	100	100
1	66.35	100	100	1	66.35	100	100
				2	98	100	100
1	186.37	100	100	1	186.37	100	100
1	186.37	100	100	1	186.37	100	100
1	88.52	17	17	4	458.57	67	86
1	88.52	25	19	4	458.57	100	100
				1	28.35	100	100
				1	28.35	100	100
3	516.64	60	57	4	760.64	80	84
1	278.35	50	65	1	278.35	50	65
1	112.18	50	31	2	356.18	100	100
1	126.11	100	100	1	126.11	100	100
4	397.33	80	90	5	440.29	100	100
1	180.93	100	100	1	180.93	100	100
3	216.40	75	83	4	259.36	100	100
1	294.93	50	77	1	86.44	50	23
1	294.93	50	77	1	86.44	50	23
29	3,548.25	55	55	34	3,910.07	64	60

Table E.3. Borrower Performance Ratings for OED Evaluated Projects, 1992–98

	Evaluated projects		Preparation satisfactory			
Sector/Subsector	No. of projects	Net commitments (US$M)	No. of Projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)
Agriculture	22	2,584.64	6	858.93	27	33
Agricultural credit	2	550.82				
Agricultural adjustment	2	618.16	1	569.21	50	92
Forestry	1	39.67	1	39.67	100	100
Irrigation and drainage	3	368.12	1	51.15	33	14
Livestock	1	45.79	1	45.79	100	100
Other agriculture	10	737.92				
Perennial crops	1	71.05				
Research	2	153.11	2	153.11	100	100
Education	4	249.64	2	232.13	50	93
Higher education	1	141.77	1	141.77	100	100
Vocational/teacher training	3	107.87	1	90.36	33	84
Electric power and other energy	4	1,011.56	4	1,011.56	100	100
Distribution and transmission	3	1,011.56	3	1,011.56	100	100
Electric power and other energy	1		1		100	
Environment	3	164.35	2	115.56	67	70
Natural resources management	1	66.35	1	66.35	100	100
Pollution control/waste management	2	98.00	1	49.21	50	50
Finance	1	186.37	1	186.37	100	100
Financial sector development	1	186.37	1	186.37	100	100
Population, heath, and nutrition	6	534.46	4	384.07	67	72
Basic health	2	75.89	1	2.29	50	3
Targeted health	4	458.57	3	381.78	75	83
Public sector management	1	28.35	1	28.35	100	100
Institutional development	1	28.35	1	28.35	100	100
Transportation	5	907.37	5	907.37	100	100
Highways	2	425.08	2	425.08	100	100
Railways	2	356.18	2	356.18	100	100
Urban transport	1	126.11	1	126.11	100	100
Urban development	5	440.29	4	259.36	80	59
Other urban development	1	180.93				
Urban management	4	259.36	4	259.36	100	100
Water supply and sanitation	2	381.37	2	381.37	100	100
Urban water supply	2	381.37	2	381.37	100	100
Grand total	53	6,488.40	31	4,365.01	58	67

Table E.3. Borrower Performance Ratings for OED Evaluated Projects, 1992–98 (cont'd)

Implementation satisfactory				Compliance satisfactory			
No. of projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)	No. of projects	Net commitments (US$M)	No. of projects (%)	Commitments (%)
16	1,774.37	73	69	15	1,525.98	68	59
1	289.53	50	53				
2	618.16	100	100	2	618.16	100	100
1	39.67	100	100	1	39.67	100	100
				1	66.07	33	18
1	45.79	100	100	1	45.79	100	100
10	737.92	100	100	9	712.99	90	97
1	43.30	50	28	1	43.30	50	28
2	232.13	50	93	2	232.13	50	93
1	141.77	100	100	1	141.77	100	100
1	90.36	33	84	1	90.36	33	84
1	66.35	33	40	3	164.35	100	100
1	66.35	100	100	1	66.35	100	100
				2	98.00	100	100
3	167.60	50	31	5	460.86	83	86
1	2.29	50	3	1	2.29	50	3
2	165.31	50	36	4	458.57	100	100
1	126.11	20	14	2	404.46	40	45
				1	278.35	50	65
1	126.11	100	100	1	126.11	100	100
3	230.76	60	52	3	368.73	60	84
				1	180.93	100	100
3	230.76	75	89	2	187.80	50	72
2	381.37	100	100	1	86.44	50	23
2	381.37	100	100	1	86.44	50	23
28	2,978.69	53	46	31	3,242.95	58	50

Table E.4 Quality Assurance Group Projects at Risk Ratings for all Active Projects in Brazil, June 1999

	Evaluated projects		Actually at risk			
Sector/Subsector	No. of projects	Net commit-ments (US$M)	No. of Projects	Net commit-ments (US$M)	No. of projects (%)	Commit-ments (%)
Agriculture	17	1,190	1	55		
Agricultural adjustment	2	145	1	55	50	38
Irrigation and drainage	3	222				
Livestock	1	44				
Other agriculture	10	719				
Research	1	60				
Education	5	671				
Other education	2	218				
Primary education	3	453				
Environment	7	719	2	65		
Environmental instit	1	50	1	50	100	100
Natural resources management	5	654				
Other environment	1	15	1	15	100	100
Finance	1	20				
Financial adjustment	1	20				
Oil and gas	12	224				
Oil and gas transportation	1	130				
Refine/store/distribute	1	94				
Population, heath, and nutrition	3	565				
Basic health	1	300				
Other population, health, and nutrition	1	100				
Targeted health	1	165				
Public sector management	3	220				
Civil service reform	1	5				
Privatization	2	215				
Transportation	9	1,415	1	300		
Highways	3	554	1	300	33	54
Railways	1	300				
Urban transport	5	561				
Urban development	3	385				
Urban development adjustment	1	100				
Urban management	2	285				
Water supply and sanitation	5	926	2	290		
Other water supply and sanitation	2	376	1	140	50	37
Urban water supply	2	400	1	150	50	38
Water supply and sanitation adjustment	1	150				
Grand total	55	6,335	6	710		

Table E.4 Quality Assurance Group Projects at Risk Ratings for all Active Projects in Brazil, June 1999 (cont'd)

Potentially at risk				Not at risk			
No. of projects	Net commit-ments (US$M)	No. of projects (%)	Commit-ments (%)	No. of projects	Net commit-ments (US$M)	No. of projects (%)	Commit-ments (%)
				16	1,135		
				1	90	50	62
				3	222	100	100
				1	44	100	100
				10	719	100	100
				1	60	100	100
				5	671		
				2	218	100	100
				3	453	100	100
1	205			4	449		
1	205	20	31	4	449	80	69
				1	20		
				1	20	100	100
1	94			1	130		
				1	130	100	100
1	94	100	100				
				3	565		
				1	300	100	100
				1	100	100	100
				1	165	100	100
				3	220		
				1	5	100	100
				2	215	100	100
				8	1,115		
				2	254	67	46
				1	300	100	100
				5	561	100	100
				3	385		
				1	100	100	100
				2	285	100	100
				3	636		
				1	236	50	63
				1	250	50	63
				1	150	100	100
2	299			47	5,326		

OED-Evaluated Operations with Forest Components

The only forest component project evaluated by OED was the Land Management I–Parana project with net commitments of US$63 million. The outcome of this project was rated satisfactory, institutional development impact was considered as substantial, and sustainability was rated as likely. The Bank and borrower performance ratings in all categories were satisfactory.

Quality Assurance Group "Project at Risk" Ratings for All Active Projects in Brazil

Overall Portfolio Ratings

The Quality Assurance Group (QAG) maintains the current project status of all active projects in terms of identifying projects at risk (actual and potential problem projects) and not at risk. These ratings are based on current supervision reports that reflect project performance in terms of effectiveness delays, compliance with legal covenants, management performance, availability of counterpart funds, procurement progress, environment/resettlement problems, slow disbursements, history of past problems, risky country, risky subsector, and economic management problems.

As of June 1999, the World Bank had 55 active lending operations with total commitments of US$6.3 billion. Of these, QAG rates 47 operations which are considered to be not at risk—85 percent of the total projects and 84 percent of the total commitments. Six projects (two projects each in environment, and water supply and sanitation; one project each in agriculture, and transportation sectors) with commitments of US$710 million are rated as actually problem projects. An additional two projects (one project each in environment, and oil and gas sector) with commitments of US$299 million are considered to be potentially problem projects. Using a 10 percent cutoff rate in terms of the project performance indicators, the most significant flags in the overall portfolio are slow disbursements, counterpart funds, effectiveness delays, risky subsector, and history of past problems.

Agriculture Project Ratings

The agriculture sector as a whole has 17 active operations with commitments of US$1.2 billion. The performance of the agriculture sector seems to be better than the overall portfolio performance, given that 16 projects are rated as not at risk—94 percent of the projects and 95 percent of the total commitments. The only project rated as an actual

problem project has a net commitment of US$55 million. The most significant risk rating flags at 10 percent cut-off rate are slow disbursements, shortage of counterpart funds, and effectiveness delays.

Forest and Forest Component Project Ratings

There are no active forest projects in Brazil. However, there are four active forest component projects with net commitments of US$442 million. Only one of these projects is rated as "not at risk" with commitments of US$167 million—25 percent of the projects and 38 percent of the commitments. Two of the projects are rated as actual problem projects with commitments of US$70 million, and one is rated as a potentially project with commitments of US$205 million.

Forest and Forest Component Projects in Brazil

In the pre-strategy period (1984-91) the World Bank approved one direct forest project with total commitments of US$49 million which is 0.5 percent of total commitments to Brazil. Given that the World Bank financed a total of 41 direct forest projects with total commitments of US$1.68 billion, the direct forest lending to Brazil represents three percent of these commitments and two percent of these projects.

In the post-strategy period (1992–99) the World Bank financed a total of 34 direct forest projects with commitments of US$1.72 billion, however, none of these projects was in Brazil (see table 6.1).

In addition to the direct forest projects, there are numerous operations which are classified as non-forest projects, which may have forest components. We consider such projects as "indirect forest projects" or "forest component projects". Generally, most of these projects are found in various sub-sectors of agriculture and recently in the sub-sectors of environment, particularly in natural resource management sub-sector.

Before 1991 the World Bank financed 32 forest component operations with total project commitments of US$1.94 billion of which US$291 million was committed for forest specific activities. Brazil had two such projects with total project commitments of US$180 million of which US$125 million were allocated for the forest specific activities.

However, after 1991 the overall number of forest component projects substantially increased to 94 projects with total project commitments of US$6.2 billion of which US$1.79 billion were related to forest activities. This increase is also reflected in Brazil's case which again had four of these component projects with total project commitments of US$442 million, out of which US$231 million were for forest specific activities. The distribution of forest component projects is presented in table 6.2.

F. Summary of November 1999 Brasilia Workshop and Stakeholder Comments

The Consultative Workshop: The World Bank Forest Strategy Review and its Impacts in Brazil (Unofficial Translation)

Brasília, November 18-19, 1999

1. **Context:** The World Bank is reviewing its forest strategy worldwide. This review includes: (1) studies regarding the loan portfolio and its impact on forests and the people that depend on them; (2) assessment of the effectiveness of the 1991 Forest Strategy; and (3) consultations with government, civil society and the private sector.

   The review will indicate the strategic role that the World Bank should have it its intervention in the forestry sector and in assistance to member countries to better address the objective of promoting conservation and sustainable use of forest resources. As part of the assessment process, independent case studies were conducted concerning the forestry sector and the impact of the World Bank in the sector in six countries (Brazil, Cameroon, China, Costa Rica, India and Indonesia). The goal of each of these six national studies is to have a clear idea of the *implementation of the 1991 Forest Strategy* in the operations of the Bank and understand the views of the various stakeholders in each country – government, the private sector and civil society – concerning Bank involvement. The objective of this *Workshop* was to discuss the document resulting from the Brazil case study.

2. **The Workshop:** Forty-seven people participated, representing 32 entities from the following sectors: government (7 institutions), private sector (12 institution), civil society (13 people from 12 entities) The complete list of participants is attached. Organized by the World Bank, the *Workshop* had the support of EMBRAPA, the Secretariat for Forestry and Biodiversity from the Ministry of Environment, the Technical Group on Forestry from the Brazilian NGO Forum and the Environment Department of the National Confederation of Industries (CNI).

   The Workshop Panel was composed of Mr. Gobind T. Nankani (Country Director, World Bank/Brazil), Mr. José Carlos Carvalho (Executive Secretary of the ministry of Environment), Mr. Francisco Reifschneider (Chief, International Secretariat of

EMBRAPA), Sr. Luiz Flávio Veit (representative, National Federation of Industries), Mrs. Adriana Moreira (representative, NGO Forum) and Ms. Uma Lele (Operations and Evaluation Department, World Bank, and coordinator of the Forest Strategy Review).

To begin, Ms. Lele presented the process for the World Bank Forest Strategy review, now taking place on a global scale. Next, she presented the document prepared by the consultants, Mr. Virgílio Viana and Mr. Adalberto Veríssimo. Following the presentation, the workshop was opened for discussion so that the different sectors could express their opinions about the document and the review process (see annex for a copy of each presentation).

On the second day, the working groups debated two themes: (1) intersectoral policies capable of promoting the sustainable use and conservation of forests; and (2) public policies capable of promoting plantation forest management (native and exotic).

3. Working Group Presentations: Each group presented and discussed in open session the following conclusions:

Group 1: Sustainable Use and Conservation of Forests

- Finance multiple use forestry management projects in tropical forests, paying attention to social and environmental safeguards.
- Finance only commercial activities certified by independent and internationally recognized entities.
- Assist in the formulation and implementation of integrated forest policies to assure the protection and sustainable use of natural forests.
- Loosen the rules of the World Bank in accordance with local realities.
- Stimulate applied research, training and extension, in the multiple use of natural forests.
- Assist actions in monitoring and control, certification and supervision of the forest sector.
- Finance the strengthening of the forest sector (commercial businesses, traditional populations, indigenous populations, small- and medium-scale producers) throughout the production chain (management, transport, processing and marketing).
- Maintain the safeguards already described in the 1991 Bank Forest Policy, including specifically the issue of certification.

Group 2: Plantation Forest Management

Assumptions:

Comparative advantage of Brazil

- Forest technology
- Available areas
- Natural factors
- The need to reverse the picture of urban/rural poverty
- Increase in supply and price of environmental services
- Brazilian environmental legislation
- Potential for inclusion of new native species
- Industrial park for consolidated forestry

Policies:

- Expand the forestry base with multiple use of land and forests
- Prioritize the expansion of plantations with small and medium producers
- Incorporate nontraditional sectorss (e.g. *Erva mate, fumicultor*)
- Reforestation without conversion of natural forests
- Environmental education (especially to prevent burnings)
- Ecologic-economic zoning discussed with civil society

Concept:

- Multiple use
- Pure and mixed plantation forests
- Environmental services

Desired results/ benefits from activity:

- Reduction in rural exodus
- Stabilization of the land base
- Increase in income/employment
- Quality of life improvement
- Reduction in forest deficit
- Reduction in cost of raw materials
- Expansion and diversification of the industrial base
- Reduction in pressure on native forests
- Reduction in CO_2 emissions due to decreased transport distances
- Conservation of water basins
- CO_2 sequestration
- Reduction in burnings
- Conservation of biodiversity (especially, reduce fragmentation)

4. Conclusions: During the final open session, all sectors represented expressed great satisfaction for the opportunity to contribute to the process of the forest policy review nad for the opportunity to meet with different sectors in a constructive manner.

The *NGO Forum* reaffirmed the importance of civil society participation in the process of reviewing the Bank's forest strategy. The Forum stated that the process should proceed with caution and that forest certification is fundamental (see Annex F).

The representative of government (Ministry of Environment) emphasized the importance of the attendence of the representative from the *Casa Civil* of the President of the Republic, and the partnerships between the government, civil society and the private sector. He stated that this debate should continue, especially in light of the launching of the National Forest Policy in April 2000, with the participation of all sectors.

The representatives of the private sector mentioned that the sector favors changes in the forest strategy of the Bank, and that the private sector is in favor of certification. They nevertheless do not agree that financing to the forest sector should be conditioned on certification. They also expressed their support for forest management and the modernization of the industrial park for the sector.

Ms. Uma Lele, in name of the Operations and Evaluation Department of the World Bank, thanks those present, reaffirming also the importance of the participation of each sector represented. She explained that in December 1999 the results of the consultations in the various countries where similar *workshops* were held would be presented to the Directors of the World Bank and that the studies would be available on the Bank's webpage. The conclusion of the studies on the impact of the Bank's Forest Policy in the various countries is expected in May 2000.

F1. The response of the Government of Brazil (SBF/MMA) to the OED Evaluation of *The World Bank 1991 Forest Strategy and Its Implementation*

Workshop held in Brasilia, Brazil on November 17–18, 1999

Brazil is in the process of developing a set of policies and directives for sustainable development of its forest resources. This incorporates all aspects of forest management including the production, conservation, and protection of remaining forests. The new policy takes a conservation ap-

proach toward biological diversity, while advocating the sustainable use of forest resources and reduction of predatory practices.

The directives seek to enhance the intrinsic social benefits of collective right actions on forests. They allow for economically feasible opportunities resulting from good management of natural and planted areas.

The strategy for the new forest policy aims at aligning government actions with the wider interests of the society for the maintenance of the remaining forests, and increase of social benefits through forest management and changes in forest use practices.

The steps necessary to achieve these directives are as follows:

- *Institutional development* is necessary to develop forest management practices through the emphasized role of the federal government in coordinating partnerships with the state and municipal governments. A development-oriented participatory approach needs to be adopted which includes all stakeholders in decision making and which strengthens the additional role of IBAMA parallel to state forestry organizations in training and allocating staff responsible for the countries' forests.
- *Promotion and implementation of sustainable forest development* should be based on the economically feasible and ecologically sustainable use of forest resources. These activities should encourage: intensively managed multiple use forest systems; searching for socially and economically advantageous alternatives which stimulate the valuation of timber and non-timber products; steering reforestation policy toward the recovery of degraded areas; reestablishing the role of the forests for traditional populations; reformulating land use concepts; establishing economic mechanisms capable of dealing with the risks and costs associated with the long forest gestation periods; and researching to find alternatives that ensure sustainable forest management and determine a new industrial order in the forest sector.
- *International trade and forest policy* that seeks to establish global criteria and indicator mechanisms for forest management to evaluate and determine the sustainability of forests. Ensure enforcement of all international agreements and conventions on forests. Strengthen the participation and leadership role of Brazil in forums and events where the Brazilian interests are at stake, particularly in tropical forests.
- *Biodiversity protection in forest ecosystems* by developing control and monitoring instruments and regulating the use of forest

resources. Also by consolidating the system of conservation units which should adhere to the new technological zoning realities.

- *Influence other sector strategies* by reformulating the main instruments and strategies in other sectors to create a positive effect which contributes to the sustainable development of forest resources.

The forest strategy and its implementation should also accomplish the following:

- Alter the Brazilian Forest Code
- Incorporate sustainable use concepts into agriculture expansion policies, colonization, and land reform policies
- Reverse the predatory pattern of forest resource use
- Address the potential deficit of forest raw material for industrial consumption
- Change the emphasis from command and control to mechanisms of an economic, social and environmental nature
- Facilitate necessary cooperation between the government sectors on federal, state and municipal level
- Influence the planning of federal and regional agricultural expansion by making it a sustainable process with desirable characteristics
- Ordain the itinerant forest industry
- Improve decisionmaking by improving the availability of timely, dependable, and up-to-date data on production, trade, consumption, and adequate use (waste, deforestation, fire) of forest resources
- Adequately monitor the process of agriculture expansion resulting from deforestation including fires
- Make resources available for the use of cutting edge technology for monitoring and enforcement.

The implementation of these directives imply changes in forest management instruments and supra-sectoral mechanisms necessary to enhance the distribution of benefits from cultivation, forest management, and conservation of natural areas. Recently, several legal land policy components were altered to meet several such objectives being negotiated globally.

Changes seem necessary to influence the behavior and practice of exploration. The Provisional Measure (*Medida Provisória - MP*) 1511/96, for example, was published by the government to organize the occupation of forest areas in the Amazon. This MP amended article 44 of the Brazilian Forest Code, stating that regardless of its size, at least 50 percent of the total area of rural properties should be kept as forest

reserve, setting the limit of usable area at only 20 percent. This was a great achievement to maintain the forest cover of the land by forcing the owner to keep larger legal reserves and therefore, reduce the subutilization or abandonment of cleared areas and avoid the cycle of clearing-itinerancy-abandonment-clearing. The government used this restriction to reverse the pattern of agronomic/cattle-raising activities followed by plain abandonment. The MP also states that new land clearings cannot be authorized before the owner regenerates the previously degraded areas. The review of MP 1511 allowed the small owners, under 100 hectares, to be free of these restrictions and to incorporate advances in ecological and economic zoning which could guarantee the sustainability of their agriculture. The reactions of owners to MP 1511 shows that the acquisition of large land areas for speculation has become a less attractive option due to a reduction in the value of expropriation processes (a Brazilian example of action on the issue of land use organization).

Another substantial change being implemented via Law 9393/96—Rural Land Tax (*Imposto Territorial Rural*)—provides incentives for the maintenance of forest reserves and establishment of sustainable forest management activities (a Brazilian example of action in land issues).

Development of actions to reverse predatory exploration has become an important aspect of government priorities. This is reflected by actions such as the establishment of a Natural Resource Chamber *(Câmara de Recursos Naturais*) within the Casa Civil da Presidência da República to follow the development of forest policies. Research has shown that 80 percent of exploration in the Amazon occurs on an irregular basis which tends to create difficulties for new foreign enterprises who wish to operate in the Amazon for timber extraction.

In the Amazon Region, approximately 50 million m^3 of wood is extracted, based on estimates of 20 percent annual growth over the last five years. However, it is estimated that 60 to 70 percent of the wood is wasted because of the harvesting and industrial processes. Further, concerns about sustainability (exploration and replenishment of forest resources) are nonexistent and the access to biological diversity and genetic material is not regulated, favoring the smuggling of extracts generated and produced in the Amazon.

This waste demonstrates that there is an abundance of forest resources, and therefore, forest products are undervalued.

Creating a shortage of forest resources could be a way to increase the value of forest products and consequently assure an attitude change in

the way forests are utilized. This objective is sought through the national forest program and new concession mechanisms. In order to do so, we should state a few issues from the National Forest Program. First, technical evaluations indicate that the abundance of forest resources from the Amazon and its present exploitation through predatory means does not reflect its true economic value. The main challenges are causing an economic shortage of resources before they actually reach a critical point, estimating and formalizing the real value of their use, and generating a greater value added. Second, reports show that in addition to the activities of transcontinental enterprises in Brazil, businesses are entering the Amazon as stockholders of small local enterprises, which tend to employ existing practices since they are highly profitable.

The Government of Brazil is anticipating that Brazil, especially the Amazon, will become the main supplier of natural wood to Asian countries, a role presently fulfilled by the North American countries. The expectation is that Brazil's participation in international trade should increase given that the Malaysian, Indonesian, and other Asian countries are reaching their production limit.

The establishment of a social program in the region to regulate the exploration of timber through a regiment of controlled use and access to public lands may be an alternative, given the existing state of ecological depredation and high incidence of poverty. Organizing those who extract timber into community associations will make sustainable exploration of timber as well as its trade and industrialization possible.

The proposed system foresees growth in wood production and offers a set of actions that will allow for an organized system of forest use. This system will be established based on public bids on forest areas.

The first bid will be a test. It will be conducted in the Tapajós National Forest, one of the five locations offered to the private sector by the government beyond the year 2000. The idea is to make the national forests fulfill their multiple objectives based on regulatory instruments for the marketing of forest products. The Tapajós Project has been developed over the last two decades, and is focused on developing forest measurement techniques to measure change in forest inventories over time, along with road infrastructure and environmental impact evaluation mechanisms.

The Tapajós National Forest is part of the 39 existing national forests in the Amazon and has the greatest potential for forest products.

The Jamari National Forest has 225,000 hectares and should join the model of forest concession. IBAMA is preparing a more aggressive

bid and could offer an area from 30–50,000 hectares. The other three forests that are in the government's plan (Bom Futuro National Forest and Jamari National Forest in Rondônia, Tefé National Forest in the Amazon, and the Caxuanã National Forest in Pará) will be addressed after 1998.

The implementation of forest concessions in areas with native vegetation is an old practice being carefully evaluated by the government. Though it has been successful in the central-southern region with the production of paper and cellulose, official permits for the exploration of natural resources from Brazilian forests by private enterprises has been a polemic issue with negative reactions from several sectors of the society.

The international debate on forests at the United Nations, particularly on issues addressed by the Intergovernmental Panel on Forests (*Painel Intergovernamental de Florestas*—IPF) is currently the most important global forum.

Among the countries with extensive tropical forests, the Brazilian stance has been to defend its right to maintain its forests, services, and externalities resulting from management and conservation of forest resources. This has to be done through internal policies, seeking to maintain clear trade rules that meet effective criteria and indicator mechanisms for forest management without relenting the sovereign right of how to use and protect its forest resources.

It should be emphasized that the Brazilian government wishes to increase the area of plantation forests particularly through smallholdings to ensure sustainable performance and development of the forest sector. Strategically, the government does not support compensatory mechanisms that are not in line with the national public policy and which create unnecessary burdens on the Brazilian forest endowment.

Other important issues were mentioned, but we believe it will be essential that World Bank support credit and financing mechanisms for the management of native forests and initiatives for plantation forestry through the private sector. We believe it is important that performance evaluation mechanisms in the forest sector acknowledge the regional factors and differences and apply positive experiences in a given region based on the issues specific to that region.

Hélio S. Pereira

F2. The Response of the Federation of Industries of the State of Mato Grosso (FIEMT—Federação das Indústrias no Estado de Mato Grosso) to the OED evaluation of the *World Bank 1991 Forest Strategy and its Implementation*

Workshop held in Brasilia, Brazil on November 17–18, 1999

Summary

The sector understands that native forest management is not enough to ensure a sustainable flow of timber resources from Mato Grosso and proposes that the Bank should promote forestry by financing timber plantations for timber mills and lamination industries.

Introduction – Mato Grosso Forest Industry

The timber industry in the State of Mato Grosso was first established in the 1960s with the colonization of the forestlands in the northern and western regions of the state. During this time large tracts of primary forests were cleared for agriculture production and pastures. The resulting large quantities of harvested wood played an essential role in the establishment of numerous timber mills, lamination plants, and plywood plants within the state.

At present the timber industry in Mato Grosso generates 15 percent of the state's revenue and employs 35 percent of the industrial labor force. The industry's raw material consumption is approximately 4.5 million m^3/year. More than 75 percent of this requirement is met by selective harvesting based on "forest management plans" in the primary forests. The remaining 25 percent comes from land clearings associated with the agro-pastoral industry.

Though there are still extensive primary forests left within the state, their timber potential is much lower than commonly perceived because:

- The forests are highly heterogeneous and host more than 2,000 different tree species. The distribution of species varies according to the topography and soil characteristics which has resulted in low species volume, generally less than 1.0 m^3/ha.
- Relatively few species are used by the timber mills, and the laminating and plywood industry. Less than 100 species are used with some frequency but only about 20 species account for more than half of the regional production.

Although selective harvesting has little impact on the structure of the forest itself, it does deprive the forest of species with any commercial value, thereby impacting the process of regeneration.

Sustainability and Forest Regeneration

It should be emphasized that the regeneration of extracted species alone is not sufficiently adequate to assure complete regeneration of any given species, even with the support of various forest management strategies. For instance, the African experience shows that even planting seedlings of commercially viable species in exploited forests has resulted in low forest regeneration.

The reforestation of teak and some other native species has been effectively achieved in Mato Grosso, which provides a concrete example of its technical viability. However, economic and financial limitations have hampered reforestation efforts necessary to achieve future sustainability.

Financing difficulties in forest management arise from long gestation periods and the nature of cash flows associated with the forests. The rotation or harvesting cycles for timber used in the mills and lamination industry is usually over 25 years. Cash flows are characterized by the concentration of expenses in the beginning of the cycle (approximately 70 percent of expenses occur in the first three years) and the revenues occur at the end of the rotation period (more than 90 percent of the revenues are associated with the final harvest). Financing forest projects requires grace periods of 25 years or more, and annual interest rates vary between 2–4 percent, depending on the species. The reforestation of timber crops with lower commercial values experience even more financial difficulties. They tend to be less profitable because timber market prices generally do not incorporate basic resource costs.

Society seems to or "pretends to" believe that the Amazon and other natural forests are unlimited sources of timber and that the raw materials withdrawn from these areas are an abundant resource without any economic value. While this view prevails, there are no real insights on the sustainability issue.

In the long run, scarcity of timber may increase its value, creating profit margins that will allow for product substitution. The incorporation of environmental impact costs may even further increase its economic value in relation to other building material (aluminum, steel, plastics, ceramic products, etc.) and therefore make timber plantations more profitable. However, if we wait until timber prices are high enough to justify financing reforestation, it may be too late to achieve desired sustainability levels.

Proposal: Finance Forest Promotion

The reforestation of timber-producing species which could be used in small-scale mills and lamination industries is proposed through grant financing for the small and medium-size rural producers from Mato Grosso. This proposal is based on the following considerations:

- Projected timber shortages for mills and lamination industries within the next 10 to 30 years
- Successful results observed for reforestation projects in Mato Grosso
- Availability of large cleared lands currently without any economic use
- Environmental role of reforestation in terms of providing long term soil cover which protects the soil from harsh tropical climates, while regulating the climate and water cycle
- Rural producers already have a majority of the production means (land, tools, equipment, idle labor, infrastructure, and management) necessary to allow them to produce timber at a price which is lower than the current market prices
- Producers' experience in plant cultivation, hands-on approach, and the small scale of plantations, are all factors which increase the confidence of the industry in terms of foreseeing better quality timber production
- Producers can consider small reforestation projects as complementary activities to their primary sources of income which are necessary to support them and may even be used to cover some of the reforestation expenses until the tree crops mature
- Building a reserve of substantial value and liquidity within the property can be an exemplary "retirement fund" which can offer greater economic stability and incentive to the producers to stay in the rural area
- Generation of sustainable and well distributed wealth in the rural area
- Use of reforestation along with other crops and natural vegetation to minimize environmental risks associated with monocultures
- Use of reforestation to sequester large quantities of carbon from the atmosphere in standing timber. After harvest it may be utilized for other long-term uses (furniture, frames, floorings, etc.)
- Availability of reforested timber will reduce pressure on the primary forests.

The financing of a pilot project for forest promotion, implementation, and monitoring is proposed. The intent is to plant 1,000 hectares annually over a five year period. It is estimated that the total cost per hectare will be of US$1,000.00/ha. The Federation of Industries of the State of Mato Grosso—FIEMT (*Federação das Indústrias no Estado de Mato Grosso*)—is at the disposal of the World Bank to give further details of the proposal.

Luís Flávio Veit
Director

F3. Agenda

Date: 18–19 November 1999
Location: Manhattan Plaza Hotel
SHN Qd.02 Blocos A/E
Brasília - DF

November 18

2:00 Workshop opening with sector representatives
2:30 Presentation on the Review of Forest Strategy of OED/IBRD
Robert Schneider, Uma Lele
3:30 Coffee Break
3:50 Presentation on the results of the case study on Brazil
Virgílio Viana, Adalberto Veríssimo
5:00 Panel discussion of the study
Sector representatives
6:00 Dinner

November 19

8:30 Work group session—analysis of the study conclusions
10:15 Coffee Break
10:30 Plenary
12:00 Lunch
2:00 Work groups on thematic areas
3:30 Coffee Break
3:45 Closing plenary: presentation of the recommendations about forest strategy
5:30 Conclusion

F4. List of Participants

Adalberto Veríssimo	IMAZON
Adriana Moreira	IPAM
Adriana Ramos	ISA
Afonso Henrique Paulino	SINDIFER
André Guimarães	IBRD
Bruno Stern	GETHAL
Carlos Alberto Funcia	SBS
Carlos Luiz Regazzi Filho	CNI
Carmen Puig	SEAIN
Celso Junius Ferreira	ANAMMA
Cláudia Calório	ICV
Claudionor da Sliva	GTA
Ednardo Machado	MMA
Eduardo Canepa	BNDES
Eric Stoner	USAID
Flávia Barros	Rede Brasil
Flávio Montiel	Greenpeace
Francisco Reifschneider	EMBRAPA
Guilherme Carvalho	FIEPA/AIMEX
Helcio Souza	INESC
Hélio Pereira	MMA
Isaura Frondizi	BNDES
John Forgach	Banco Axial
John Garrison	IBRD
Jorge Alberto Yared	EMBRAPA
José Batuira de Assis	ABRACAVE
Juan Carlos Rueda	CNS
Luiz Flávio Veit	FIEMT
Manuel Cesário	WWF
Mario Mantovani	CONFLORESTA
Mirian Prochnow	RMA
Newton Zerbini	MMA
Raimundo Deusdará	MMA
Ricardo Tarifa	IBRD
Robert Schneider	IBRD
Sandra Faillace	FASE
Sérgio Ahrens	EMBRAPA
Sérvulo Vicente	SEAIN
Syed Arif Husaid	IBRD
Teodoro Lamurier	BDMG
Uma Lele	IBRD
Vasco Flandoli	ABPM
Victor Hoeflich	EMBRAPA
Victor Sucupira	MMA
Virgilio Viana	USP
Weber Amaral	ESALQ/USP

G. Summary of March 2000 Brasilia Workshop

World Bank Consultation on the Forest Strategy Implementation Review

Brasília, March 15–16, 2000

1. **Context:** The World Bank is in the process of reviewing its forest strategy throughout the world. This process includes: (1) evaluation of the impacts of its portfolio on the forests and on people who depend on forests; (2) evaluation of the efficacy of the 1991 forest policy; (3) case studies; and (4) regional consultations with government, civil society and the private sector. The Forest Policy Review will indicate how the Bank should act in the forest sector and assist countries to better promote conservation and sustainable use of natural resources.

   In November 1999, the Bank promoted a workshop to discuss with representatives of the Brazilian government, the private sector, and civil society the results of a case study on the Bank's performace in the forest sector of Brazil. Results of the case study and workshop were later presented to the Bank.

   In addition to the case studies, the Bank is also organizing regional consultations throughout the world to consult with a wide range of stakeholders the impact of the Bank's 1991 forest policy implementation and strategy. Consultations were held in Tunisia and Brazil. The next regional consultations will be held in the U.S., Finland, Switzerland, Bangladesh, Singapore, Johannesburg, and Quito.

   Ths report describes the outcomes of the Brazilian consultation.

2. **The Workshop:** On March 15 and 16, the Bank brought together in Brasilia, Brazil, 60 people from a wide range of stakeholders (39 organizations), including representatives of the government (seven institutions), the private sector (11 institutions), civil society (15 institutions), and international organizations (six organizations). The agenda and the complete list of participants are in annexes 1 and 2.

   During the opening, the World Bank Sector Leader for ESSD in Brazil, Dr. Robert Schneider, stated that the objective of the workshop was to consult the diverse stakeholders on the Bank's 1991 Forest Strategy, and to gather suggestions regarding changes

in the strategy. He clarified that the workshop was divided into two parts. Part I would set the stage by allowing an NGO to present results of an independent study on the Brazilian forest sector, and the government to present the new framework for forest policy in Brazil. Part II would discuss specifically the Bank's forest strategy. Dr. Schneider's presentation is included in annex 3.

3. Part I: Setting the stage: The forest sector in Brazil at a crossroads. (This presentation does not necessarily represent the Bank's opinion)

Sr. Eugenio Arima, from the NGO IMAZON (Institute of People and the Environment in the Amazon) presented the results of analysis showing the economic rationale to support the Amazon forest sector. Based on RADAM and IBGE census data, his analysis shows that in areas of high rainfall there is a substantial decline in agricultural/cattle ranching production. In such areas, which comprise 60 percent of the Brazilian Amazon, forest activities already provide more employment and income than ranching, which is the next major land use. He infers that sustainable forest activities can generate seven times more employment and four times more income per hectare than ranching. See annex 4 for the slides from Mr. Arima's presentation.

Mr. Raimundo Deusdará, from the Ministry of the Environment, presented the National Forest Program (NFP), currently under preparation by the Government of Brazil. The NFP program is the new framework for government stragegy on the forest sector. It is composed of two parts: (1) structural actions, such as normative policies, forest monitoring, forest extension, and institutional strengthening; and (2) production activities such as the sustainable management of forest resources, rehabilitation of degraded lands, reforestation and afforestation, and support to traditional forest populations. See annex 5 for Mr. Deusdará's presentation.

3. Part II: The World Bank Forest Strategy Implementation Review

In the second part of the workshop, the Bank's forest policy was specifically discussed. Mr. Ricardo Tarifa, environment specialist in the World Bank, presented the current IBRD 1991 policy. Next, the results of the independent evaluation done by the World Bank's Operations and Evaluation Department in Washington were

presented by Ms. Uma Lele. Finally, Mr. Christian Peter, from the World Bank in Washington, talked about the review process and consultation on the forest strategy around the world.

On the second day, working groups (including a mix of representatives from the Bank, government, NGOs, and the private sector) discussed and made presentations on the following topics: public policies (group 1); natural and plantation forests (group 2); and tropical forests conservation and forest dwellers (group 3).

To each group, the following questions were posed: (1) Does the Bank have a meaningful role to play in the forest sector?; (2) If so, what is it?; and (3) If so, how do we fulfill it?

Work Group 1: Public Policy

Does the Bank have a meaningful role to play in the forest sector?

1. Yes. The Bank already works in the forest sector (very little), and indirectly in intersectional projects that have a negative impact (roads, agriculture, urbanization, energy, zoning, etc.).
2. The Bank's refusal to act in natural forest management is in itself an action, albeit negative.
3. This involvement should be reviewed and redirected, including the removal of restrictions on funding economical forest activities, as currently stated in the Bank's 1991 Forest Strategy.
4. In comparison to other countries, Brazil has potential and advantages (size of tropical forest, biodiversity, technology for the planting of production forests and environmental protection, etc.) which provide Brazil with the right credentials to receive Bank funds and support sustainable forest development.
5. Brazil is currently taking important steps to implement a new forest policy, through its National Forest Program and its subprograms (Florestar, Sustentar, and Forescer). This shows the social, environmental and economic importance of the forest sector to the Government of Brazil, even arguing that the NFP's current goals are set lower than necessary due to budget limitations imposed by the Treasury.

Work Group 2: Management of planted and native forests

Does the Bank have a meaningful role to play in the forest sector?

1. Yes. The Bank has a significant role in the forest sector at the global level.

Where and how should the Bank act?

Issues where there was consensus:

1. The Bank should support public sector training restructuring actions—e.g., forest policy technical assistance, implementation of public (production) forests, forest monitoring, environmental services, education, training, and research.
2. Creation of a forest fund to finance natural and planted forests (such as the Prototype Carbon Fund).
3. Offer performance guaranties as a way to promote forest management in public areas (the Bank could finance performance bonds for borrowers of funds inteded for forest activities).
4. Projects to be financed by the Bank should follow criteria for social, environmental, economic, and cultural sustainability.
5. Forest sector issues should be included in the country assistance strategy (CAS) preparation, and the discussion process should be open, transparent, and democratic, with wide partipation from several sectors, civil society, and the National Congress, and not restricted to the Bank and the staff from ministries of planning and finance.
6. The Bank should support the consolidation of small-scale forest management experiences.
7. The Bank should focus on forestry projects with social and environmental certification done by independent institutions.[35]

Issues where consensus was not reached

8. Forest certification whould be done by organzations with international credibility (this was the opinion of NGOs, and relates to item 7 above).
9. Direct funding from the World Bank for the exploitation of tropical forests should be restricted to projects developed by local communities and grassroots organizations (this was the position of the NGO Rede Brasil).

Work Group 3: Tropical forest conservation and forest peoples

Problems identified by the group

1. The ambiguity of the 1991 Forest Strategy results in misunderstandings.
2. Achievements by individual projects are not influencing government policies.
3. The Bank has had a passive attitude and not made full use of its instruments.

4. There is no clear process for the implementation of the Bank's 1991 Forest Strategy.

Does the Bank have a meaningful role to play in the forest sector?

5. Yes. The group understands that the Bank should expand its presence in the Brazilian forest sector.

Where and how should the Bank act?

6. In conservation units and indigenous lands, with the participation of the government, local communities, and Brazilian NGOs.
7. Extend the work to other Brazilian biomes, such as Mata Atlantica, Cerrados, and Caatinga.
8. The Bank should support effective policy formulation. It should look to its experience on projects to transform project results into policies.
9. Create mechanisms for the direct participation of communities in areas of project implementation, involving the local governments (state and municipal).
10. The Bank should have a more proactive attitude to influence government policies in the forest sector.
11. CAS elaboration consultation should continue to be participatory, and the forest sector should be incorporated prominently into CAS discussions.
12. The Bank should support projects for the rehabilitation of degraded lands in previously forested regions, both rural and urban.
13. Incorporate the concept of environment services of forests in policy formulation, in project implementation, and other funding (for example, IFC).
14. Define guidelines and criteria to take into account the environmental services provided by forests in the formulation of World Bank forest policies.
15. Create a management committe in the Bank, with participation of civil society and government, to implement the Bank's forest strategy (following the model set up by the Rain Forest Pilot Program).
16. Use the financing mechanisms envisaged by the Kyoto Protocol to promote forest conservation and improving the quality of life of forest dwellers.
17. Improve channels for the dissemination of forest sector information.

Endnotes

Summary

1. Until recently, this was called the World Bank/WWF alliance. This partnership is now being widened to seek broader ownership of the conservation effort, particularly involving national and local institutions.

Chapter 1

2. Relative to Brazil's annual GNP of US$760 billion, this is still a small amount.

3. The ability of forests to serve as repositories, or "sinks," of carbon dioxide (CO_2) is vitally important to the health and stability of the global environment. The Bank's 1991 Forest Strategy cites this potential of forests as a significant reason for why the World Bank should give special attention to the conservation of the tropical rainforest in the Amazon and to reforestation.

Chapter 2

4. These figures represent all forest types, not only tropical moist forest. It also should be pointed out that not all Brazil's forests are "richly endowed;" the country's forests are in fact quite heterogeneous.

5. The **Legal** Amazon is made up of all of the north region (the states Acre, Amapa, Amazonas, Para, Rondonia, Roraima, and Tocatins) plus parts of the states of Maranhao, Mato Grosso, and Goias. The southern edge is the 16th parallel, and the eastern edge is the 44th meridian.

Chapter 3

6. Wood is used to produce charcoal for the steel and iron industries.

7. Dollar values corrected for December 1998. Total revenue is based on the total production value for the timer industry in 1994 (US$46.883 billion), trade of wood products in 1993 (US$4.717 billion), the value of companies providing forest harvesting services (US$85 million), and silviculture and natural forest extraction.

Chapter 4

8. See the OED Indonesia case study. Since 1980, the importance of the forest sector to Brazil's international trade has increased slightly. In that year, it accounted for 5.42 percent of total exports and 1.2 percent of imports. In 1998, these values had risen to 7.14 percent and 1.98 percent, respectively. It is noteworthy that even though Brazil has maintained a positive trade balance in forest products since 1980, through the 1995–98 period Brazil's overall wood trade balance was negative (Bacha and Marquesini 1999).

9. It is noteworthy that since 1980, Brazil has maintained a positive trade balance in forest products, even through the 1995–98 period when Brazil's overall trade balance was negative (Bacha and Marquesini 1999).

10. The policy and regulatory issues surrounding forests are discussed in detail in the "Forest Regulation" section of this chapter.

11. In October 1999, the government fined a Brazilian company US$360,000—a record amount—for illegally cutting, storing, and transporting protected tree species in Para (CNN, October 4, 1999).

12. A new government program, known as "Move Forward Brazil" (Avanca Brasil), has been proposed by the federal government and is now being analyzed by the Brazilian congress. The program is similar to "Brazil in Action."

13. Lei # 4.771, September 15, 1965: *Codigo Florestal***.**

14. Comprising of Acre, Para, Amazonas, Roraima, Amapa, and Mato Grosso, the regions north of the 13th parallel in the states of Tocantins and Goias, and those to the west of the 44th meridian in the State of Maranhao. In all *cerrado* regions the legal reserve is 20 percent (Chomitz 1999).

15. SUFRAMA (Superintendency for the Manaus Free Trade Zone) and SUDAM have administered support to the domestic wood products industry. Between 1968 and 1975, 11.3 percent of SUFRAMA's projects were for wood projects. These 19 projects represented an investment of US$53 million. SUDAM also promoted logging as part of the second Amazon Development Plan in 1974. By 1976, SUDAM had made investments of US$144 million in 23 projects involving wood products (Schneider 1992).

16. The internal market is strongest in the southeast (38 percent of total), followed by the south (18 percent), northeast (14 percent), and the center-west (5 percent). The Amazon itself consumes 10 percent of forest production. The United States and the European Community traditionally have been the largest importers of Amazonian wood products, with Japan next. Amazonian exports to other Asian countries (South Korea, Taiwan, the Philippines, Thailand, and Indonesia) began in the 1990s (Smeraldi and Verissimo 1999).

17. This study was financed by EMBRAPA as an input into this OED report.

18. This study was commissioned by OED, financed by EMBRAPA, and was carried out by the Brazilian team of the current study.

19. Vosti (1999 personal communication) disagrees with this characterization (see above) and hence with the alternative offered.

20. In the 1960s and 1970s, the Government of Brazil invested heavily in infrastructure development, including road construction. On a national level, public investment in transport accounted for some 40 percent of total public capital formation during this period and reached 3.3 percent of GDP in 1975. Roads received the largest share of these investments until the mid-1970s (World Bank 1991). Thousands of kilometers of roads were built in the Amazon in the 1960s and 1970s. The effect has been to open the region to colonization and economic development and expand Brazil's agricultural frontier well into the Amazon region. Roads built by logging companies also have contributed to this. Improvement in transportation infrastructure continues to be an important element in government policies for the Amazon region.

Chapter 5

21. Banco da Amazonia alone, for example, has R$253 million available for 1999.

22. "Ii Oficina De Manejo Florestal Comunitario Da Amazonia" was held in Maraba, Para State, September 27–October 1, 1999 and was attended by more than 70 participants, including representatives of the World Bank, donors (USAID, GTZ, IICO), IBAMA, leading Brazilian NGOs, researchers, and community leaders.

23. The CRP program involved a one-time, 50 percent cost share and subsequent annual payments over a 10-year period.

Chapter 6

24. A detailed discussion of forest definitions can be found in *A Sustainable Forest Future?* by David Pearce, Francis Putz, and Jerome Vanclay (1999).

25. If sustainability is interpreted according to the first or third definition then the commitment to "sustainable management and conservation oriented forestry" contradicts the rationale for the logging ban. The strategy paper (pg. 10) noted that tropical moist forests "are the most fragile forests in that their soils are easily degraded or deforested, and experience to date indicates that even if reforestation or selective felling is attempted, the original ecosystems cannot be fully renewed or sustained." This perception underlies the Bank's ban on lending for commercial logging. Where valid the above statement implies that "sustainable logging" is an oxymoron.

26. This is the case only in forest plantations and only if the scheme is limited to developing countries (Schneider, personal communication 1999).

27. Timber producers skeptical of the economic viability of natural forest management have become frequent visitors of Mil Madereiras. Some have shown interest in the potential economic gains (particularly in reducing harvesting and transportation costs, improving product marketing and reducing legal problems) and are assessing the feasibility of improving their management systems in order to qualify for certification. For example, Gethal, the largest producer of plywood in the Amazon, has been preparing for certification for the past two years and is now undergoing formal auditing.

28. In 1997, Mil Madereiras was brought under the Forest Stewardship Council (FSC) certification system. It was the first natural forest management operation in Brazil to seek certification, and as of June 1999, it remains the only such area certified by the FSC.

29. A Bank sponsored workshop on Opportunities for Sustainable Forest Management was held in Manaus in October 1999 and brought together producers, buyers of certified timber, private ecological investment funds, leading Brazilian and international NGOs, certifiers, and government representatives. The meeting was seen as a historical event for the future of forest management in the Amazon. For the first time, market advantages (premium prices, access to investment funds, access to markets, corporate image, etc.) of certifiable forest management appeared to be greater than perceived costs.

30. In the case of Mil Madereiras, all workers are officially registered and, as a result, have access to social security benefits. Additionally, workers are provided with protective equipment (Tasso Azevedo, personal communication).

31. *Identification*: Undertaken by FUNAI through dissemination of a map of the designated areas in the *Diario Oficial* of the state and of Brazil, with a period of 90 days during which states, municipalities or third parties can raise objections.

Delimitation: Administrative authorization from FUNAI from the Justice Ministry to proceed with the physical demarcation of the area, through a *Protaria Declaratoria*.

Demarcation: Demarcation of the area by FUNAI, defining territorial limits and removing non-indigenous occupants.

Ratification: Presidential approval of the above processes through a decree.

Registration: Registration of the land in the land registry (CRI) and with the Secretary of Federal Property (SPU). Once the demarcation process is complete, the indigenous land receives documentation equal to a private property title (Schartzman and Santilli 1999).

32. See the case studies of China, India, and Indonesia.

Chapter 9

33. The EC wanted to take over leadership of the project from the Bank, nevertheless, within the German instance itself, KfW and GTZ have not always seen eye-to-eye on critical issues.

Chapter 10

34. The existence of externalities, recognized the strategy paper, implies that the free interplay of market forces will not bring about socially desired outcomes. Using the example of the Brazilian Amazon, the strategy paper reported the estimated value of carbon in an undisturbed hectare to be US$375 to US$1,625 and the land prices between US$20 and US$300, with the benefit of saving the 21 million hectares anywhere in the range of US$750 million to US$3.2 billion, compared to the cost of US$420 million to US$600 million. In recognizing that "it appears economically efficient for outsiders to pay the owners of the land in the Amazon not to deforest and to preserve the natural forest," the strategy pointed only to the GEF as a source of such transfers. In fact, the US$30 million in grants to Brazil through the GEF is insignificant in comparison to the magnitude of payments suggested in the strategy paper, and has in any case not focused on the issue of payments to Brazil for environmental services, but largely focused on conserving biodiversity.

Annexes

35. Mr. Luis Favio Veit (from the private sector) later sent a letter to Bank staff stating that "the private sector understands that certification should be a voluntary act, and opposes it as a compulsory requirement. We accept that certification could be an element to differentiate otherwise equivalent proposals. We agree that certification whould be done by a credible organization, although we disagree on whether it should be done by an internationally recognized organization."

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